CO_2 SPARGING PHASE 1 FULL-SCALE IMPLEMENTATION AND MONITORING REPORT

Revision 1

LCP CHEMICALS SITE, BRUNSWICK, GA

Prepared for Honeywell

Prepared by:

Mutch Associates, LLC

360 Darlington Avenue

Ramsey, NJ 07446

In collaboration with:

Parsons

3577 Parkway Lane, Suite 100

Norcross, GA 30309

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EXECUTIVE SUMMARY

In-situ carbon dioxide (CO_2) sparging was designed and implemented to treat a subsurface caustic brine pool (CBP) formed by historical production of industrial chemicals at the LCP Chemicals Site, Brunswick, GA (Site). Phase 1 of CO_2 sparging was conducted in accordance with the "CO_2 Sparging Work Plan, LCP Chemicals Site, Brunswick, GA" dated April 24, 2013 (Sparging Work Plan) and approved by the U.S. Environmental Protection Agency (EPA). The CBP is being addressed under an Administrative Settlement Agreement and Order on Consent (AOC), which was entered into between Honeywell and EPA on April 18, 2007. The remedial action objectives (RAOs) that are defined in the AOC and include: 1) reducing the pH of the CBP to between 10 and 10.5 and 2) reducing the density of the CBP.

As set forth in the EPA-approved Sparging Work Plan, the technical objectives of Phase 1 of full-scale sparging include:

- Reduce pH as determined by measured pH in deep Satilla monitoring wells;
- Determine the average radius of influence (ROI) of sparging to develop a technical approach for Phase 2 of CO_2 sparging;
- Determine the optimal sparging regimen to maximize CO_2 utilization efficiency; and
- Reduce mercury (Hg) concentrations as determined by comparison of pre- and post-sparging concentrations in mid and deep Satilla monitoring wells.

All of these objectives were met during Phase 1.

Well Network and Sparge Protocol

Sixty four (64) sparge wells were installed at an initial coarse grid spacing of 80 ft as described in the Work Plan. In addition, 15 shallow piezometers were installed to supplement the existing shallow Satilla monitoring wells to measure water depth during sparging.

The position of the 80-ft grid relative to the Site was adjusted to maximize the number of deep Satilla monitoring points within 15 to 30 ft of a sparge well. The final radial distances had three monitoring points within 15 ft of a sparge well, twelve monitoring points between 15 and 30 ft of a sparge well, and thirteen monitoring points between 30 and 40 ft of a sparge well. These monitoring points were critical in evaluating treatment effectiveness and determining the sparging ROI.

Prior to and following CO_2 sparging, all deep, mid, and shallow Satilla wells within the treatment area and seven deep Satilla wells outside the treatment area were sampled to provide baseline and post-

sparge groundwater quality data. Pre-sparge pH in the deep Satilla within the 8-acre treatment footprint varied from 7.35 to as high as 12.28 (MW-511B). The majority of pH values in the deep Satilla were pH > 10.5, consistent with historical data. The lower pH values were the result of sparging during the Proof of Concept Test. Pre-sparge pH in the mid Satilla varied from 6.09 to 11.56, with many values above pH 9.0. The mid Satilla depth interval represents a transition from dense, high pH water in the deep Satilla to neutral pH water in the shallow Satilla.

Sparging Activity

Sparging was initiated on November 8, 2013 with the use of a portable system to commission individual sparge wells; the portable system was used for this purpose though November 21, 2013. Sparging with the primary system was initiated on November 18 and continued through February 13, 2014. The Work Plan proposed the use of three regimens to evaluate treatment effectiveness and efficiency of CO_2 use. These regimens are reported in the work plan as A, B and C. However, in an effort to more rapidly assess treatment effectiveness, a fourth regimen, Regimen D, was also employed whereby wells were sparged twice per week.

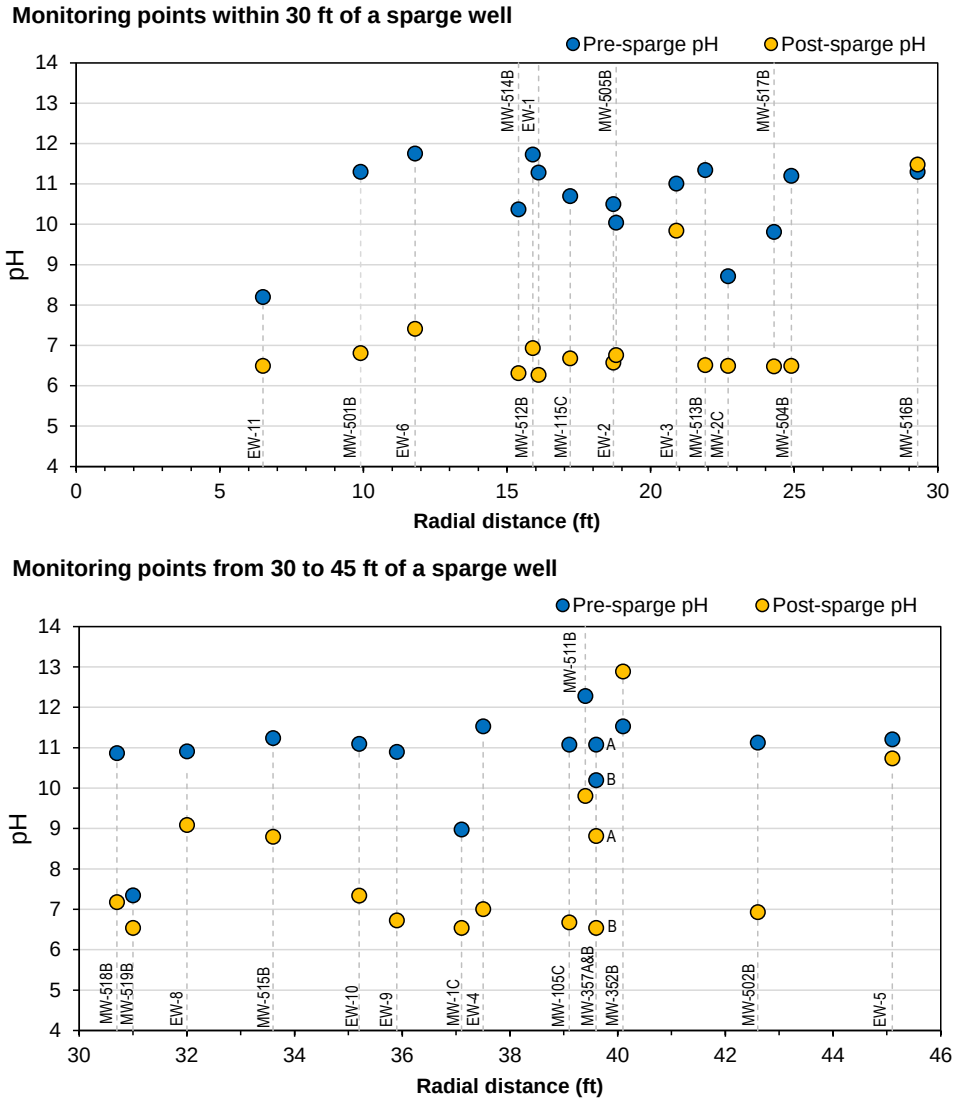
All 64 sparge wells were used to inject CO_2. The average flow rate per well varied from 10.6 standard cubic feet per minute (scfm) (SW-53) to 51.1 scfm (SW-65). The average flow rate for all sparge wells was 28.3 scfm.

Changes in pH

The pH of groundwater was measured throughout the sparging program in all monitoring points (monitoring wells and extraction wells) within the sparging footprint. In many deep Satilla monitoring points, pH changes were evident within the first few sparge events. In others, a gradual pH decrease was observed after each successive event, with the well eventually reaching pH $\leq$ 7.5. A few deep Satilla monitoring points showed a temporary increase in pH during sparging to above pre-sparge values, followed by a decrease in pH upon continued sparging. Only two deep Satilla monitoring points showed relatively little influence from sparging.

A summary of the pre-and post-sparge pH results are shown in the figure below. The post-sparge measurements were made 12 days after the end of sparging. The top panel shows pH in deep Satilla monitoring points over the radial distances ranging from 6.5 ft (EW-11) to 29.3 ft (MW-516B). Within 30 ft, 14 out of 15 points had a post-sparge pH of less than 10.0. The only monitoring point to not reach at least pH 10 was MW-516B, which is 29.6 ft from its nearest sparge well. A large majority of wells within 30 ft (13 out of 15, 87%) reached a pH less than 7.5. The notable exception is EW-3 at 20.9 ft.

The pH in EW-3 declined from a pre-sparge value of 11.01 to as low as 6.61 during sparging, but rebounded to a final post-sparge pH of 9.84. The historic pH in EW-3 has consistently been approximately 11.4 since 2007. The bottom panel shows pH over distances from 30.7 ft (MW-518B) to 45.1 ft (EW-5). The majority of monitoring points within the 30 to 40 ft range also had post-sparge pH values of less than 10, and many had pH values less than 7.5. Most notable was MW-502B, which had a post-sparge pH of 6.93 at a radial distance of 42.6 ft.



Above: Pre-sparge and post-sparge pH for deep Satilla monitoring wells and extraction wells.

Evaluation of Radius of Influence and Sparge Regimens

The Phase 1 post-sparge monitoring results indicated that CO_2 sparging was effective at lowering pH in monitoring points at radial distances varying from 6.5 to 42.6 ft. The ability to influence pH at a

given distance away from a sparge well is affected by the density of gas channels which is a function of the permeability and heterogeneity of the aquifer. A site-specific average ROI, estimated from the Phase 1 sparging data, is critical to the design and implementation of subsequent CO_2 sparging phases. For the purpose of ROI estimation, beneficial effect of sparging was defined as a decrease from pre-sparge pH (i.e. pH = 10.5 to 12) to pH $\leq$ 7.5. Using Maximum Likelihood Estimation (MLE) methods, an average ROI of 32.9 ft was estimated from the post-sparge data for pH and the radial distances from sparge wells to monitoring points. This is considerably larger than the 20 to 24 ft ROI observed during the Proof of Concept Test.

As described above, four separate sparge regimens (Regimen A through D) were evaluated as part of Phase 1 sparging. Conclusions drawn from this analysis include the following:

- Sparging once per week has similar efficiency to once per two weeks and is optimal for scheduling.
- Wells can be sparged multiple times per week, but efficiency decreases slightly.
- Sparging for short bursts (e.g. 1 hour) is not practical because of the loss of well yield over time and the prolonged ramp-up period required for some wells to start taking CO_2.

Based on this evaluation, the optimal sparging regimen was Regimen A (once per week), although a longer break between successive sparge events is acceptable if necessary due to scheduling. Some sparge wells required longer sparge durations of 8 to 24 hours to provide adequate flow.

Evaluation of Efficiency

The efficiency of CO_2 sparging was evaluated by comparing the theoretical CO_2 demand of the CBP with the actual CO_2 mass required to lower the pH to less than 7.5. The CO_2 demand of the CBP was evaluated using the geochemical model PHREEQC v3.0.2 using a typical pre-sparge and post-sparge CBP water chemistry. The CO_2 sparging efficiency was estimated by dividing the modeled CO_2 demand (obtained from the pre-sparge water quality data) by the median mass of CO_2 injected into each sparge well after Phase 1 sparging was complete (9,800 lb):

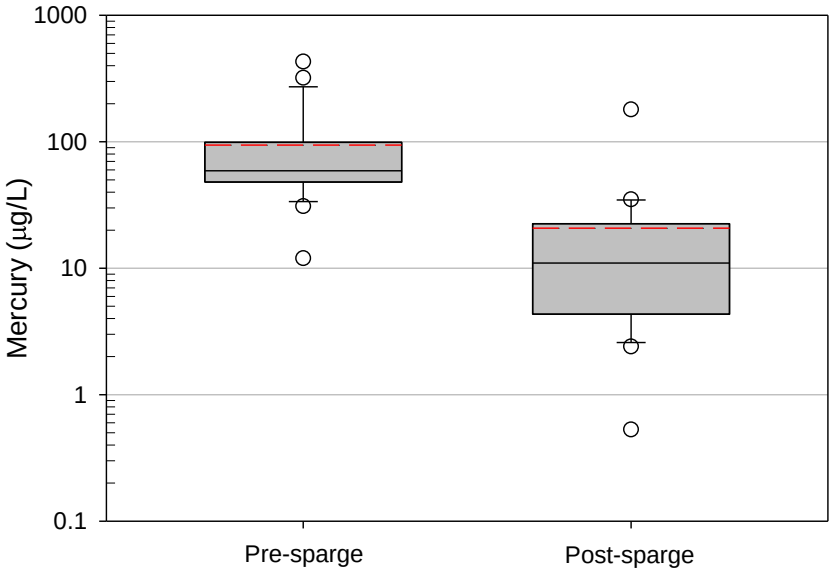
$$\text{Sparging efficiency, } \eta = \frac{2{,}800 \text{ lb}}{9{,}800 \text{ lb}} \times 100\% = 29\%$$

The 29% efficiency is approximately 3-times larger than the efficiency estimated from the Proof of Concept Test (9.7%). The primary reason for this increase is the larger ROI achieved in Phase 1 of sparging. An ROI of 20 ft was assumed in the Proof of Concept Test efficiency estimate. The increase in ROI from 20.0 to 32.9 ft, increases the volume of water treated by 2.7-times compared to the Proof of

Concept Test. Sparging once to twice per week (as compared to sparging day after day as was done in the Proof of Concept Test) allows the residual saturation of CO_2 gas to dissolve into the water. When sparging is stopped, partial collapse of induces local mixing within the ROI as water is forced into spaces once occupied by CO_2. All of these processes increase efficiency of CO_2 sparging with respect to lowering pH by increasing mass transfer of CO_2 into the groundwater.

Changes in Hg Concentrations

Approximately two weeks after Phase 1 sparging, groundwater samples collected from deep Satilla monitoring wells indicated that Hg concentrations were considerably lower within the sparging footprint; 28 out of 30 monitoring points in the deep Satilla showed decreases in Hg after sparging. Many deep Satilla monitoring points (12 out of 30) showed Hg concentrations less than 10 µg/L. An additional 7 deep Satilla monitoring points (19 out of 30) showed Hg concentrations less than 20 µg/L. The effect of sparging on Hg is best examined in wells where sparging lowered the pH to less than 7.5 because of the known effect of pH on Hg. In these wells, the average Hg concentration decreased from 94 µg/L to 21 µg/L (n = 22), resulting in a decrease of 78%. The median Hg decreased from 59 to 11 µg/L. This decrease is shown graphically in the figure below as a box plot.



Above: Pre- and post-sparge Hg concentrations in deep Satilla monitoring points where post-sparge pH was less than 7.5. The boundary of the box closest to zero indicates the 25th percentile, a line within the box marks the median, and the boundary of the box farthest from zero indicates the 75th percentile. The error bars above and below the box indicate the 90th and 10th percentiles values. The mean value in each box is indicated by the dashed red line.

Conclusions

A summary of the key results is presented below:

- All of the technical objectives of Phase 1 of CO_2 sparging were met.
- Sparging was effective in reducing the pH of the CBP groundwater. Following Phase 1 of sparging, 14 out of 15 deep Satilla monitoring points within a radial distance of 30 ft from a sparge well had a post-sparge pH < 10.0, and 13 out of 15 monitoring points had a post-sparge pH < 7.5. Many points at distances greater than 30 ft showed significant decreases in pH.
- An average ROI of 32.9 ft was estimated from the pH versus distance data. This is considerably larger than the 20 to 24 ft ROI measured in the Proof of Concept Test.
- The optimal sparging regimen was Regimen A (once per week), although a longer break between successive sparge events is acceptable if scheduling requires it. Some sparge wells required longer sparge durations of 8 to 24 hours to provide adequate flow.
- The efficiency of CO_2 sparging was evaluated by comparing the CO_2 demand of the CBP with the amount of CO_2 mass required to lower the pH to circumneutral and found to be 29%. This efficiency is approximately three times larger than the efficiency estimated from the Proof of Concept Test (9.7%). The presence of residual CO_2 saturation within the aquifer has potential for continued reduction in pH and mercury long after sparging has ceased.
- CO_2 sparging resulted in a significant decline in aqueous-phase Hg concentrations. In monitoring points where post-sparge pH was less than 7.5, the average Hg concentration decreased from 94 μg/L to 21 μg/L (n = 22), a decrease of 78%.
- The pre-and post-sparging aquifer testing showed no sharp loss of aquifer transmissivity. The mean of six pre-sparge specific capacities was 0.011 gpm/ft. The mean of ten post-sparge specific capacities measured approximately two weeks after sparging was 0.035 gpm/ft.
- The pre-sparge aquifer testing indicated that the basal Satilla varies in hydraulic conductivity within the CBP from 2 to 17 ft/d, with a mean value of 9.9 ft/d. The Proof of Concept pre-sparging aquifer test had previously measured a hydraulic conductivity of 8.9 ft/d in that area of the CBP.
- A significant fraction of the injected CO_2 remained in the formation as residual CO_2 saturation and was not vented to the atmosphere. The emplacement of CO_2 residual saturation into the Satilla provides a long-term source of pH-neutralization and mercury precipitation for water flowing from upgradient locations. This may also serve as protection against pH rebound.
- As the CO_2 residual saturation dissolves into the surrounding groundwater, a process that could take months or years, aquifer properties such as hydraulic conductivity and storativity should

concomitantly approach pre-sparge levels, except for whatever impact the minimal reduction in porosity may have on these properties. Our experience to date, specifically the Proof of Concept test and these recent post-sparge aquifer tests, does not suggest that these latter impacts are of particular concern.

Recommendations

Based on the above results, the following recommendations are provided for Phase 2:

- Given that the actual average ROI achieved in the Phase 1 full-scale implementation was 32.9 ft, further evaluation of well layout and spacing is warranted. Also, additional pH monitoring scheduled for 5-months post-sparging (refer to the Technical memo *Post-sparge pH monitoring and Geoprobe transects, dated June 20, 2014*) may provide useful information for Phase 2 sparge well placement and implementation within the Phase 1 sparging footprint, and in the area southwest of SW-7.
- A formal sampling round should be conducted approximately 7 months after cessation of Phase 1 sparging to serve as post-sparge monitoring and pre-Phase 2 baseline monitoring.
- The recommended sparging regimen for the next phase of sparging is once per week (Regimen A), however sparging at longer intervals is also acceptable if required.
- Sparge wells should be scheduled for durations longer than 4 hours where necessary to provide adequate mass flows of CO_2.
- An overall mass of at least 8,000 to 9,000 lb of CO_2 per sparge well is required in moderate alkalinity areas, and 1.5 to 2.0 times this amount in high alkalinity area is estimated to be required to meet treatment objectives.

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Alk	Alkalinity
AOC	Agreement and Order of Consent
ARCO	Atlantic Refining Company
bgs	Below ground surface
btoc	Below top of casing
CBP	Caustic brine pool
CO_2	Carbon dioxide
CO_3^{2-}	Carbonate ion
Cr(III)	Trivalent chromium
Cr(VI)	Hexavalent chromium
DOC	Dissolved organic carbon
DOM	Dissolved organic matter
EPA	Environmental Protection Agency
EW	Extraction Well
ft	Feet
ft/d	Feet per day
gpm	Gallons per minute
Hg	Mercury
HDPE	High-density polyethylene
lb	Pounds
LCP	Linden Chemicals and Plastics
MLE	Maximum Likelihood Estimation
MW	Monitoring Well
NTU	Nepholometric Turbidity Unit
ORP	Oxidation Reduction Potential
PID	Photoionization Detector
psi	Pounds per square inch
psia	Pounds per square inch – absolute
psig	Pounds per square inch – gauge
PVC	Poly vinyl chloride
PZ	Piezometer
RAO	Remedial Action Objective
RI	Remedial Investigation
ROI	Radius of influence
SC	Specific conductivity
scfm	Standard cubic feet per minute
SW	Sparge Well
TDS	Total dissolved solids
TSS	Total suspended solids
µg/L	Microgram per Liter
VFD	Variable frequency drive

1 INTRODUCTION

Mutch Associates, LLC, in collaboration with Parsons Corporation (Parsons), have prepared this report of Phase 1 of CO_2 sparging at the LCP Chemicals Site in Brunswick, Georgia. (Site) Phase 1 of CO_2 sparging was conducted in accordance with the "CO_2 Sparging Work Plan, LCP Chemicals Site, Brunswick, GA" dated April 24, 2013 (Sparging Work Plan) (Mutch Associates and Parsons, 2013a). Formal approval of the Sparging Work Plan was granted by the U.S. Environmental Protection Agency (EPA) on May 1, 2013. Sparging was designed to remediate a subsurface caustic brine pool (CBP) formed by historical production of industrial chemicals on the site. The CBP is being addressed under an Administrative Settlement Agreement and Order of Consent (AOC) entered into between EPA and Honeywell on April 18, 2007. The remedial action objectives (RAO) were defined in the AOC and included reducing the pH of the CBP to between 10 and 10.5 and reducing the density of the CBP.

This report is organized in the following manner:

- Section 2 - Describes the sparge well installation and sparge system construction;
- Section 3 - Describes the specific procedures and protocols employed during sparging;
- Section 4 - Presents the results of sparging on pH, total dissolved solids and mercury (Hg), along with an analysis of radius of influence, sparging effectiveness and efficiency and groundwater levels; and
- Section 5 - Conclusions and recommendations.

1.1 Site Description

The Site is located at 4125 Ross Road,[1] in the City of Brunswick, in Glynn County, Georgia, and is bordered by the Turtle River marshes to the west and south and the urban populations of Brunswick to the north and east. The Site encompasses approximately 813 acres, of which 684 acres are tidally influenced salt marsh. A Site location map is provided in Figure 1-1.

Industrial operations were conducted by multiple parties from approximately 1919 until 1994. The site was originally owned and operated by the Atlantic Refining Company (ARCO) who operated a petroleum refinery from 1919 until 1930 and a petroleum storage facility until approximately 1955. Portions of the site were also owned by Georgia Power Company and the Dixie O'Brien Paint Company.

[1] We understand that a site address was developed as part of the County's upgrade to its 911-emergency system.

In 1955, the property was purchased by Allied Chemical, Inc. (Allied). From 1956 to 1979, chlorine, hydrochloric acid, and sodium hydroxide were produced by Allied by the electrolysis of sodium chloride using Hg cells (the chlor-alkali chemical manufacturing process). In 1979, LCP Chemicals purchased the property and continued to operate the chlor-alkali process until they ceased operations in 1994. Honeywell (formerly Allied) repurchased most of the property that constitutes the Site in 1998 and currently still owns most of the property (a portion of the uplands was sold to the County several years ago for site redevelopment into a jail complex).

During chemical production activities at the Site, a portion of the shallow aquifer was contaminated by residuals of chlor-alkali-manufacturing operations. A subsurface CBP formed. The CBP is characterized by elevated pH, total dissolved solids, and concentrations of dissolved metals. This CBP is defined in the AOC as groundwater with a pH above 10.5. Figure 1-2 shows the location and extent of the CBP based on pH data collected in 2012.[2]

1.2 Summary of Proof of Concept Test

Full-scale CO_2 sparging was preceded by a Proof of Concept Test. The Proof of Concept Test was conducted from October 29, 2012 to November 17, 2012 in accordance with the "Final Work Plan for CO_2 Sparging Proof of Concept Test, LCP Chemicals Site, Brunswick, GA" dated September 11, 2012 (Proof of Concept Test Work Plan) (Mutch Associates, 2012). Formal approval of the Proof of Concept Test Work Plan was granted in a letter from EPA on September 10, 2012. The Proof of Concept Test was designed to evaluate the feasibility of CO_2 sparging to remediate the CBP in order to meet the objectives of the AOC.

Key observations from the Proof of Concept Test that are relevant to the design and implementation of full-scale sparging, as described in the Proof of Concept report (Mutch Associates and Parsons, 2013b) are:

1. Significant pH reductions from pH 11-12 in the deep Satilla were achievable in 5 to 7 days sparging at circa 50 standard cubic feet per minute (scfm).

[2] The mapping of the CBP (Figure 1-2) was created by kriging pH data from deep Satilla monitoring wells (MW series) from the May/June 2012 monitoring event, supplemented with data from September 2011 for extraction wells (EW series). For most wells, field pH values were used for the mapping. The only exceptions were MW-357A, MW-357B, MW-512B and MW-516B, where laboratory pH was conservatively used because field pH was considerably lower than historic values. Well MW-113C was not included in kriging because of poor resolution in this area of the site.

2. A radius of influence (ROI) of at least 20 ft was achieved in the deep Satilla and greater than 60 ft at the water table surface.
3. Hg levels in the high pH CBP waters fully-impacted by the sparging declined from 110-120 µg/L to 11-33 µg/L (70 to 90% reductions).
4. During sparging, significant mounding of the potentiometric surface was observed. Shallow Satilla wells within the 20-ft radius of sparge wells increased to within 1 foot of the ground surface.
5. Significant rebound of pH or Hg was not observed based on results from groundwater monitoring conducted 3 months after completion of sparging.

The Proof of Concept Test indicated that CO_2 sparging is an effective, innovative technology, suitable for full-scale implementation at the Site (Figure 1-3). Observations made during testing further indicated that full-scale implementation of CO_2 sparging should be conducted over a multiple-year, sequential effort. The principal drivers for this sequential implementation would be:

- Management of groundwater mounding caused by superposition of multiple, closely-spaced sparge wells; and
- Maximization of sparging efficiency.

The Proof of Concept Test indicated that managing groundwater mounding during full-scale implementation would be critical as mounding during the test was substantial. The groundwater table rose to within 1 foot of the ground surface during the testing. This potential for mounding could be exacerbated by superposition of mounding from multiple nearby sparging wells and by seasonal rises of the groundwater table. Moreover, in some areas of the CBP, the water table is even closer to the surface than at the test site. These factors could impose a practical limit on the spacing of wells and the number of wells that could be sparged simultaneously. Conducting the implementation over multiple years would allow active sparge wells to be further apart, thereby reducing the superposition of groundwater mounding. The optimal time for sparging would be when the groundwater table is at its lowest, during the drier summer and early fall months.

The Proof of Concept Test suggested that CO_2 sparge efficiency could be enhanced by a sparge regimen that emphasizes short bursts of sparging (anywhere from ½ to 4 hrs.) followed by rest periods. The rest periods would allow CO_2 gas residual saturation remaining in the formation to both dissolve and diffuse into the surrounding CBP waters. The Proof of Concept Report concluded that during the first year of sparging, different sparge regimens should be tested in an effort to optimize sparge efficiency.

The Proof of Concept results also showed that the pH reached target levels in the deep Satilla at least 20 ft away from sparge well MW-1C (Mutch Associates and Parsons, 2013b). This indicated an effective ROI of at least 20 ft in the deep Satilla. Modest decreases in pH in deep Satilla wells were observed at radial distances greater than 20 ft, indicating some consumption of CO_2 demand. The ROI in the intermediate and shallow Satilla was significantly larger than 20 ft. For example, gas channels extended all the way from MW-1C to MW-517A, which is a distance of approximately 100 ft away. Therefore, there was some uncertainty regarding the ROI that would be achieved during full-scale implementation. The Proof of Concept report indicated that further evaluation of ROI could be achieved by using an initial coarse grid spacing for sparge wells during the first year of sparging, followed by filling in with a denser well spacing for Years 2+ based on observed results.

1.3 Technical Objectives of Phase 1 of Full-scale Sparging

As described in the EPA-approved Sparging Work Plan (Mutch Associates and Parsons, 2013a), the technical objectives of Phase 1 of full-scale sparging include:

- Reduce pH as determined by measured pH in deep Satilla monitoring wells;
- Determine the average ROI of sparging to develop a technical approach for Phase 2 of CO_2 sparging;
- Determine the optimal sparging regimen to maximize CO_2 utilization efficiency; and
- Reduce Hg concentrations as determined by comparison of pre- and post-sparging concentrations in mid and deep Satilla monitoring wells.

Data collected during Phase 1 sparging is compiled and evaluated in this report. Specifically, this report contains the following information on Phase 1 of CO_2 sparging:

- A description of the installed CO_2 injection and distribution system, including boring / well construction logs;
- A tabular summary of injection activities at each well, including mass of CO_2 injected per event;
- Changes in pH observed in the monitoring well network;
- Pre- and post-sparge groundwater monitoring results of other constituents;
- An assessment of the overall effectiveness of the Phase 1 sparging effort, including evaluation of ROI and CO_2 efficiency of use;
- An assessment of the relative effectiveness of the four sparging regimens; and
- Recommendations regarding the next phase of sparging activities.

2 SYSTEM CONSTRUCTION

2.1 Sparge Well Construction

2.1.1 Sparge Well Installation and Development

As shown below and on Figure 2-1, 64 sparge wells were installed at an initial coarse grid spacing of 80 ft for the first phase of full-scale implementation. The initial 80-ft coarse grid spacing was selected to provide flexibility for well placement in the following years because it can accommodate a final spacing of either 40 or 46 ft (Mutch Associates and Parsons, 2013a).

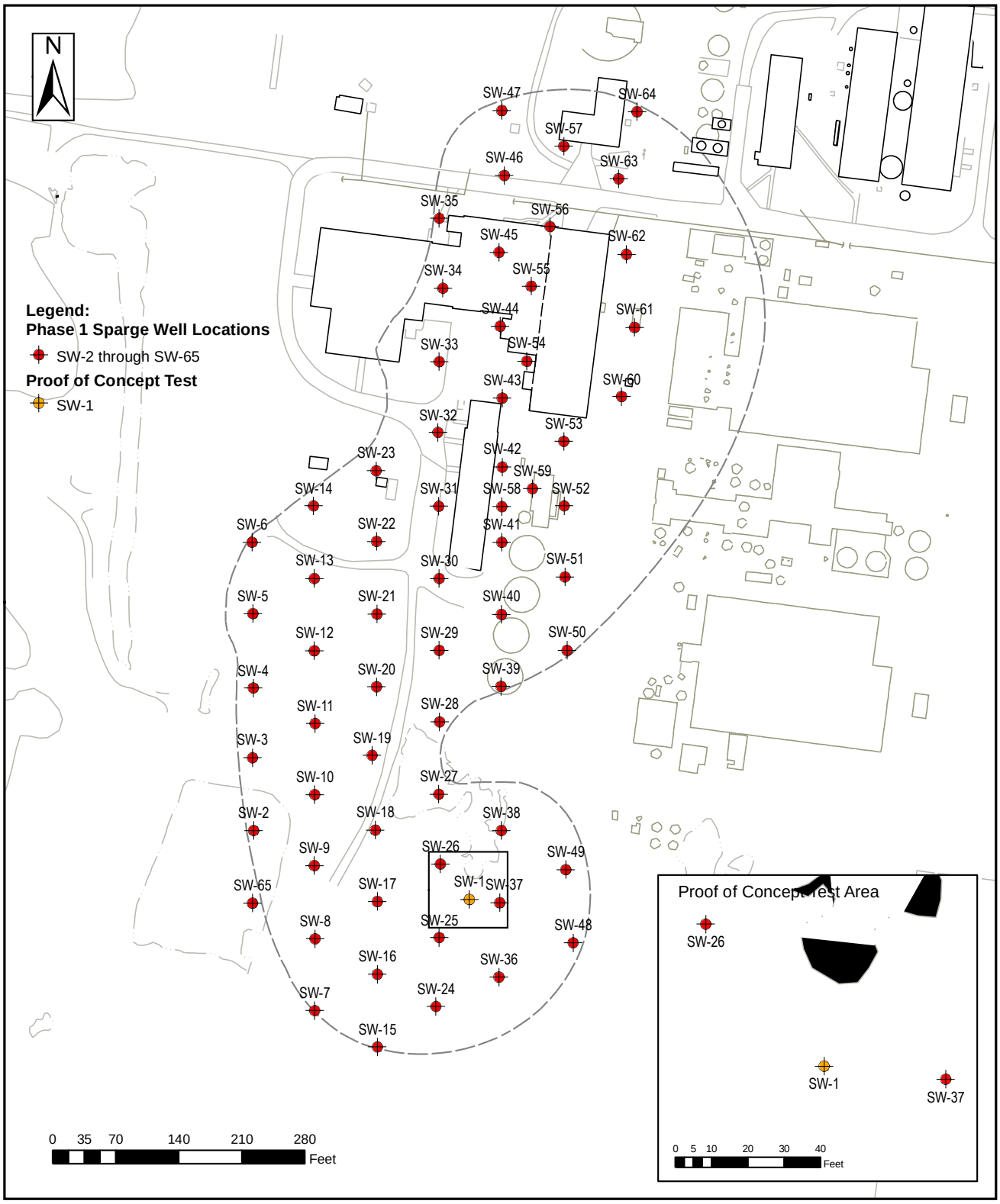
One of the technical objectives of Phase 1 of sparging was to determine sparging ROI. Therefore, the position of the 80-ft grid relative to the site was adjusted to maximize the number of deep Satilla monitoring points within 15 to 30 ft of a sparge well[3]. The resulting location of sparge wells relative to deep Satilla monitoring points is shown in Figure 2-2; the final radial distances between sparge wells and monitoring points is shown in Figure 2-3. A summary of this distribution is provided below:

- Three monitoring points are within 15 ft of a sparge well;
- Twelve monitoring points are between 15 and 30 ft of a sparge well;
- Thirteen monitoring points are between 30 and 40 ft of a sparge well; and
- Two monitoring points are at radial distances greater than 40 ft.

The sparge wells were installed between July 23 and August 13, 2013. During installation, several wells had to be relocated due to physical impediments to installing wells at the regular grid spacing (Figure 2-1). Notable relocations included:

- Sparge wells SW-54, SW-55, and SW-56 were moved west of the originally anticipated locations, away from an elevated pad;
- Sparge well SW-65 was moved to the southwest corner of the site, based on subsurface obstructions at the originally anticipated location between SW-62 and SW-63; and
- Sparge wells SW-58 and SW-59 were moved to the EW-6 area, away from the groundwater treatment plant infiltration galleries.

[3] Throughout this report the term "radial distance" is used to describe the distance from sparge well to the nearest monitoring point. A monitoring point refers to monitoring wells (MW) and extraction wells (EW) in the Satilla aquifer.



Above: Location of 64 sparge wells installed as part of Phase 1 of CO_2 sparging.

Sparge wells were constructed with 2 ft of 2-inch diameter, 0.010-inch slotted Schedule 40 PVC screen with a 2-inch Schedule 40 PVC riser. In general, the well screen was set at the top of the variably cemented sandstone which forms the base of the Satilla, except where a clay stratum was encountered directly above the variably cemented sandstone, in which case the boring was grouted (95% Type 2 Portland / 5% bentonite) to the top of clay, with the screen being set just above the clay. Well construction was completed with a 20/30 sand pack to 2 ft above the top of screen, followed by a 2-ft bentonite seal, and cement grout to the surface. Boring logs / well construction diagrams are included in Appendix A.

Following installation, the sparge wells were developed by removing an average 70 gallons of water with the goal of achieving a turbidity of 50 Nephelometric Turbidity Units (NTU). During well development, yields less than 0.5 gallons per minute (gpm) were observed in a number of sparge wells; these wells were surged with a surge block to improve yield. Final yields and water quality data obtained during well development are included in the summary table provided in Appendix B.

2.1.2 Piezometer Installation

Consistent with the EPA-approved Sparging Work Plan, 15 shallow piezometers were installed at the locations shown on Figure 2-4 to supplement the existing shallow Satilla monitoring wells (Figure 2-5) to measure water depth during sparging. Piezometers were constructed with 5 ft of 2-inch diameter, 0.010-inch slotted Schedule 40 PVC screen with a 2-ft PVC riser. Piezometer construction was completed with a 20/30 sand pack to 0.5 ft above the top of screen, followed by a 0.5-ft bentonite seal, and cement grout to the surface. Piezometer construction diagrams are included in Appendix C.

2.1.3 Monitoring Well Completions

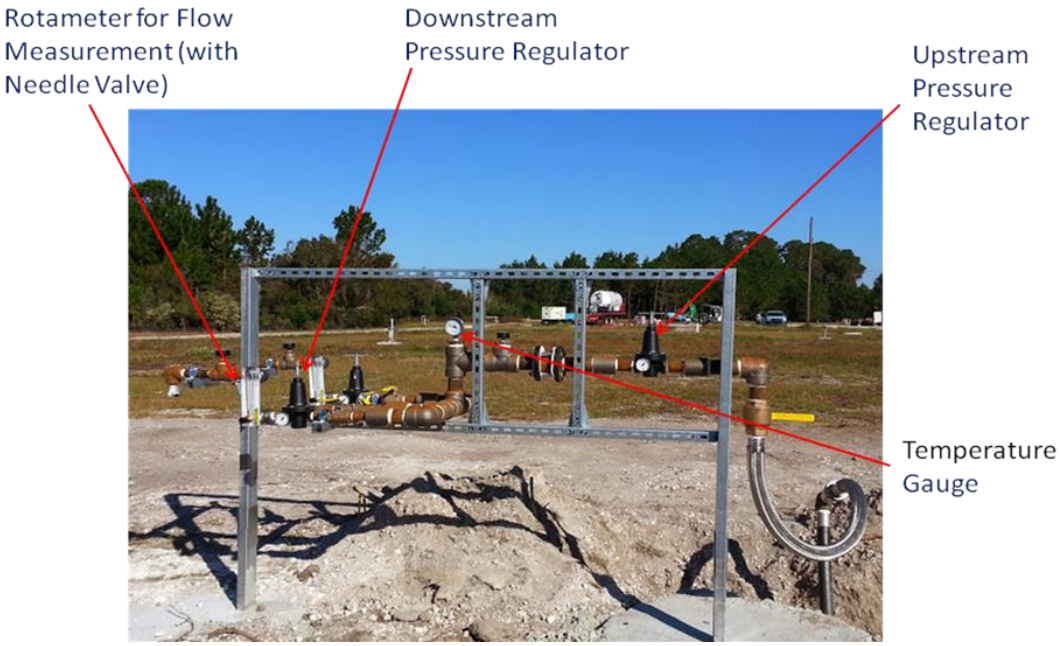
To reduce the potential for groundwater surfacing, threaded plugs were installed on all monitoring wells within the sparge zone to contain the rise of water. Mid and shallow Satilla monitoring wells are shown in Figure 2-5. The monitoring wells were outfitted with fittings and ports to allow for instrumentation cables and manual pressure measurements (Figure 2-6).

2.2 CO_2 Storage, Vaporization, and Distribution System

2.2.1 Primary System

Consistent with the EPA-approved Sparging Work Plan, equipment to store, vaporize, and distribute CO_2 to each of the 64 sparge wells was installed at the site between October 7, 2013 and

November 22, 2013. A Site Operations Plan is provided as Figure 2-7; a system P&ID is provided as Figure 2-8; various system components are illustrated below.



Above: Photo showing a typical distribution panel. **Below:** Photo showing typical sparge wellhead installation.

Storage and vaporization equipment was installed by the vendor (Airgas Carbonic) on an existing elevated pad, including two 50-ton refrigerated bulk tanks for liquid CO_2 storage, two 105-kw process vaporizers to convert liquid CO_2 to gaseous form, pressure regulators to reduce CO_2 line pressures from 300 psi to a field delivery pressure of approximately 50 psi, a trim heater to compensate for temperature drop through the pressure regulator and to adjust the final temperature of the gaseous CO_2, a flow meter, a low temperature shut-off valve, and other instrumentation and controls. The bulk storage tanks were equipped with a telemetry system to transmit tank level data to the vendor to schedule CO_2 deliveries. Following installation of the CO_2 system, a performance test was conducted that confirmed a CO_2 gas generation capacity of greater than 550 scfm.

Equipment installed for the distribution system included distribution piping, distribution panels, portable hoses, and instrumentation. As shown on Figure 2-7 and Figure 2-8, the distribution piping consisted of a 4-inch main line with eight 2-inch lateral lines. Distribution piping in the northern portion of the site, where there are former building slabs, was on-grade carbon steel. Distribution piping in the southern portion of the site was buried high-density polyethylene (HDPE). The 2-inch lateral lines were connected to distribution panels using flexible braided steel hoses.

Figure 2-8 (system P&ID) and the picture above illustrate a typical distribution panel. Each distribution panel included an upstream pressure regulator to reduce field delivery pressure (approximately 50 psi) to panel pressure (approximately 35 psig). This upstream pressure regulator, with the downstream pressure regulators, provided redundant pressure reduction to the sparge wells to reduce the likelihood of the subsurface being exposed to excessive pressures that could cause fracturing (see Section 3.3.3 for further discussion regarding regulation of applied pressure).

The distribution panels included three 1-inch branch lines following the upstream pressure regulator; each branch line included a downstream pressure regulator and a flow meter (rotameter). The downstream regulators were provided to regulate discharge pressure into the sparge wells; pressure gauges were provided downstream of these regulators to record discharge pressures. A rotameter with a needle valve was provided to measure and regulate CO_2 flow to the sparge wells. A temperature gauge also was provided at each distribution panel. Temperature measurements, together with the flow and pressure measurements, were used to estimate CO_2 mass sparged into each sparge well. Approximately 200-foot long rubber hoses were used to connect the distribution panels to the sparge wells; the hoses were moved from well to well during operations.

Top left: Typical sparge well. **Top right:** 105-kw process vaporizers**. Middle left:** Distribution panel with hose connections. **Middle Right:** Portable CO_2 sparging system. **Bottom left:** 50-ton CO_2 storage tanks.

A typical sparge well is shown in the figure above. Each sparge well was equipped with a pressure gauge to record well head pressure during injection, a bleed valve to bleed pressure following a sparge, and a shut-off valve.

2.2.2 Portable System

In an effort to accelerate overall project schedule while construction of the primary system was being completed, a 26-ton, 500 lb/hr potable system (see photo above) provided by Airgas Carbonic was used to initiate sparging at individual wells from November 8 through November 22, 2013.

3 PROCEDURES AND PROTOCOLS

3.1 Groundwater Sampling

Prior to and following CO_2 sparging, specific monitoring and extraction wells were sampled to provide baseline and post-sparge groundwater quality data. Post-sparge sampling of Satilla monitoring wells occurred approximately 2 weeks after the end of Phase 1 sparging. The monitoring wells and extraction wells that were sampled are presented on Table 3-1.

Table 3-1: Monitoring Points for Phase 1 CO_2 Sparging

Deep Satilla			
MW-105C[b]	MW-502B[b]	MW-514B[b]	EW-3
MW-112C[a]	MW-503B[a,b]	MW-515B	EW-4
MW-113C[a]	MW-504B[b]	MW-516B[b]	EW-5
MW-115C[b]	MW-505B	MW-517B	EW-6
MW-352B	MW-507B[a]	MW-518B[b]	EW-8
MW-353B[a]	MW-508B[a]	MW-519B	EW-9
MW-357A	MW-510B[a]	MW-1C	EW-10
MW-357B	MW-511B[b]	MW-2C	EW-11
MW-358B[a]	MW-512B[b]	EW-1	
MW-501B[b]	MW-513B[b]	EW-2	
Mid Satilla			
MW-105B	MW-504A	MW-514A	MW-1B
MW-115B	MW-505A	MW-516A	MW-2B
MW-352A	MW-511A	MW-517A	
MW-501A	MW-512A	MW-518A	
MW-502A	MW-513A	MW-519A	
Shallow Satilla			
MW-105A	MW-1A	MW-3A	
MW-115A	MW-2A		

[(a)] Indicates a well outside of the sparging area which served as a background monitoring well.
[(b)] Indicates well was selected for measurement of specific gravity in the field pre-and post-sparging.

The wells were purged and sampled using the low flow "Tubing-in-Screened-Interval" method, pursuant to US EPA Region IV Environmental Investigations Standard Operating Procedure (SOP) – March 2013 (USEPA, 2013). The guidance document *Groundwater Sampling Guidelines for Superfund and RCRA Project Managers* (Yeskis and Zavala, 2002) was also referenced for additional technical support. Per the method, the tubing intake was lowered to the middle of the screened interval of the well, and a peristaltic pump was used to purge the groundwater at a very low flow rate. Throughout the purge process, depth-to-water measurements were collected to assess and maintain stable drawdown. A minimum one equipment volume was purged prior to stabilization parameters (pH, specific conductivity,

dissolved oxygen, and turbidity) being collected. Although not considered stabilization parameters, temperature and oxidation reduction potential were also recorded. Once the required parameters were stable for three consecutive readings, and goals for turbidity had been reached[4], groundwater samples were collected for laboratory analysis as described in Table 3-2.

Tab1e 3-2: Water Quality Analytes and Associated Laboratory Methods

Analyte	Method[(c)]	Description
pH	EPA SW-846 9040B	Ion selective electrode
Alkalinity	SM 2320B	Potentiometric titration
Total Hg Filtered Hg[(a)]	EPA SW-846 7470A	Cold-vapor atomic absorption spectrophotometry
Total dissolved solids	SM 2540C	Gravimetric
Chloride and sulfate	EPA SW-846 9056	Ion chromatography
Sulfide	SM 4500 S2 F	Iodometric titration
Total metals & silica[(b)]	EPA SW-846 6010B	Inductively Coupled Plasma – Atomic Emission Spectroscopy
Dissolved and total organic carbon	SM 5310B	Combustion / Infrared Spectrophotometry
Ferrous iron	SM 3500-Fe-D	Spectrophotometry

[(a)] If after 2 hours of purging or 5 well volumes had been purged, and turbidity was still greater than 50 NTUs, a filtered sample for Hg was also collected.
[(b)] Total metals included aluminum, barium, beryllium, calcium, cobalt, chromium, iron, potassium, magnesium, manganese, sodium, nickel, selenium, vanadium, zinc.
[(c)] After consultation with the laboratory, the chloride and sulfate methods were changed to SW-846 9038 and SW-846 9251 respectively for a subset of samples to help minimize matrix interferences.

The groundwater samples were preserved on ice and submitted to TestAmerica Laboratories in Savannah, GA for analysis. Once the groundwater samples had been collected, approximately 900 mL of groundwater were pumped into a graduated cylinder and the specific gravity was determined using a hydrometer for those wells indicated on Table 3-1. Purge logs, including a summary of stabilization parameters and specific gravity measurements, are provided in Appendix D.

3.2 Short-Term Aquifer Testing

Short term aquifer tests were conducted on ten (10) sparge wells prior to and following sparging. Monitoring wells were outfitted with a pressure transducer that took water level readings every second. The sparge wells were pumped using a Grundfos Redi-Flo2© 1.8 inch diameter pump and accompanying variable frequency drive (VFD). The sparge wells were pumped for 10 to 60 minutes at pumping rates

[4] Goals for turbidity were: less than 10 NTUs; a minimum 1 hour purge with turbidity less than 50 NTUs and with turbidity measurements within 10%; or a minimum 5-well volume purge or 2-hour purge, whichever occurred first.

ranging from 0.3 gpm to 1.8 gpm depending on the yield of each sparge well. Tests results are presented and discussed in Section 4.12.

3.3 Sparge Operations

3.3.1 Sequence of Operations

Sparging was initiated on November 8, 2013 with the use of the portable system to commission individual sparge wells; the portable system was used for this purpose though November 21, 2013. Sparging with the primary system was initiated on November 18, 2013 and continued through February 13, 2014.

The sparge well commissioning process entailed gradually applying pressure to individual wells to understand well-specific pressure / flow relationships, while at the same time making observations and collecting shallow groundwater elevations to understand the potential for groundwater mounding and surfacing. Based on commissioning activities, initial guidelines for sparge well sequencing included the following:

- Two sparge wells per distribution panel would be sparged simultaneously, initially for approximately 4 hour periods.
- Extended duration sparging would be applied to areas with high alkalinity.
- When possible, sparging would occur from adjacent distribution panels, and focus on contiguous portions of the site, to reduce operator travel time between distribution panels.
- Sparging operations were initiated at the northern portion of the site and cycled southward through the balance of the site. This approach favored treatment in the northern portion of the site, where there was a preponderance of monitoring wells, the data from which could be used to guide operations going forward. Initially, sparge wells were scheduled such that there was a 160 ft separation between adjacent operating sparge wells. This was done to manage shallow groundwater rise and prevent groundwater surfacing. During sparging, the piezometers were monitored for groundwater levels. Superposition of mounding was not significant at this 160 ft spacing; groundwater levels never rose to within 1 ft of the ground surface. Therefore, sparging into adjacent sparge wells (approximately 80 ft apart) was tested with close monitoring of nearby piezometers. This closer spacing did not result in significant superposition of mounding and therefore sparging into adjacent sparge wells was incorporated into the schedule.

Early in the program, it was determined that a 4 hour sparging duration was inadequate for a number of wells, due to the required time to establish flow. As a result, for these wells, the planned sparging duration was increased to approximately 8 hours, or approximately 24 hours via overnight sparging.

Sparge operations were suspended over the 2-week holiday period between December 21, 2013 and January 6, 2014. During this period of time, collected data was evaluated in detail and the following guidelines were established for the balance of the program:

- The general target mass for individual sparge wells would be 8,000 to 9,000 lb;
- High alkalinity wells would be sparged at 1.5 to 2 times the general target; and
- ROIs in excess of 24 ft were being observed, and additional focus on sparge wells with paired monitoring wells at greater than 24 ft was warranted.

Sparging was conducted pursuant to these guidelines for the remainder of the Phase 1 sparging from January 6, 2014 through February 13, 2014.

3.3.2 Sparge Regimens

The CO_2 Sparging Work Plan (April 2013) proposed the use of three regimens to evaluate treatment effectiveness and efficiency of CO_2 use. These regimens are reported in the work plan as A, B and C. However, in an effort to more rapidly assess treatment effectiveness, a fourth regimen, Regimen D, was also employed. The four treatment regimens, and assigned sparge wells, are shown on Table 3-3. Evaluation and further discussion of the sparge regimens are discussed in Section 4.6.

Table 3-3: Summary of Treatment Regimens

Regimen	Description	Number of wells	Assigned Sparge Wells
A	4-hr sparge, once per week	41	All sparge wells unless otherwise indicated
B	4-hr sparge, once every two weeks	14	The following sparge wells associated with DP-5, alternating by week: • Week 1: SW-31, SW-30, SW-29, SW-21, SW-12, SW-20, SW-11, SW-4 • Week 2: SW-23, SW-22, SW-14, SW-6, SW-13, SW-5
C	One, 1-hr sparge per day, 4 days per week	3	The following wells associated with DP-3: SW-33, SW-44, SW-54
D	4-hr sparge, twice per week	6	The following wells associated with DP-2: SW-56, SW-62, SW-61, SW-60; The following wells associated with DP-4: SW-41 and SW-58

3.3.3 Maximum Wellhead Pressures

Fractures can be generated in geologic formations if air or any other gas is injected at a pressure that exceeds the sum of the natural strength of the formation and the in-situ stresses present (Suthersan, 1997). The pressure required to fracture a consolidated geologic formation is a function of the cohesive or tensile strength of the formation and the pressure exerted by the weight of soil and water. Because the Satilla Aquifer is primarily composed of non-cohesive sands, cohesive strength was conservatively assumed to be zero. Therefore, considering only the weight of the water and soil, the minimum pneumatic fracture initiation pressure, P_i is:

$$P_i > d_w(\gamma_w\phi + \gamma_{soil}(1-\phi)) + (d_{tot} - d_w)\gamma_{soil}(1-\phi) \quad (3\text{-}1)$$

where d_w is the depth of water (saturated thickness), d_{tot} is the total depth of soil, ϕ is the soil porosity, γ_w is the specific weight of water (62.4 lb/ft^3) and γ_{soil} is the specific weight of soil.

Sparge wells (SWs) at the Site were screened at different intervals and therefore would have their own unique minimum pneumatic fracture initiation pressures. Table 3-4 provides calculated minimum pneumatic fracture initiation pressures for all sparge wells.

The calculations of P_i presented in Table 3-4 assumed a 5-ft unsaturated zone, porosity of 0.30, and a specific gravity of soil equal to 2.65 (specific weight of soil equal to 116 lb/ft^3). The 5 ft of unsaturated zone provides a conservative estimate of P_i (the actual depth of the unsaturated zone varies from approximately 3 to 4 ft). There is also additional head loss from the well head to the base of the sparge well screen, resulting in lower effective pressures at the well screen. Therefore, actual field conditions at a particular sparge well would yield a slightly larger value of P_i, which could allow for slightly higher sparging pressures at the well head. During sparging implementation, pressure applied to individual sparge wells was gradually increased until a satisfactory flow was achieved or until pressures were no more than 2 psi of P_i (Table 3-4).

Table 3-4: Calculated Minimum Pneumatic Fracture Initiation Pressure for Phase 1 Sparge Wells

Sparge Well	Top of Screen, d_{tot} (ft bgs)	Depth of water, d_w (ft)	P_i (psi)	Sparge Well	Top of Screen, d_{tot} (ft bgs)	Depth of water, d_w (ft)	P_i (psi)
SW-2	47.5	42.5	32.3	SW-34	42.0	37.0	28.4
SW-3	46.0	41.0	31.2	SW-35	42.0	37.0	28.4
SW-4	48.5	43.5	32.9	SW-36	47.0	42.0	31.9
SW-5	48.5	43.5	32.9	SW-37	49.0	44.0	33.3
SW-6	48.5	43.5	32.9	SW-38	49.5	44.5	33.6
SW-7	48.0	43.0	32.6	SW-39	49.5	44.5	33.6
SW-8	48.0	43.0	32.6	SW-40	50.0	45.0	34.0
SW-9	47.5	42.5	32.3	SW-41	48.5	43.5	32.9
SW-10	47.5	42.5	32.3	SW-42	49.5	44.5	33.6
SW-11	49.5	44.5	33.6	SW-43	46.0	41.0	31.2
SW-12	49.0	44.0	33.3	SW-44	47.0	42.0	31.9
SW-13	49.5	44.5	33.6	SW-45	42.0	37.0	28.4
SW-14	47.0	42.0	31.9	SW-46	42.0	37.0	28.4
SW-15	47.0	42.0	31.9	SW-47	44.0	39.0	29.8
SW-16	49.0	44.0	33.3	SW-48	45.0	40.0	30.5
SW-17	48.5	43.5	32.9	SW-49	50.5	45.5	34.3
SW-18	50.5	45.5	34.3	SW-50	49.0	44.0	33.3
SW-19	44.0	39.0	29.8	SW-51	50.0	45.0	34.0
SW-20	49.0	44.0	33.3	SW-52	49.5	44.5	33.6
SW-21	44.0	39.0	29.8	SW-53	46.5	41.5	31.6
SW-22	48.0	43.0	32.6	SW-54	42.0	37.0	28.4
SW-23	48.0	43.0	32.6	SW-55	40.5	35.5	27.4
SW-24	48.5	43.5	32.9	SW-56	45.5	40.5	30.9
SW-25	51.0	46.0	34.7	SW-57	46.0	41.0	31.2
SW-26	50.0	45.0	34.0	SW-58	49.0	44.0	33.3
SW-27	49.5	44.5	33.6	SW-59	49.5	44.5	33.6
SW-28	49.5	44.5	33.6	SW-60	45.5	40.5	30.9
SW-29	50.0	45.0	34.0	SW-61	47.0	42.0	31.9
SW-30	50.0	45.0	34.0	SW-62	45.0	40.0	30.5
SW-31	47.0	42.0	31.9	SW-63	47.6	42.6	32.3
SW-32	47.5	42.5	32.3	SW-64	50.5	45.5	34.3
SW-33	46.0	41.0	31.2	SW-65	48.0	43.0	32.6

3.3.4 Sparge Well Maintenance

Well maintenance activities occurred December 11-12, 2013. Eight sparge wells (SW-6, SW-16, SW-23, SW-24, SW-42, SW-43, SW-53, and SW-56) were selected for well maintenance. These eight SWs were selected based on having low flow (< 5 scfm) or delayed flow (flow taking longer than 1 hour to begin) characteristics as shown in the operational data collected up through December 10, 2013. The maintenance program, performed by the well installation contractor (Groundwater Protection), consisted

of jetting water into the well screen interval to flush fines from the well bore and the well screen. Once relatively clear water was produced by the well, approximately 100 gallons of clean water was pumped into the well to provide a zone of clean water around the well screen to reduce any precipitation in that region. The jetting of these wells resulted in improved flow characteristics. All eight sparge wells were more efficient in reaching CO_2 mass injection targets post-jetting. Surge-blocking was also conducted in several wells to further enhance well yields.

SW-59 had visual evidence of CO_2 gas coming from underneath the concrete pad shortly after initiation of flow to the well. This "short-circuiting" of flow caused some erosion of soil around the pad. This was addressed by placing coarse gravel around the concrete pad. The flow caused by short circuiting was not detrimental to sparging since a nearby monitoring point (MW-513B) showed a decrease in pH as a result of sparging into SW-59.

3.4 Field Measurements During Sparging

During sparging, flow rates were measured on the rotameters, temperature was measured at a gauge on each distribution panel, and pressure was measured at a pressure gauge just downstream of the rotameter. These measurements were collected at periodic intervals, typically every half-hour during normal sparging operations. These measurements were recorded on daily sparge log sheets, and transcribed to a master spreadsheet for calculation of total mass sparged (see Section 3.5). A summary of these measurements for each sparge well is provided in Appendix E.

3.5 Measurement and Calculation of Flowrates and CO_2 Mass

A flow rate of approximately 50 scfm per well was initially targeted for Phase 1 of full-scale implementation. This was based upon (i) the success of the Proof of Concept Test results in lowering pH and (ii) the observation that in general, higher flow rates achieved larger pH decreases in deep Satilla wells during sparging.

The flow rate of gas to the sparge well was read from a distribution panel rotameter upstream of the well head. Rotameters report accurate flow rates only when the operating conditions (temperature and pressure) are the same as the conditions under which the rotameter was calibrated. When operating and calibration conditions differ, flow readings from a rotameter must be corrected. The rotameter correction equation for gases is:

$$Q^*(\text{scfm}) = Q_{\text{rotameter}} \sqrt{\left(\frac{T_{\text{std}}}{T_{\text{act}}}\right)\left(\frac{P_{\text{act}}}{P_{\text{std}}}\right)} \tag{3-2}$$

where $Q_{\text{rotameter}}$ is the flow reading from the rotameter, Q* is the gas volumetric flow rate (in scfm), P_{act} is the actual pressure (in psia), T_{act} is the actual temperature (in °R), P_{std} is the standard pressure (in psia), T_{std} is the standard temperature (530 °R) of the rotameter correction. Rotameters installed on the permanent system were calibrated for carbon dioxide, so an additional specific gravity correction was not required. For CO_2 sparging, Equation 3-2 becomes:

$$Q^*(\text{scfm } CO_2) = Q_{\text{rotameter}} \sqrt{\left(\frac{530^\circ R}{T_{\text{act}} + 460}\right)\left(\frac{P_{\text{act}} + 14.7}{14.7 \text{ psi}}\right)} \tag{3-3}$$

The rotameter used for the portable system was not calibrated for CO_2. Therefore, a specific gravity correction was also required:

$$Q^*(\text{scfm } CO_2) = Q_{\text{rotameter}} \sqrt{\left(\frac{530^\circ R}{T_{\text{act}} + 460}\right)\left(\frac{P_{\text{act}} + 14.7}{14.7 \text{ psi}}\right)\left(\frac{1}{SG}\right)} \tag{3-4}$$

The mass of CO_2 injected into sparge wells was calculated by numerically integrating the flow versus time data for each sparge well (Appendix E). The trapezoidal method of integration was employed and the equation used to calculate the mass for each well is shown below:

$$M_{\text{sparged}} = \rho^*_{\text{gas}} \int Q^* dt \approx \rho^*_{\text{gas}} \sum \bar{Q}^* \Delta t \tag{3-5}$$

where ρ^*_{gas} represents the density of carbon dioxide equal to 0.1144 lb/ft^3 at standard temperature and pressure (70 °F and 14.7 psi). A 24 hour mass balance check on the system was conducted on February 12 – 13, 2014, that indicated that the mass released from the tank for sparging was larger than the mass accounted for by Equation 3-5. The mass balance difference from this test was +13.6%. As a result, a correction factor (C_F) of 1.136 was used to modify Equation 3-3 to more accurately account for the mass to each sparge well.

$$Q^*(\text{scfm } CO_2) = C_F Q_{\text{rotameter}} \sqrt{\left(\frac{530^\circ R}{T_{\text{act}} + 460}\right)\left(\frac{P_{\text{act}} + 14.7}{14.7 \text{ psi}}\right)} \tag{3-6}$$

A system-wide CO_2 mass balance was also conducted to confirm overall mass of CO_2 sparged. This system-wide mass balance is discussed in Section 4.5.

3.6 Monitoring During Sparging

Groundwater pH and conductivity were measured throughout the sparging program in all monitoring points within the sparging footprint. A portable peristaltic pump was used to pump water to the surface. Tubing was lowered to the mid-point of the screen and water was pumped with a flow rate that ranged from 0.25 to 2.50 L/min. The water passed through a flow cell equipped with a YSI Professional Plus multi-parameter probe that measured pH, specific conductance, barometric pressure, and temperature. The probe was set to take readings every 30 seconds. The well was pumped until all parameters were stabilized over three consecutive readings. The final stabilized reading was used as the data point of record. The data was recorded on the internal memory of the meter and was reported out at the end the day. The frequency of pH measurements during CO_2 sparging varied for the various wells at the site. Therefore, monitoring points at the Site were divided into six categories:

- Priority deep (12 monitoring wells, 5 extraction wells)
    - These are deep Satilla wells within a 10 to 32 foot distance of a sparge well;
    - These wells are the highest priority with respect to pH sampling; and
    - The sampling frequency was approximately one to three times per week.
- Deep (8 monitoring wells, 5 extraction wells)
    - These are deep Satilla wells at distances less than 10 ft or greater than 32 ft from a sparge well
    - The sampling frequency was approximately one to three times per week.
- Outside deep (8 monitoring wells)
    - These are deep Satilla wells west of the sparging footprint, located between sparging area and marsh;
    - The purpose of monitoring these wells was to assess lateral CBP movement;
    - MW-113C and MW-358B were included on this list because of historic elevated pH (location is indicated on Figure 1-2); and
    - The sampling frequency was approximately every four weeks.
- Mid (17 monitoring wells)
    - These are mid Satilla wells within the sparging footprint;
    - Some of these wells have pH > 10.5 and are considered to be within the CBP;
    - Changes in pH in these wells provide an indication of extent of CO_2 channel formation;
    - Some of these wells are expected to intercept gas channels/pressurize; and
    - The sampling frequency was approximately every two weeks.
- Shallow (5 monitoring wells)

- These are shallow Satilla wells within the sparging footprint;
- Some of these wells are expected to intercept gas channels/pressurize; and
- The sampling frequency was approximately every two weeks.

In addition, wells screened in the Coosawhatchie A/B formation (HWEast2, HWEast3, HWEast5, MW-352D, MW-115, and MW-360D) were sampled to assess effect of sparging on pH.

All pH electrodes were calibrated daily to ensure accuracy of results. A three point standard curve using pH 4.01, 7.00, and 10.01 was used. A valid pH calibration curve was obtained only when the slope was within 5% of the theoretical value of −59 mV/pH. Specific conductance was also calibrated daily. A calibration check was performed at least once per day to ensure electrode stability.

3.7 Piezometric Surface and Groundwater Table

Groundwater levels of shallow Satilla wells were monitored via a combination of automatic data loggers and manual water level readings. Solinst Level Loggers were employed for automatic data logging. The data logger was set to a designated depth within the well and securely affixed to prevent any movement. The automatic data loggers were synchronized for time and programmed to record water levels at five minute intervals during the CO_2 sparging period.

A total of 15 new shallow piezometers were placed within the sparging footprint. These piezometers, along with shallow Satilla wells, were monitored for water level rise via manual measurement with an electronic water level meter.

A total of 10 pressure transducers (Solinst, Levelogger) were used throughout the sparging program. The transducers in these monitoring wells were used to obtain information on piezometric surface rise in the deep Satilla and shallow groundwater level rise throughout the sparging program. The locations of the transducers were in the north, central, and south ends of the sparging footprint as well as along the western edge. Specific details are provided below.

For a portion of the “break-in” period (November 13 - 26, 2013) five transducers were installed in monitoring wells within the sparging footprint: MW-510B, MW-511B, MW-513B, MW-512B, and MW-504B. Starting on November 26, 2013, five transducers were relocated and placed to the west of the sparging footprint: MW-112C, MW-353B, MW-503B, MW-507B and MW-508B. Beginning on December 3, 2013, five transducers were once again relocated and placed within the sparging footprint: PZ-63, MW-501B, MW-513B, MW-516B and MW-2C. The five transducers placed in the wells to the

west of the sparging footprint have been left in place at the end of sparging to observe seasonal groundwater level trends.

3.8 Air Monitoring

Ambient air monitoring during sparging consisted of grab sample monitoring for carbon dioxide, oxygen, and hydrogen sulfide using a MultiRae Model PGM-50-5P multi-gas meter, and for Hg using a Jerome Model 431X meter. Representative sparge wells were selected over the course of the program for sampling, with samples collected at each sparge well at least once. Typically, measurements were collected at the sparge wells and approximately 10 ft north, south, east, and west of the sparge wells (i.e., five locations per sparge well).

Approximately 300 sampling events (five locations each) were conducted over the course of the program; sample results are reported on the forms provided in Appendix F; a summary of the results is provided below (Table 3-5). No exceedances of action levels for the four air constituents monitored were observed.

Table 3-5: Summary of Air Monitoring Results

Air Constituent	Units	Action Level	Minimum Observed Level	Maximum Observed Level	Notes
CO_2	ppmv	2500	340	1320	-
O_2	% by volume	> 19.5% and < 22.0%	20.5	21.6	-
H_2S	ppmv	10	0	0	-
Hg	mg/m^3	0.05	0.000	0.003	7 samples 0.003; all others 0.000

4 RESULTS OF PHASE 1 SPARGING

4.1 Sparge Flow Rates

The first two weeks of sparging operations involved a "break-in" period where CO_2 was injected into each sparge well for the first time. These first injections were important because they provided critical information on injection pressures required to achieve flow. All wells took flow on the first attempt. The average flow rates for each sparge well over the entire duration of sparging are presented in Figure 4-1. The average flow rate varied from 10.6 scfm (SW-53) to 51.1 scfm (SW-65). The average flow rate for all sparge wells was 28.3 scfm.

4.2 Effect of Sparging on pH

4.2.1 Pre-sparge pH

Pre-sparge pH is shown in plan view for deep Satilla wells in Figure 4-2 and for mid Satilla wells in Figure 4-3[5]. Pre-sparge pH in the deep Satilla within the treatment area (dashed lines) varies from pH 7.35 (MW-519B) to as high as 12.28 (MW-511B). The majority of pH values in the deep Satilla were pH > 10.5, consistent with historical data. The lower pH values near MW-519B are the result of sparging during the Proof of Concept Test (shown in the inset map on Figure 4-2 and Figure 4-3). Pre-sparge pH in the mid Satilla varied from 6.09 (MW-1B) to 11.56 (MW-514A), with many values above pH 9.0. The mid Satilla depth interval represents a transition from dense, high pH water in the deep Satilla to neutral pH water in the shallow Satilla.

The pre-sparge pH in sparge wells is shown in plan view on Figure 4-4. In general, a large majority (52 out of 64 or 81%) of sparge wells had pH $\geq$ 10.5. Notable exceptions included the low pH area in the vicinity of the Proof of Concept test. SW-1 was used as a sparge well during the test, so its low pH is expected. However, the pH in nearby SW-26 and SW-27 were also both below 7.0, suggesting that water in these locations was neutralized as a result of sparging during the Proof of Concept Test. Note that SW-26 and SW-27 are 44 and 113 ft away from the Proof of Concept test sparge, respectively. The low pre-sparge pH in SW-27 could also be influenced by upgradient neutral pH water. However, this

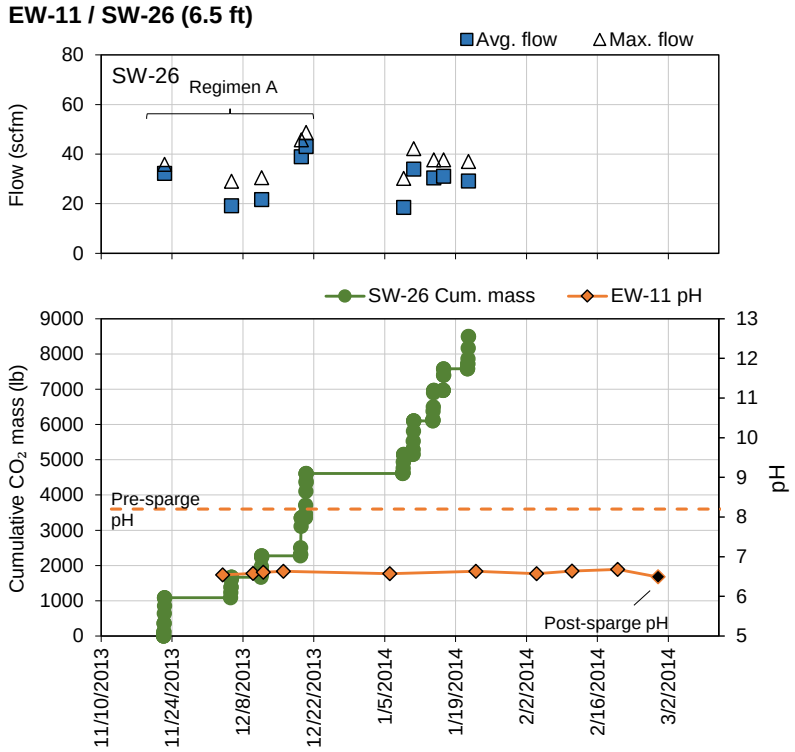
[5] Field pH measurements were reported as the pre-sparge pH for nearly all monitoring points. In some cases, field pH were anomalously low compared to laboratory-measured pH and historical values for the site. In these instances, laboratory pH was used in place of field pH.

is somewhat unlikely since MW-515B (approximately 50 ft NNE from SW-27) had a pre-sparge a pH of 11.24.

Phase 1 of CO_2 sparging was designed to treat the main body of the CBP as mapped using the 2012 pH dataset (Mutch Associates and Parsons, 2013a). There is some uncertainty as to the extent of the CBP at its southern boundary because of decreasing monitoring well density in this area. Sparge wells along the southern edge of the CBP (e.g. SW-3, SW-2, SW-65, SW-7 and SW-15) all had pH > 10.5, suggesting that the CBP may extend outside the Phase 1 sparging footprint.

4.2.2 pH Monitoring Results During Sparging

Pre-sparge and continuous monitoring results for all 30 deep Satilla monitoring points are shown in Figures 4-5 through 4-19. As illustrated below for EW-11, each figure shows pH versus time data for the monitoring point along with the identity of its nearest sparge well, the distance to the sparge well, the sparge well average and maximum flow rates, and the cumulative CO_2 mass injected.



Above: CO_2 flow, mass and pH as a function of time for EW-11.

The dashed line represents the pre-sparge pH measured in late August/early September 2013 as part of pre-sparge sampling. The last data point (indicated by a black diamond with orange outline) represents the field pH recorded as part of the post-sparge sampling round. The cumulative mass of CO_2 injected into SW-26 is shown as green circles. SW-26 is 6.5 ft from EW-11, which is the shortest distance between EW-11 and any sparge well. The upper portion of the figure shows the timing of the sparge events, the average and maximum flow rates, and sparge regimen that was assigned to SW-26. Note that Figures 4-5 through 4-19 are sorted from smallest to largest distance from monitoring point to sparge well.

The trends in pH over time in individual monitoring points are unique and it is not practical to describe all of the day-to-day changes. However, there are several general observations that are of note which shed light on the effectiveness of treatment with CO_2:

- In three monitoring points, the pH decreased to $\leq$ 7.5 after only one or two sparge events. Examples include EW-11 (Figure 4-5) which is 6.5 ft from its nearest sparge well (SW-26), MW-504B (Figure 4-11) which is 24.9 ft from its nearest sparge well (SW-43), and MW-518B (Figure 4-12) which is 30.7 ft from its nearest sparge well (SW-4).
- Many monitoring points showed a gradual pH decrease after each successive event, with the point eventually reaching pH $\leq$ 7.5. Examples include EW-6 (Figure 4-6), MW-512B (Figure 4-7), EW-1 (Figure 4-7), MW-115C (Figure 4-8), and EW-9 (Figure 4-15).
- Many monitoring points showed a general decline in pH with each successive event, but showed evidence of short-lived rebound before finally reaching neutral pH $\leq$ 7.5. Examples include MW-501B (Figure 4-5), MW-512B (Figure 4-7), MW-505B (Figure 4-9), and MW-517B (Figure 4-11).
- A few monitoring points showed a temporary increase in pH during sparging to above pre-sparge values, only to be followed by a decrease in pH upon continued sparging. Examples include MW-2C (Figure 4-10), MW-519B (Figure 4-13), and MW-357A (Figure 4-17).
- A few monitoring points temporarily reached pH $\leq$ 7.5, only to rebound to higher pH during continued sparging or shortly after the end of sparging. However, the post-sparge pH in these points (monitored one to two weeks after sparging had ended) was generally less than pH 10. Examples include EW-3 (Figure 4-9) and EW-8 (Figure 4-13).
- Only two monitoring points showed relatively no influence from sparging. These monitoring points were MW-516B (29.3 ft from SW-11, Figure 4-12), MW-352B (40.1 ft from SW-62, Figure 4-18).

4.2.3 pH Results After Four Weeks of Sparging

An analysis of pH in monitoring points was undertaken after 4 weeks of sparging as an interim evaluation of effectiveness and to better identify required CO_2 mass. This 4-week time frame was significant because many monitoring wells had already seen decreases in pH to approximately 7.0. The pH values in monitoring points is plotted versus radial distance as a bubble plot in Figure 4-20. The size of the data point represents the mass of CO_2 required to decrease the pH to 7.0. After 4 weeks of sparging, nine monitoring points (EW-11, MW-501B, EW-6, MW-514B, EW-1, MW-505B, MW-504B, MW-518B, and MW-502B) had pH values $\leq$ 7.5. The mass required to achieve this decrease in pH varied from 1,100 to 8,800 lb of CO_2. With the exception of two monitoring points at approximately 40 ft, monitoring points that had not yet achieved a lower pH after 4 weeks had not received 8,000 lb of CO_2. Therefore, 8,000 to 9,000 lb became a preliminary target mass for all sparge wells. As sparging progressed, monitoring points within 40 ft generally achieved a pH less than 7.5 when their nearest sparge received a mass of approximately 8,000 lb, further confirming that this was the appropriate mass of CO_2 per sparge well. Exceptions to this mass target were high alkalinity areas where additional CO_2 was required (discussed in more detail in Section 4.2.4).

4.2.4 Treatment of High Alkalinity Areas

Prior to the start of sparging, the pre-sparge groundwater alkalinity data for the deep Satilla (Figure 4-21) were examined to determine high alkalinity areas that would exhibit a higher demand for CO_2. Monitoring points with high alkalinity appear in four areas at the Site:

- EW-6 and areas to the west. This includes a large spatial area that includes MW-511B, EW-5, MW-510B, MW-508B and MW-353B.
- Proof of Concept Test area. This includes EW-11, MW-519B, MW-1C, MW-2C and MW-115C. Many of these wells had lower pH before Year 1 sparging as a result of activity related to the Proof of Concept Test.
- Area near MW-352B.
- Area near MW-516B.

The alkalinity in the deep Satilla monitoring wells and extraction wells follows a lognormal probability distribution with median of 2,800 mg/L as $CaCO_3$ (Figure 4-22). The only well that sits off the distribution is MW-352B, which has an extremely high alkalinity of 17,000 mg/L. There are no sparge wells within 30 ft of MW-352B. EW-6 has the second highest alkalinity (8,400 mg/L) of deep

Satilla wells within the sparging footprint. Note this has decreased significantly from a high of 15,970 mg/L in June 2010.

Wells that sit on the upper 33% of the alkalinity distribution include MW-2C, MW-508B, MW-516B, MW-510B, MW-115C, EW-11, EW-5, MW-519B, MW-1C, EW-6, and MW-352B. These wells have values for alkalinity greater than 4,300 mg/L. As a result of these high-alkalinity areas, the total mass of CO_2 was increased to 1.5 to 2.0 times the general target of 8,000 to 9,000 lb in the following sparge wells:

- EW-6 and areas west: SW-4, SW-6, SW-14, SW-22, SW-23, SW-31, SW-32, SW-41, SW-42, SW-52, SW-58, SW-59.
- Proof of Concept area: SW-37.
- MW-516B and area west: SW-11, SW-19, SW-20.

4.2.5 Post-sparge pH Results

A summary of the changes in pH after sparging is provided in Table 4-1. The relationship between post-sparge pH and radial distance is shown in Figure 4-23. The top panel shows pH in monitoring points over the distances ranging from 6.5 ft (EW-11) to 29.3 ft (MW-516B). Within 30 ft, 14 out of 15 wells had a post-sparge pH of less than 10.0. The only monitoring point to not reach at least pH 10 was MW-516B, which is 29.6 ft from its nearest sparge well. As discussed earlier, the pH in this well was unchanged through the entire sparging period. A large majority of wells within 30 ft (13 out of 15, 87%) reached a pH less than 7.5. The notable exception is EW-3 at 20.9 ft. The pH in EW-3 declined to as low as 6.61 during sparging, but rebounded back to a final post-sparge pH of 9.84.

The bottom panel shows pH over distances from 30.7 ft (MW-518B) to 45.1 ft (EW-5). The majority of monitoring points within the 30 to 40 ft range had post-sparge pH values of less than 10, and many had pH values less than 7.5. Most notable was MW-502B, which had a post-sparge pH of 6.93 at a radial distance of 42.6 ft.

Post-sparge pH results are shown in plan view for deep Satilla monitoring points in Figure 4-24. The only monitoring points within the sparging footprint of the deep Satilla that remained above pH 10.0 were MW-516B, MW-352B and EW-5. MW-352B and EW-5 are at considerable distances (< 40 ft) from their nearest respective sparge wells (Figure 4-23).

Results for post-sparge pH in mid Satilla monitoring points are shown in Figure 4-25. The pH in the mid Satilla after sparging ranged from 5.71 to 8.59. All three wells that had pH > 10 prior to the start

of sparging (MW-352A, MW-514A and MW-518A, see Figure 4-3) were lowered to a pH of approximately 7.0.

Post-sparge pH values in sparge wells (shown in Figure 4-26) were all circumneutral with the exception of SW-7 (pH 8.37) which is on the outer-edge of the sparging footprint. Presumably, some water from outside the sparging footprint travelled in towards SW-7 as the piezometric surface in the deep Satilla relaxed back to normal levels (Section 4.11). The circumneutral pH in the large majority of sparge wells was to be expected since these wells all received considerable masses of CO_2 during sparging.

Table 4-1: Summary of Pre- and Post-Sparge pH in Deep Satilla Monitoring Points within the Sparging Footprint

Monitoring Point	Sparge Well	Radial Distance (ft)	Pre-sparge pH	Post-sparge pH	ΔpH
EW-11	SW-26	6.5	8.62	6.49	-2.13
MW-501B	SW-63	9.9	11.3	6.81	-4.49
EW-6	SW-58	11.8	11.75	7.41	-4.34
MW-514B	SW-61	15.4	10.37	6.31	-4.06
MW-512B	SW-30	15.9	11.73	6.93	-4.80
EW-1	SW-62	16.1	11.28	6.27	-5.01
MW-115C	SW-37	17.2	10.7	6.68	-4.02
EW-2	SW-35	18.7	10.5	6.57	-3.93
MW-505B	SW-33	18.8	10.04	6.76	-3.28
EW-3	SW-44	20.9	11.01	9.84	-1.17
MW-513B	SW-59	21.9	11.34	6.51	-4.83
MW-2C	SW-37	22.7	8.71	6.49	-2.22
MW-517B	SW-27	24.3	9.81	6.48	-3.33
MW-504B	SW-43	24.9	11.2	6.49	-4.71
MW-516B	SW-11	29.3	11.3	11.48	0.18
MW-518B	SW-4	30.7	10.87	7.18	-3.69
MW-519B	SW-26	31.0	7.35	6.54	-0.81
EW-8	SW-30	32.0	10.5	9.09	-1.41
MW-515B	SW-28	33.6	11.24	8.8	-2.44
EW-10	SW-19	35.2	11.1	7.34	-3.76
EW-9	SW-5	35.9	10.9	6.73	-4.17
MW-1C	SW-37	37.1	8.98	6.54	-2.44
EW-4	SW-53	37.5	11.2	7.01	-4.19
MW-105C	SW-46	39.1	11.08	6.68	-4.4
MW-511B	SW-22	39.4	12.28	9.81	-2.47
MW-357A	SW-13	39.6	10.2	6.54	-3.66
MW-357B	SW-5	39.6	11.08	8.82	-2.26
MW-352B	SW-62	40.1	11.53	12.89	1.36
MW-502B	SW-45	42.6	11.13	6.93	-4.20
EW-5	SW-23	45.1	10.5	10.74	0.24

4.2.6 Effect of Sparging on Coosawhatchie pH

The effect of sparging in the Satilla on pH in the Coosawhatchie A/B aquifer was assessed by monitoring six wells screened in the Coosawhatchie. MW-352D, MW-115, and MW-360D were sampled five weeks into the sparging effort on July 15, 2014 and immediately at the conclusion of sparging on February 21, 2014. HWEast2, HWEast3, HWEast5 were sampled immediately at the conclusion of sparging on February 22, 2014. This data, along with measurements made on May 31, 2012 which serve as a pre-sparge baseline, is summarized in Table 4-1. Values for pH for MW-352D, MW-115, and MW-360D during and after sparging were almost identical to each other (within 0.06 units). The post-sparge values for five out of six wells were within 0.5 units of the 2012 values. The only large difference in pH was observed in HW-East5 where the pH decreased from 9.00 to 7.13. The relatively small changes in pH in Coosawhatchie wells indicate that sparging in the deep Satilla has not had a significant effect on water quality. This is an expected result given the separation of these units by the variably-cemented sandstone and the short time period from the end of sparging.

Table 4-2: Summary of pH Data Collected in Monitoring Wells Screened in the Coosawhatchie A/B

Monitoring Point	May 31, 2012	January 15, 2014	February 21-22, 2014
MW-115D	10.22	10.10	10.14
MW-352D	6.35	6.80	6.84
MW-360D	9.92	10.09	10.15
HW-East2	6.58	-	6.38
HW-East3	6.63	-	6.32
HW-East5	9.00	-	7.13

4.3 Evaluation of Sparging Radius of Influence

An average ROI for achieving pH $\leq$ 7.5 was estimated using specialized statistical methods for handling censored data. Consider a single monitoring point situated *x* ft from its associated sparge well. If sparging results in a pH $\leq$ 7.5 in the monitoring point, the ROI for that specific sparge well must be greater than or equal to *x*. Conversely, if the monitoring point post-sparge pH $\geq$ 7.5, the ROI must be less than *x*. This type of data, therefore, can be described as being either right- or left-censored. Evaluation of summary statistics for censored data requires specialized statistical techniques. Common practices such as substitution of one-half the upper bound of a left-censored data point are not appropriate for this application (Helsel, 2012). Right-censored data are thought of as extending from the lower boundary value to infinity. Since this is not realistic for a sparge well ROI, a finite upper bound of 45 ft was used, which is only slightly larger than the maximum observed ROI of 42.6 ft (SW-45 / MW-502B). A natural

lower bound on left censored data is zero. Therefore, the data can actually be described as *interval censored*. Table 4-3 indicates the ROI intervals associated with each sparge well / monitoring well pair. A lower bound of zero was selected for left-censored data, which is a very conservative estimate.

Table 4-3: Summary of Intervals Used for the Maximum Likelihood Estimation of Average Radius of Influence

Sparge well	Monitoring point	Radial Distance (ft)	Lower Interval (ft)	Upper Interval (ft)
SW-26	EW-11	6.5	6.5	45.0
SW-63	MW-501B	9.9	9.9	45.0
SW-58	EW-6	11.8	11.8	45.0
SW-61	MW-514B	15.4	15.4	45.0
SW-30	MW-512B	15.9	15.9	45.0
SW-62	EW-1	16.1	16.1	45.0
SW-37	MW-115C	17.2	17.2	45.0
SW-35	EW-2	18.7	18.7	45.0
SW-33	MW-505B	18.8	18.8	45.0
SW-44	EW-3	20.9	0	45.0
SW-59	MW-513B	21.9	21.9	45.0
SW-37	MW-2C	22.7	22.7	45.0
SW-27	MW-517B	24.3	24.3	45.0
SW-43	MW-504B	24.9	24.9	45.0
SW-52	MW-513B	29.1	0	29.1
SW-11	MW-516B	29.3	0	29.3
SW-4	MW-518B	30.7	30.7	45.0
SW-26	MW-519B	31.0	31.0	45.0
SW-30	EW-8	32.0	0	32.0
SW-28	MW-515B	33.6	0	33.6
SW-19	EW-10	35.2	35.2	45.0
SW-5	EW-9	35.9	35.9	45.0
SW-37	MW-1C	37.1	37.1	45.0
SW-53	EW-4	37.5	37.5	45.0
SW-46	MW-105C	39.1	39.1	45.0
SW-22	MW-511B	39.4	0	39.4
SW-5	MW-357B	39.6	39.6	45.0
SW-13	MW-357A	39.6	0	40.1
SW-62	MW-352B	40.1	42.6	45.0
SW-45	MW-502B	42.6	0	44.4
SW-23	EW-5	45.1	0	45.1

One available method to describe the statistics of interval censored data is Maximum Likelihood Estimation (MLE). This is a parametric method which requires selection of an underlying probability distribution for the data. For the site-specific average ROI analysis, both normal and log-normal distributions were considered since these two distributions are commonly used to describe environmental

data (Helsel, 2012). The statistical software package *R* (R Core Team, 2013) was used with the *fitdistrplus* package (Delignette-Muller et al., 2014) to implement the MLE method. The MLE output is shown in Figure 4-27. This figure shows the ROI intervals for each well pair as well as normal (solid line) and log-normal (dashed line) distributions fit to the ROI data intervals. The two fitted distributions are very similar. The key summary statistics from the normal regression are shown and support an average ROI of 33.5 ft. Using a log-normal regression results in a slightly smaller average of 32.3 ft. Since there is no way of knowing which underlying distribution is the most appropriate, an average ROI of 32.9 ft was selected, the midpoint of these two values.

4.4 Sparge Well Total Mass

The total CO_2 mass sparged into each sparge well is shown in Figure 4-28. The median mass of CO_2 injected was 9,800 lb. The target minimum mass for all wells was 8,000 to 9,000 lb based upon an analysis of pH results after four weeks (Section 4.2.3). High alkalinity areas at the site were determined to require more CO_2 because of the increased acid demand (discussed in Section 4.2.4). The target mass for high alkalinity areas was 1.5 to 2.0 times the general target of 8,000 to 9,000 lb. As shown on Figure 4-28, all of the sparge wells received the minimum required CO_2 dosage.

4.5 CO_2 Mass Balance

A system-wide mass balance was performed to determine the total mass of CO_2 injected and to verify the masses injected into each sparge well. The total mass delivered to the site must be equal to the sum of the CO_2 mass sparged, the CO_2 left in inventory and any major losses during start-up:

$$M_{\text{delivered}} = M_{\text{sparged}} + M_{\text{inventory}} + M_{\text{major losses}} \quad (4\text{-}1)$$

The total mass delivered to the site by Airgas was 860,000 lb (430 tons). The storage tanks, initially empty, had 32,000 lb (16 tons) remaining in inventory at conclusion of sparging. Also, the portable system had approximately 4,000 lb (2 tons) remaining when it was returned to Airgas. Therefore, the total mass in inventory, $M_{\text{inventory}}$, is equal to 36,000 lb (18 tons). During system start-up, the tank telemetry system indicated that 16,000 lb (8 tons) were used, effectively setting $M_{\text{major losses}}$. The mass of CO_2 sparged, calculated using numerical integration of the flow versus time data (Equation 3-5), was 783,000 lb (391.5 tons). The mass balance error was calculated according to:

$$\text{Error \%} = \frac{(M_{\text{sparged}} + M_{\text{inventory}} + M_{\text{major losses}}) - M_{\text{delivered}}}{M_{\text{delivered}}} \times 100\% \quad (4\text{-}2)$$

The mass balance error calculated using this approach was −3.4%:

$$\text{Error \%} = \frac{(783{,}000 + 32{,}000 + 16{,}000) - 860{,}000}{860{,}000} \times 100\% = -3.4\% \quad (4\text{-}3)$$

This is an acceptable level of error for this type of system mass balance.

4.6 Evaluation of Sparging Regimens

Four sparging regimens were tested as part of Phase 1 sparging to increase efficiency of CO_2 usage. A summary of the sparge regimens is provided in Table 3-3. These regimens were evaluated by examining monitoring points that were within 40 ft of a sparge well on the specific regimen. This evaluation occurred after 4 weeks of sparging so that regimens could be altered or changed to ensure overall treatment effectiveness. A discussion of the effectiveness of the various regimens is presented below.

- Regimen A (4-hr sparge, once per week): Fourteen monitoring points had nearest-neighbor sparge wells on this regimen. This was the largest number of monitoring points of all regimens. All monitoring points associated with sparge wells on this regimen within 31 ft reached a pH of ≤ 7.5 by the end of sparging. For wells with good CO_2 yields (flow rates greater than 20 scfm), this regimen achieved pH targets quickly. For wells with low yields, longer sparging durations (up to 24 hr) were eventually required to inject enough mass to eventually reach pH targets. This regimen was relatively easy to schedule since wells on this regimen were sparged regularly at a once per week interval. This regimen also allowed sufficient time for subsidence of the mound in piezometric surface.
- Regimen B (4-hr sparge, once every two weeks): Eight (8) monitoring points had nearest-neighbor sparge wells on this regimen. Since regimens were tested for approximately 4 weeks, wells on Regimen B had three sparge events before evaluation of effectiveness. The pH results suggest that Regimen B was no more efficient than Regimen A.
- Regimen C (one, 1-hr sparge per day, 4 days per week): Two monitoring points had nearest-neighbor sparge wells on this regimen: (MW-505B / SW-33 and EW-3 / SW-44, Figure 4-9). SW-33 was effective at lowering pH in MW-505B after three weeks of sparging, and although SW-44 was initially effective at lowering pH in EW-3, ultimately the pH rebounded. Flow rates

in all sparge wells on this regimen decreased over time (e.g. see top panels of Figure 4-9), and eventually very small masses of CO_2 were injected over a 1 hr sparge event. This decreasing sparge yield over time made this regimen impractical. This regimen was not continued after 4 weeks.

- Regimen D (4-hr sparge, twice per week): There were two monitoring points that had nearest-neighbor sparge wells on this regimen: (MW-514B / SW-61, EW-1 / SW-62). Both monitoring points are in the 15 to 16 ft radial distance range. This sparge regimen was effective at lowering the pH in both monitoring points, however, the pH decline was gradual in both cases. Also, the total mass of CO_2 required to achieve the pH decrease was approximately 8,000 lb. This was similar or even higher than the mass required for wells on Regimen A and B at larger radial distances. This regimen, while effective, was less efficient than Regimens A and B.

Conclusions from the sparge regimen evaluation:

- Sparging once per week has similar efficiency to once per two weeks and is optimal for scheduling.
- Waiting two weeks to re-sparge a well was not beneficial enough to warrant prolonging time in the field.
- Wells can be sparged multiple times per week, but is less efficient.
- Sparging for short bursts (e.g. 1 hour) is not practical because of the loss of well yield over time and the prolonged ramp-up period required for some wells to start taking CO_2.

The optimal sparging regimen was Regimen A (once per week), although a longer break between successive sparge events is acceptable if scheduling requires it. Some sparge wells required longer sparge durations of 8 to 24 hours to provide adequate flow.

4.7 Efficiency of CO_2 Sparging

The efficiency of CO_2 sparging was evaluated by comparing the CO_2 demand of the CBP with the amount of CO_2 mass required to lower the pH to circumneutral. The CO_2 demand of the CBP was evaluated using the geochemical model PHREEQC v3.0.2 (Parkhurst and Appelo, 2013). A typical pre-sparge and post-sparge CBP water chemistry was constructed using median values from the pre- and post-sparge sampling rounds (Table 4-4). PHREEQC was used to model the titration of this water (initial pH 11.05) with CO_2 until the median pH of the post-sparge CBP was obtained (pH 6.63). A total of 0.057 mol/L of CO_2 was required to lower the pH of the prototypical CBP water to 6.63.

Table 4-4. Prototypical Pre- and Post-Sparge Deep Satilla Water Chemistries [a]

Species	Units	Pre-Sparge Value	Post-Sparge Value
Sodium	mg/L	4,250	4,350
Potassium	mg/L	8.05	14.0
Calcium	mg/L	12.0	24.0
Magnesium	mg/L	0.13	6.45
Chloride	mg/L	5,200	4,900
Alkalinity	mg/L as $CaCO_3$	2,750	4,500
Sulfate	mg/L	130	38.5
Silica	mg/L as SiO_2	550	79.5
Sulfide	mg/L	14.2 [b]	--- [c]
DOC	mg/L	275	230
Hg	µg/L	59.0	12.0
pH [d]	std units	11.05	6.63
Total Dissolved Solids	mg/L	11,500	11,000

(a) Water chemistries based on median values of values from deep wells (except where noted)
(b) Maximum likelihood estimation (MLE) used to estimate median sulfide concentration because of presence of left-censored concentration data
(c) Sample matrix issues elevated method detection limits and prevented reliable determination of post-sparge sulfide concentrations
(d) pH values are averages not medians

The average radius of influence to lower the pH to circumneutral was determined to be 32.9 ft using MLE methods. Assuming a porosity, ϕ, of 0.35, and assuming that most of the CO_2 demand is present in the lower 15 ft of the Satilla, the volume of water within this 32.9 ft was calculated as 17,850 ft^3 (or 5.1×10^5 L):

$$V = \pi\phi r^2 h = \pi(0.35)(32.9\text{ ft})^2(15\text{ ft}) = 17{,}850\text{ ft}^3 \quad (4\text{-}4)$$

The demand of CO_2 is the product of this volume and the model result for the amount of CO_2 required to lower the pH of a prototypical water to pH 6.63:

$$CO_2\text{ Demand} = (5.1\times10^5\text{ L})(0.057\text{ mol/L})\left(\frac{44\text{ g}}{\text{mol}}\right)\left(\frac{2.2\text{ lb}}{1000\text{ g}}\right) = 2{,}800\text{ lb} \quad (4\text{-}5)$$

The CO_2 sparging efficiency was estimated by dividing this demand by the median mass of CO_2 injected into each sparge well (9,800 lb):

$$\text{Sparging efficiency, } \eta = \frac{2{,}800\text{ lb}}{9{,}800\text{ lb}}\times100\% = 29\% \quad (4\text{-}6)$$

The median was used because it is not affected by the additional mass sparged into the high alkalinity areas. The 29% efficiency is approximately 3-times larger than the efficiency estimated from the Proof of Concept Test (9.7%). The primary reason for this increase is the larger ROI achieved in Phase 1 of sparging. A conservative ROI of 20 ft was assumed in the Proof of Concept Test efficiency estimate. During the Proof of Concept Test, the ROI was at least 19.9 ft but was less than 24.6 ft, based on results in the two furthest monitoring wells (MW-519B and MW-115C) from the sparge well MW-1C. The increase in ROI from 20.0 to 32.9 ft, increases the volume of water treated by 2.7-times compared to the Proof of Concept Test[6]. This large increase in efficiency is most likely due to the change in operations in Phase 1 of sparging. Sparging once to twice per week (as compared to sparging day after day as was done in the Proof of Concept Test) allows the residual saturation of CO_2 gas to dissolve into the water. Partial collapse of channels when sparging is stopped induces local mixing within the ROI as water is forced into spaces once occupied by CO_2. All of these processes increase efficiency of CO_2 sparging with respect to lowering pH.

4.8 Effect of Sparging on Hg

4.8.1 Pre-sparge Hg Results

Pre-sparge results for Hg in deep Satilla wells are shown in Figure 4-29. Pre-sparge deep Satilla wells within the sparging footprint ranged from 7.2 to 690 μg/L. The highest concentration measured was 690 μg/L in MW-352B. Concentrations of Hg in deep Satilla wells west of the sparging footprint generally had lower Hg concentrations than within the sparging footprint. Concentrations of Hg in the Proof of Concept test area varied between 31 and 62 μg/L. These relatively low Hg concentrations reflect sparging into MW-1C and SW-1 as part of the test. Concentrations of Hg in the deep Satilla in this area prior to the Proof of Concept test were approximately 110 μg/L.

Pre-sparge results for Hg in mid Satilla (Figure 4-30) were generally lower than in the deep Satilla, consistent with historical data. The two wells with the highest concentrations were MW-352A (300 μg/L) and MW-514A (350 μg/L). These wells are in the same area as MW-352B which had the highest concentration in the deep Satilla (discussed above). The lowest concentrations within the sparging footprint were in the Proof of Concept Test area, the result of prior sparging with CO_2.

[6] This was determined by dividing the ratios of the square of the radii: $(32.9 \text{ ft})^2 / (20.0 \text{ ft})^2 = 2.7$

4.8.2 Preliminary Hg Sampling Results

Samples from select monitoring points were sampled on December, 11-12, 2013 after approximately three weeks of sparging. The purpose of this sampling event was to determine preliminary effects of pH decline on Hg concentrations. A summary of these results is presented in Table 4-5.

Table 4-5: Summary of Preliminary Hg Sampling Results After Three Weeks of Sparging

Monitoring Point	Screen Designation	Pre-Sparge Hg / Hg at time of sample collection (µg/L)	Pre-Sparge pH / pH at time of sample collection
MW-517A	Mid Satilla	7.3 / 3.4	9.31 / 6.20
MW-518B	Deep Satilla	53 / 73	10.87 / 6.63
MW-504B	Deep Satilla	320 / 61	11.20 / 6.46
MW-514A	Mid Satilla	350 / 120	11.56 / 6.52
MW-502B	Deep Satilla	120 / 32	11.13 / 6.84
EW-11	Deep Satilla	48 / 23	8.62 / 6.61

These results generally show that Hg was lowered significantly once the pH was lowered to below pH 7.0. This observation is consistent with results from the Proof of Concept Test (Mutch Associates and Parsons, 2013b). The only exception is MW-518B where Hg increased from 53 to 73 µg/L. This increase was short-lived as the Hg concentration in MW-518B was 4.8 µg/L in the post-sparge sampling round (discussed in Section 4.8.3 below).

4.8.3 Post-sparge Hg Concentrations

Post-sparge Hg concentrations are shown in plan view for the deep Satilla in Figure 4-31. After sparging, Hg concentrations were considerably lower within the sparging footprint, with a range of 0.53 to 260 µg/L. Many monitoring points (12 out of 30) showed Hg concentrations less than 10 µg/L. An additional 7 monitoring points (19 out of 30) showed Hg concentrations less than 20 µg/L. The changes in Hg concentrations for all 30 monitoring points within the sparging footprint are summarized in Table 4-5. 28 out of 30 monitoring points showed decrease in Hg after sparging. The only two deep Satilla monitoring points which increased in Hg were EW-3 and MW-516B. The large increase in Hg in EW-3 is probably due to water of different quality moving into the EW-3 area after sparging. This is supported by the large increases in TDS (5,800 to 11,000 mg/L) and silica (29 mg/L to 330 mg/L) from pre-sparge to post-sparge.

Table 4-6: Summary of Pre- and Post-Sparge pH in Deep Satilla Monitoring Points Within the Sparging Footprint

Monitoring Point	Pre-sparge pH	Post-sparge pH	Pre-sparge Hg (µg/L)	Post-sparge Hg (µg/L)	Hg Change (µg/L)	Hg % Change
EW-11	8.62	6.49	48	3	−45	−94%
MW-501B	11.3	6.81	48	13	−35	−73%
EW-6	11.75	7.41	430	180	−250	−58%
MW-514B	10.37	6.31	40	4.1	−35.9	−90%
MW-512B	11.73	6.93	85	30	−55	−65%
EW-1	11.28	6.27	50	0.53	−49.47	−99%
MW-115C	10.7	6.68	62	19	−43	−69%
EW-2	10.5	6.57	60	6.7	−53.3	−89%
MW-505B	10.04	6.76	53	32	−21	−40%
EW-3	11.01	9.84	7.2	71	63.8	+886%
MW-513B	11.34	6.51	12	11	−1	−8%
MW-2C	8.71	6.49	49	34	−15	−31%
MW-517B	9.81	6.48	92	14	−78	−85%
MW-504B	11.2	6.49	320	7.7	−312.3	−98%
MW-516B	11.3	11.48	34	37	3	+9%
MW-518B	10.87	7.18	53	4.8	−48.2	−91%
MW-519B	7.35	6.54	31	15	−16	−52%
EW-8	10.5	9.09	48	2.7	−45.3	−94%
MW-515B	11.24	8.8	30	10	−20	−67%
EW-10	11.1	7.34	68	35	−33	−49%
EW-9	10.9	6.73	120	4.6	−115.4	−96%
MW-1C	8.98	6.54	43	11	−32	−74%
EW-4	11.2	7.01	160	20	−140	−88%
MW-105C	11.08	6.68	58	2.4	−55.6	−96%
MW-511B	12.28	9.81	160	82	−78	−49%
MW-357A	10.2	6.54	71	4.1	−66.9	−94%
MW-357B	11.08	8.82	180	5.7	−174.3	−97%
MW-352B	11.53	12.89	690	260	−430	−62%
MW-502B	11.13	6.93	120	4.4	−115.6	−96%
EW-5	10.5	10.74	300	180	−120	−40%

The effect of sparging on Hg is best examined in wells where sparging lowered the pH to circumneutral because of the known effect of pH on Hg in deep Satilla wells (Mutch Associates, 2013). Therefore, summary statistics are presented in Table 4-7 for monitoring points that were lowered to pH less than 7.5. The average Hg concentration decreased from 94 µg/L to 21 µg/L (n = 22), resulting in a decrease of 78%. The median Hg decreased from 59 to 11 µg/L. This decrease is shown graphically in Figure 4-32 in the form of box plot. The boundary of the box closest to zero indicates the 25th percentile,

a line within the box marks the median, and the boundary of the box farthest from zero indicates the 75th percentile. The error bars above and below the box indicate the 90th and 10th percentiles values. The mean value in each box is indicated by the dashed red line.

Table 4-7: Summary Statistics for Constituents in Deep Satilla Monitoring Points Where pH was Lowered to Less Than 7.5

Chemical Constituent		Average	Standard Deviation	Median	Difference	Percent Change
Hg (µg/L)	Pre	94	96	59	−73	−78%
	Post	21	36	11		
Alkalinity (mg/L as $CaCO_3$)	Pre	2,655	2,181	2,050	+2,513	+95%
	Post	5,168	2,668	4,350		
TDS (mg/L)	Pre	14,714	11,624	10,350	−2268	−15%
	Post	12,445	8,440	10,050		
Ferrous Iron (µg/L)	Pre	2,932	1,939	2,300	+5,295	+181%
	Post	8,227	6,117	7,000		
Dissolved Organic Carbon (mg/L)	Pre	280	170	265	−75.6	−27%
	Post	205	121	205		
Total Organic Carbon (mg/L)	Pre	282	228	25	−80.14	−28%
	Post	202	139	197		
Arsenic (µg/L)	Pre	71	97	48	−45.27	−64%
	Post	26	27	20		
Chromium (µg/L)	Pre	242	161	205	+3.09	1%
	Post	245	191	235		
Sulfide (mg/L)	Pre	18.9	13.2	19	−7.5	−40%
	Post	11.4	14.5	5.0		
Silica (mg/L as SiO_2)	Pre	730	1,308	325	−612	−84%
	Post	118	179	67.5		

Post-sparge Hg concentrations are shown in plan view for the mid Satilla in Figure 4-33. After sparging, concentrations in the mid Satilla generally decreased. MW-352A and MW-514A, the two mid Satilla monitoring wells with the highest Hg concentrations (both were ≥ 300 µg/L), showed large decreases in Hg to 11 and 47 µg/L, respectively. Most of the monitoring points in the mid Satilla (10 out of 17, 59%) were less than 10 µg/L. The only well in the mid Satilla to increase significantly after sparging was MW-516A which increased from 16 to 84 µg/L. The average decrease in Hg of 78% in deep Satilla wells is slightly better than results obtained from the Proof of Concept Test where the average percent decrease within the 20-ft sparging ROI was 67% (n = 4).

The relationship between Hg and pH in deep Satilla wells is shown in Figure 4-34. As discussed earlier, Hg concentrations decreased with decreasing pH. The Proof of Concept test showed a curvilinear dependence where Hg concentrations decreased sharply when the pH was lowered below pH 8 (Mutch Associates and Parsons, 2013b). A similar dependence is present in the Phase 1 data except that there is inherently more variability because the entire CBP is represented. Several wells are called-out on the figure to highlight the strong pH dependence. Interestingly, MW-515B, MW-357B and EW-8 showed large decreases in Hg without reaching a neutral post-sparge pH. These wells did, however, reach pH ≤ 7.0 for various periods during sparging only to rebound to a final post-sparge pH of approximately 9.0 (Section 4.2.5). This suggests that slight pH rebound does not result in re-release of Hg to groundwater.

The CBP is generally a sulfide-rich, reducing environment. Dissolved Hg speciation in the presence of sulfide is dominated by: complexes with sulfide such as $HgHS^-$, HgS_2^{2-}; complexes with polysulfides such as $Hg(S_x)_2^{2-}$ and HgS_xOH^-; complexes with thiol groups present on dissolved organic matter (DOM); and HgS(s) precipitated as metacinnabar or cinnabar (Skyllberg, 2008). The geochemical conceptual model for Hg within the CBP is discussed in the RI (GeoSyntec Consultants, 1997) and in the CO_2 Sparging Proof of Concept Final Report (Mutch Associates and Parsons, 2013b). Solubility of Hg in the presence of sulfide generally decreases with decreasing pH as a result of precipitation of Hg sulfide, HgS(s) (Jay et al., 2000).

4.9 Effect of Sparging on Additional Geochemical Parameters

4.9.1 Effect of Sparging on Silica

Since the Proof of Concept test, we have suspected that amorphous silica precipitated once the pH decreased as a result of CO_2 sparging. The concern over silica precipitation is that it may significantly lower the aquifer hydraulic conductivity. Therefore, pre-and post-sparge silica are shown in plan view in Figure 4-35 and Figure 4-36, respectively. Pre-sparge silica values within the sparging footprint ranged from 29 mg/L to 17,000 mg/L (Figure 4-35). High silica areas generally are west of the EW-6 area and in an isolated areas near MW-352B. A low silica area exists near the Proof of Concept test, as a result of prior sparging in this area. Post-sparge silica values were typically much lower, ranging from 41 mg/L to 14,000 mg/L (Figure 4-36). Limiting the data to deep Satilla monitoring points that were lowered to pH ≤ 7.5 (n = 22) results in average pre-and post-sparge silica values of 730 and 118 mg/L, respectively. The average percent decrease in silica in these wells was 84%. This is almost identical to the average 88% percent decrease observed after the Proof of Concept Test (n = 4) (Mutch Associates and Parsons, 2013b).

The effect of sparging on silica concentrations was examined with the assistance of geochemical modeling. Visual MINTEQ (Gustafsson, 2011) was used to model silica solubility using pre-sparge and post-sparge prototypical CBP water quality (Table 4-4). Measured and modeled silica concentrations are shown versus pH are shown in Figure 4-37. Two model lines are shown, corresponding to solubility of silica with respect to quartz (solid line) and amorphous silica (dashed line). The pre-sparge data tends to be elevated in pH and silica, and tend to fall on or close to the quartz solubility line. The post-sparge data tends to be lower in pH, and lies on or close to the amorphous silica line. Several wells are highlighted on Figure 4-37 to illustrate the effect of aquifer geochemistry on silica concentrations. Monitoring points where the pH was lowered due to sparging (e.g. MW-512B, EW-6 and EW-10) shifted from being in equilibrium or in slight super-saturation with respect to quartz to being in equilibrium with amorphous silica. Monitoring points that were not affected by sparging (e.g. MW-358B and MW-353B) show little change in silica concentration and are in equilibrium with quartz. A well that was previously affected by sparging (EW-11) moved along the amorphous silica line after the pH was lowered during Phase 1 sparging. This indicates that silica solubility is controlled by quartz or is slightly supersaturated with respect to quartz within the CBP prior to CO_2 sparging, which is consistent with dissolution of silica sand after release of caustic brine. After the pH is lowered via CO_2 sparging, the solubility is controlled by amorphous silica, consistent with precipitation of this phase.

These analytical data and geochemical modeling results support the hypothesis that amorphous silica precipitates once the pH has decreased as a result of CO_2 sparging. The degree to which silica may reduce hydraulic conductivity of the aquifer depends upon the reduction in porosity that results when silica precipitates. Loss of hydraulic conductivity is not something that can be easily determined from the chemical data presented in this section and is best determined through aquifer testing. This is further discussed in Section 4.11.

4.9.2 Effect of Sparging on Total Dissolved Solids (TDS)

Pre- and post-sparge TDS are shown in plan view in Figure 4-38 and Figure 4-39, respectively. Pre-sparge TDS values within the sparging footprint ranged from 4,900 mg/L to 56,000 mg/L (Figure 4-38). High TDS areas generally are in the Proof of Concept area and in isolated areas near EW-6 and MW-352B. Post-sparge TDS values were slightly lower than pre-sparge values, ranging from 4,200 mg/L to 42,000 mg/L (Figure 4-39). The average pre-sparge TDS for all deep Satilla monitoring wells (n = 30) was 15,700 mg/L. Post-sparging, the average TDS in these wells was 12,800 mg/L. Limiting the data to deep Satilla monitoring points that were lowered to pH 7.5 (n = 22), results in pre- and post-sparge

TDS values of 14,700 and 12,400 mg/L, respectively. The percent decrease of TDS in wells that were lowered to pH 7.5 or lower was 16%.

There are numerous geochemical reactions occurring during CO_2 sparging which can affect TDS. However, CO_2 sparging is not expected to have a large effect on TDS since sodium and chloride are the major components of TDS within the CBP, and these ions generally behave conservatively (i.e. do not precipitate or adsorb). The most important process that may lower TDS is silica precipitation (Section 4.9.1). Conversely, increases in bicarbonate ion concentration as a result of CO_2 sparging is expected to increase TDS. The net result was a modest decrease in TDS of 16%.

4.9.3 Effect of Sparging on Specific Gravity

Specific gravity was monitored because it is one of the criteria identified in the removal AOC. Specific gravity of groundwater is a manifestation of the presence of dissolved solids. Pre- and post-sparge specific gravity data is summarized in Table 4-8. The majority of specific gravity measurements were between 1.01 and 1.02. A total of five monitoring points increased, three stayed the same and two decreased. The mean specific gravity increased slightly from 1.018 to 1.020. Specific gravity also increased slightly from pre- to post- sparging in a few of the deep Satilla wells after the Proof of Concept Test.

Specific gravity was monitored because it is one of the criteria identified in the AOC. The specific gravity of any water is dictated by the concentrations of dissolved solids. Similar to TDS (Section 4.9.2), a large change in specific gravity was not expected after CO_2 sparging. Also, like TDS, the specific gravity of the CBP is largely a function of sodium and chloride ions, which generally behave conservatively. The lack of change in the CBP specific gravity upon CO_2 sparging is inconsequential with respect to mercury since the density of the water does not affect mercury immobilization which is driven by the change in pH. Furthermore, there is no significant harm is expected of the specific gravity, which in many cases only slightly exceeds that of fresh water.

Table 4-8: Pre- and Post-Sparge Specific Gravity[a]

Monitoring Point	Pre-Sparge Specific Gravity	Post-Sparge Specific Gravity	ΔSG
MW-105C	NM	(1.01)	-
MW-115C	1.03	1.045	+0.015
MW-501B	NM	(1.02)	-
MW-502B	1.02	1.023	+0.003
MW-503B	1.00	1.01	+0.01
MW-504B	1.02	1.02	0
MW-511B	1.02	1.02	0
MW-512B	1.025	1.01	-0.015
MW-513B	1.01	1.02	+0.01
MW-514B	1.00	1.01	+0.01
MW-516B	1.02	1.02	0
MW-518B	1.03	1.02	-0.01
Mean[b]:	1.018	1.020	0.002

[a]MW-105C and MW-501B were inadvertently not measured (NM) in the field
[b]Means were calculated from 10 monitoring wells for which pre- and post-sparge measurements were made

4.9.4 Effect of Sparging on Arsenic and Chromium

Pre-sparge arsenic concentrations in deep Satilla monitoring points (Appendix G) ranged from 20 to 790 µg/L with an average of 100 µg/L (n = 30). The percent change in arsenic in the deep Satilla was evaluated by computing summary statistics for monitoring points within the sparging footprint where the pH decreased to ≤ 7.5 (Table 4-7). Arsenic decreased from an average of 71 to 26 µg/L for a percent decrease of 64%. This is almost identical to the 67% decrease (n = 4) in deep Satilla wells observed immediately after the Proof of Concept Test. Concentrations of arsenic in mid Satilla monitoring points were generally much lower than the deep Satilla. The average pre-sparge concentration in the mid Satilla ranged from 7.7 to 55 µg/L (n = 17) with an average of 20 µg/L. Post-sparge concentrations were slightly lower, ranging from 5.5 to 40 µg/L (n = 17) with an average of 18 µg/L.

Pre-sparge chromium concentrations in deep Satilla monitoring points (Appendix G) ranged from 30 to 720 µg/L with an average of 235 µg/L (n = 30). The percent change in chromium in the deep Satilla was evaluated by computing summary statistics for monitoring points within the sparging footprint where the pH was decreased to ≤ 7.5 (Table 4-7). Average chromium concentrations were essentially unchanged from pre-sparging (242 µg/L) to post-sparging (245 µg/L). Chromium showed only a slight decrease (22%) after the Proof of Concept Test (n = 4). Concentrations of chromium in the mid Satilla monitoring points were generally slightly lower than the deep Satilla. The average pre-sparge concentration of chromium in the mid Satilla ranged from 12 to 560 µg/L (n = 17) with an average of 133

µg/L. Post-sparge concentrations were slightly lower, ranging from 8.8 to 160 µg/L (n = 17) with an average of 138 µg/L. Chromium speciation in the CBP is most likely trivalent (as opposed to hexavalent) because of the large concentrations of ferrous iron and dissolved sulfide which are both known to reduce Cr(VI) to Cr(III) (Pettine et al., 1998; Pettine et al., 1994).

4.10 Effect of Sparging on Monitoring Wells West of Sparging Footprint

Eight monitoring wells to the west of the sparging footprint (MW-353B, MW-358B, MW-503B, MW-507B, MW-510B, MW-112C, and MW-113C, see Figure 1-2) were sampled as part of the pre-sparge and post-sparge sampling rounds and as part of monitoring during Phase 1 of sparging. The purpose of monitoring these wells was to determine if sparging influenced water quality outside of the sparging footprint. The pH of MW-358B, MW-353B, MW-305B, MW-507B and MW-508B were generally unaffected by CO_2 sparging. A comparison of historical and Phase 1 pH results for MW-503B, MW-358B and MW-508B are provided in Figure 4-40. Conversely, MW-112C, MW-113C and MW-510B showed some change in pH during sparging (Figure 4-41). MW-112C increased from a pre-sparge value of 8.11 to a post-sparge pH of 11.29. The pH in MW-112C has been as high as 10.5 as recently as October 2008 (Figure 4-41), suggesting that water quality near MW-112C is somewhat variable. The increase in pH in MW-112C is probably due to a small amount of movement of groundwater in this area during sparging. The pH in MW-113C decreased from a pre-sparge pH of 12.92 to a post-sparge pH of 9.08. This change in pH occurred shortly after the start of sparging, but it is highly unlikely that CO_2 gas reached as far out as MW-113C which is 462 ft from its nearest sparge well (SW-7). The historical pH in MW-113C has been as low as 9.78 in December 1995 and as high as 12.92 in September 2013, once again showing a rather large historic variation in water quality in this well. The pH of MW-510B changed quite a bit during CO_2 sparging. The pre-sparge pH of 11.33 decreased to 9.55 after three weeks of sparging, only to increase mid-way through sparging to pH 11.94, and then finally decrease to pH 10.20 after sparging was completed. MW-510B was only 57 ft from SW-23. Some effect of CO_2 sparging on the pH of this well is expected given that the average ROI was to achieve pH $\leq$ 7.5 was 32.9 ft.

Hg in the monitoring wells west of the sparging footprint stayed relatively the same in some wells and decreased in others. MW-112C, MW-507B, and MW-510B Hg levels were relatively unchanged. Hg in the remaining monitoring wells all decreased. In general, decreases in Hg in the wells to the west of the sparging footprint were associated with small decreases in pH. Most notable was the decrease in Hg in MW-113C from 45 to 3.1 µg/L. This decrease in Hg is associated with a decrease in pH from 12.92 to

a post-sparge pH of 9.08, consistent with the known pH dependence on Hg concentrations in the deep Satilla. The only exception was MW-508B which showed a decrease in Hg from 92 to 40 μg/L with an increase in pH from 6.98 to 10.07.

4.11 Effect of Sparging on Piezometric Surfaces

As in the Proof of Concept Test, the piezometric surface in the deep Satilla Aquifer, and to a lesser extent the groundwater table in the Satilla Aquifer, were influenced during sparging.

We begin with a discussion of mounding of the groundwater table. Figure 4-42 shows the changes in water level in PZ-63 during a single sparge event in SW-63 (the locations of piezometers can be found on Figure 2-4). SW-63 is 3.4 feet from PZ-63. The water level in PZ-63 began to rise nearly instantaneously after sparging began. SW-63 was run for eight hours. The water level in PZ-63 increased until it peaked four hours into sparging at 1.5 feet higher than the pre-sparge water elevation of 6.33 feet (NAVD 88). The water level in PZ-63 remained steady at its peak for three hours before the water level began to slowly decline during the final hour of sparging. PZ-63 water levels decreased for seven hours until reaching the pre-sparge level. The elevation of the ground water table in PZ-63 was a function of both radial distance and flow rate of the nearby sparge wells. The higher the flow rate was in SW-63, the higher the water elevation peaked in PZ-63. SW-61, at a radial distance of 167 feet, increased the water level in PZ-63 by 0.1 feet on December 6, 2013. The further away the sparge well was from PZ-63, the smaller the rise in water level. However, when multiple sparge wells were operating in the same region or for long durations, the superposition of mounding was more noticeable. The water level in PZ-63 experienced its largest increase in water level elevation on January 14, 2014 of two feet, or about 1 foot below ground surface, when nearby SW-63 and SW-64 were sparging simultaneously for greater than 18 hours.

The 15 shallow piezometers were checked periodically while sparging into accompanying sparge wells. There was not a single instance during sparging that resulted in the ground water table reaching the surface in these piezometers. There were, however, several instances when shallow groundwater surfaced in low-lying areas of the site within the sparging footprint. These instances were often preceded by periods of precipitation and resulted in localized standing water that either evaporated or percolated back into the ground within the sparge footprint. The long-term effect of sparging on the groundwater table was an increase in water level elevation during sparging, followed by a gradual return to pre-sparge levels.

The piezometric surface in the deep Satilla monitoring wells within the sparge footprint was strongly influenced by sparging. The piezometric surface changed as a function of sparge well flow rates and radial distance from the sparge well. Monitoring well, MW-2C, located in the deep Satilla, was outfitted with a transducer that recorded the piezometric surface throughout the sparging program. Figure 4-43 shows the effect of sparging on the piezometric surface within MW-2C for a single sparging event. SW-37 is 22.7 feet from MW-2C. The piezometric surface in MW-2C began to increase approximately 50 minutes after sparging began in SW-37, which was run for nine hours. The piezometric elevation in MW-2C increased steadily with increases in the sparge flow rate throughout the sparging event. Near the end of the sparge period, the piezometric surface reached its maximum value. The piezometric surface began to decline immediately after sparging ended. The water level in MW-2C returned to pre-sparge conditions approximately seven hours after sparging ended. Further, the water level receded for an additional five hours until it reached 3.1 feet (NAVD 88), approximately one foot below the pre-sparge water level of 4.1 feet (NAVD 88). The water level in MW-2C then began to slowly increase and approach its pre-sparge value. As in the Proof of Concept test, the rise in piezometric surface in deep Satilla wells extended outward from sparge wells for considerable distances. For example, Figure 4-44 shows two sparging events occurring at radial distances of 64 feet (SW-26) and 104 feet (SW-49). SW-49, at a radial distance of 104 feet from MW-2C, caused the piezometric surface to increase by approximately 10 feet.

As discussed in Section 2.1.3, prior to sparging, monitoring wells and piezometers within the sparging footprint were fitted with threaded caps. These threaded caps were largely effective in containing the rising waters in monitoring wells and piezometers. There were, however, several instances where an open sample port or loose fitting resulted in deep Satilla groundwater surfacing as foam or as localized standing water within the sparging footprint. In most cases, the pH of the water that came to surface had been neutralized by the sparging effort. In all cases, the standing water evaporated or percolated into the ground within the sparging footprint. There were no apparent long term effects of sparging on the piezometric surface in the deep Satilla. The piezometric surface elevation rose and fell during sparge operations but gradually returned to pre-sparge levels during rest periods. The long term hydrographs for all deep Satilla monitoring wells can be found in Appendix H.

The water levels in three pairs of monitoring wells were measured with transducers to evaluate change in head differences during Phase 1 sparging efforts to assess migration of deep Satilla water outside the sparging footprint. One well within each pair is located within the sparging footprint and one well is located west of the sparging footprint, adjacent to the marsh. The selected well pairs were MW-

501B and MW-503B, MW-513B and MW-508B, and MW-516B and MW-112C. Available groundwater levels from July 2007 and October 2009 (provided by EPS Planning Specialists, Inc.) were used to calculate the historical averages of pre-sparge head differences in each monitoring well pair, as shown in Table 4-9. Hydrographs of these paired water levels (in ft NAVD 88) are shown in Figures 4-45 through Figure 4-47. A least squares regression, linear trendline was fit to water levels obtained from monitoring well transducer data and the difference between the trendlines was taken at three points during the sparging period and then averaged. For each monitoring pair, the average head difference during sparging was insignificantly different from the historical average as shown in Table 4-8. Therefore, the data indicate that the Phase 1 sparging had an insignificant impact on sparging footprint migration as the average westerly hydraulic gradient did not appreciably change during the sparging activities.

Table 4-9: Difference in Water Levels in Selected Well Pairs

	North End of Site MW-501B to MW-503B (347 feet apart)	Center of Site MW-513B to MW-508B (366 feet apart)	South End of Site MW-516B to MW-112C (346 feet apart)
Historical Period			
July 2007	1.4	2.3	1.4
October 2009	1.4	4.3	1.2
Historical Average	**1.4**	**3.3**	**1.3**
Sparging Period			
Beginning of Sparging	1.3	2.5	1.9
Winter Rest Period	1.3	3.1	1.6
End of Sparging	1.3	3.9	1.2
Average During Sparging	**1.3**	**3.1**	**1.5**

Notes:
1. All values in units of feet (ft)
2. A positive number indicates the well within the sparging footprint had a higher water level than the well west of the sparging footprint
3. The first well in each pair is the well within the sparging footprint and the second well is located west of the sparging footprint. i.e. MW-501B is within the sparging footprint

4.12 Analysis of Pre- and Post-Short-Term Aquifer Tests

Short-term, pre- and post- sparging aquifer testing was conducted in ten of the sparge wells as set forth in the EPA-approved Sparging Work Plan. These ten sparge wells were selected because there was an existing deep Satilla monitoring well within a reasonable distance of the sparge well that could be used for monitoring drawdown. In each case, a pressure transducer was deployed in a monitoring well to measure any drawdown induced by the pumping of the sparge well. In the pre-sparging aquifer testing,

sufficient drawdown was observed in several wells, which permitted analysis of aquifer properties. In cases where insufficient drawdown was observed or where the sparge well dewatered, flow rates or specific capacities were used to evaluate changes in aquifer properties.

In the post-sparging aquifer tests, the presence of residual saturation of CO_2 gas in the aquifer profoundly affected aquifer properties, as was previously observed in the comprehensive Proof of Concept aquifer test (Mutch Associates, 2013). In the Proof of Concept aquifer test, CO_2 residual saturation in the aquifer was shown to decrease aquifer hydraulic conductivity by about 75% and substantially increase aquifer storativity. The decrease in hydraulic conductivity was primarily attributable to CO_2 gas occupying a fraction of the aquifer's pore spaces. Precipitation of silica was believed to be a secondary mechanism of hydraulic conductivity reduction. The increase in storativity is also attributable to CO_2 residual saturation.

The intrusion of CO_2 gas into pore spaces forces water out of those pore spaces and reduces groundwater saturation and groundwater relative permeability. The observed increase in aquifer storativity is attributable to the higher compressibility of entrapped CO_2 gas relative to groundwater[7]. The presence of residual saturation of CO_2 gas in the aquifer precludes aquifer test analysis using conventional methodologies. Consequently, for post-sparging aquifer testing, the Theis curve matching methodology used in the pre-sparge aquifer test analysis are not used for aquifer test analysis because they yield erroneous aquifer properties. Instead, we rely on observed pumping rates and specific capacities to evaluate the extent of any changes in aquifer properties. The increase in storativity actually *increases* the yield of some wells during early-time aquifer test pumping. This is a transient phenomenon that only manifests itself during early-time pumping of the aquifer. During long-term pumping, the influence of storativity will diminish and aquifer transmissivity would control the pumping rate. Since aquifer transmissivity is reduced by the CO_2 residual saturation (and any accompanying silica precipitation), long-term well yields would be expected to be less than pre-sparge well yields, at least until the CO_2 gas fully dissolves into the surrounding water. How long CO_2 dissolution takes is a function of a number of variables, but could vary from months to years. The pre-sparging aquifer tests yield a number of useful estimates of hydraulic conductivity of the basal Satilla formation. This data allow us to better understand the spatial variations in hydraulic conductivity within the basal Satilla formation and will be helpful in design of future sparge events.

[7] Under a unit decline in total hydraulic head, entrapped CO_2 gas expands substantially more than groundwater and consequently forces more water out of the pore spaces of the aquifer, thereby increasing aquifer storativity.

The results of the pre- and post-sparge aquifer testing of each of the ten sparge wells are presented in the following subsections.

4.12.1 Pre- and Post-Sparge Aquifer Testing of SW-4

SW-4 has an accompanying monitoring well, MW-518B, at a radial distance of 30.7 ft. A summary of pre- and post-sparge aquifer test data is in Table 4-10 below. The pre-sparge aquifer test pumped SW-4 at 0.5 gpm, which induced approximately 0.07 ft of drawdown in MW-518B at 14 minutes. The drawdown is shown in Figure 4-48. SW-4 dewatered after 14 minutes. The pre-sparge aquifer test pumped a total of 6.7 gallons, which is approximately equal to the amount of well casing storage. The pre-sparge yield of this well was therefore close to zero. In contrast, the post-sparge aquifer test pumped SW-4 at 0.5 gpm for 33 minutes, which induced 0.07 ft of drawdown in MW-518B. SW-4 did not dewater during the post-sparge aquifer test and a total of 30 gallons was pumped to the surface, with approximately 23 gallons coming from the formation. The specific capacity increased 4.4 times from the pre-sparge test value of 0.01 gpm/ft to the post-sparge test value of 0.044 gpm/ft. The increase in specific capacity is believed to be attributable to CO_2 residual saturation in the aquifer, which increases the storativity of the aquifer. The increase in storativity translates to an increase in well yield at least in the short term, when drawdown is rapidly increasing.

Table 4-10: Pre- and Post-Sparge Aquifer Test Summary for SW-4

	Pre-Sparge	**Post-Sparge**
Date tested:	8/22/13	3/1/14
Nearby monitoring well:	MW-518B	MW-518B
Radial distance to monitoring wells(s) (ft):	30.7	30.7
Test duration (min):	14	60
Average flow (gpm):	0.5	0.5
Total volume pumped (gal):	6.7	30.0
Well bore storage (gal):	7.5	7.0
Gallons pumped from aquifer (gal):	0.0	23.0
Specific capacity (gpm/ft):	0.010	0.044
Hydraulic conductivity (ft/d):	Not determined	Not determined
Notes:	Dewatered	Completed Test

4.12.2 Pre- and Post-Sparge Aquifer Testing of SW-11

SW-11 has an accompanying monitoring well, MW-516B, at a radial distance of 29.3 ft. A summary of pre- and post-sparge aquifer test data is in Table 4-11 below. The pre-sparge aquifer test pumped SW-11 at 0.4 gpm for 20 minutes. Approximately 0.14 ft of drawdown was observed in MW-516B as shown in Figure 4-49. SW-11 dewatered during the pre-sparge aquifer test after 20 minutes. The pre-sparge aquifer test pumped a total 8.8 gallons, with approximately 1.2 gallons coming from the formation. Well bore storage was calculated to be 7.6 gallons. Subsequently, the post-sparge aquifer test pumped SW-11 at 0.5 gpm, which induced negligible drawdown in MW-516B at 30 minutes. SW-11 did not dewater during the post-sparge aquifer test and pumped a total of 14 gallons, with approximately 7.1 gallons coming from the formation. The specific capacity increased four times from the pre-sparge test value of 0.009 gpm/ft to the post-sparge test value of 0.036 gpm/ft.

Table 4-11: Pre- and Post-Sparge Aquifer Test Summary for SW-11

	Pre-Sparge	**Post-Sparge**
Date tested:	8/22/13	3/2/14
Nearby monitoring well:	MW-516B	MW-516B
Radial distance to monitoring wells(s) (ft):	29.3	29.3
Test duration (min):	20	30
Average flow (gpm):	0.4	0.5
Total volume pumped (gal):	8.8	14.3
Well bore storage (gal):	7.6	7.3
Gallons pumped from aquifer (gal):	1.2	7.1
Specific capacity (gpm/ft):	0.009	0.036
Hydraulic conductivity (ft/d):	Not determined	Not determined
Notes:	Dewatered	Completed Test

4.12.3 Pre- and Post-Sparge Aquifer Testing of SW-22

SW-22 has an accompanying monitoring well, MW-511B, at a radial distance of 39.4 ft. A summary of pre- and post-sparge aquifer test data is in Table 4-12 below. The pre-sparge aquifer test pumped SW-22 at 1.7 gpm, which induced approximately 0.13 ft of drawdown in MW-511B at 60 minutes. The drawdown is shown Figure 4-50. The pre-sparge aquifer test pumped a total 101.4 gallons, with approximately 94.6 gallons coming from the formation. Well bore storage was calculated to be 6.8 gallons. Subsequently, the post-sparge aquifer test pumped SW-22 at 1.5 gpm which induced 0.05 ft of drawdown in MW-511B at 60 minutes. The post-sparge aquifer test pumped a total of 89.4 gallons, with approximately 82.2 gallons coming from the formation. The pre-sparge aquifer test yielded a hydraulic conductivity of 14 ft/d using the Theis method. The calculations and fit are shown in Figure 4-51. The specific capacity for the post-sparge aquifer test was 0.046 gpm/ft.

Table 4-12: Pre- and Post-Sparge Aquifer Test Summary for SW-22

	Pre-Sparge	Post-Sparge
Date tested:	8/23/13	3/1/14
Nearby monitoring well:	MW-511B	MW- 511B
Radial distance to monitoring wells(s) (ft):	39.4	39.4
Test duration (min):	60	60
Average flow (gpm):	1.7	1.5
Total volume pumped (gal):	101.4	89.3
Well bore storage (gal):	6.8	7.0
Gallons pumped from aquifer (gal):	94.6	82.2
Specific capacity (gpm/ft):	Not determined	0.046
Hydraulic conductivity (ft/d):	14	Not determined
Notes:	Completed Test	Completed Test

4.12.4 Pre- and Post-Sparge Aquifer Testing of SW-30

SW-30 has an accompanying monitoring well, MW-512B, at a radial distance of 15.9 ft. A summary of pre- and post-sparge aquifer test data is in Table 4-13 below. The pre-sparge aquifer test pumped SW-30 at 0.5 gpm which induced approximately 0.13 ft of drawdown in MW-512B at 60 minutes, as shown Figure 4-52. The pre-sparge aquifer test pumped a total 31.7 gallons, with approximately 24.8 gallons from the formation. Well bore storage was calculated to be 7.0 gallons. Subsequently, the post-sparge aquifer test pumped SW-30 at 0.6 gpm which induced 0.18 ft of drawdown in MW-512B at 60 minutes. The post-sparge aquifer test pumped a total of 35.4 gallons, with approximately 28.2 gallons coming from the formation. The pre-sparge aquifer test yielded a hydraulic conductivity of 2.0 ft/day using the Theis method. The calculations and fit are shown in Figure 4-53. The specific capacity for the post-sparge aquifer test was 0.042 gpm/ft.

Table 4-13: Pre- and Post-Sparge Aquifer Test Summary for SW-30

	Pre-Sparge	Post-Sparge
Date tested:	8/22/13	3/2/14
Nearby monitoring well:	MW-512B	MW-512B
Radial distance to monitoring wells(s) (ft):	15.9	15.9
Test duration (min):	61	60
Average flow (gpm):	0.5	0.6
Total volume pumped (gal):	31.7	35.4
Well bore storage (gal):	7.0	7.2
Gallons pumped from aquifer (gal):	24.8	28.2
Specific capacity (gpm/ft):	Not determined	0.042
Hydraulic conductivity (ft/d):	2.0	Not determined
Notes:	Completed Test	Completed Test

4.12.5 Pre- and Post-Sparge Aquifer Testing of SW-33

SW-33 has an accompanying monitoring well, MW-505B, at a radial distance of 18.8 ft. A summary of pre- and post-sparge aquifer test data is in Table 4-14 below. The pre-sparge aquifer test pumped SW-33 at 0.6 gpm which induced negligible drawdown in MW-505B at 19 minutes, as shown Figure 4-54. SW-33 was dewatered during the pre-sparge aquifer test in 19 minutes. The pre-sparge aquifer test pumped a total 10.5 gallons, with approximately 3.7 gallons from the formation. Well bore storage was calculated to be 6.7 gallons. In contrast, the post-sparge aquifer test pumped SW-33 at 0.7 gpm which induced 0.09 ft of drawdown in MW-505B at 34 minutes. SW-33 dewatered during the post-sparge aquifer test at 34 minutes. A total of 25.5 gallons were pumped, with approximately 18.6 gallons coming from the formation. The specific capacity increased 1.45 times from the pre-sparge test value of 0.011 gpm/ft to the post-sparge test value of 0.016 gpm/ft.

Table 4-14: Pre- and Post-Sparge Aquifer Test Summary for SW-33

	Pre-Sparge	**Post-Sparge**
Date tested:	8/23/13	2/28/14
Nearby monitoring well:	MW-505B	MW-505B
Radial distance to monitoring wells(s) (ft):	18.8	18.8
Test duration (min):	19	34
Average flow (gpm):	0.6	0.7
Total volume pumped (gal):	10.5	25.5
Well bore storage (gal):	6.7	6.9
Gallons pumped from aquifer (gal):	3.7	18.6
Specific capacity (gpm/ft):	0.011	0.016
Hydraulic conductivity (ft/d):	Not determined	Not determined
Notes:	Dewatered	Dewatered

4.12.6 Pre- and Post-Sparge Aquifer Testing of SW-43

SW-43 has an accompanying monitoring well, MW-504B, at a radial distance of 24.9 ft. A summary of pre- and post-sparge aquifer test data is in Table 4-15 below. The pre-sparge aquifer test pumped SW-43 at 0.4 gpm which induced approximately 0.09 ft of drawdown in MW-504B at 60 minutes, as shown Figure 4-55. The pre-sparge aquifer test pumped a total 21.6 gallons, with approximately 14.6 gallons from the formation. Well bore storage was calculated to be 6.7 gallons. Subsequently, the post-sparge aquifer test pumped SW-43 at 0.8 gpm which induced 0.07 ft of drawdown in MW-504B at 60 minutes. The post-sparge aquifer test pumped a total of 45.0 gallons, with approximately 38.3 gallons coming from the formation. The pre-sparge aquifer test yielded a hydraulic conductivity of 6.7 ft/d using the Theis method. The calculations and fit are shown in Figure 4-56. The specific capacity for the post-sparge aquifer test was 0.055 gpm/ft.

Table 4-15: Pre- and Post-Sparge Aquifer Test Summary for SW-43

	Pre-Sparge	**Post-Sparge**
Date tested:	8/22/13	2/28/14
Nearby monitoring well:	MW-504B	MW-504B
Radial distance to monitoring wells(s) (ft):	24.9	24.9
Test duration (min):	60	60
Average flow (gpm):	0.4	0.8
Total volume pumped (gal):	21.6	45.0
Well bore storage (gal):	7.0	6.7
Gallons pumped from aquifer (gal):	14.6	38.3
Specific capacity (gpm/ft):	Not determined	0.055
Hydraulic conductivity (ft/d):	6.7	Not determined
Notes:	Completed Test	Completed Test

4.12.7 Pre- and Post-Sparge Aquifer Testing of SW-46

SW-46 has an accompanying monitoring well, MW-502B, at a radial distance of 38 ft. A summary of pre- and post-sparge aquifer test data is in Table 4-16 below. The pre-sparge aquifer test pumped SW-46 at 0.5 gpm which induced approximately 0.02 ft of drawdown in MW-502B at 28 minutes, as shown Figure 4-57. SW-46 was dewatered during the pre-sparge aquifer test in 28 minutes. The pre-sparge aquifer test pumped a total 14.0 gallons, with approximately 7.8 gallons from the formation. Well bore storage was calculated to be 6.2 gallons. In contrast, the post-sparge aquifer test pumped SW-46 at 0.7 gpm which induced negligible drawdown in MW-502B at 65 minutes. SW-46 did not dewater during the post-sparge aquifer test and a total of 46.0 gallons were pumped, with approximately 39.8 gallons coming from the formation. The specific capacity increased 1.54 times from the pre-sparge test value of 0.011 gpm/ft to the post-sparge test value of 0.017 gpm/ft.

Table 4-16: Pre- and Post-Sparge Aquifer Test Summary for SW-46

	Pre-Sparge	**Post-Sparge**
Date tested:	8/22/13	3/1/14
Nearby monitoring well:	MW-502B	MW-502B
Radial distance to monitoring wells(s) (ft):	38	38
Test duration (min):	28	65
Average flow (gpm):	0.5	0.7
Total volume pumped (gal):	14.0	46.0
Well bore storage (gal):	6.2	6.2
Gallons pumped from aquifer (gal):	7.8	39.8
Specific capacity (gpm/ft):	0.011	0.017
Hydraulic conductivity (ft/d):	Not determined	Not determined
Notes:	Dewatered	Completed Test

4.12.8 Pre- and Post-Sparge Aquifer Testing of SW-59

SW-59 has an accompanying monitoring well, MW-513B, at a radial distance of 21 ft. A summary of pre- and post-sparge aquifer test data is in Table 4-17 below. The pre-sparge aquifer test pumped SW-59 at 0.6 gpm which induced approximately 0.01 ft of drawdown in MW-513B at 20 minutes, as shown Figure 4-58. SW-59 was dewatered during the pre-sparge aquifer test in 20 minutes. The pre-sparge aquifer test pumped a total 12.4 gallons, with approximately 5.5 gallons from the formation. Well bore storage was calculated to be 6.9 gallons. In contrast, the post-sparge aquifer test pumped SW-59 at 0.4 gpm which induced 0.08 ft of drawdown in MW-513B at 30 minutes. SW-59 did not dewater during the post-sparge aquifer test and a total of 13.5 gallons were pumped, with approximately 6.8 gallons coming from the formation. The specific capacity increased 2-times from the pre-sparge test value of 0.01 gpm/ft to the post-sparge test value of 0.02 gpm/ft.

Table 4-17: Pre- and Post-Sparge Aquifer Test Summary for SW-59

	Pre-Sparge	**Post-Sparge**
Date tested:	8/22/13	3/2/14
Nearby monitoring well:	MW-513B	MW-513B
Radial distance to monitoring wells(s) (ft):	21	21
Test duration (min):	20	30
Average flow (gpm):	0.6	0.4
Total volume pumped (gal):	12.4	13.5
Well bore storage (gal):	6.9	6.6
Gallons pumped from aquifer (gal):	5.5	6.8
Specific capacity (gpm/ft):	0.010	0.020
Hydraulic conductivity (ft/d):	Not determined	Not determined
Notes:	Dewatered	Completed Test

4.12.9 Pre- and Post-Sparge Aquifer Testing of SW-61

SW-61 has an accompanying monitoring well, MW-514B, at a radial distance of 17 ft. A summary of pre- and post-sparge aquifer test data is in Table 4-18 below. The pre-sparge aquifer test pumped SW-61 at 0.7 gpm which induced negligible drawdown in MW-514B at 16 minutes, as shown Figure 4-59. SW-61 was dewatered during the pre-sparge aquifer test in 16 minutes. The pre-sparge aquifer test pumped a total 10.4 gallons, with approximately 3.6 gallons from the formation. Well bore storage was calculated to be 6.8 gallons. In contrast, the post-sparge aquifer test pumped SW-61 at 0.5 gpm which induced 0.06 ft of drawdown in MW-514B at 60 minutes. SW-61 did not dewater during the post-sparge aquifer test and a total of 32.6 gallons were pumped, with approximately 26.0 gallons coming

from the formation. The specific capacity increased 2.5-times from the pre-sparge test value of 0.013 gpm/ft to the post-sparge test value of 0.033 gpm/ft.

Table 4-18: Pre- and Post-Sparge Aquifer Test Summary for SW-61

	Pre-Sparge	**Post-Sparge**
Date tested:	8/22/13	3/1/14
Nearby monitoring well:	MW-514B	MW-514B
Radial distance to monitoring wells(s) (ft):	17	17
Test duration (min):	16	60
Average flow (gpm):	0.7	0.5
Total volume pumped (gal):	10.4	32.6
Well bore storage (gal):	6.8	6.7
Gallons pumped from aquifer (gal):	3.6	26.0
Specific capacity (gpm/ft):	0.013	0.033
Hydraulic conductivity (ft/d):	Not determined	Not determined
Notes:	Dewatered	Completed Test

Table 4-19: Pre- and Post-Sparge Aquifer Test Summary for SW-63

	Pre-Sparge	**Post-Sparge**
Date tested:	8/22/13	3/1/14
Nearby monitoring well:	MW-501B	MW-501B
Radial distance to monitoring wells(s) (ft):	9.9	9.9
Test duration (min):	61	60
Average flow (gpm):	0.6	0.6
Total volume pumped (gal):	37.2	37.8
Well bore storage (gal):	7.1	6.8
Gallons pumped from aquifer (gal):	30.1	31.0
Specific capacity (gpm/ft):	Not determined	0.038
Hydraulic conductivity (ft/d):	17	Not determined
Notes:	Completed Test	Completed Test

4.12.10 Pre- and Post-Sparge Aquifer Testing of SW-63

SW-63 has an accompanying monitoring well, MW-501B, at a radial distance of 9.9 ft. A summary of pre- and post-sparge aquifer test data is in Table 4-19 above. The pre-sparge aquifer test pumped SW-63 at 0.6 gpm which induced approximately 0.08 ft of drawdown in MW-501B at 61 minutes, as shown Figure 4-60. The pre-sparge aquifer test pumped a total 37.2 gallons, with approximately 30.1 gallons from the formation. Well bore storage was calculated to be 7.1 gallons. Subsequently, the post-sparge aquifer test pumped SW-63 at 0.6 gpm which induced 0.07 ft of drawdown in MW-501B at 60 minutes. The post-sparge aquifer test pumped a total of 37.8 gallons, with

approximately 31.0 gallons coming from the formation. The pre-sparge aquifer test yielded a hydraulic conductivity of 17 ft/d using the Theis method. The calculations and fit are shown in Figure 4-61. The specific capacity for the post-sparge aquifer test was 0.038 gpm/ft.

4.12.11 Summary of Pre- and Post-Sparging Aquifer Testing Results

The following conclusions can be drawn from the pre-and post-sparging aquifer testing:

1. No sharp loss of aquifer transmissivity was observed. Although, the presence of CO_2 residual saturation in the aquifer precludes direct analysis of aquifer properties by conventional methods in the post-sparging tests, the yields and specific capacities of the sparge wells were only moderately different. In fact, the residual saturation of CO_2 actually increased short-term yields and specific capacities of many of the wells for reasons described above. The mean of six pre-sparge specific capacities was 0.011 gpm/ft. The mean of ten post-sparge specific capacities was 0.035 gpm/ft.
2. The 2013 pre-sparge aquifer testing indicated that the basal Satilla varies in hydraulic conductivity within the CBP from 2 to 17 ft/d, with a mean value of 9.9 ft/d. The Proof of Concept pre-sparging aquifer test had previously measured a hydraulic conductivity of 8.9 ft/d in that area of the CBP. The 2012 Proof of Concept Test indicated that pre-sparge transmissivity was reduced by 75% principally due to CO_2 residual saturation. The results of the Phase 1 pre- and post-sparge aquifer testing, while not as definitive as the more highly instrumented Proof of Concept Test aquifer testing, do not suggest that any substantially different behavior occurred during the Year 1 sparging. Sparge wells maintained both their CO_2 gas injection rates and their groundwater pumping yields.

As the CO_2 residual saturation dissolves into the surrounding groundwater, a process that could take months or years, aquifer properties should concomitantly approach pre-sparge levels, except for whatever impact silica or other precipitates have had on those properties. Our experience to date, specifically the Proof of Concept test and these recent post-sparge aquifer tests, does not suggest that these latter impacts are of concern.

5 CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

A summary of the key results is presented below:

- All of the technical objectives of Phase 1 of CO_2 sparging were met.
- Sparging was effective in reducing the pH of the CBP groundwater. Following Phase 1 of sparging, 14 out of 15 deep Satilla monitoring points within a radial distance of 30 ft from a sparge well had a post-sparge pH < 10.0, and 13 out of 15 monitoring points had a post-sparge pH < 7.5. Many points at distances greater than 30 ft showed significant decreases in pH.
- An average ROI of 32.9 ft was estimated from the pH versus distance data. This is considerably larger than the 20 to 24 ft ROI measured in the Proof of Concept Test.
- The optimal sparging regimen was Regimen A (once per week), although a longer break between successive sparge events is acceptable if scheduling requires it. Some sparge wells required longer sparge durations of 8 to 24 hours to provide adequate flow.
- The efficiency of CO_2 sparging was evaluated by comparing the CO_2 demand of the CBP with the amount of CO_2 mass required to lower the pH to circumneutral and found to be 29%. This efficiency is approximately three times larger than the efficiency estimated from the Proof of Concept Test (9.7%). The presence of residual CO_2 saturation within the aquifer has potential for continued reduction in pH and mercury long after sparging has ceased.
- CO_2 sparging resulted in a significant decline in aqueous-phase Hg concentrations. In monitoring points where post-sparge pH was less than 7.5, the average Hg concentration decreased from 94 μg/L to 21 μg/L (n = 22), a decrease of 78%.
- The pre-and post-sparging aquifer testing showed no sharp loss of aquifer transmissivity. The mean of six pre-sparge specific capacities was 0.011 gpm/ft. The mean of ten post-sparge specific capacities measured approximately two weeks after sparging was 0.035 gpm/ft.
- The pre-sparge aquifer testing indicated that the basal Satilla varies in hydraulic conductivity within the CBP from 2 to 17 ft/d, with a mean value of 9.9 ft/d. The Proof of Concept pre-sparging aquifer test had previously measured a hydraulic conductivity of 8.9 ft/d in that area of the CBP.
- A significant fraction of the injected CO_2 remained in the formation as residual CO_2 saturation and was not vented to the atmosphere. The emplacement of CO_2 residual saturation into the Satilla provides a long-term source of pH-neutralization and mercury precipitation for water flowing from upgradient locations. This may also serve as protection against pH rebound.

- As the CO_2 residual saturation dissolves into the surrounding groundwater, a process that could take months or years, aquifer properties such as hydraulic conductivity and storativity should concomitantly approach pre-sparge levels, except for whatever impact the minimal reduction in porosity may have on these properties. Our experience to date, specifically the Proof of Concept test and these recent post-sparge aquifer tests, does not suggest that these latter impacts are of particular concern.

5.2 Recommendations

The following are recommended for the Phase 2 sparging:

- Given that the actual average ROI achieved in the Phase 1 full-scale implementation was 32.9 ft, further evaluation of well layout and spacing is warranted. Also, additional pH monitoring scheduled for 5-months post-sparging (refer to the Technical memo *Post-sparge pH monitoring and Geoprobe transects, dated June 20, 2014*) may provide useful information for Phase 2 sparge well placement and implementation within the Phase 1 sparging footprint, and in the area southwest of SW-7.
- A formal sampling round should be conducted approximately 7 months after cessation of Phase 1 sparging to serve as post-sparge monitoring and pre-Phase 2 baseline monitoring.
- The recommended sparging regimen for the next phase of sparging is once per week (Regimen A), however sparging at longer intervals is also acceptable if required.
- Sparge wells should be scheduled for durations longer than 4 hours where necessary to provide adequate mass flows of CO_2.
- An overall mass of at least 8,000 to 9,000 lb of CO_2 per sparge well is required in moderate alkalinity areas, and 1.5 to 2.0 times this amount in high alkalinity area is estimated to be required to meet treatment objectives.

6 REFERENCES

Delignette-Muller, M.L., Pouillot, R., Denis, J.-B., Dutang, C. (2014). fitdistrplus: help to fit of a parametric distribution to non-censored or censored data.

GeoSyntec Consultants (1997). Remedial Investigation Report Ground Water Operable Unit Volume I LCP Chemicals Brunswick, Georgia.

Gustafsson, J.P. (2011). Visual MINTEQ ver. 3.0. KTH, Department of Land and Water Resources Engineering.

Helsel, D.R. (2012). Statistics for censored environmental data using Minitab and R. Wiley-Blackwell, Oxford.

Jay, J.A., Morel, F.M.M., Hemond, H.F. (2000). Mercury speciation in the presence of polysulfides. *Environ. Sci. Technol.* 34, 2196-2200.

Mutch Associates (2012). Final Work Plan for CO_2 Sparging Proof of Concept Test.

Mutch Associates, Parsons (2013a). CO_2 Sparging Work Plan, LCP Chemicals Site, Brunswick, GA.

Mutch Associates, Parsons (2013b). CO_2 Sparging: Proof Of Concept Test Report.

Parkhurst, D.L., Appelo, C.A.J. (2013). Description of Input and Examples for PHREEQC Version 3—A Computer Program for Speciation, Batch-Reaction, One-Dimensional Transport, and Inverse Geochemical Calculations, Chapter 43 of Section A, Groundwater Book 6, Modeling Techniques. USGS.

Pettine, M., D'Ottone, L., Campanella, L., Millero, F.J., Passino, R. (1998). The reduction of chromium(VI) by iron(II) in aqueous solutions. *Geochim. Cosmochim. Acta* 62, 1509-1519.

Pettine, M., Millero, F.J., Passino, R. (1994). Reduction of chromium(VI) with hydrogen-sulfide in NaCl media. *Marine Chem.* 46, 335-344.

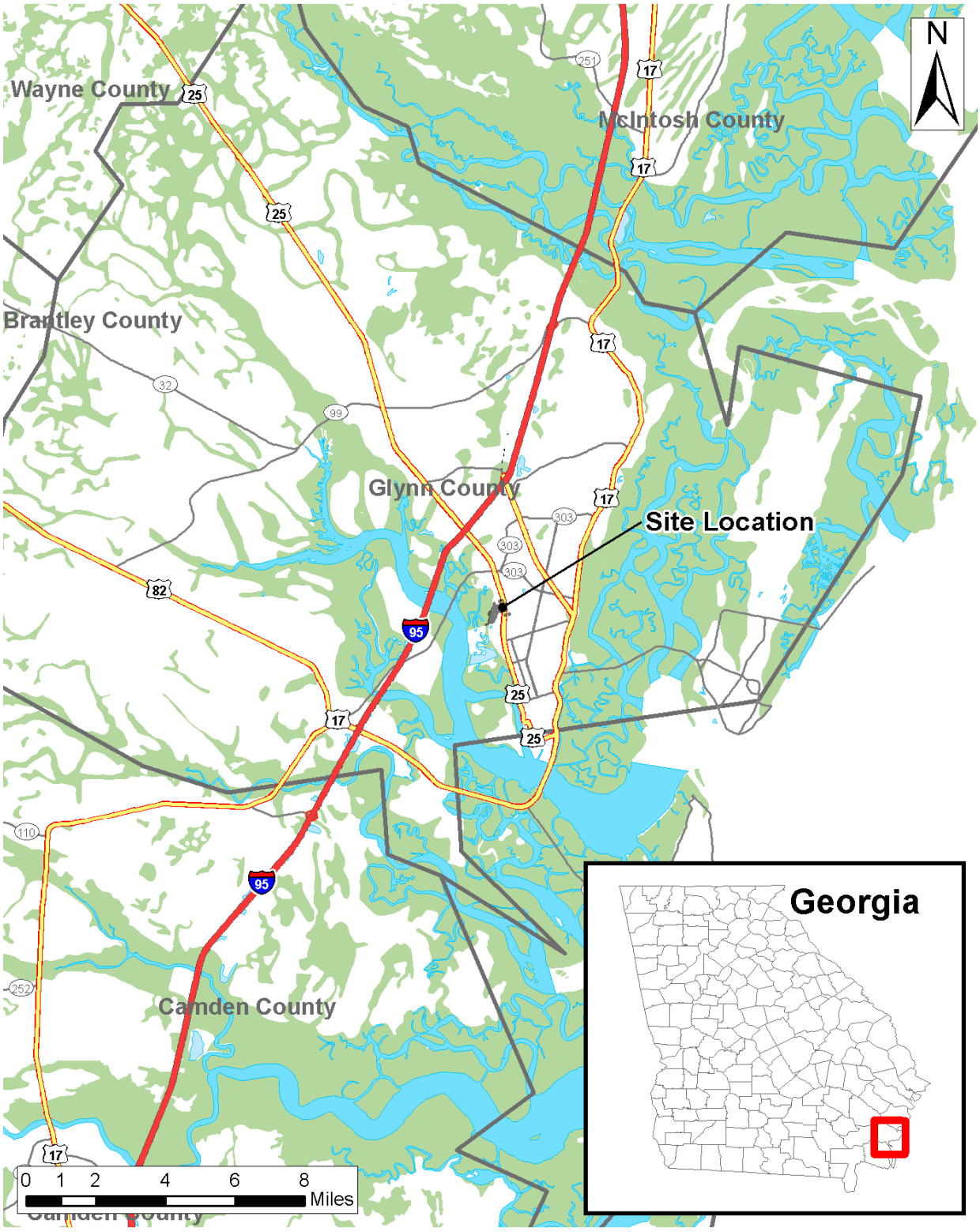
R Core Team (2013). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria.

Skyllberg, U. (2008). Competition among thiols and inorganic sulfides and polysulfides for Hg and MeHg in wetland soils and sediments under suboxic conditions: Illumination of controversies and implications for MeHg net production. *J. Geophys. Res.* 113, G00C03.

Suthersan, S.S. (1997). Remediation Engineering: Design Concepts. CRC Press.

USEPA (2013). SESD Operating Procedure Groundwater Sampling.

Yeskis, D., Zavala, B. (2002). Ground-Water Sampling Guidelines for Superfund and RCRA Project Managers. USEPA.

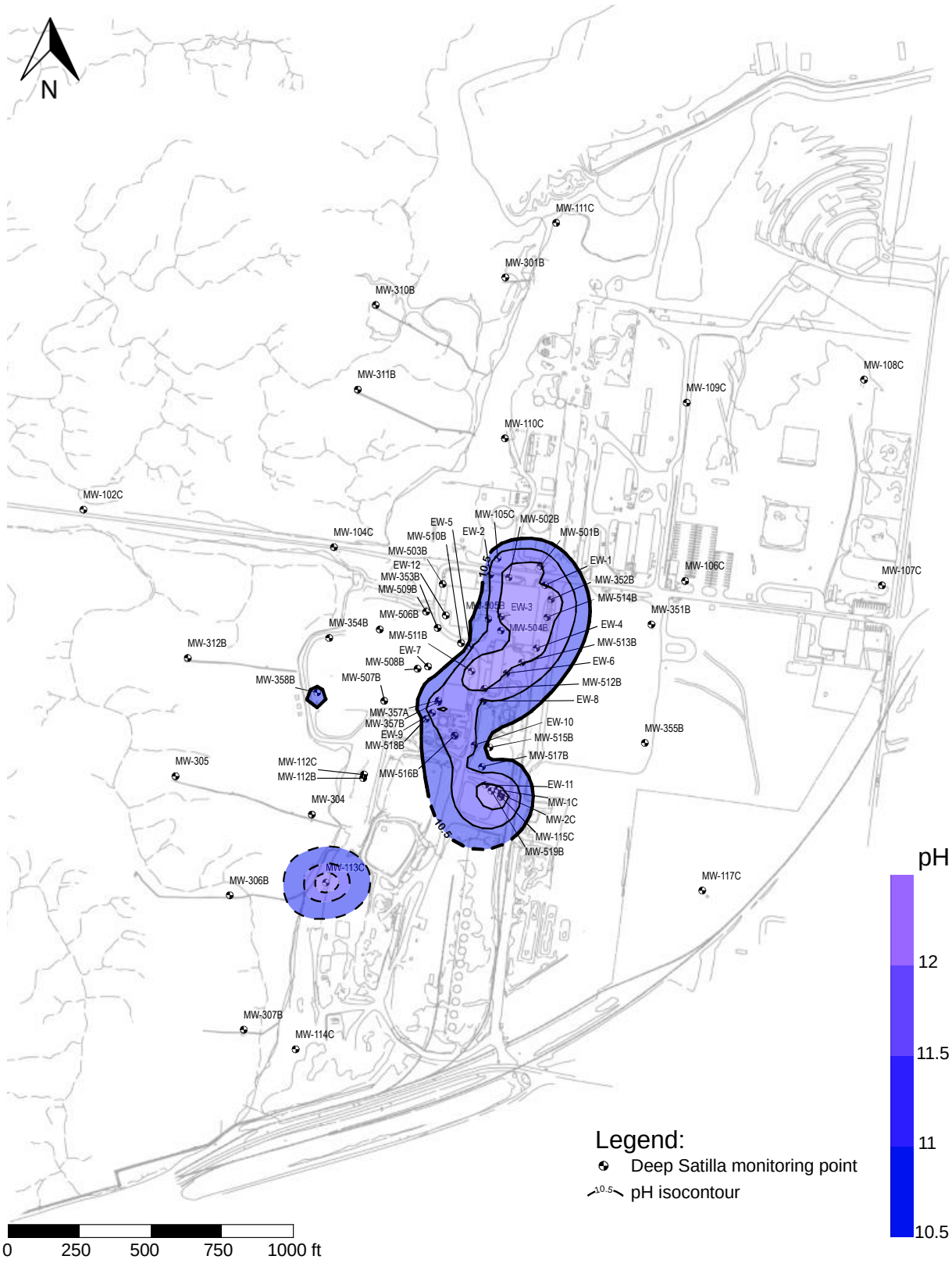


Site location map.

FIGURE 1-1

LCP Chemicals Site, Brunswick, GA

Mutch Associates, LLC
Environmental Engineers and Scientists

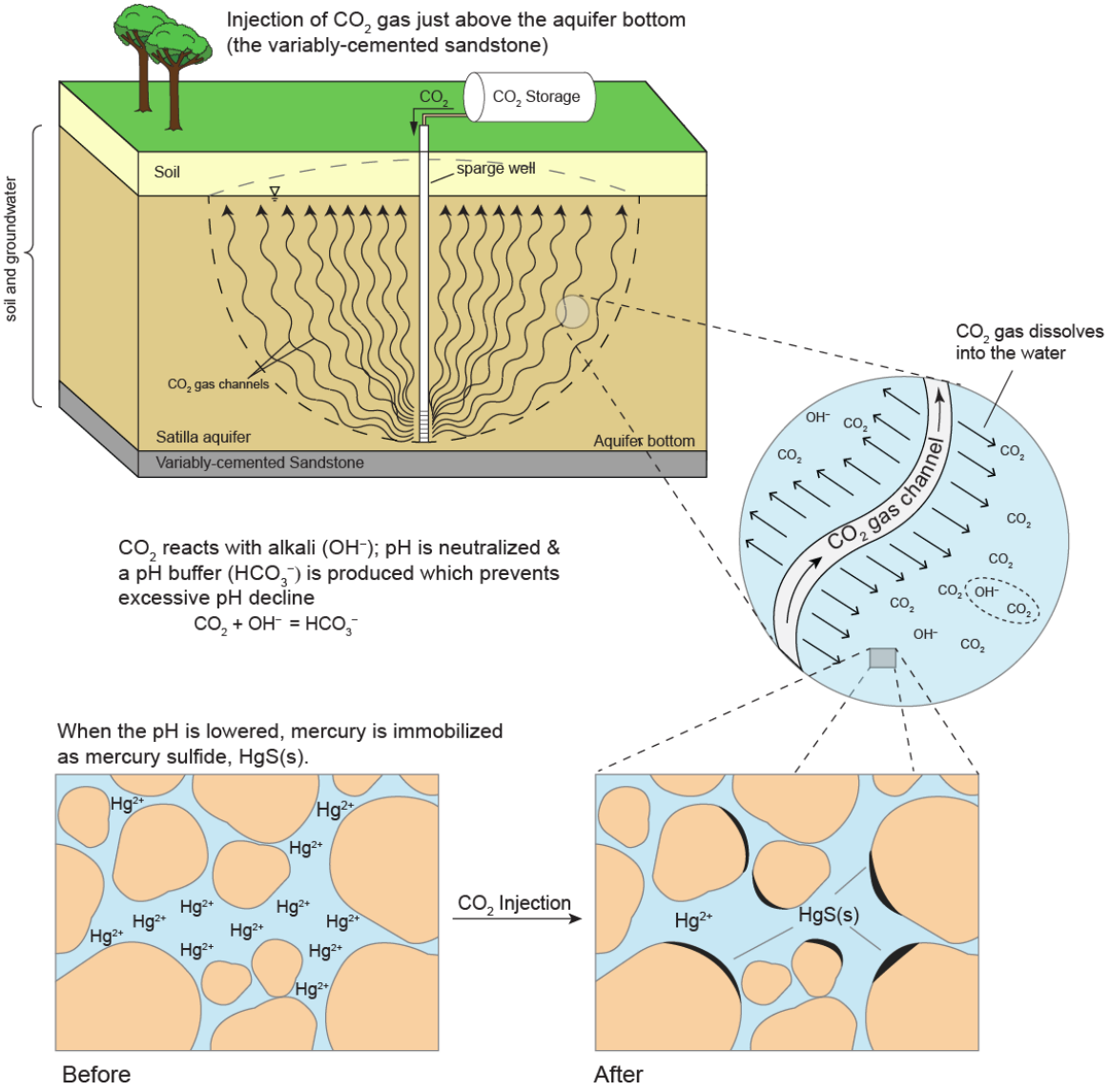


Contours of pH showing the location of the CBP in 2012.

FIGURE 1-2

LCP Chemicals Site, Brunswick, GA

Mutch Associates, LLC
Environmental Engineers and Scientists



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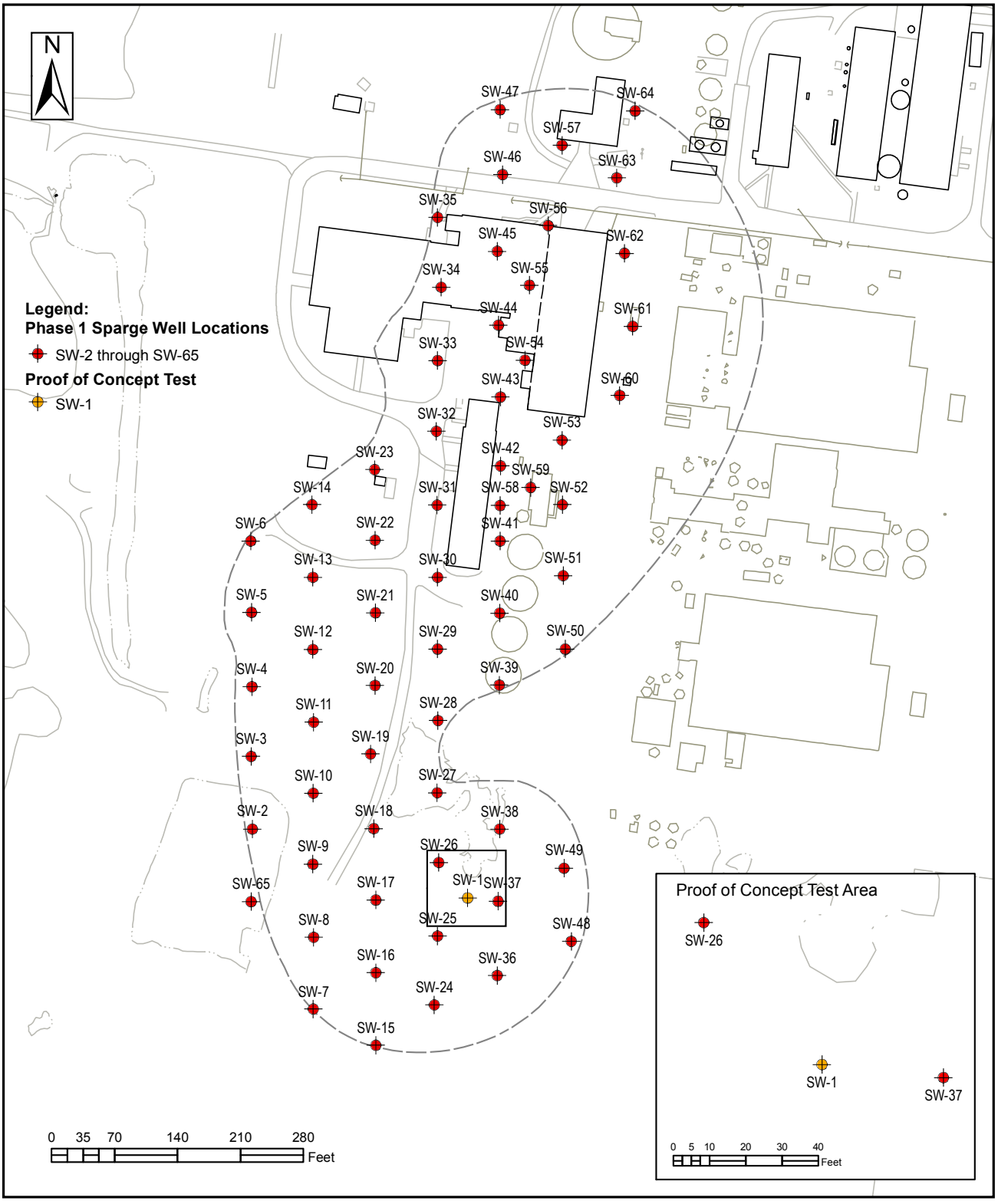
Conceptual model of CO_2 sparging.

FIGURE 1-3

LCP Chemicals Site, Brunswick, GA

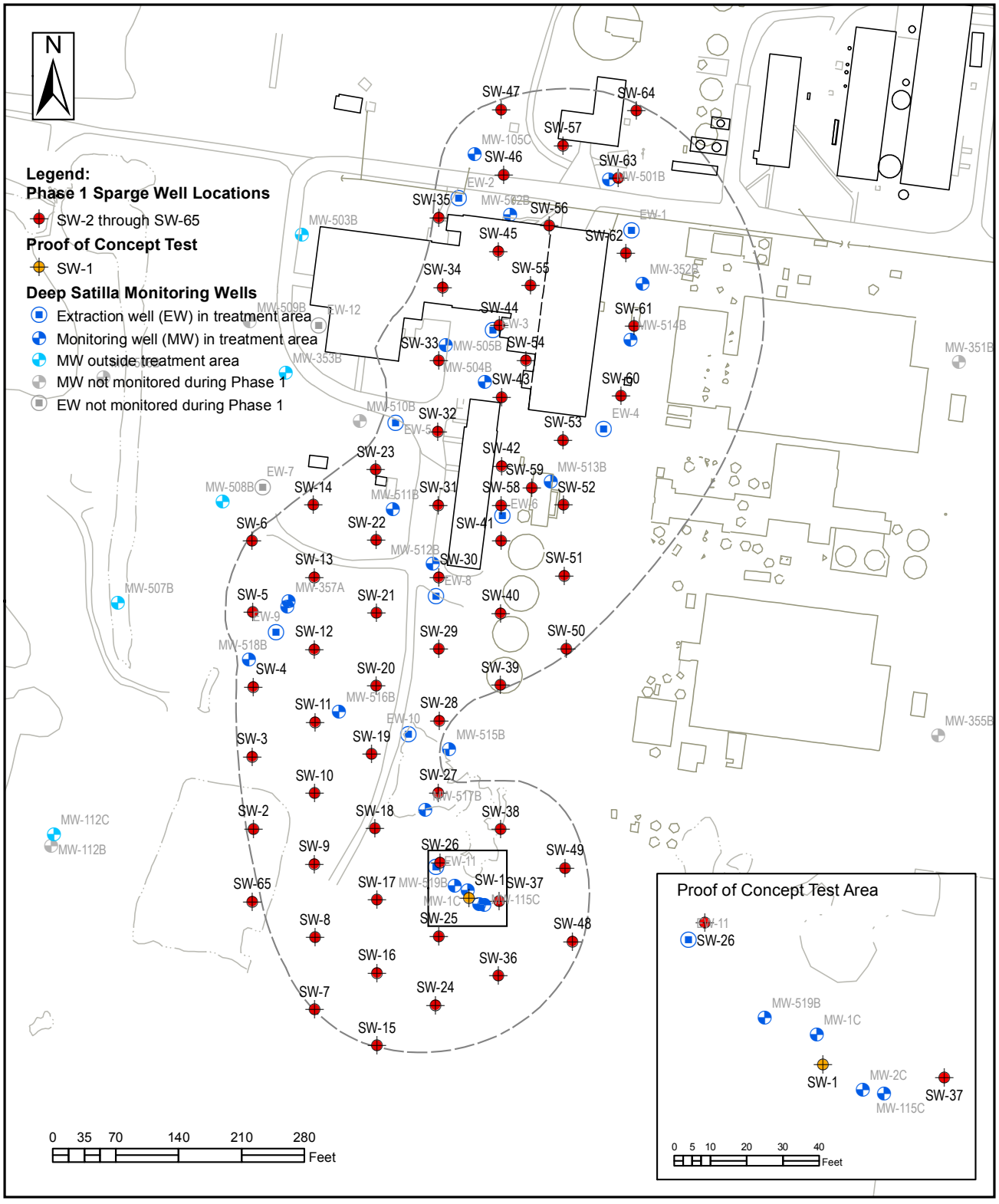


Location of 64 sparge wells installed as part of Phase 1 of CO_2 sparging.

FIGURE 2-1

LCP Chemicals Site, Brunswick, GA

Mutch Associates, LLC
Environmental Engineers and Scientists

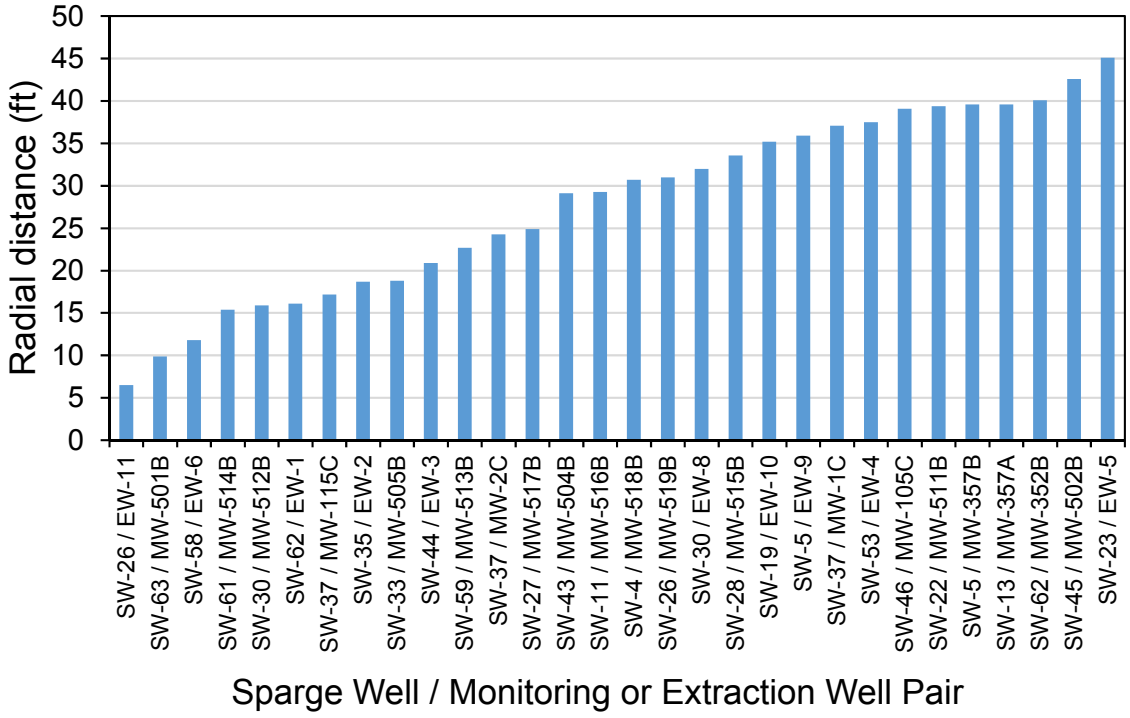


Mutch Associates, LLC
Environmental Engineers and Scientists

Monitoring well network used to evaluate performance of Phase 1 of CO_2 sparging.

FIGURE 2-2

LCP Chemicals Site, Brunswick, GA



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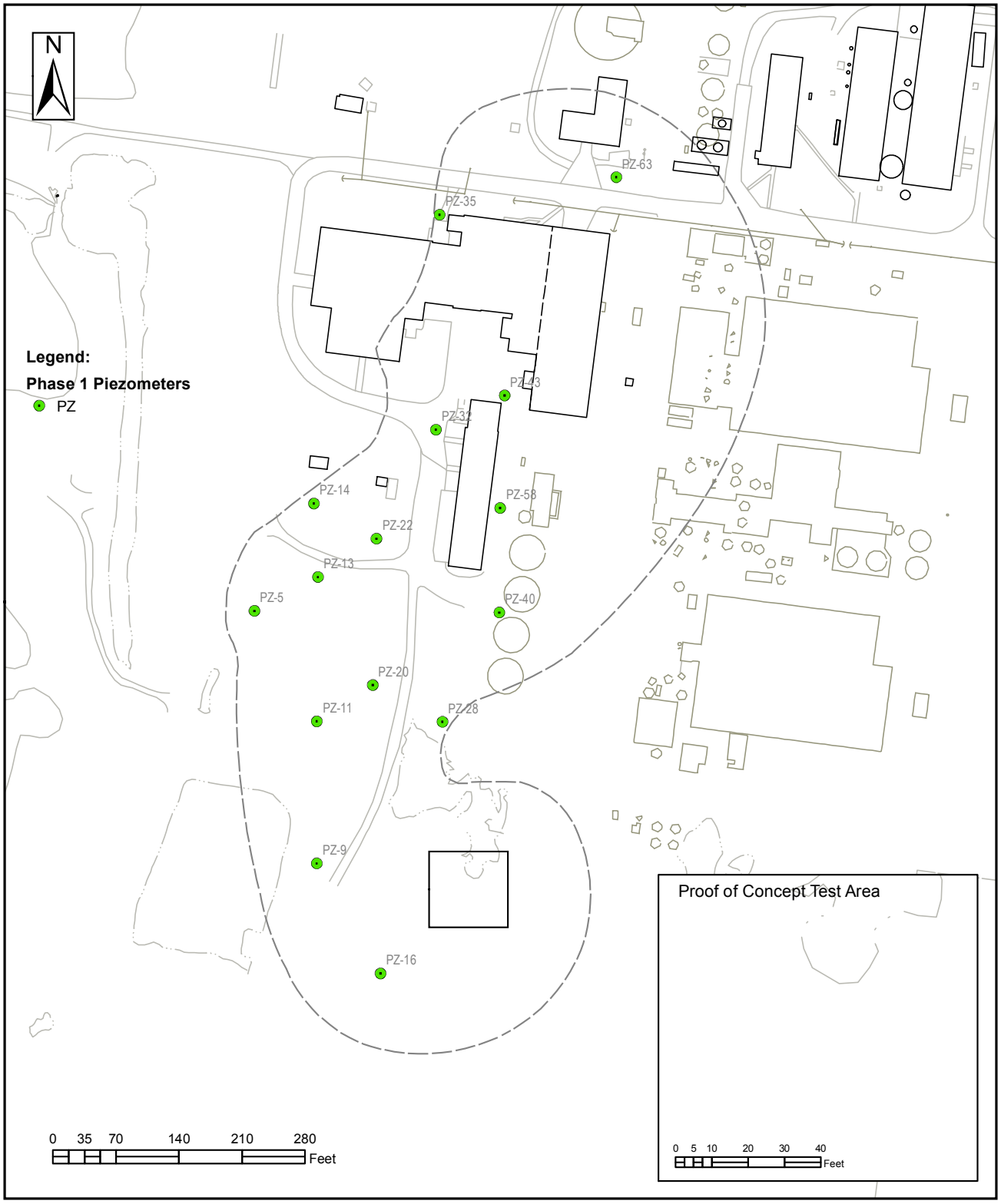
Environmental Engineers and Scientists

Sparge well distances to nearest monitoring points (monitoring wells and extraction wells).

FIGURE 2-3

LCP Chemicals Site, Brunswick, GA



Locations of piezometers installed as part of Phase 1 CO_2 sparging.

FIGURE 2-4

LCP Chemicals Site, Brunswick, GA

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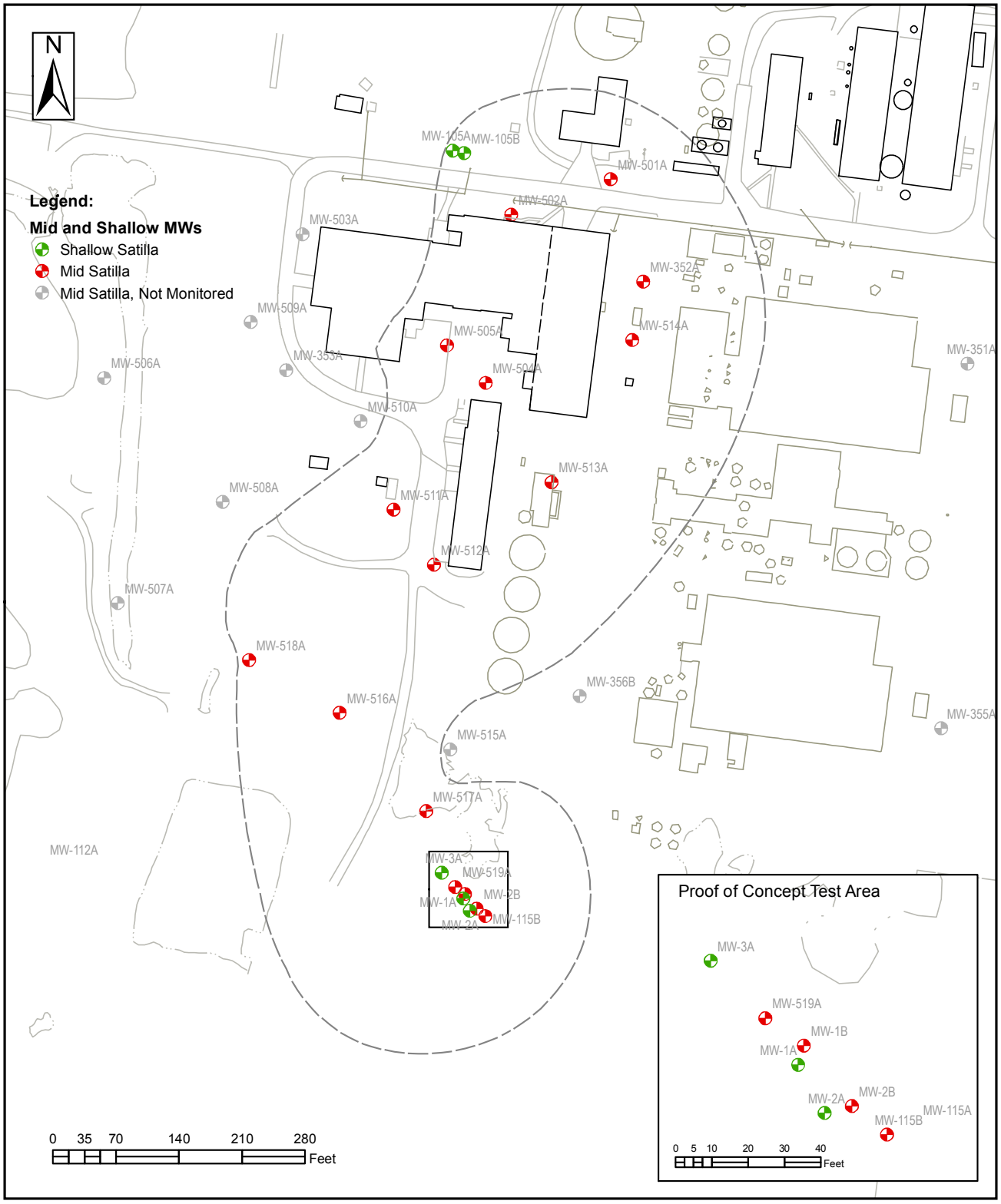
Environmental Engineers and Scientists



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Locations of mid and shallow Satilla monitoring wells.

FIGURE 2-5

LCP Chemicals Site, Brunswick, GA

Typical monitoring well completion (shown for MW-1C).

FIGURE 2-6

Mutch Associates, LLC
Environmental Engineers and Scientists

LCP Chemicals Site, Brunswick, GA

N

HWWEST1
SW-47
SW-64
SITE UTILITIES
DP-1
MW-105A
MW-105B
MW-105C
SW-57
SW-46
MW-501B
PZ-63
SW-63
MW-501A
ELEVATED PAD WITH STORAGE AND VAPORIZATION EQUIPMENT
MW-502A
MW-502B
EW-2
SW-35
PZ-35
SW-56
MW-503A
MW-503B
EW-1
SW-45
SW-62
HWEAST2
MW-352D
MW-352A
MW-352B
SW-55
SW-34
HWWEST2
DP-2
MW-509B
MW-509A
SW-44
SW-61
EW-12
EW-3
MW-514A
MW-514B
MW-505B
MW-505A
DP-3
SW-33
SW-54
MW-353A
MW-353B
SITE UTILITIES
MW-506B
MW-506A
MW-504B
MW-504A
PZ-43
SW-43
SW-60
MW-510B
MW-510A
PZ-32
SW-32
EW-5
SITE UTILITIES
SW-53
EW-4
4 INCH CS
HWEAST3
SW-42
SW-23
HWWEST3
MW-513A
MW-513B
SW-59
MW-508B
MW-508A
EW-7
PZ-14
SW-14
MW-511B
MW-511A
SW-31
SW-58
PZ-58
EW-6
SW-52
PZ-22
SW-22
SW-6
SW-41
2 INCH LATERAL (TYP)
DISTRIBUTION PANEL (TYP)
MW-512B
MW-512A
DP-4
PZ-13
SW-13
SW-30
SW-51
DP-5
MW-507A
MW-507B
EW-13
MW-357A
MW-357B
PZ-5
SW-5
SW-21
EW-8
PZ-40
SW-40
4 INCH HDPE
HISTORICAL SITE FEATURES (DASHED, TYP)
EW-9
SW-12
SW-29
SW-50
MW-518A
MW-518B
MW-360D
PZ-20
SW-20
SW-39
MW-356A
MW-356B
HWEAST4
SW-4
MW-516B
MW-516A
PZ-11
SW-11
HWWEST4
SW-28
PZ-28
EW-10
MW-515A
MW-515B
SW-19
SW-3
SW-10
SW-27
MW-517A
MW-517B
DP-8
SW-2
DP-6
SW-18
SW-38
160' RADIUS FROM DISTRIBUTION PANEL (TYP)
SITE UTILITIES
MW-1121C
MW-112B
MW-112A
PZ-9
SW-9
EW-11
SW-26
MW-3A
SW-49
MW-519A
MW-519B
MW-1C
MW-2C
MW-1B
MW-1A
SW-1
MW-115D
SW-17
SW-37
MW-115C
MW-2A
MW-115A
MW-2B
MW-115B
SW-65
SW-25
SW-8
SW-48
HWWEST5
PZ-16
SW-16
DP-7
SW-36
HWEAST5
SW-7
SW-24
SW-15

LEGEND:

- DP-3 — DISTRIBUTION PANEL
- SW-48 — CO_2 SPARGING WELL
- PIEZOMETER
- MW-352D — MONITORING WELL
- EW-1 — EXTRACTION WELL

30 15 0 30 60

SCALE: 1"=30'

NO.	DESCRIPTION	DATE	DRAWN	CHK'D	APPV'D
B	FOR INFORMATION ONLY	4/15/14	JTS		
A	FOR INFORMATION ONLY	10/23/13	JTS		

PROJECT TITLE

Honeywell

BRUNSWICK LCP FACILITY

CARBON DIOXIDE SPARGING SYSTEM

BRUNSWICK, GEORGIA

PARSONS
ENVIRONMENT AND INFRASTRUCTURE

OFFICE
301 PLAINFIELD ROAD
SYRACUSE, NY 13212
(315) 451-9560

JOB 448434

WBS

DRAWING TITLE

FIGURE 2-7
SITE OPERATIONS PLAN

SCALE 1"=30'-0"

DRAWING NO. SK-448434-C-001

REV. B

FILE NAME: P:\HONEYWELL\447567-BRUNSWICK-PROOF OF CONCEPT STUDY\10 TECHNICAL CATEGORIES\ENGR\CAD\CIVIL\447567-C-001-002-003_OPERATIONS-1.DWG
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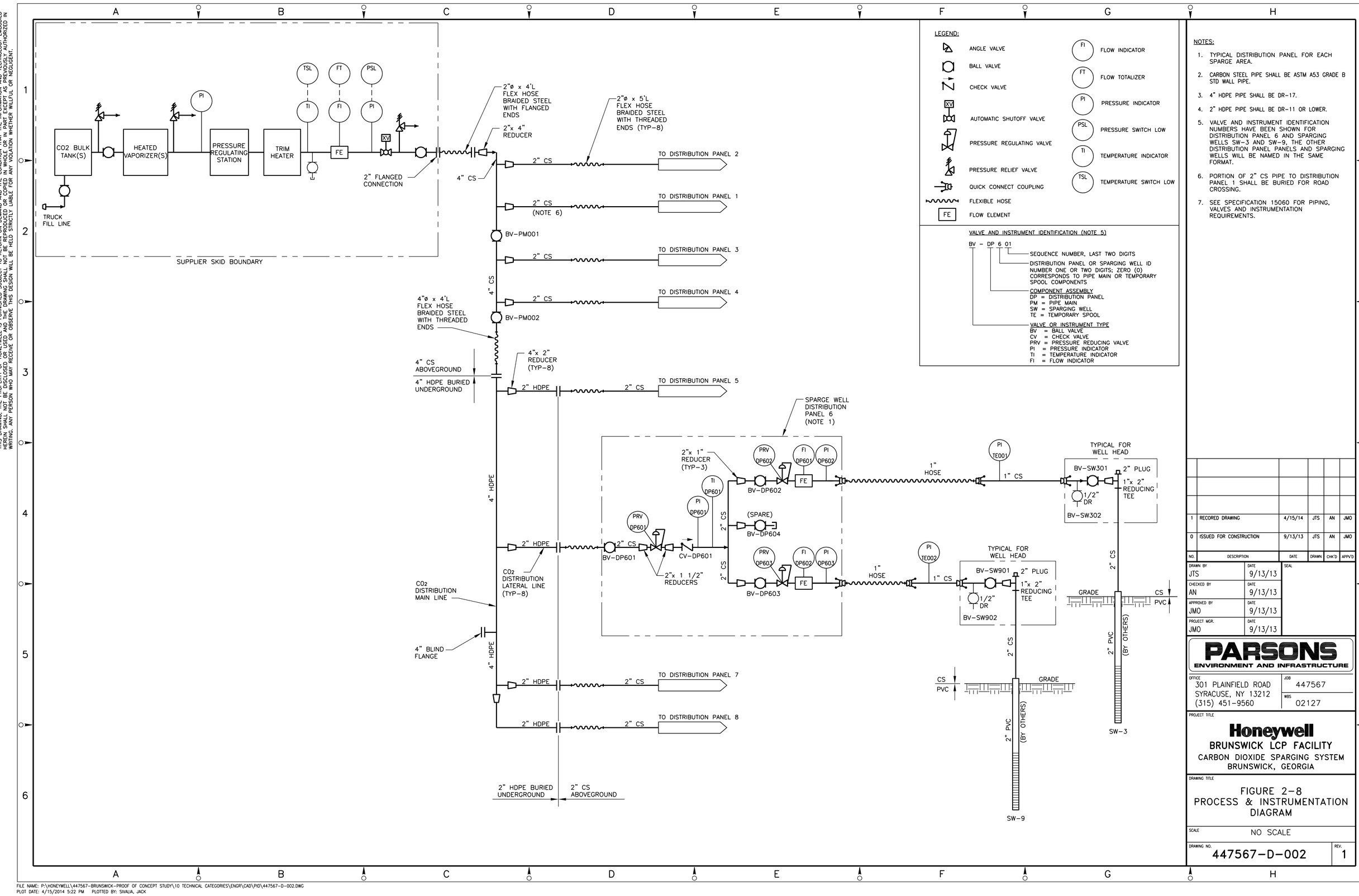

LEGEND:

- ANGLE VALVE
- BALL VALVE
- CHECK VALVE
- XV — AUTOMATIC SHUTOFF VALVE
- PRESSURE REGULATING VALVE
- PRESSURE RELIEF VALVE
- QUICK CONNECT COUPLING
- FLEXIBLE HOSE
- FE — FLOW ELEMENT
- FI — FLOW INDICATOR
- FT — FLOW TOTALIZER
- PI — PRESSURE INDICATOR
- PSL — PRESSURE SWITCH LOW
- TI — TEMPERATURE INDICATOR
- TSL — TEMPERATURE SWITCH LOW

VALVE AND INSTRUMENT IDENTIFICATION (NOTE 5)

BV - DP 6 01

- SEQUENCE NUMBER, LAST TWO DIGITS
- DISTRIBUTION PANEL OR SPARGING WELL ID NUMBER ONE OR TWO DIGITS; ZERO (0) CORRESPONDS TO PIPE MAIN OR TEMPORARY SPOOL COMPONENTS

COMPONENT ASSEMBLY
DP = DISTRIBUTION PANEL
PM = PIPE MAIN
SW = SPARGING WELL
TE = TEMPORARY SPOOL

VALVE OR INSTRUMENT TYPE
BV = BALL VALVE
CV = CHECK VALVE
PRV = PRESSURE REDUCING VALVE
PI = PRESSURE INDICATOR
TI = TEMPERATURE INDICATOR
FI = FLOW INDICATOR

NOTES:

1. TYPICAL DISTRIBUTION PANEL FOR EACH SPARGE AREA.
2. CARBON STEEL PIPE SHALL BE ASTM A53 GRADE B STD WALL PIPE.
3. 4" HDPE PIPE SHALL BE DR-17.
4. 2" HDPE PIPE SHALL BE DR-11 OR LOWER.
5. VALVE AND INSTRUMENT IDENTIFICATION NUMBERS HAVE BEEN SHOWN FOR DISTRIBUTION PANEL 6 AND SPARGING WELLS SW-3 AND SW-9, THE OTHER DISTRIBUTION PANEL PANELS AND SPARGING WELLS WILL BE NAMED IN THE SAME FORMAT.
6. PORTION OF 2" CS PIPE TO DISTRIBUTION PANEL 1 SHALL BE BURIED FOR ROAD CROSSING.
7. SEE SPECIFICATION 15060 FOR PIPING, VALVES AND INSTRUMENTATION REQUIREMENTS.

NO.	DESCRIPTION	DATE	DRAWN	CHK'D	APPV'D
1	RECORED DRAWING	4/15/14	JTS	AN	JMO
0	ISSUED FOR CONSTRUCTION	9/13/13	JTS	AN	JMO

DRAWN BY	JTS	DATE	9/13/13
CHECKED BY	AN	DATE	9/13/13
APPROVED BY	JMO	DATE	9/13/13
PROJECT MGR.	JMO	DATE	9/13/13

SEAL

PARSONS
ENVIRONMENT AND INFRASTRUCTURE

OFFICE
301 PLAINFIELD ROAD
SYRACUSE, NY 13212
(315) 451-9560

JOB 447567
WBS 02127

PROJECT TITLE
Honeywell
BRUNSWICK LCP FACILITY
CARBON DIOXIDE SPARGING SYSTEM
BRUNSWICK, GEORGIA

DRAWING TITLE
FIGURE 2-8
PROCESS & INSTRUMENTATION DIAGRAM

SCALE NO SCALE

DRAWING NO. 447567-D-002

REV. 1

FILE NAME: P:\HONEYWELL\447567-BRUNSWICK-PROOF OF CONCEPT STUDY\10 TECHNICAL CATEGORIES\ENGR\CAD\PID\447567-D-002.DWG
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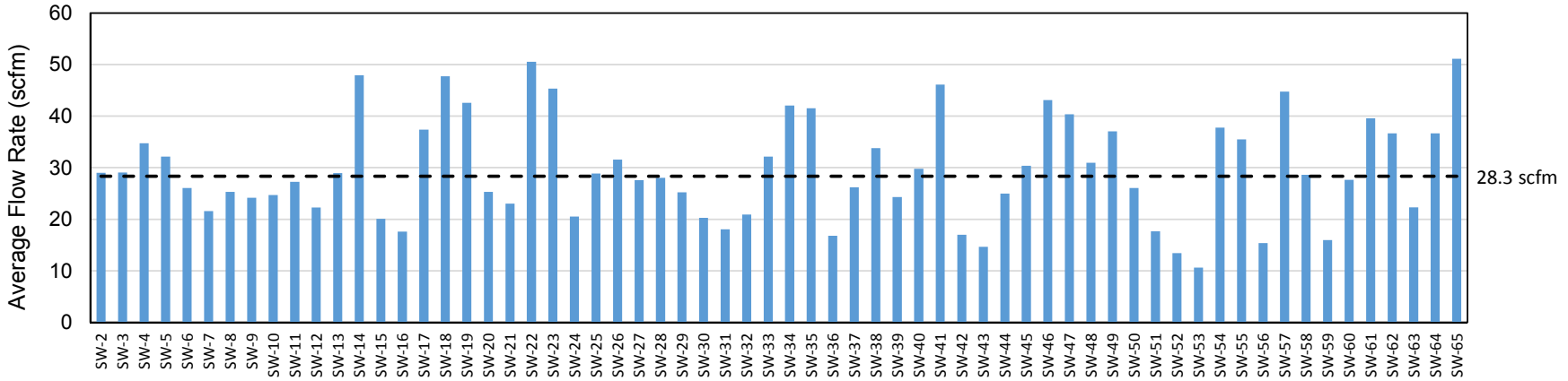

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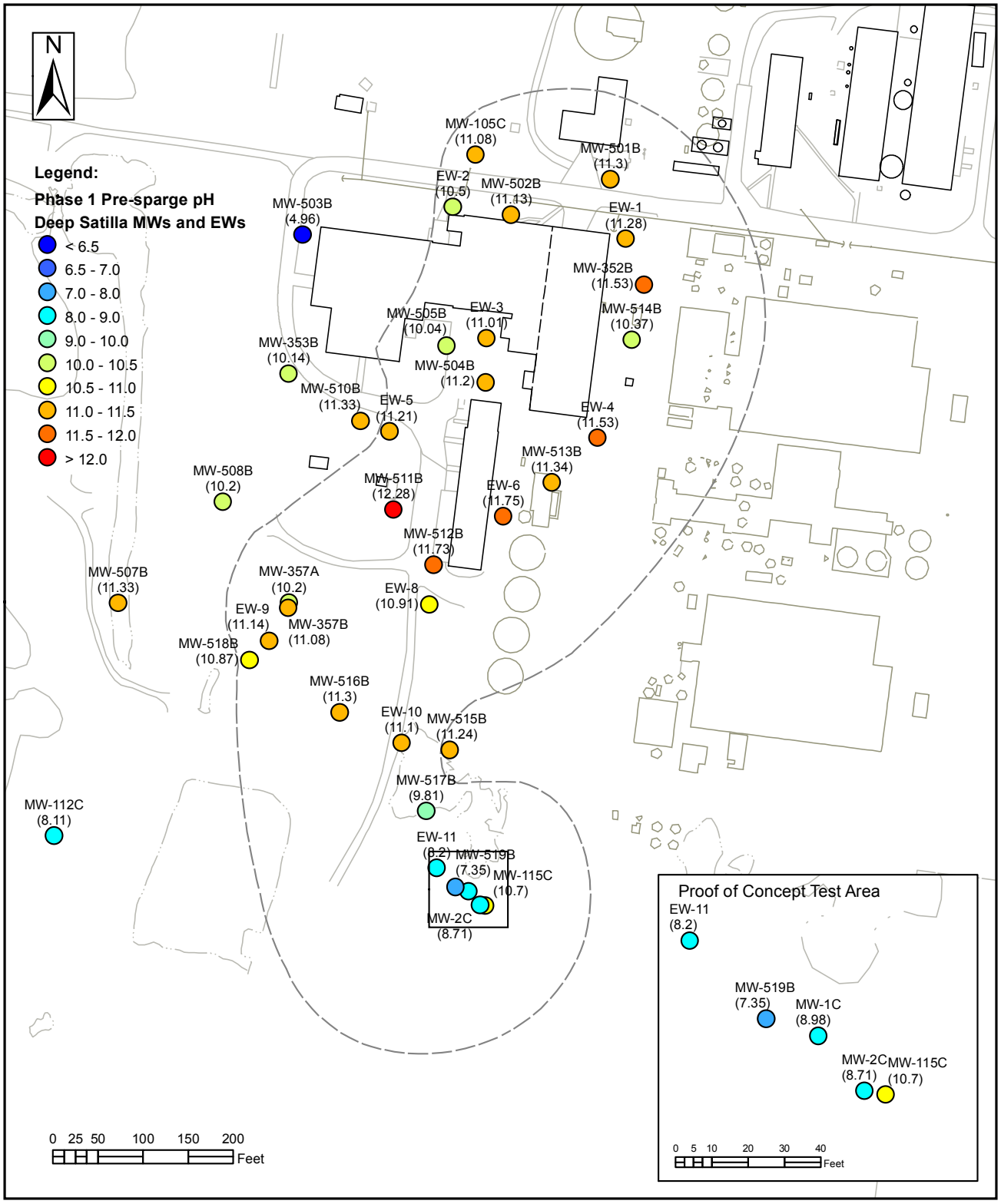
Average flow rates for the 64 Phase 1 sparge wells.

FIGURE 4-1

LCP Chemicals Site, Brunswick, GA



Pre-sparge pH in deep Satilla monitoring wells and extraction wells (data from Aug/Sept 2013).

FIGURE 4-2

LCP Chemicals Site, Brunswick, GA

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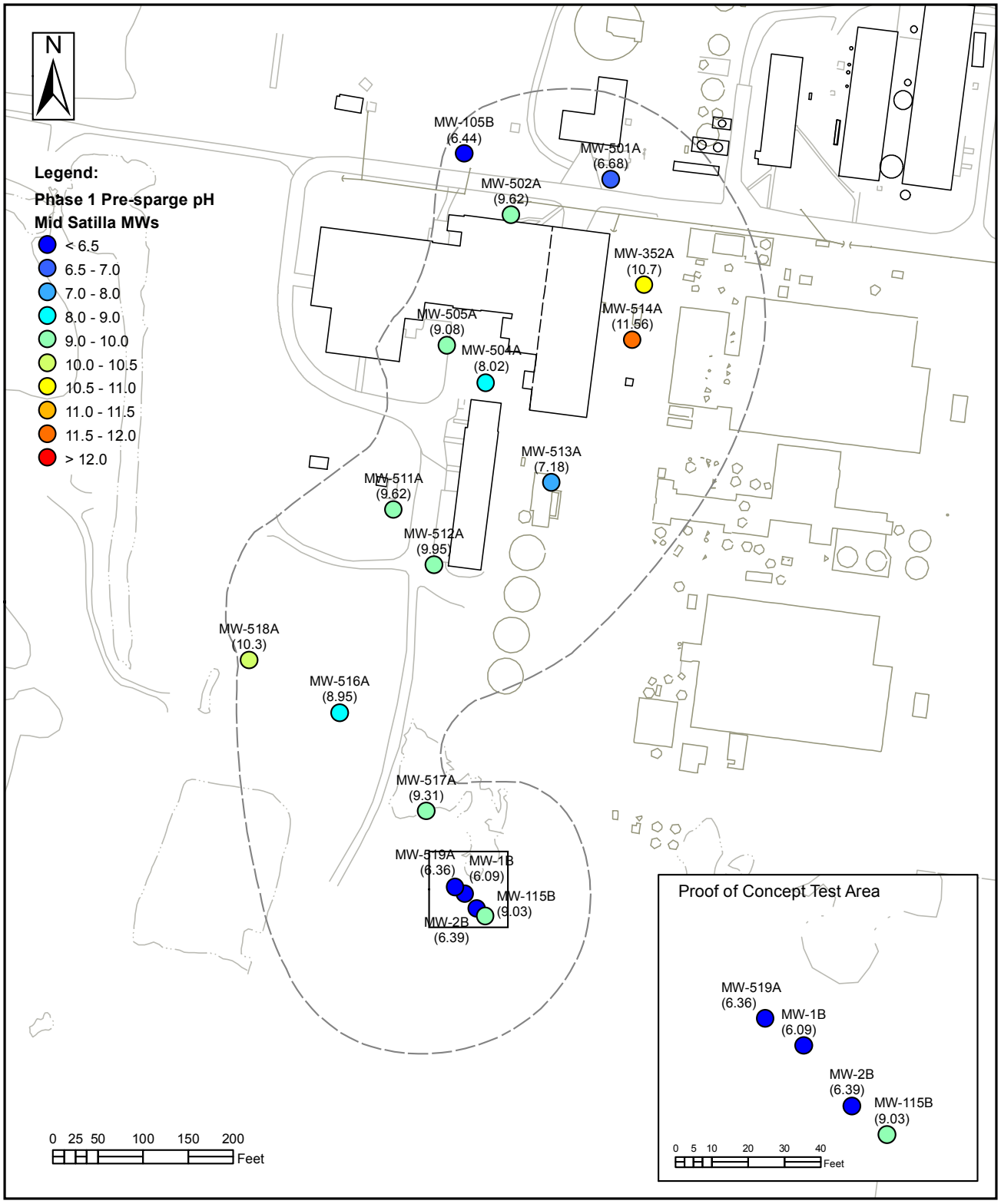
Environmental Engineers and Scientists



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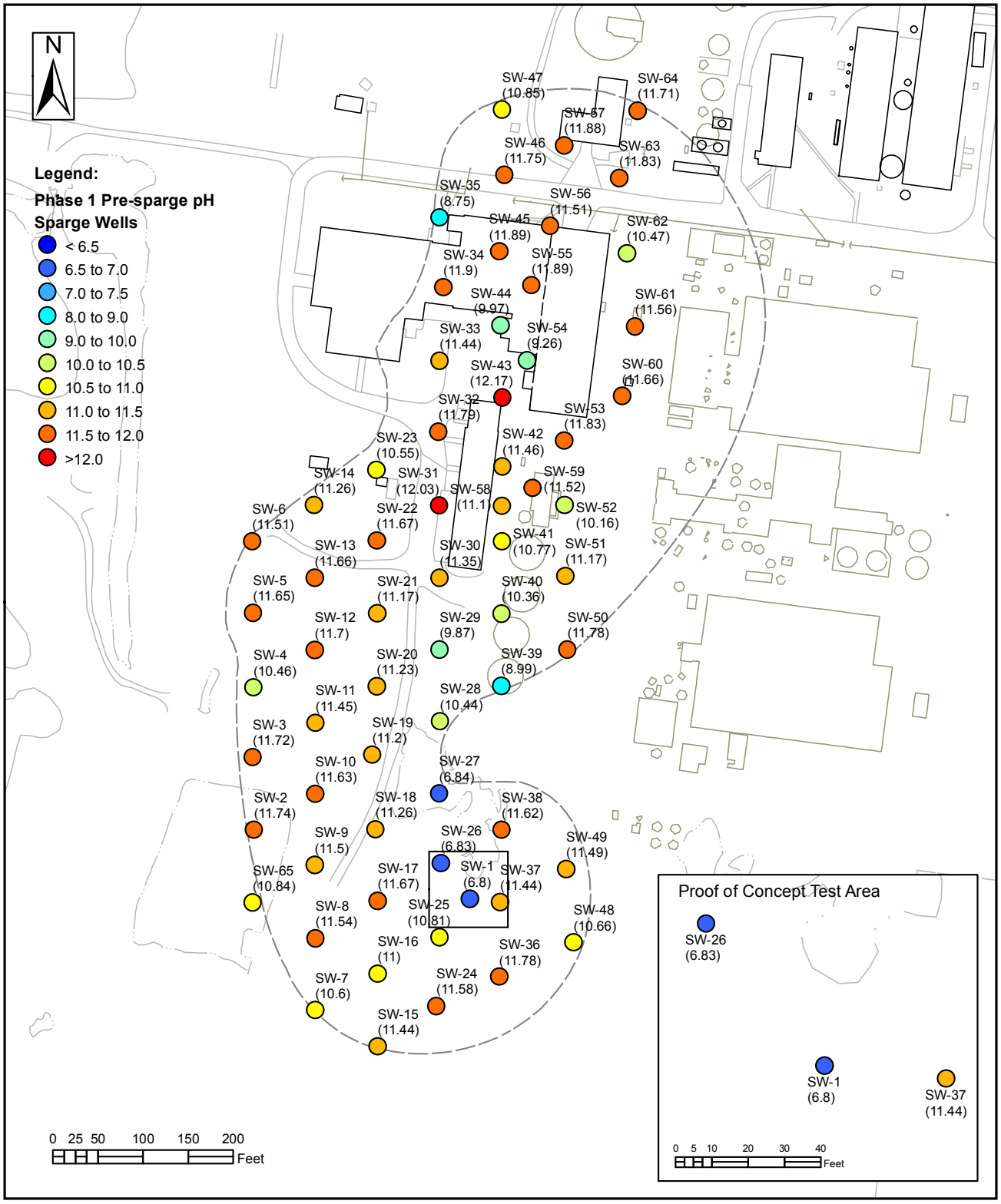
Pre-sparge pH in mid Satilla monitoring wells (data from Aug/Sept 2013).

FIGURE 4-3

LCP Chemicals Site, Brunswick, GA

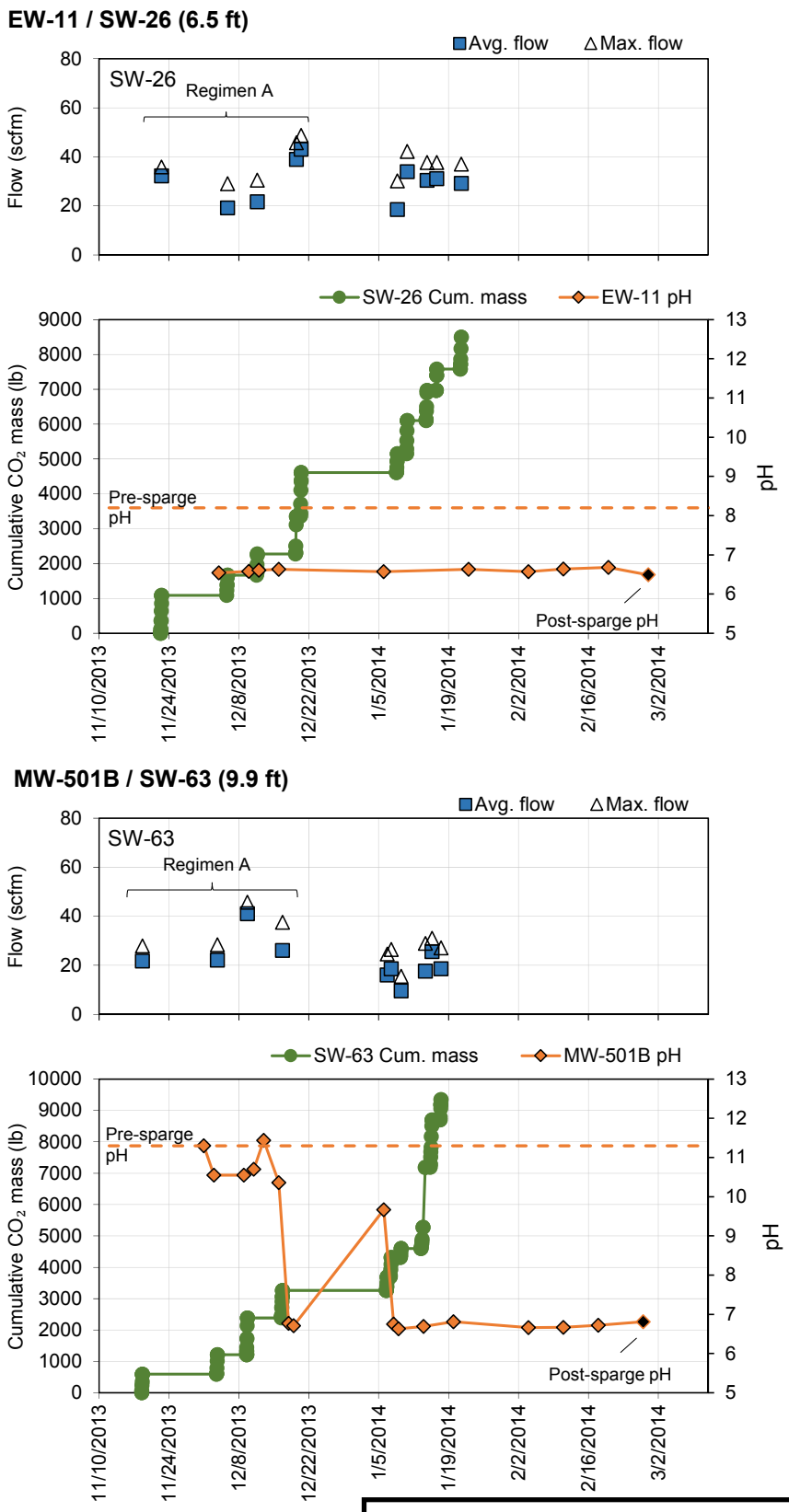


Mutch Associates, LLC
Environmental Engineers and Scientists

Pre-sparge pH in sparge wells (data from August 2013).

FIGURE 4-4

LCP Chemicals Site, Brunswick, GA



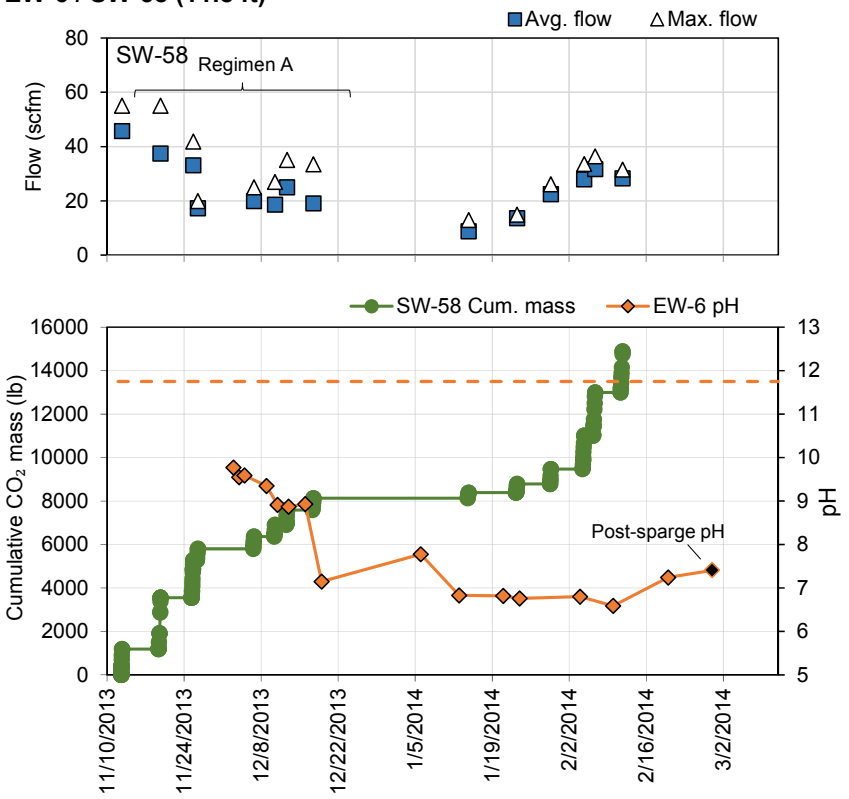
CO_2 flow, mass and pH as a function of time for EW-11 (6.5 ft from SW-26) and MW-501B (9.9 ft from SW-63).

FIGURE 4-5

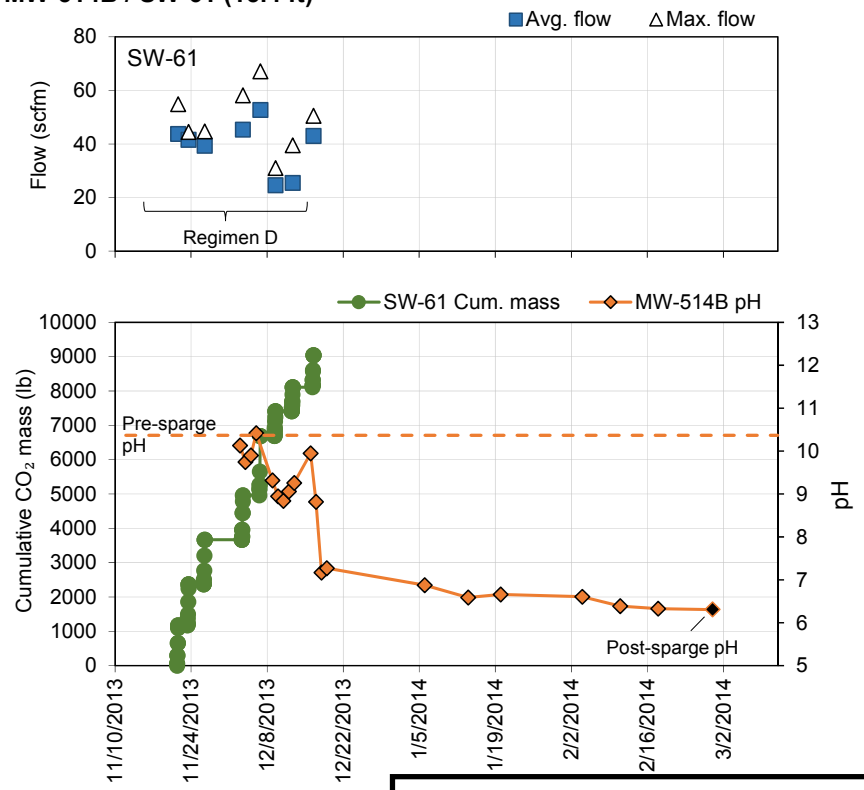
LCP Chemicals Site, Brunswick, GA

Mutch Associates, LLC
Environmental Engineers and Scientists

EW-6 / SW-58 (11.8 ft)



MW-514B / SW-61 (15.4 ft)

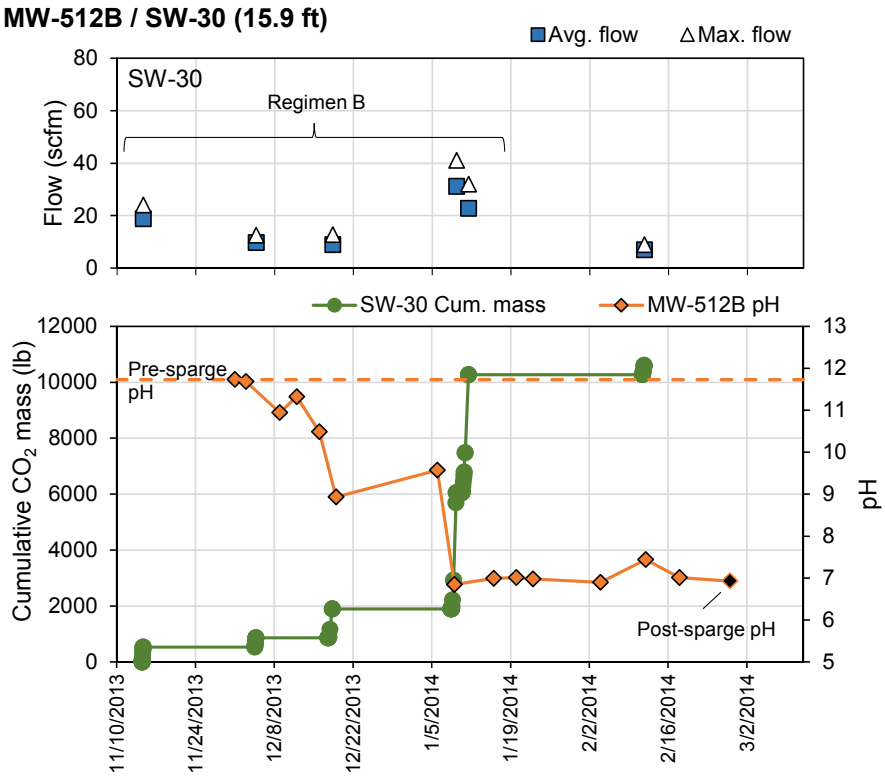


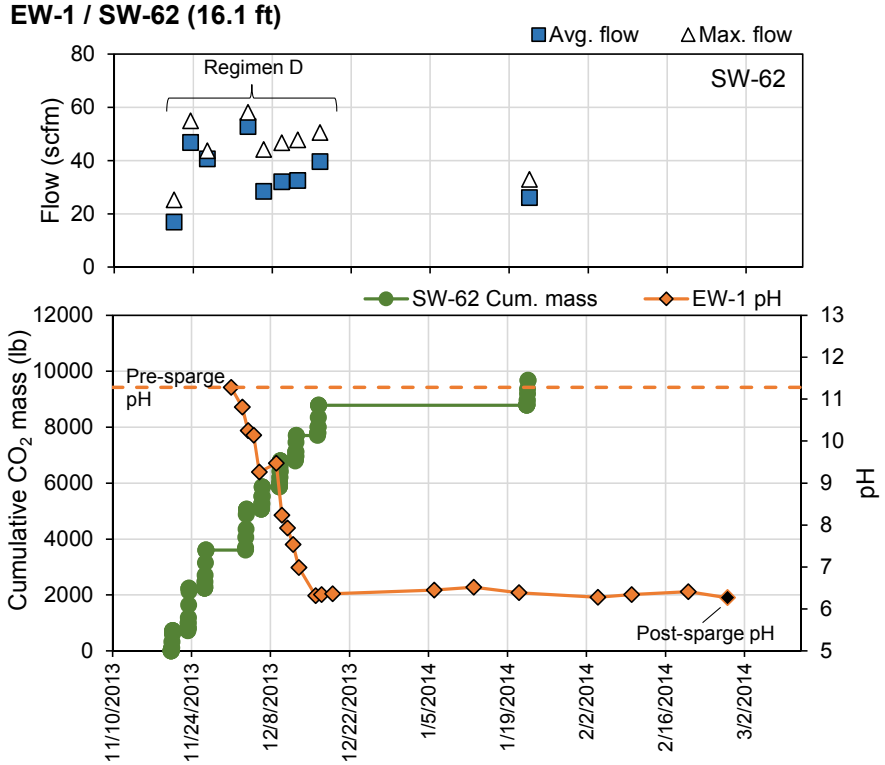
CO_2 flow, mass and pH as a function of time for EW-6 (11.8 ft from SW-58) and MW-514B (15.4 ft from SW-61).

FIGURE 4-6

Mutch Associates, LLC
Environmental Engineers and Scientists

LCP Chemicals Site, Brunswick, GA





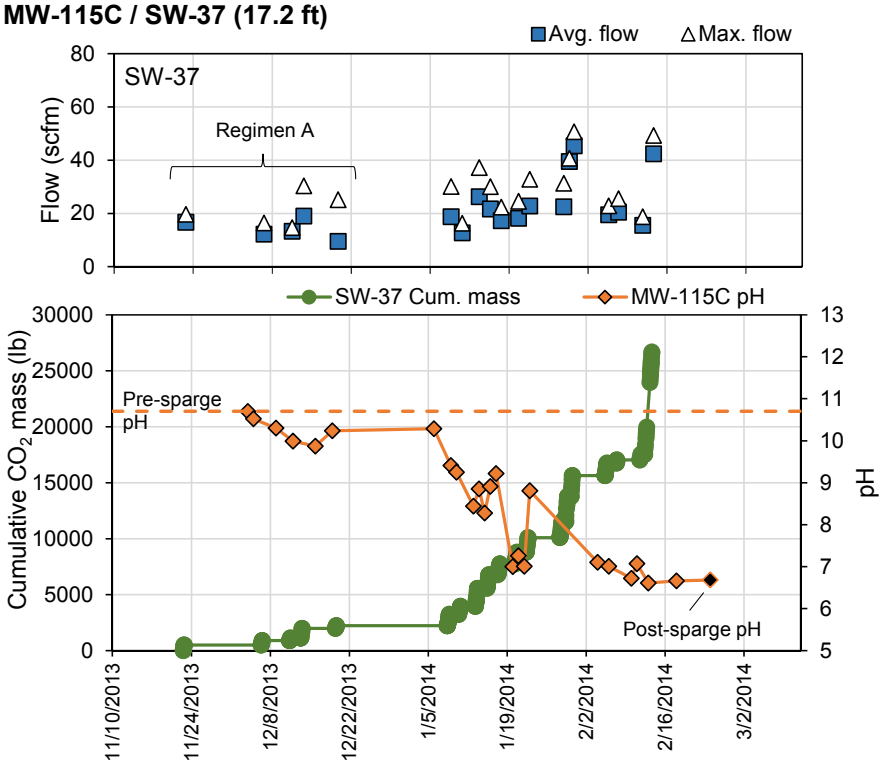
CO_2 flow, mass and pH as a function of time for MW-512B (15.9 ft from SW-30) and EW-1 (16.1 ft from SW-62).

FIGURE 4-7

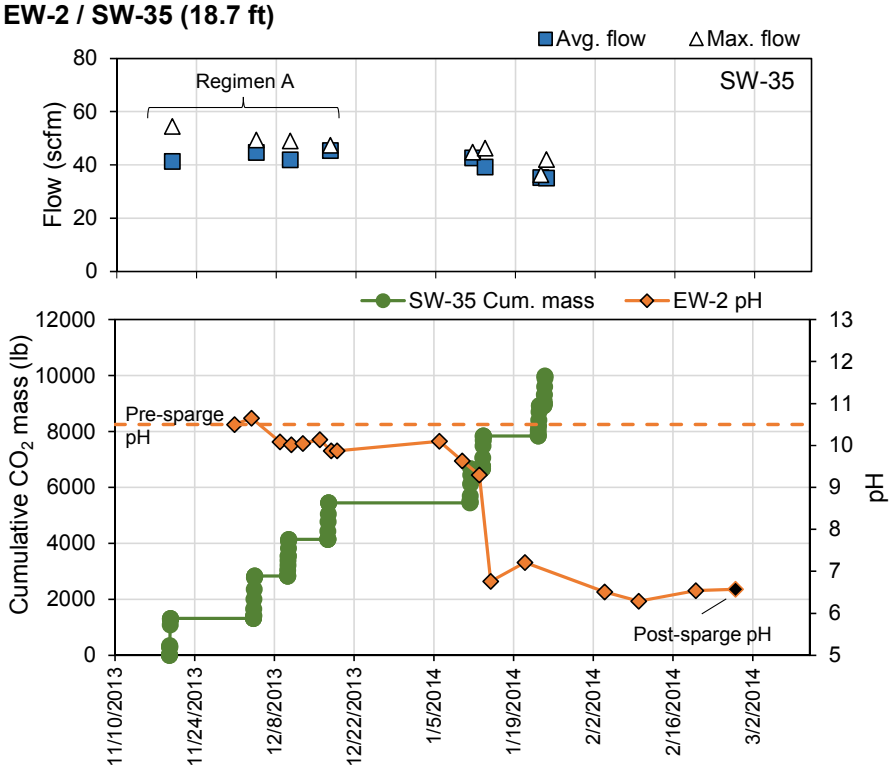
LCP Chemicals Site, Brunswick, GA

Mutch Associates, LLC
Environmental Engineers and Scientists

MW-115C / SW-37 (17.2 ft)



EW-2 / SW-35 (18.7 ft)

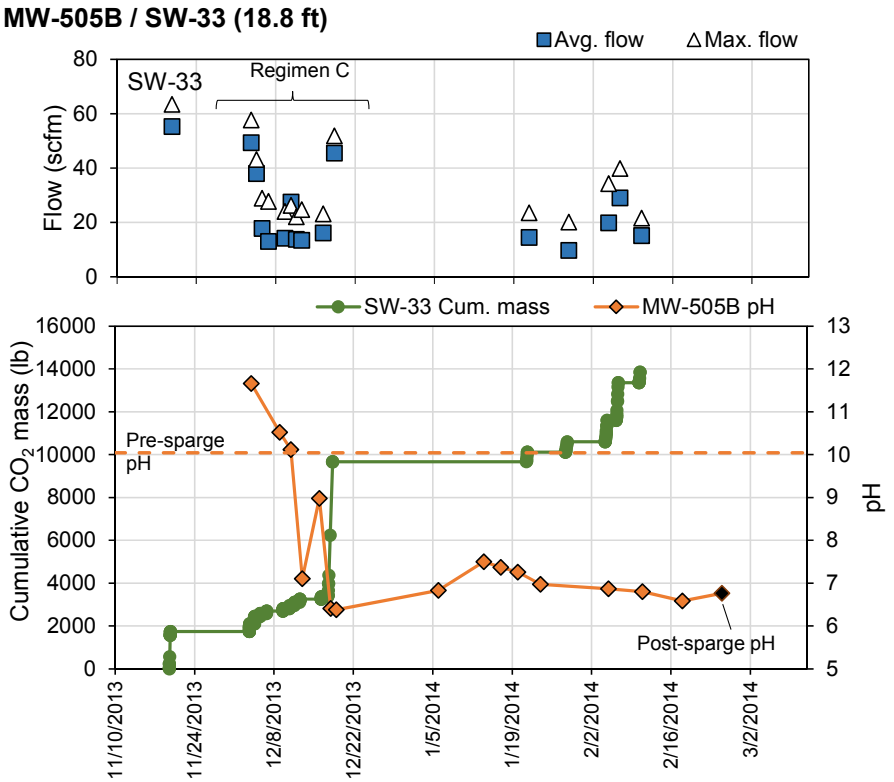


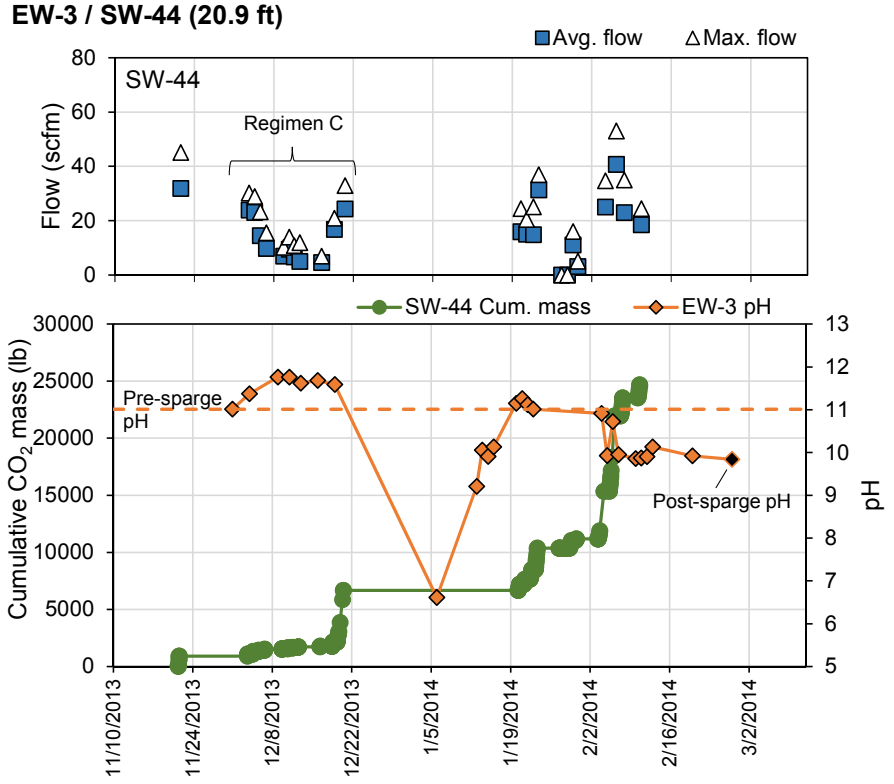
CO_2 flow, mass and pH as a function of time for MW-115C (17.2 ft from SW-37) and EW-2 (18.7 ft from SW-35).

FIGURE 4-8

LCP Chemicals Site, Brunswick, GA

Mutch Associates, LLC
Environmental Engineers and Scientists





CO_2 flow, mass and pH as a function of time for MW-505B (18.8 ft from SW-33) and EW-3 (20.9 ft from SW-44).

FIGURE 4-9

LCP Chemicals Site, Brunswick, GA

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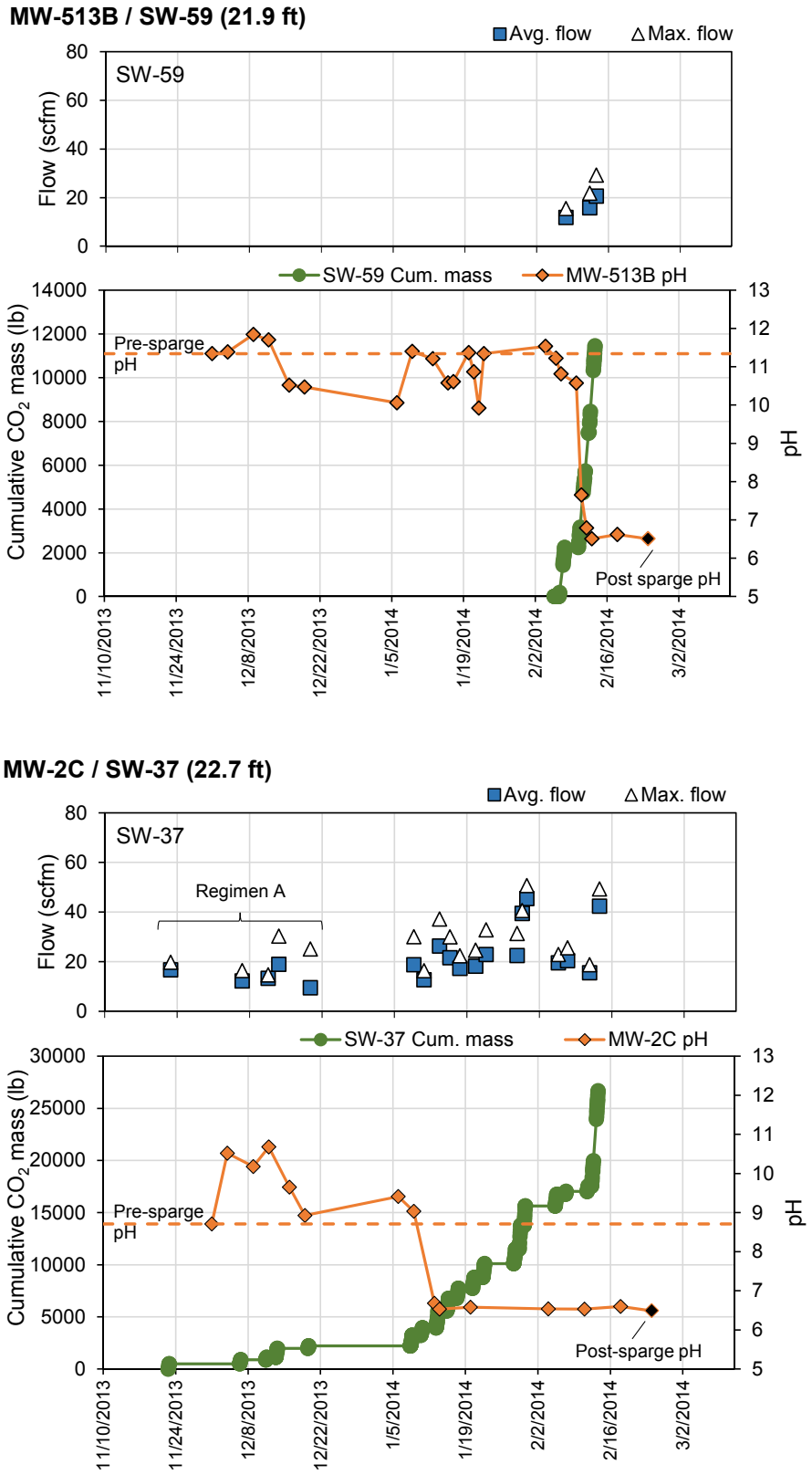
Environmental Engineers and Scientists

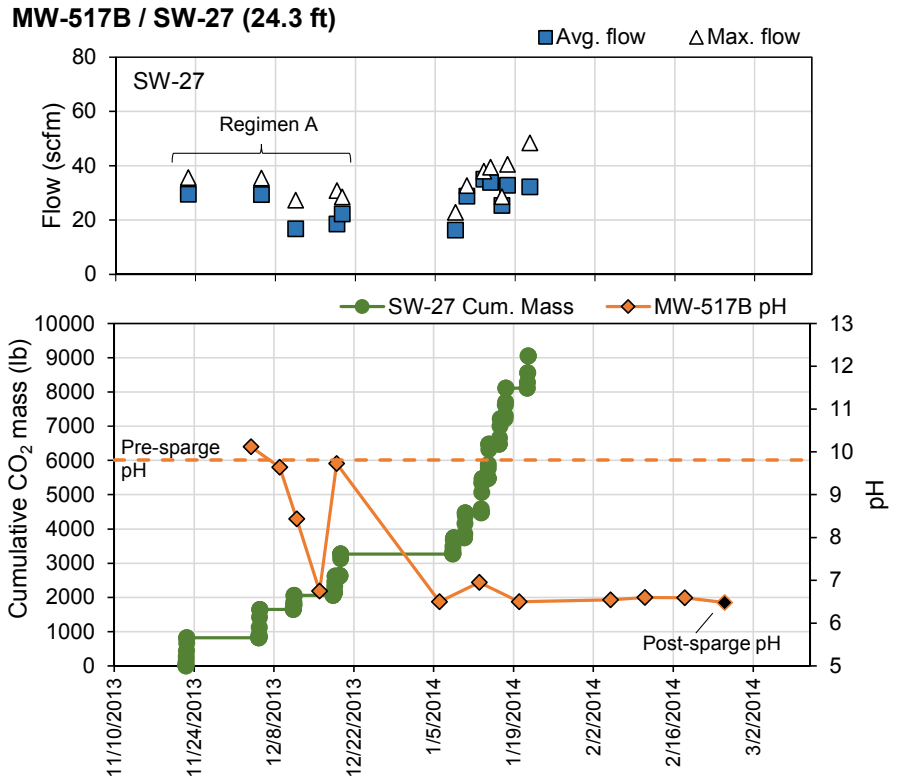


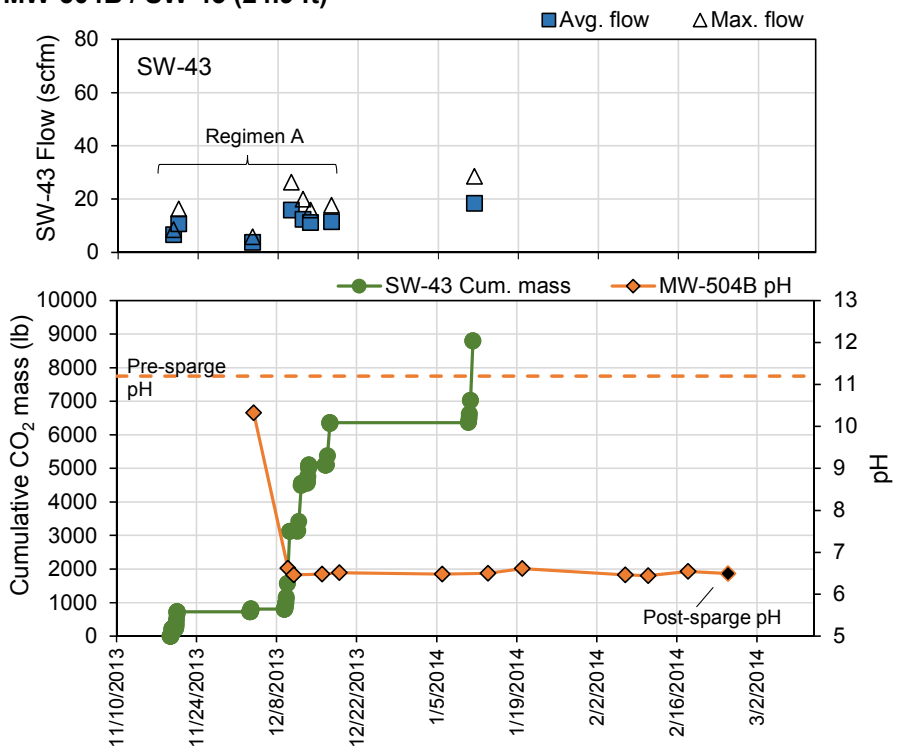
CO_2 flow, mass and pH as a function of time for MW-513B (21.9 ft from SW-59) and MW-2C (22.7 ft from SW-37).

FIGURE 4-10

Mutch Associates, LLC
Environmental Engineers and Scientists

LCP Chemicals Site, Brunswick, GA





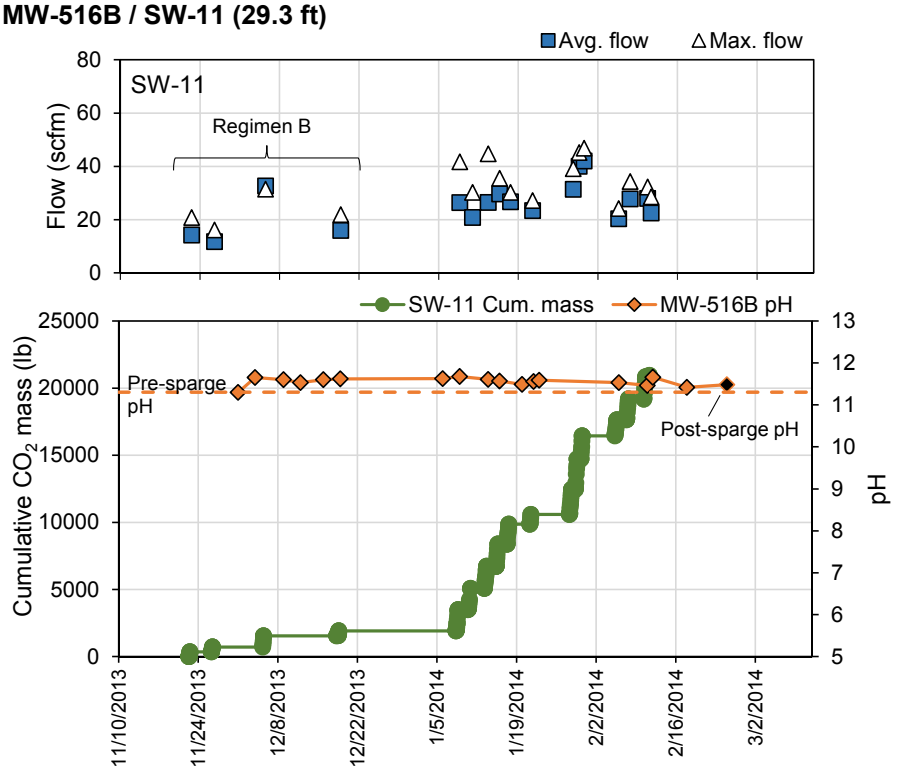
CO_2 flow, mass and pH as a function of time for MW-517B (24.3 ft from SW-27) and MW-504B (24.9 ft from SW-43).

FIGURE 4-11

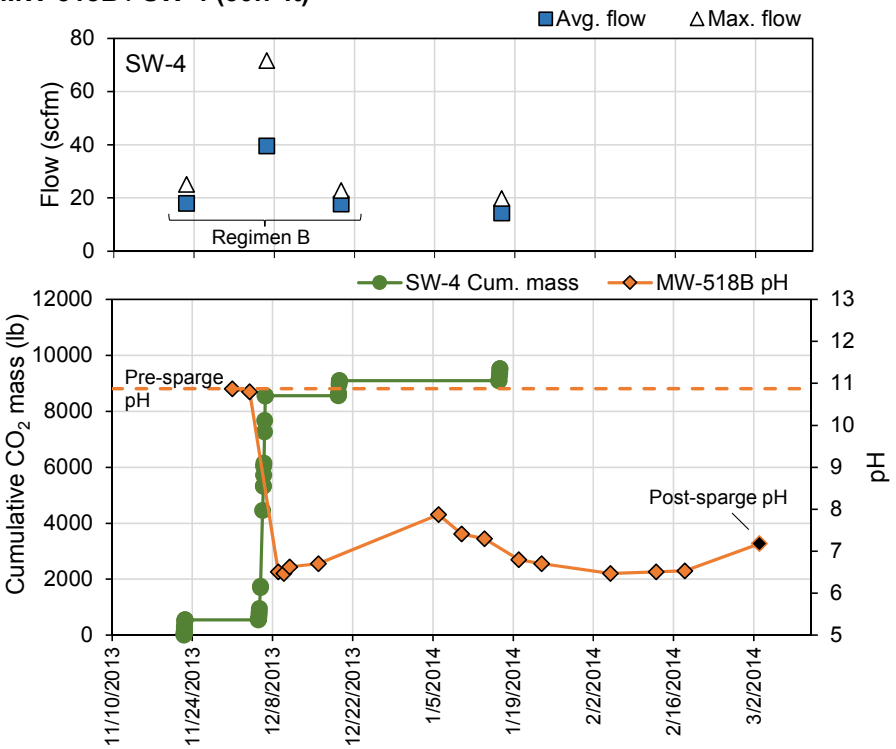
LCP Chemicals Site, Brunswick, GA

Mutch Associates, LLC
Environmental Engineers and Scientists

MW-516B / SW-11 (29.3 ft)



MW-518B / SW-4 (30.7 ft)



CO_2 flow, mass and pH as a function of time for MW-516B (29.3 ft from SW-11) and MW-518B (30.7 ft from SW-4).

FIGURE 4-12

LCP Chemicals Site, Brunswick, GA

Mutch Associates, LLC
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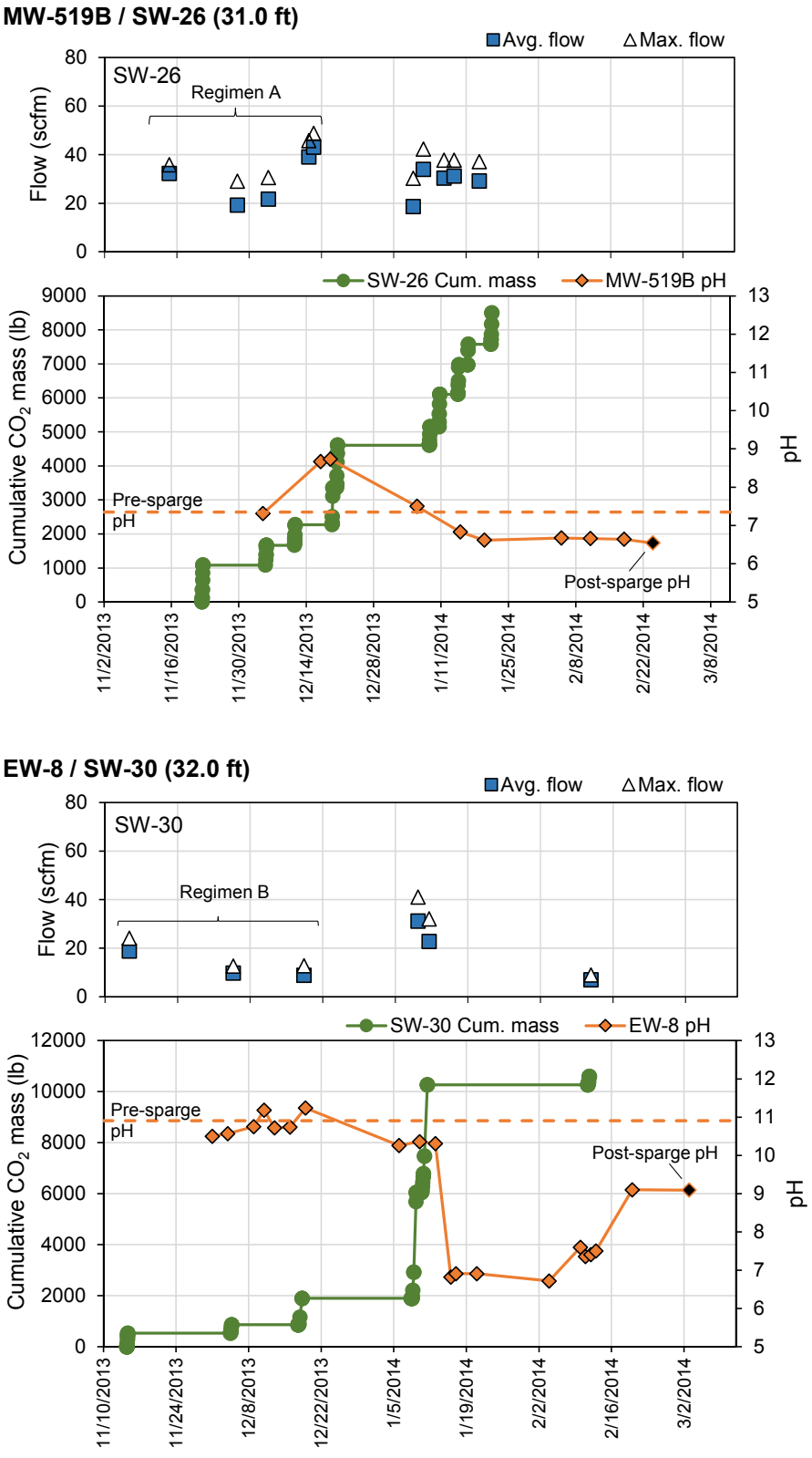

CO_2 flow, mass and pH as a function of time for MW-519B (31.0 ft from SW-26) and EW-8 (32.0 ft from SW-30).

FIGURE 4-13

LCP Chemicals Site, Brunswick, GA

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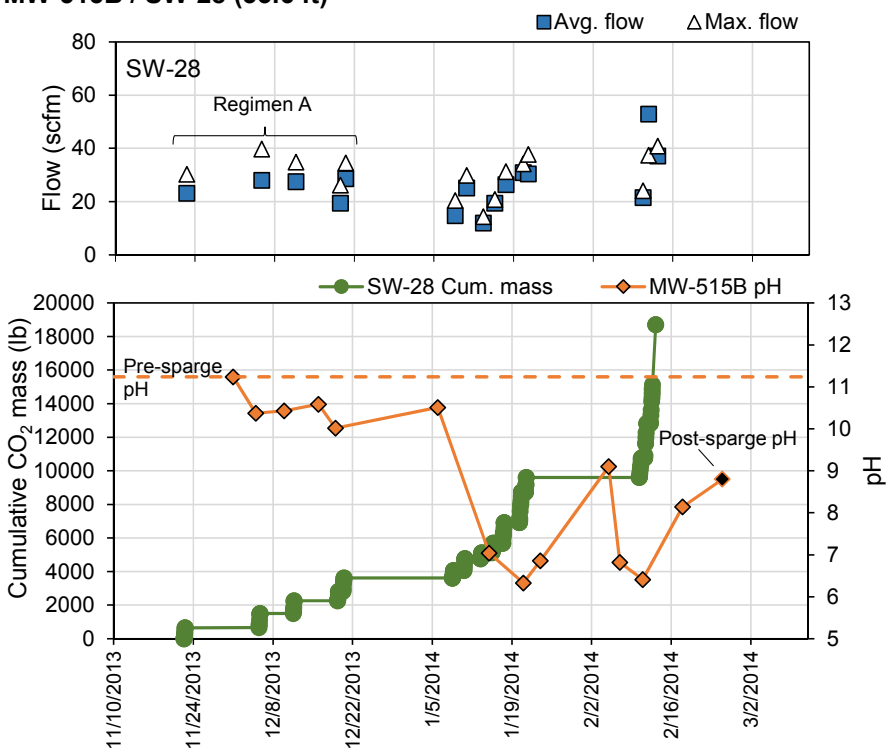
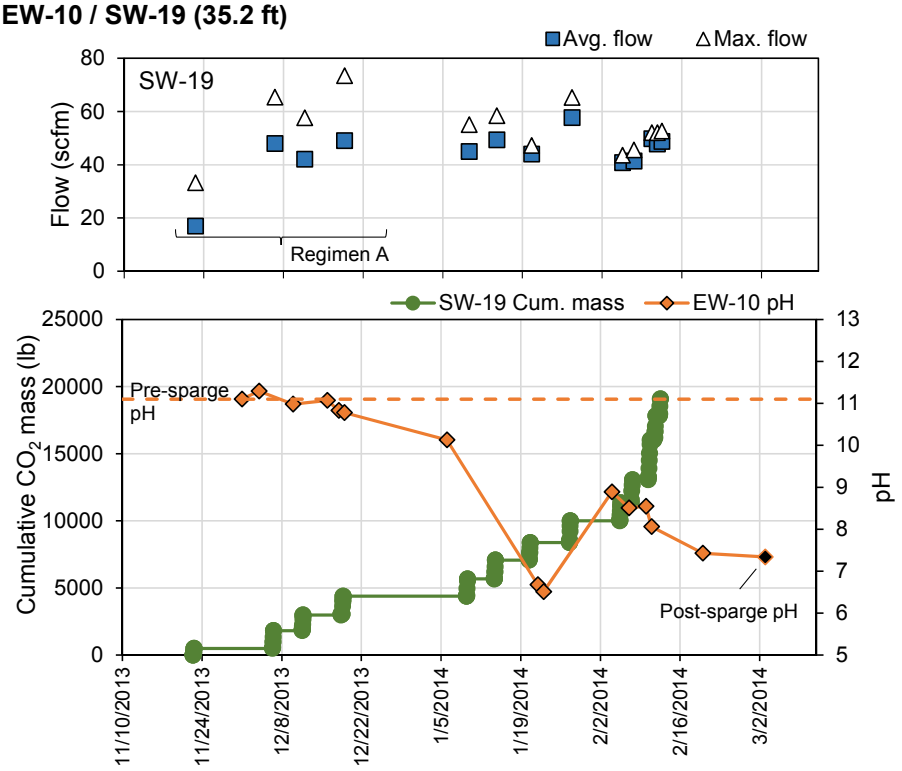
MW-515B / SW-28 (33.6 ft)



EW-10 / SW-19 (35.2 ft)



CO_2 flow, mass and pH as a function of time for EW-10 (35.2 ft from SW-19) and MW-515B (33.6 ft from SW-28).

FIGURE 4-14

LCP Chemicals Site, Brunswick, GA

Mutch Associates, LLC
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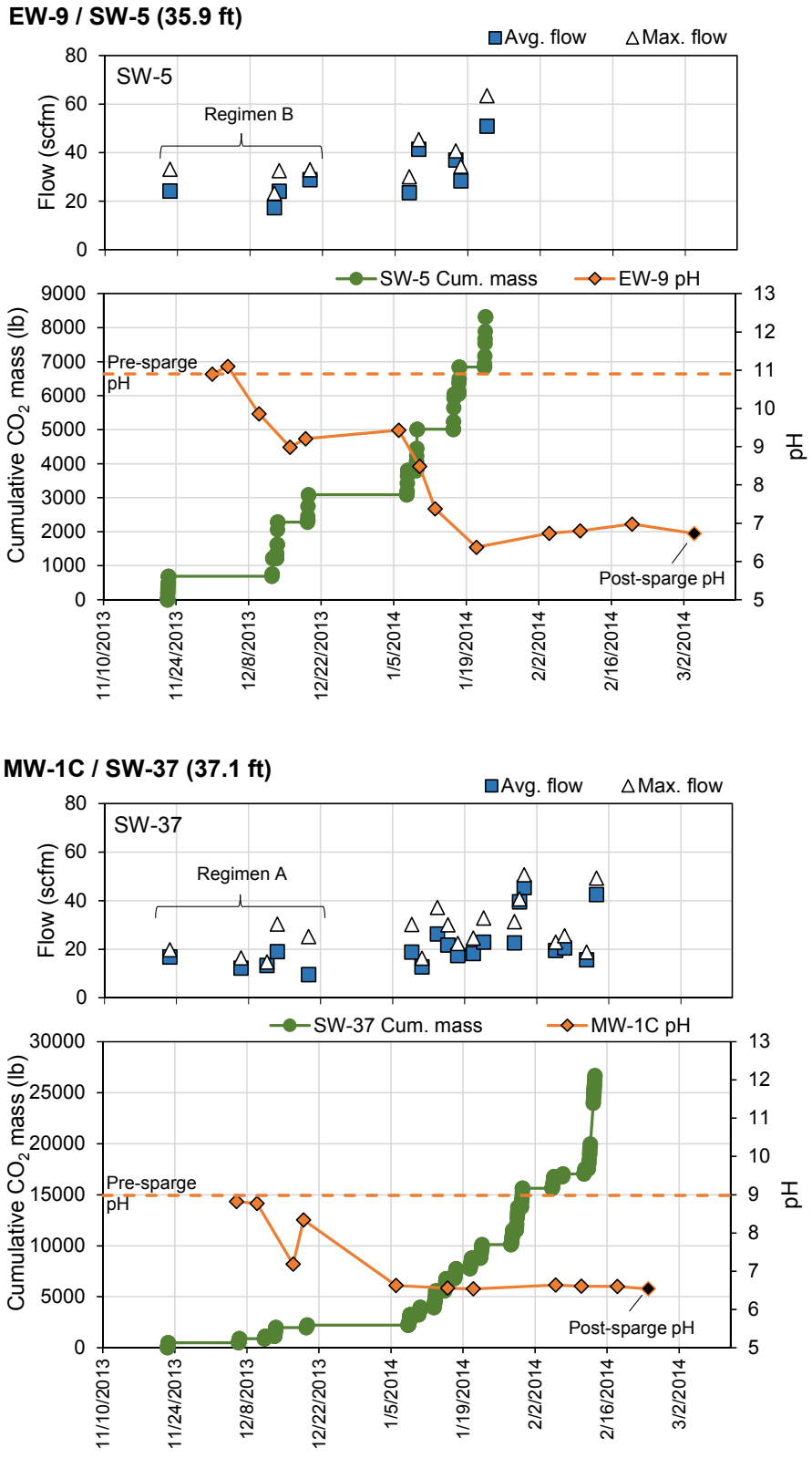

CO_2 flow, mass and pH as a function of time for EW-9 (35.9 ft from SW-5) and MW-1C (37.1 ft from SW-37).

FIGURE 4-15

LCP Chemicals Site, Brunswick, GA

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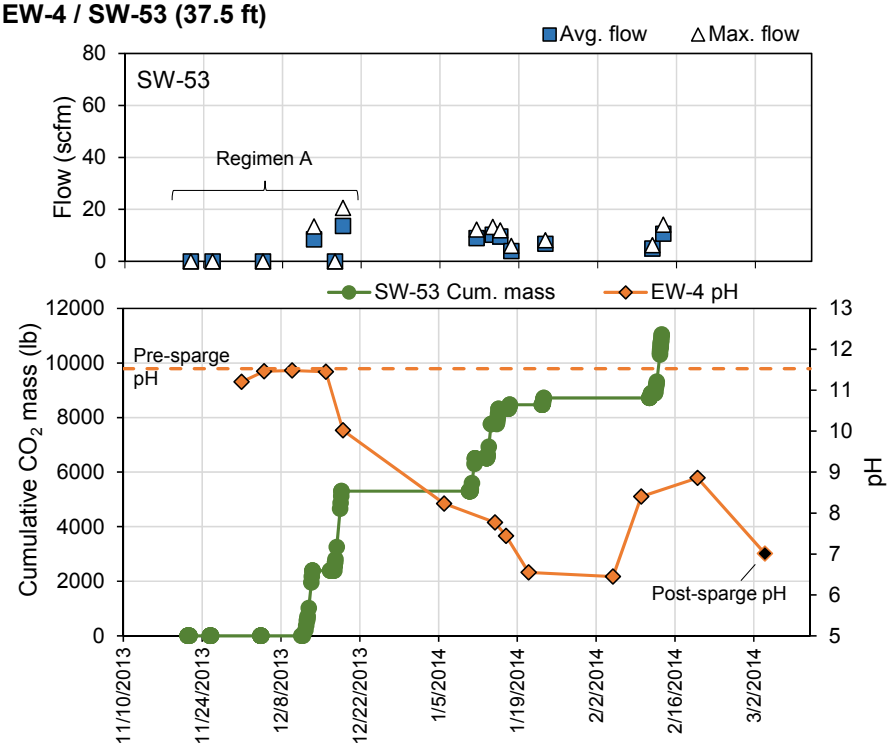
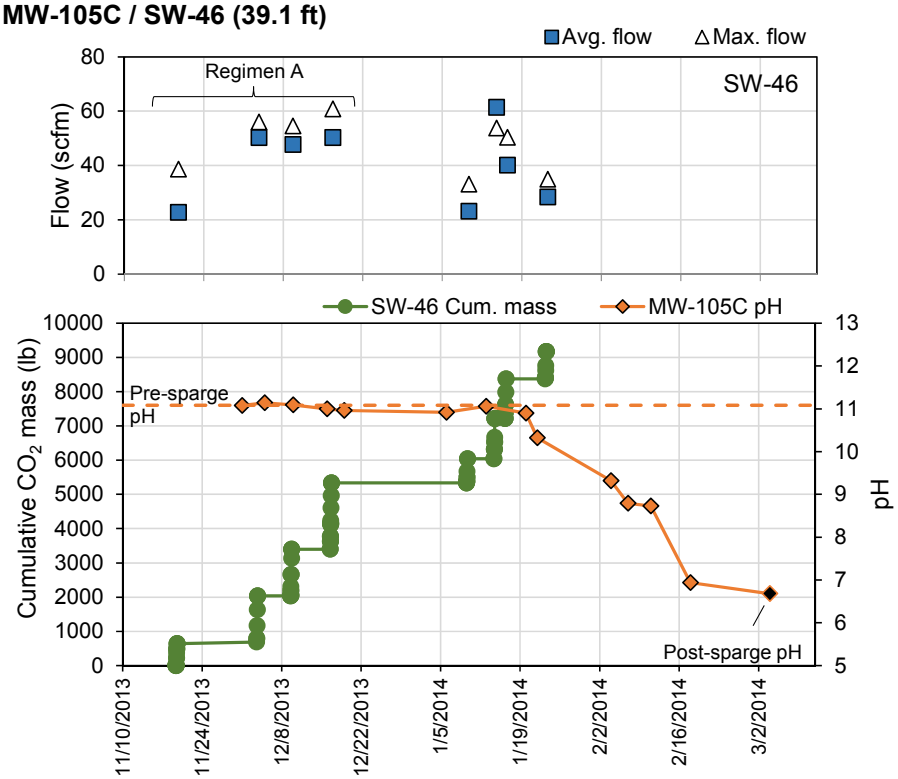
EW-4 / SW-53 (37.5 ft)



MW-105C / SW-46 (39.1 ft)



CO_2 flow, mass and pH as a function of time for EW-4 (37.5 ft from SW-53) and MW-105C (39.1 ft from SW-46).

FIGURE 4-16

LCP Chemicals Site, Brunswick, GA

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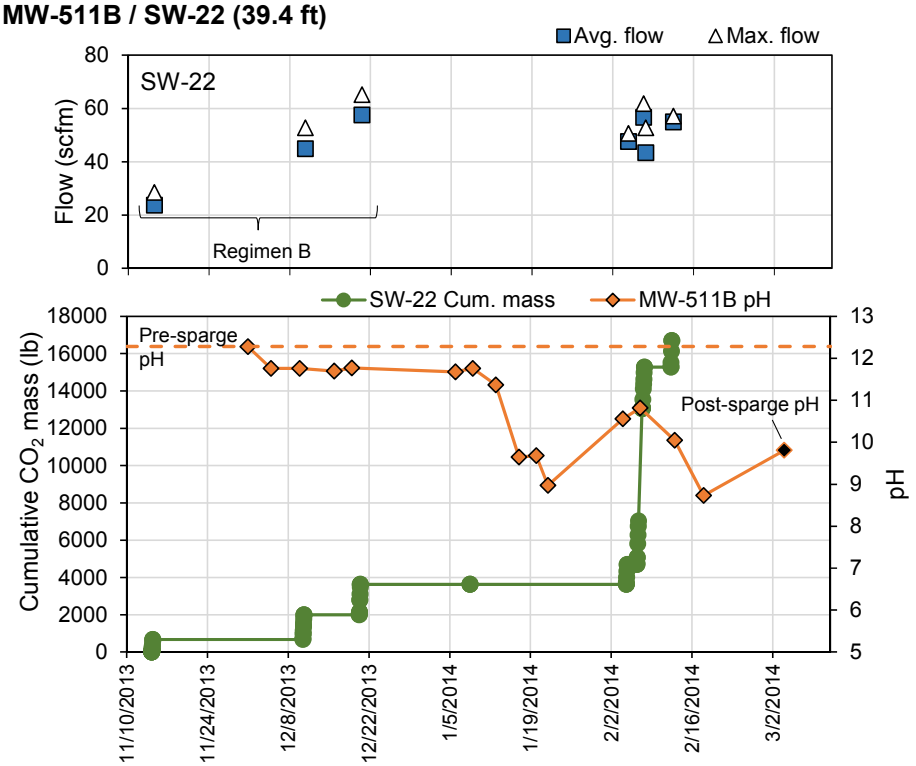
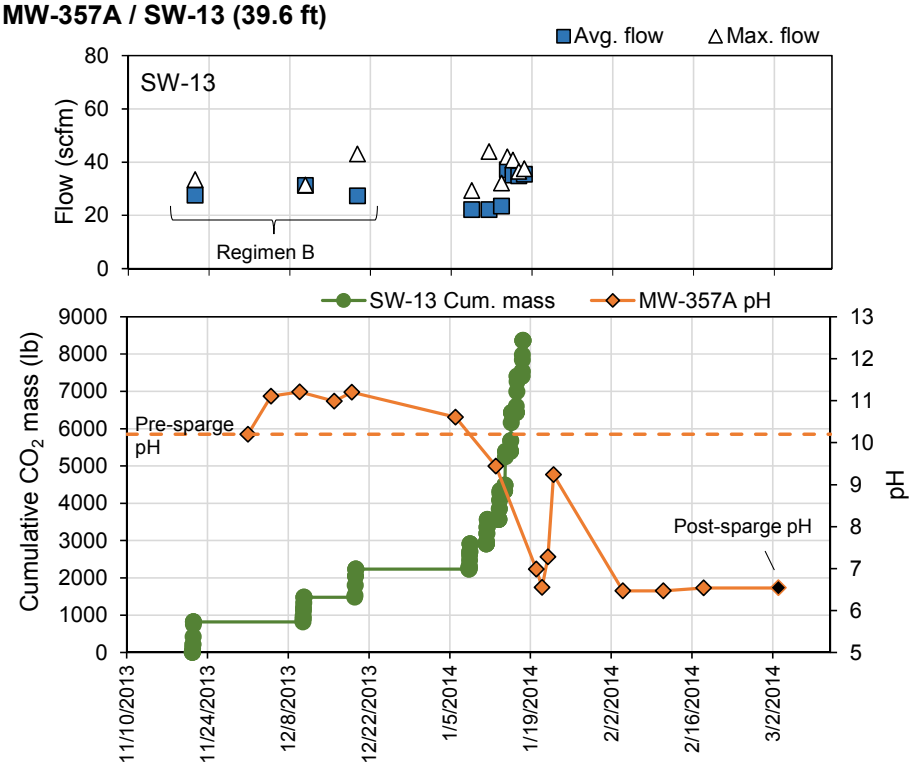
MW-511B / SW-22 (39.4 ft)



MW-357A / SW-13 (39.6 ft)



CO_2 flow, mass and pH as a function of time for MW-511B (39.4 ft from SW-22) and MW-357A (39.6 ft from SW-13).

FIGURE 4-17

LCP Chemicals Site, Brunswick, GA

Mutch Associates, LLC
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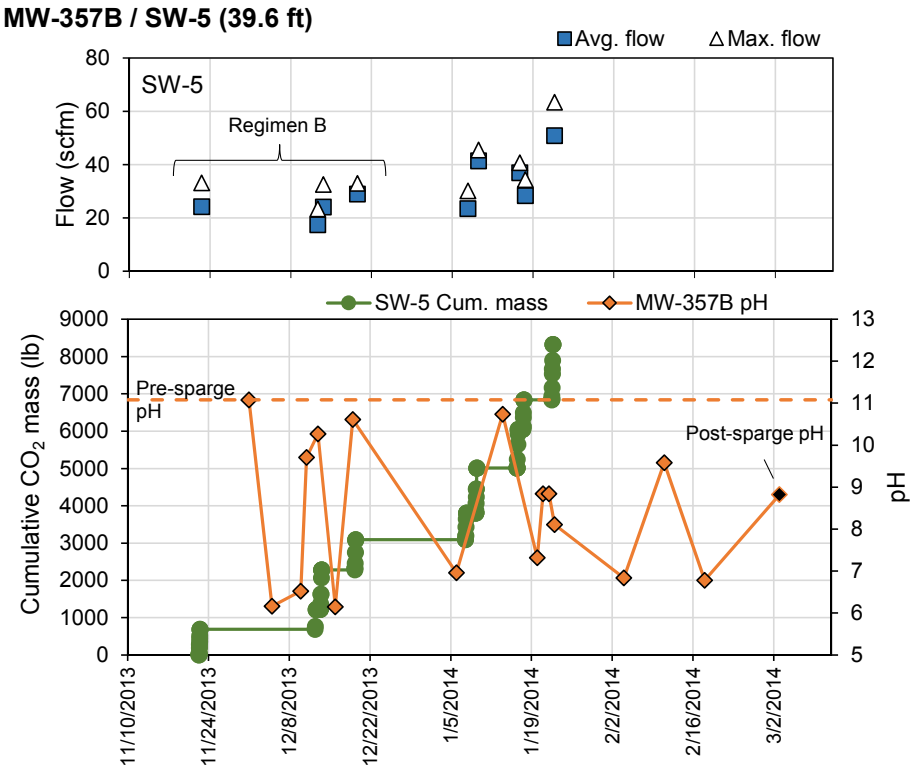

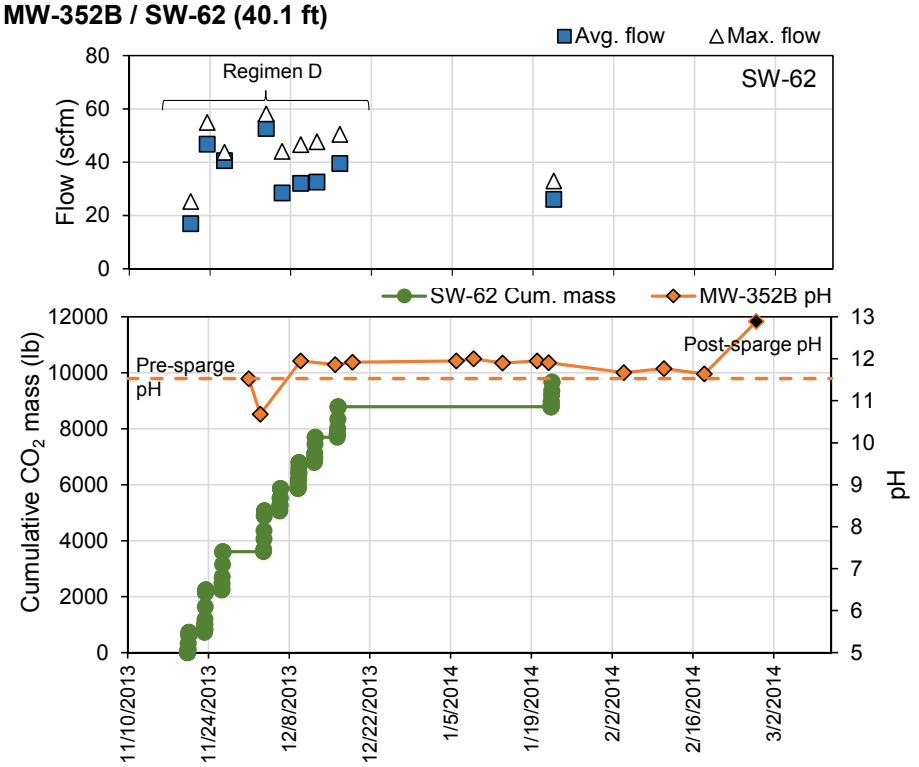

CO_2 flow, mass and pH as a function of time for MW-357B (39.6 ft from SW-5) and MW-352B (40.1 ft from SW-62).

FIGURE 4-18

LCP Chemicals Site, Brunswick, GA

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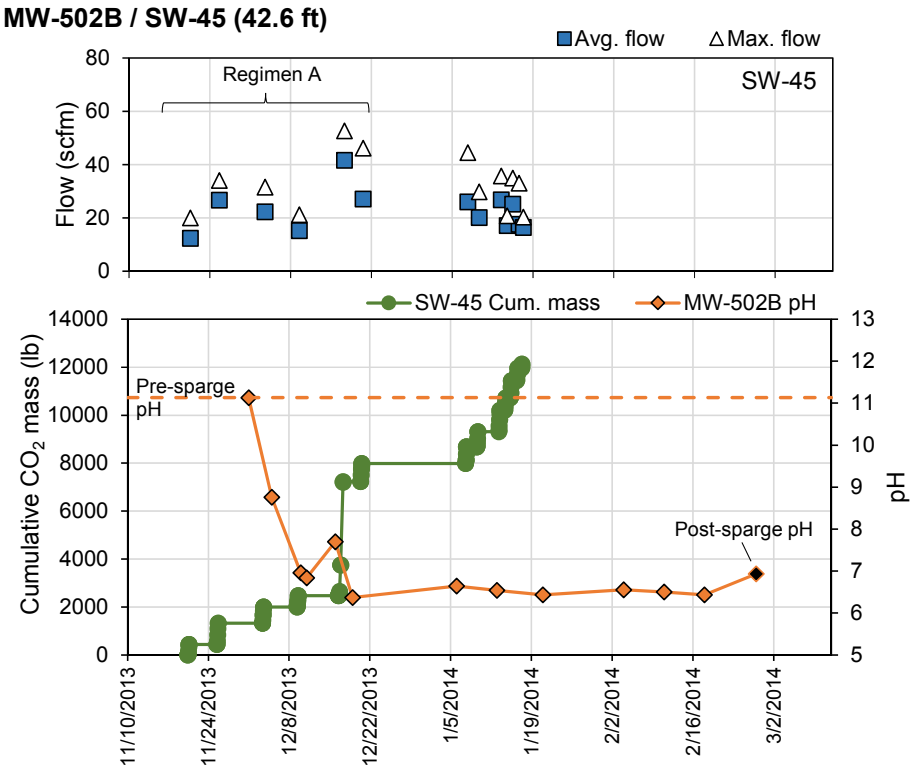

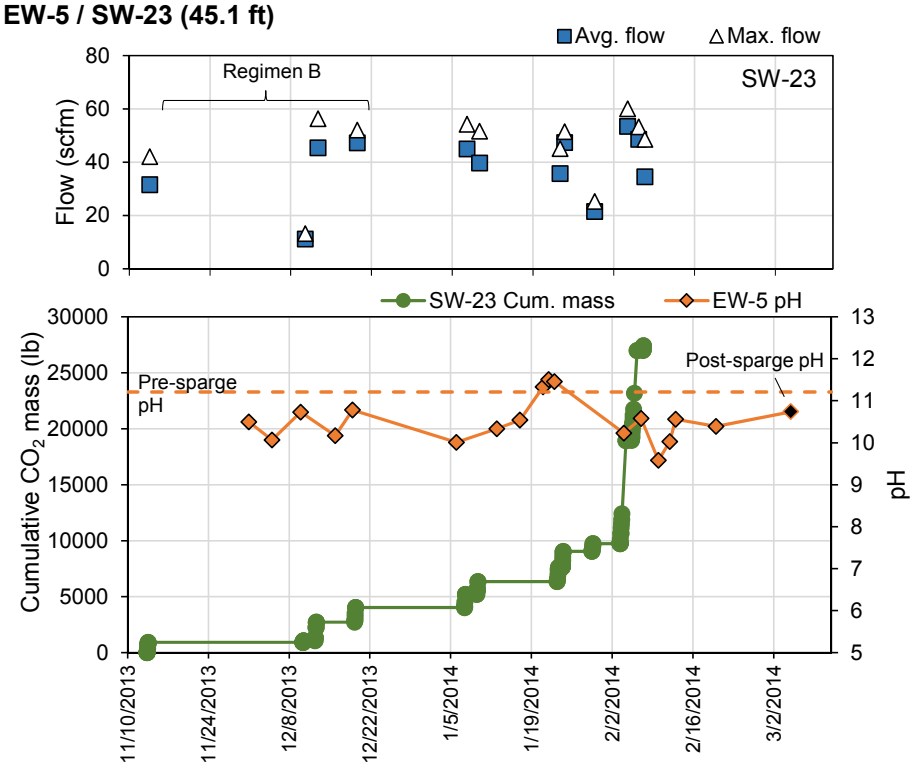

CO_2 flow, mass and pH as a function of time for MW-502B (42.6 ft from SW-45) and EW- (45.1 ft from SW-22).

FIGURE 4-19

LCP Chemicals Site, Brunswick, GA

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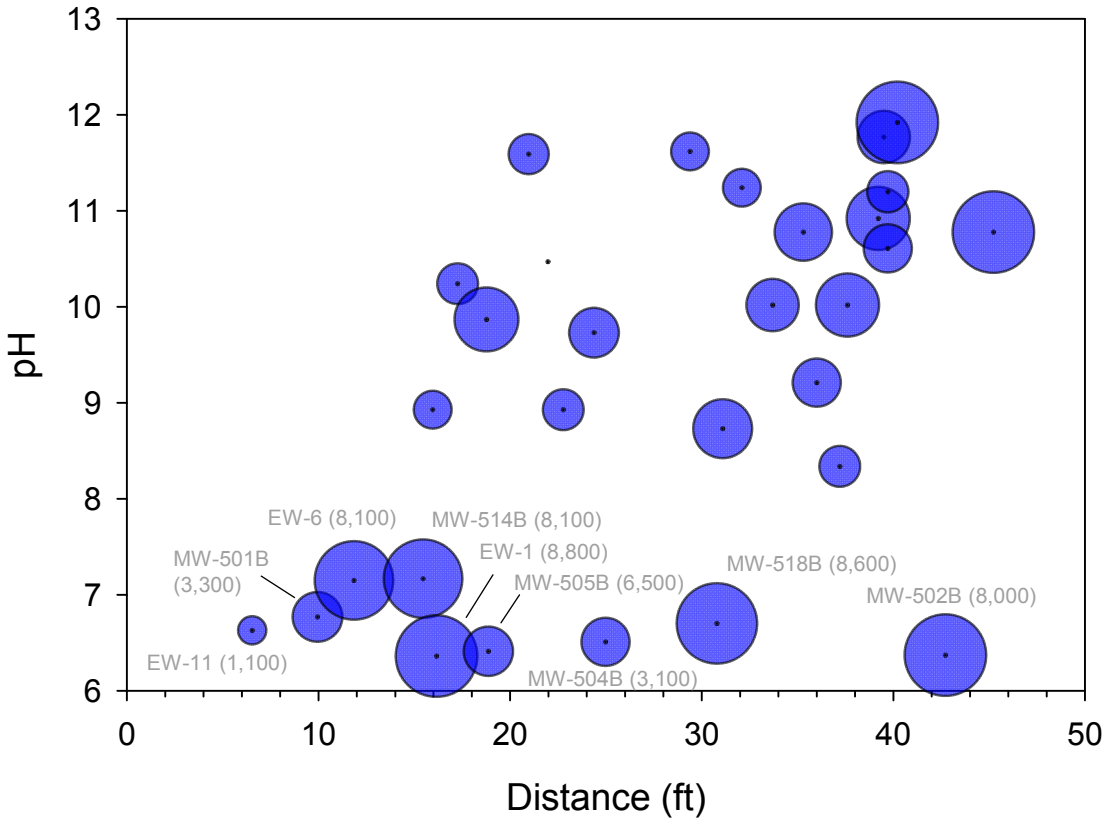

Note: Values in parenthesis indicate mass of CO_2 injected in pounds

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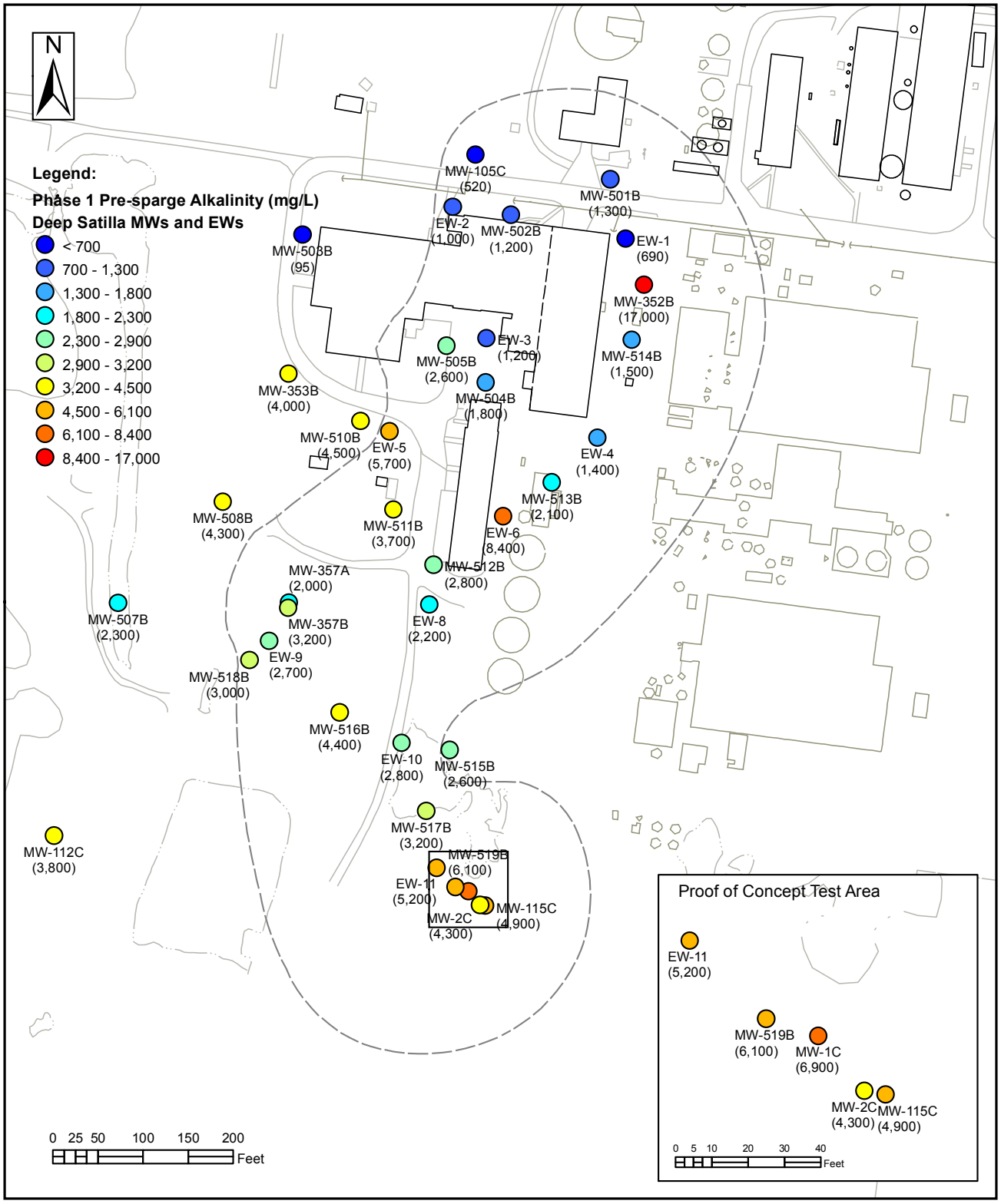
Bubble plot of monitoring well pH after 4 weeks of sparging versus distance. Size of bubbles indicate the mass of CO_2 injected at nearest sparge well.

FIGURE 4-20

LCP Chemicals Site, Brunswick, GA



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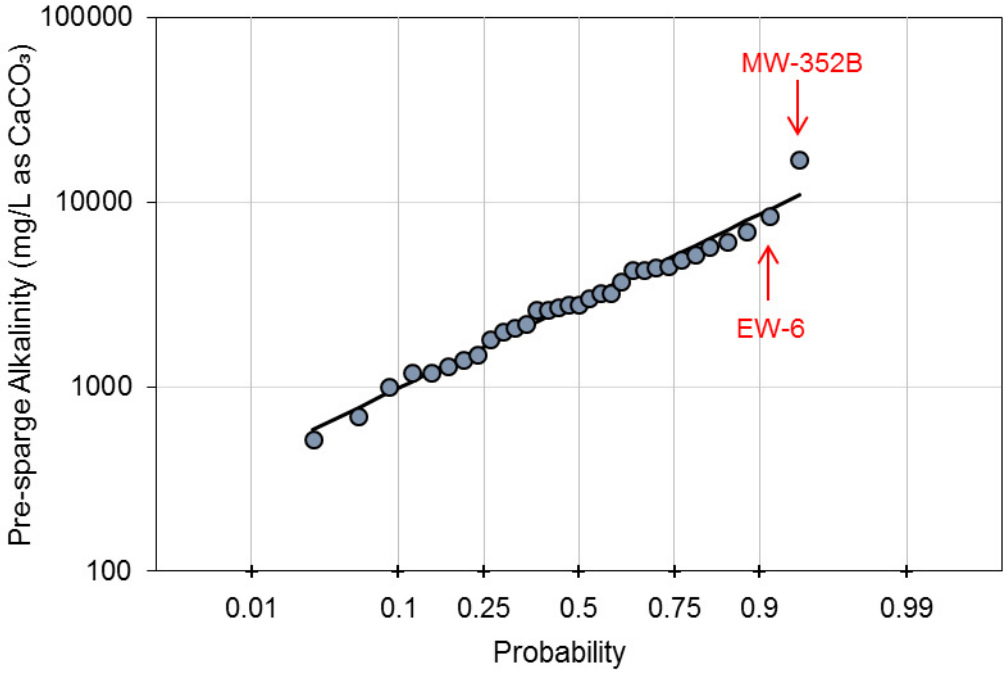
Pre-sparge alkalinity data for deep Satilla monitoring points (data from Aug/Sept 2013).

FIGURE 4-21

LCP Chemicals Site, Brunswick, GA



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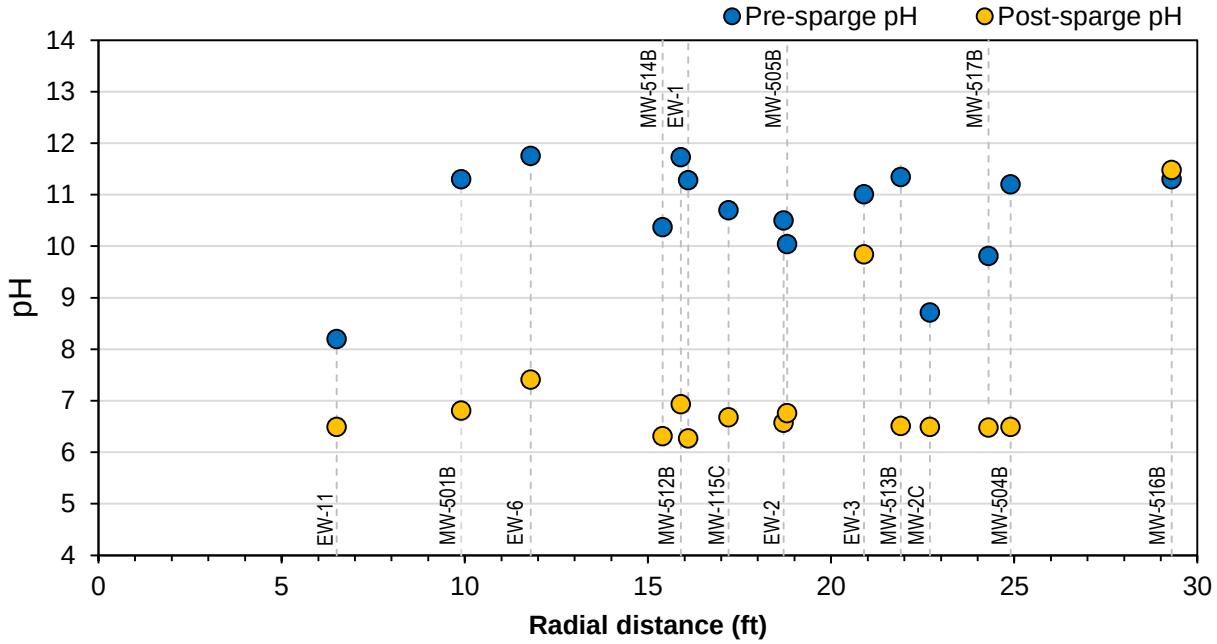
Probability distribution of pre-sparge alkalinity in deep Satilla monitoring wells and extraction wells (data from Aug/Sept 2013).

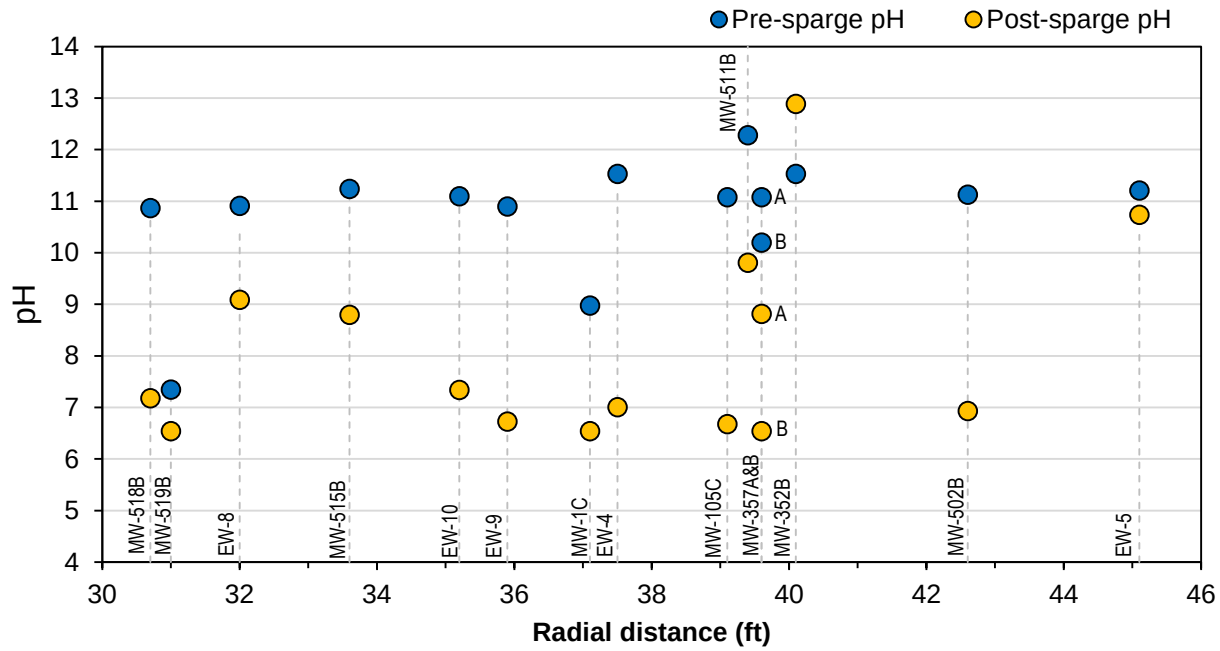
FIGURE 4-22

LCP Chemicals Site, Brunswick, GA

Monitoring points within 30 ft of a sparge well



Monitoring points from 30 to 45 ft of a sparge well



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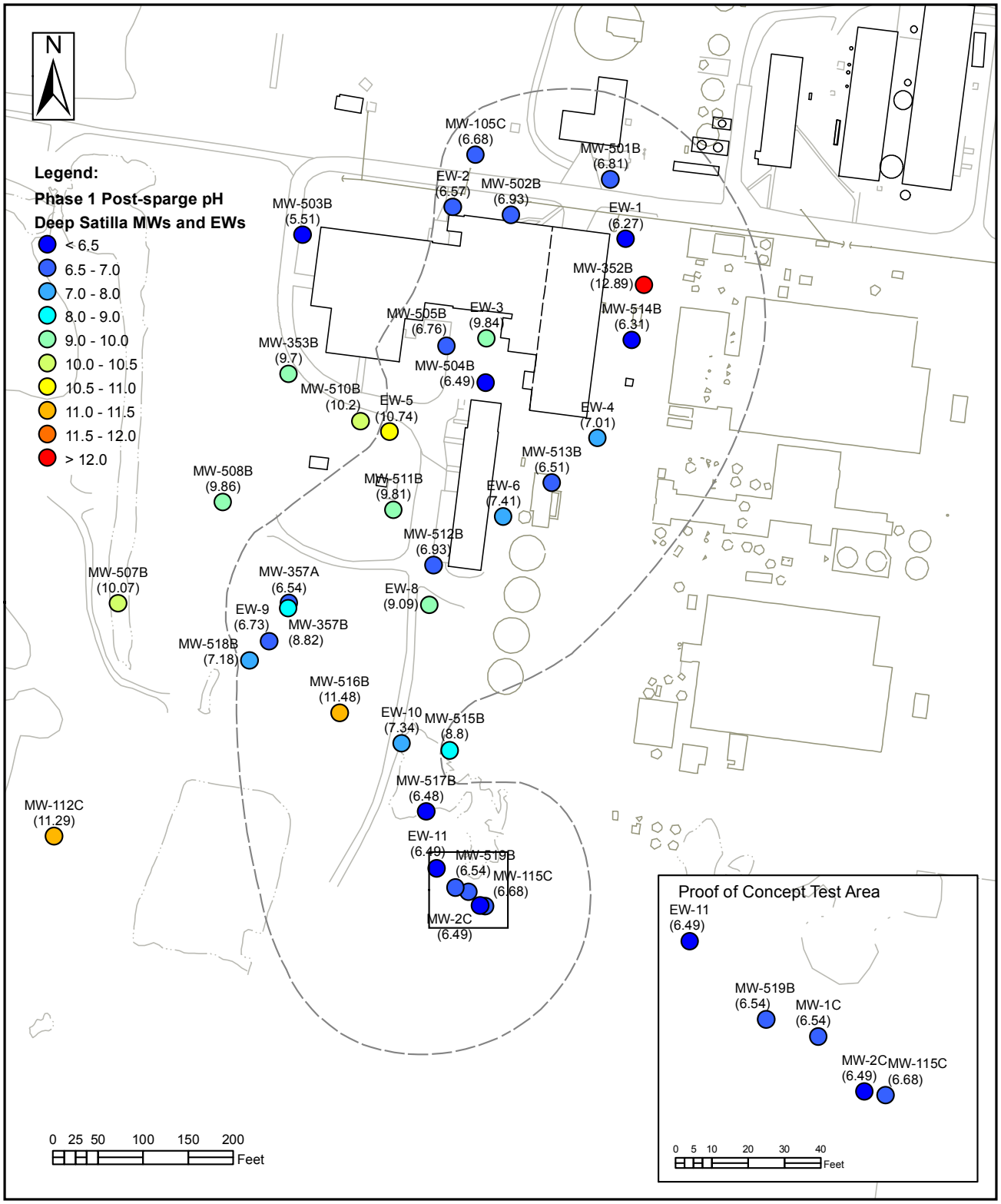
Pre-sparge and post-sparge pH for deep Satilla monitoring wells and extraction wells.

FIGURE 4-23

LCP Chemicals Site, Brunswick, GA



Post-sparge pH in deep Satilla monitoring wells (data from Feb/March 2014).

FIGURE 4-24

LCP Chemicals Site, Brunswick, GA

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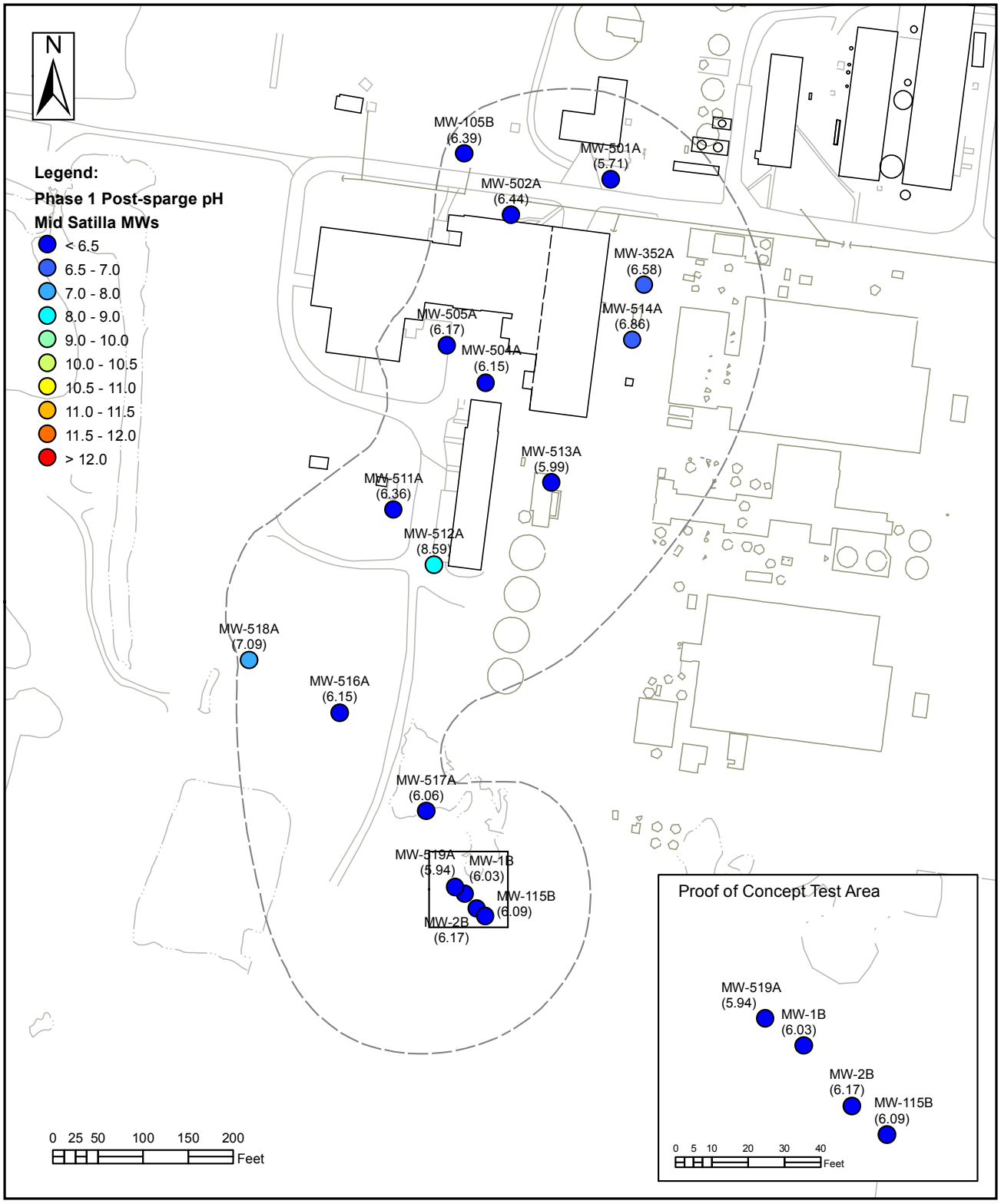

Post-sparge pH in mid Satilla monitoring wells (data from Feb/March 2014).

FIGURE 4-25

LCP Chemicals Site, Brunswick, GA

Mutch Associates, LLC
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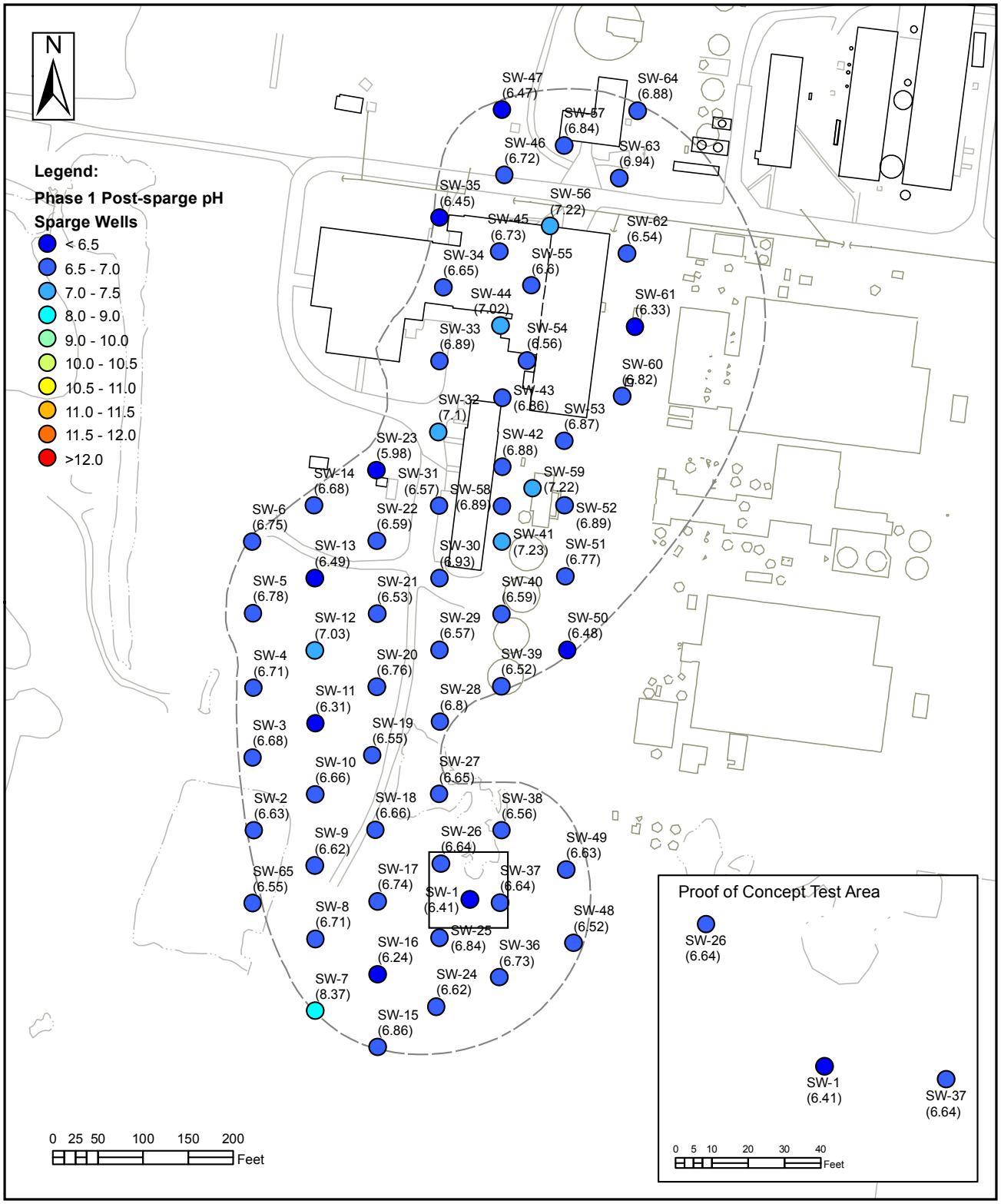

Post-sparge pH in sparge wells (data from Feb 2014).

FIGURE 4-26

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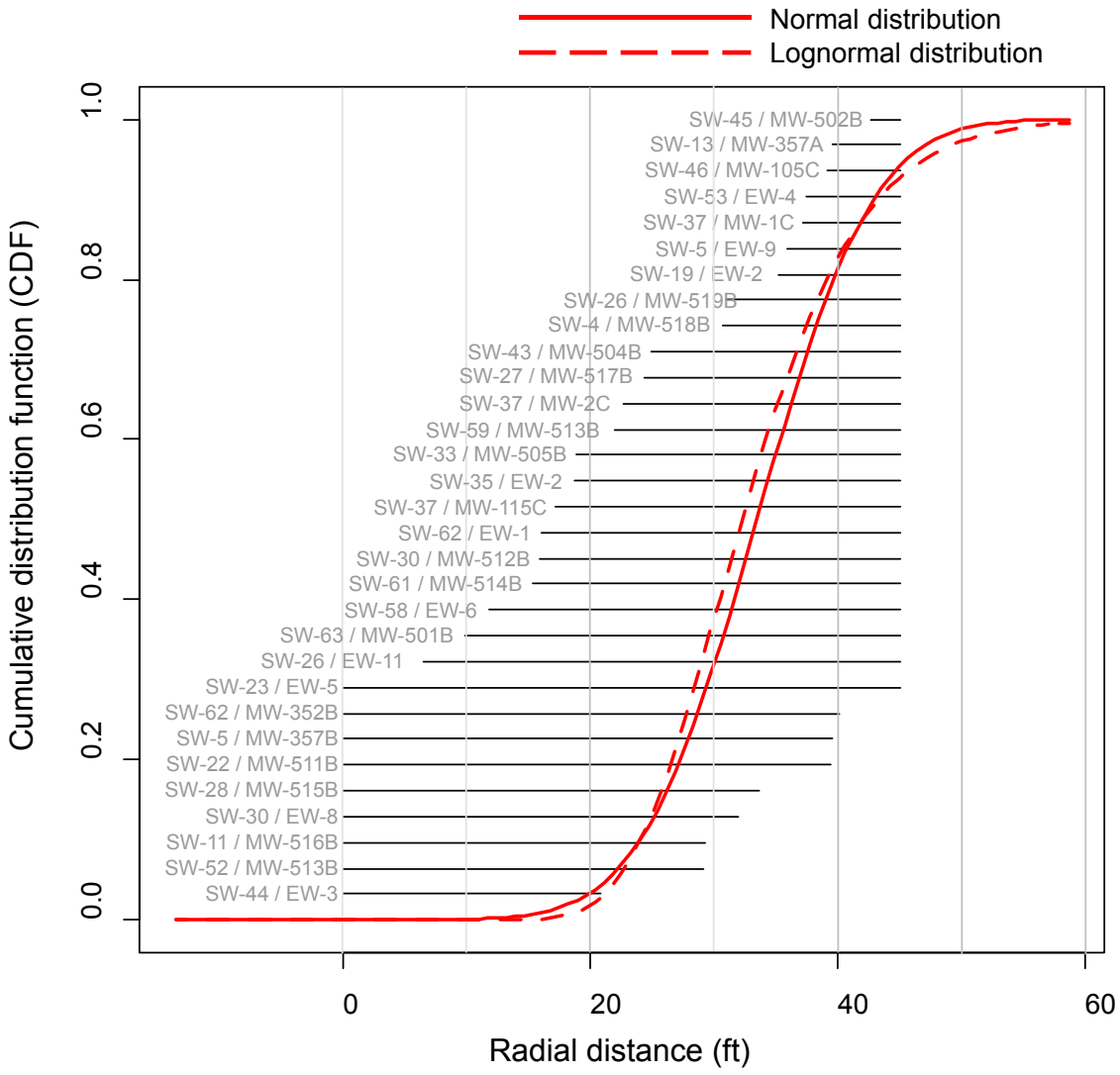
LCP Chemicals Site, Brunswick, GA



Statistic	Distance (ft)
Mean	33.5
Standard deviation	7.4
5th percentile	21.3
25th percentile	28.5
50th percentile	33.5
75th percentile	38.4
95th percentile	45.6

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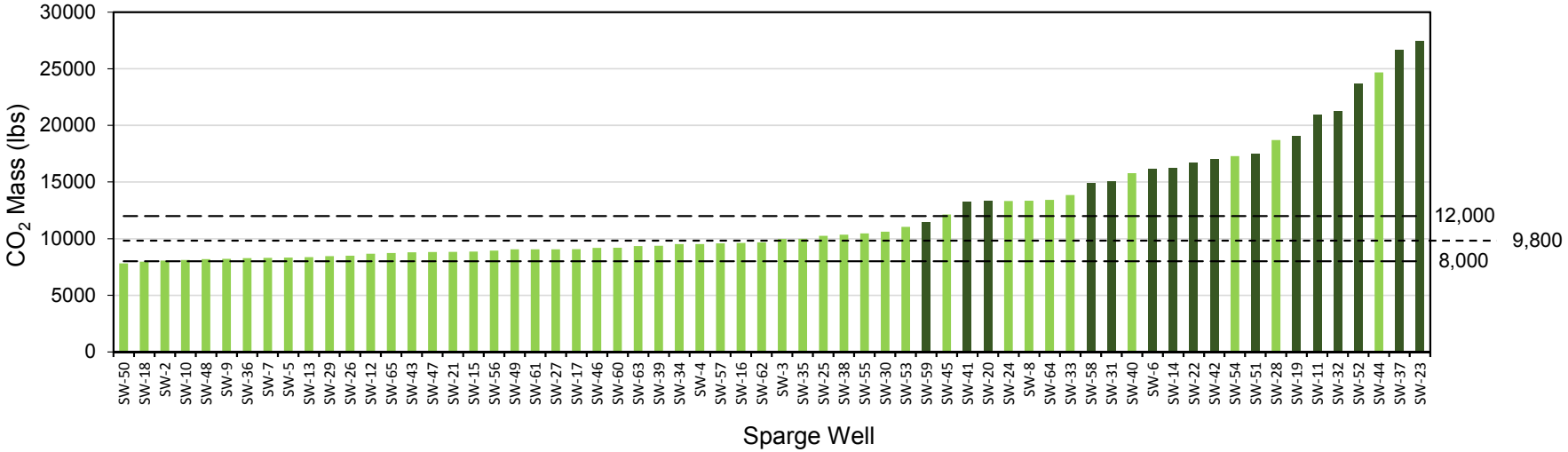
Fit of radius of influence intervals to a normal cumulative distribution function (CDF).

FIGURE 4-27

LCP Chemicals Site, Brunswick, GA



Median mass: 9,800 lbs per well
Total mass: 783,000 lbs (391.5 tons)

Legend:

- Sparge well located in low to moderate alkalinity area
- Sparge well located in high alkalinity area

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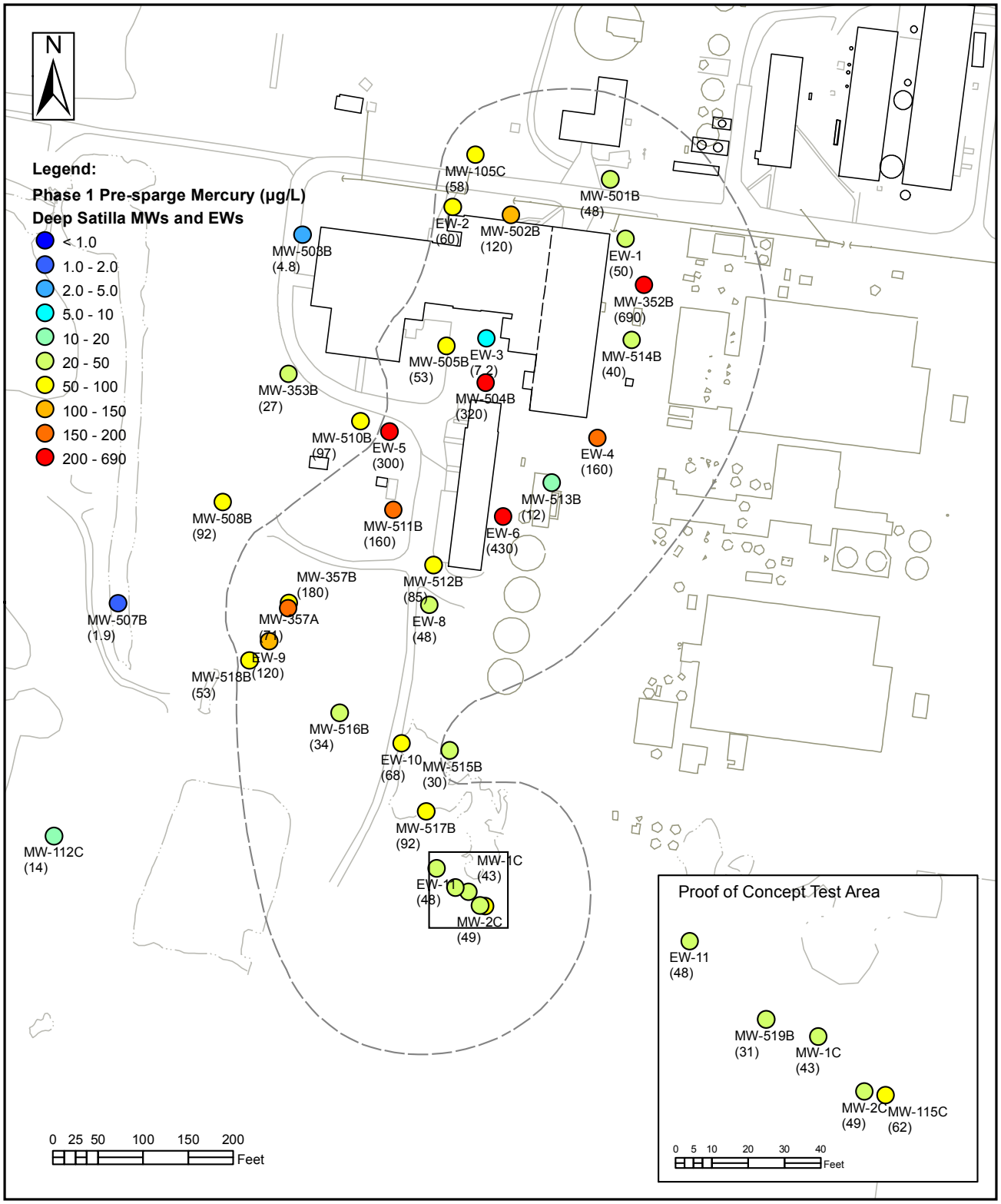
CO_2 mass per well for the 64 Phase 1 sparge wells.

FIGURE 4-28

LCP Chemicals Site, Brunswick, GA



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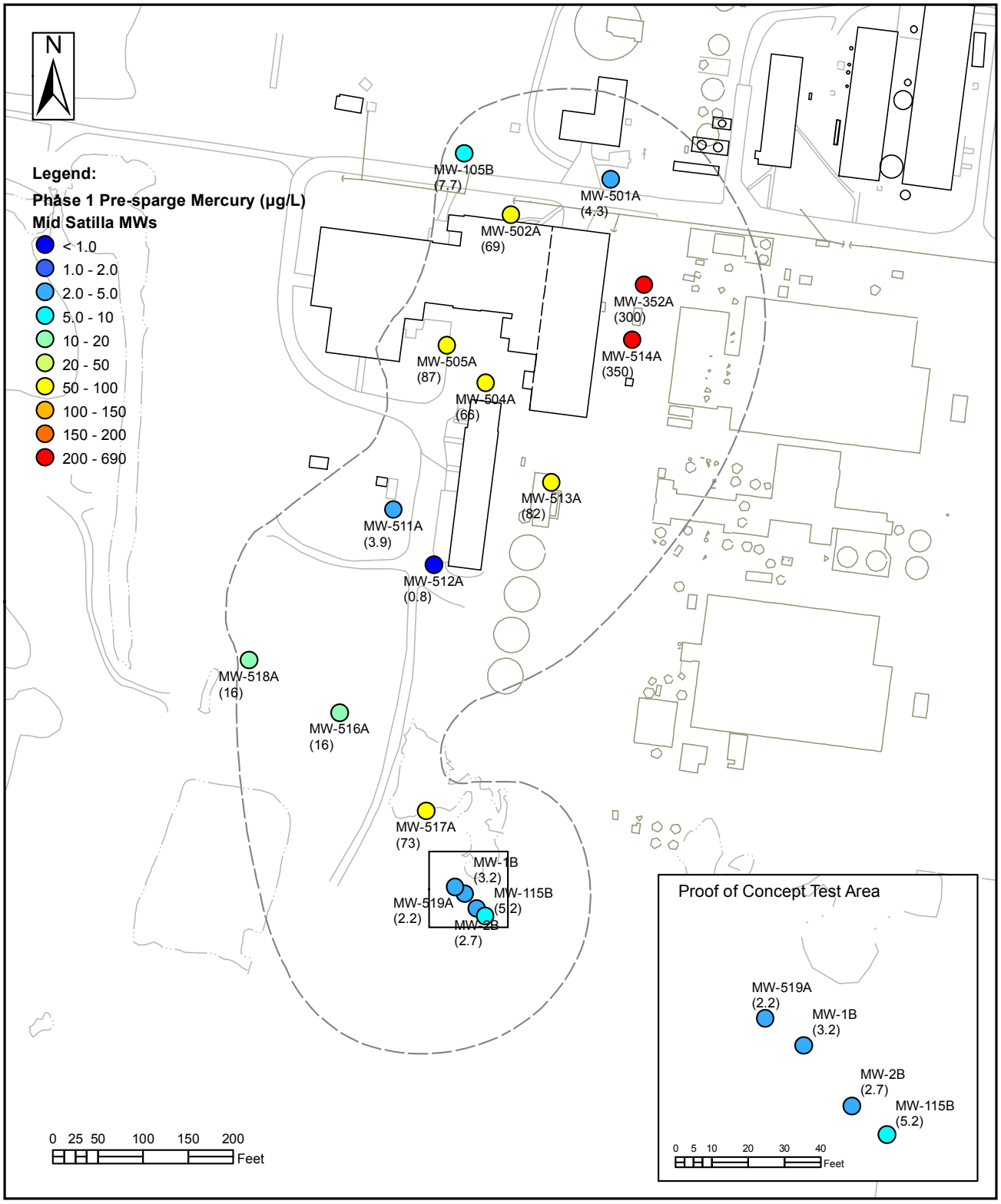
Pre-sparge mercury in deep Satilla monitoring points (data from Aug/Sept 2013).

FIGURE 4-29

LCP Chemicals Site, Brunswick, GA



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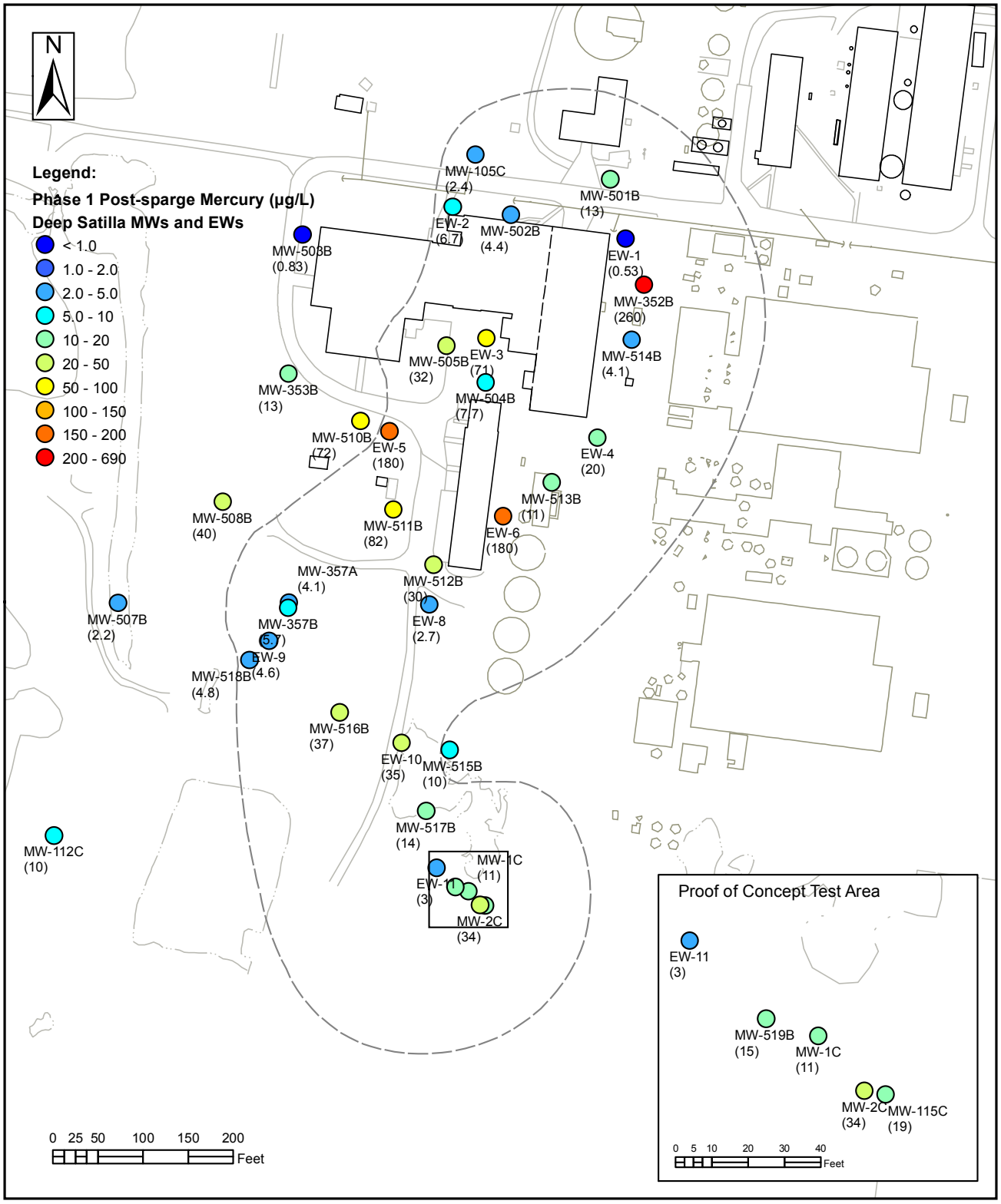
Pre-sparge mercury in mid Satilla monitoring points (data from Aug/Sept 2013).

FIGURE 4-30

LCP Chemicals Site, Brunswick, GA



Post-sparge mercury in deep Satilla monitoring points (data from Feb/Mar 2014).

FIGURE 4-31

LCP Chemicals Site, Brunswick, GA

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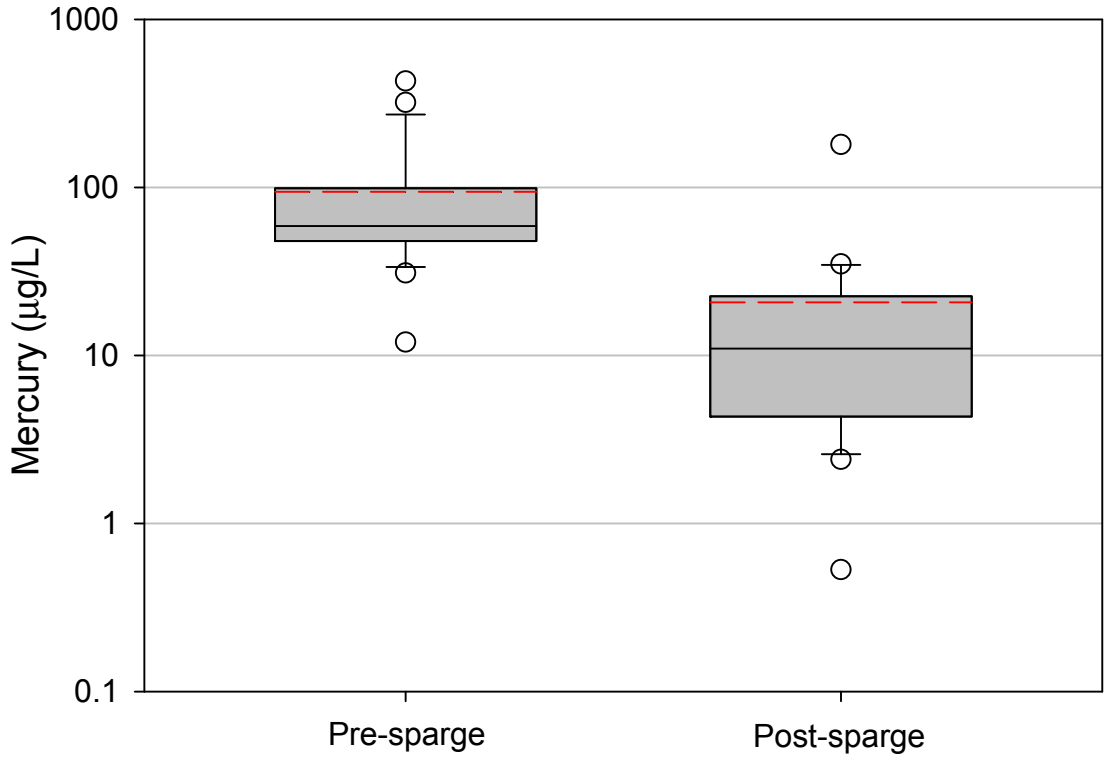

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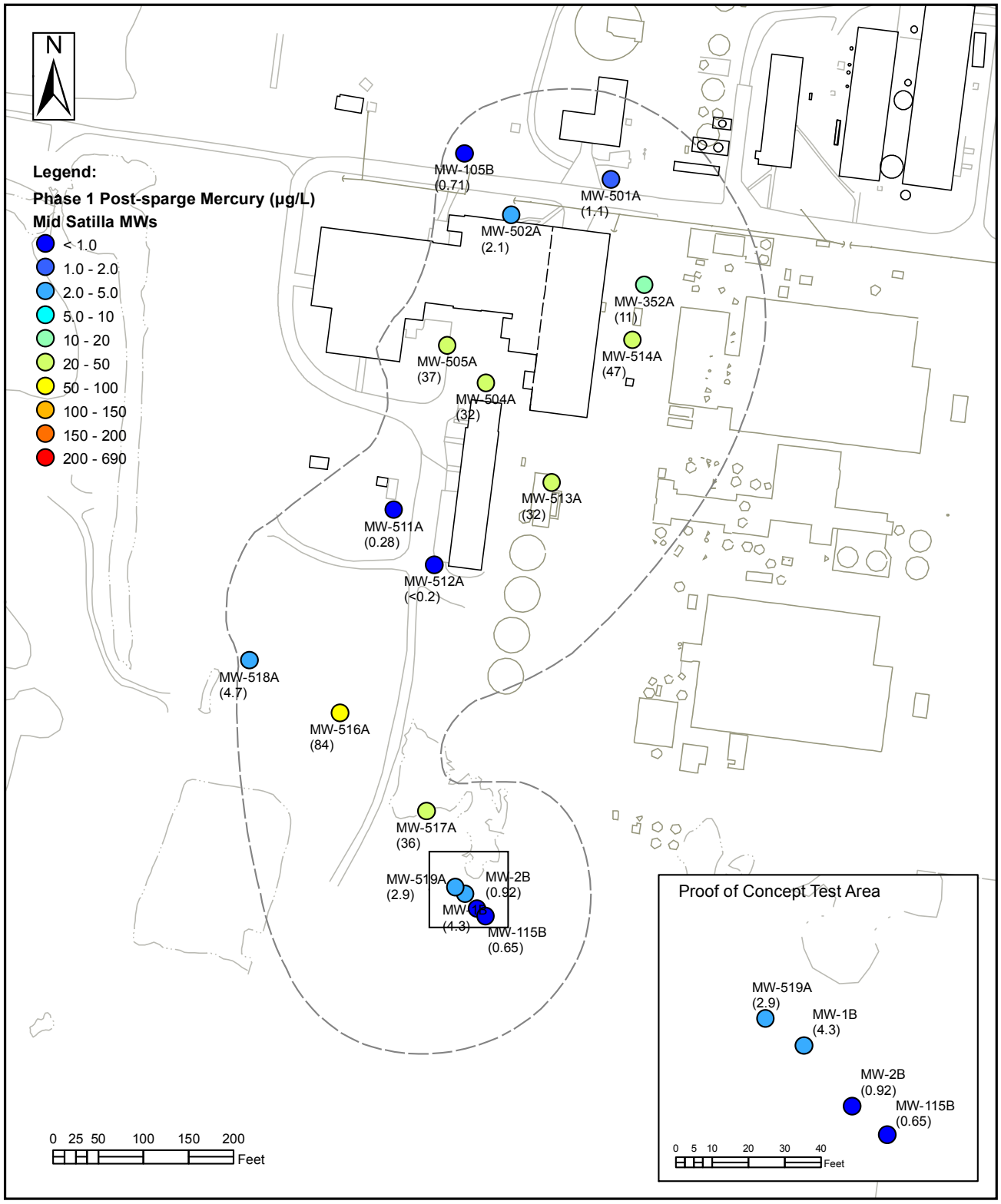
Pre and post-sparge mercury concentrations in deep Satilla monitoring points where post-sparge pH was less than 7.5.

FIGURE 4-32

LCP Chemicals Site, Brunswick, GA



Post-sparge mercury in mid Satilla monitoring points (data from Feb/Mar 2014).

FIGURE 4-33

LCP Chemicals Site, Brunswick, GA

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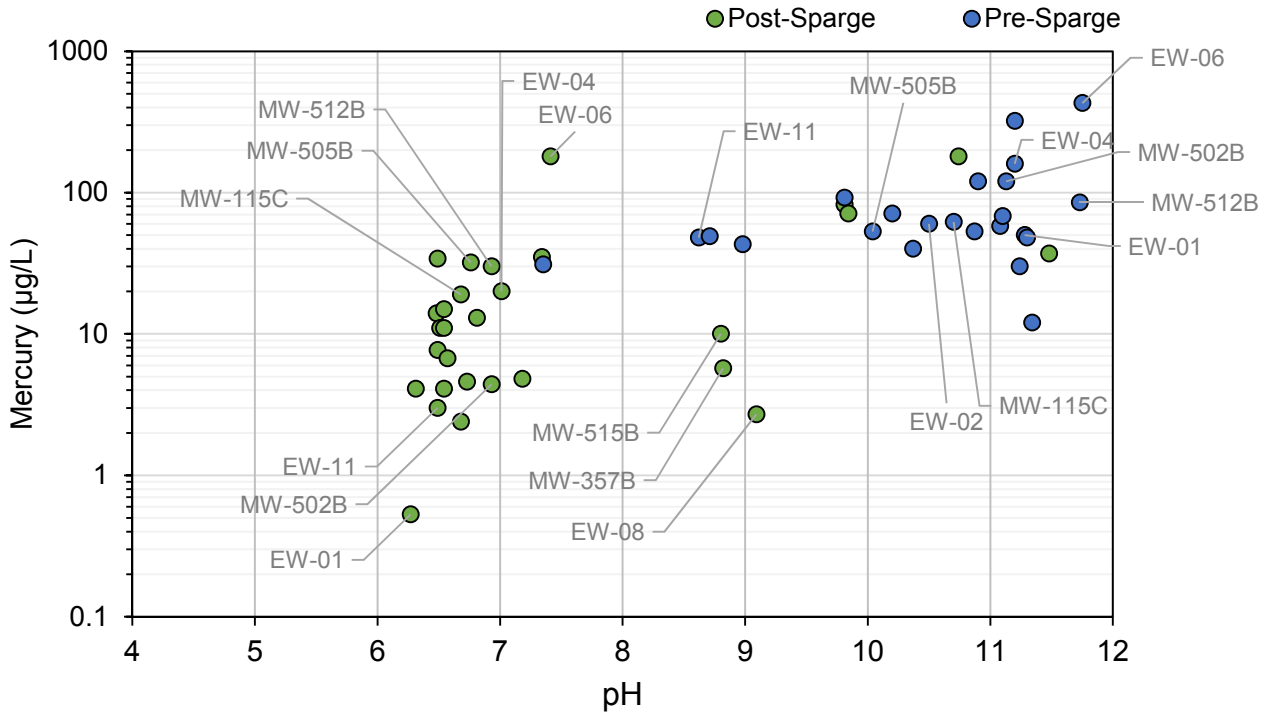

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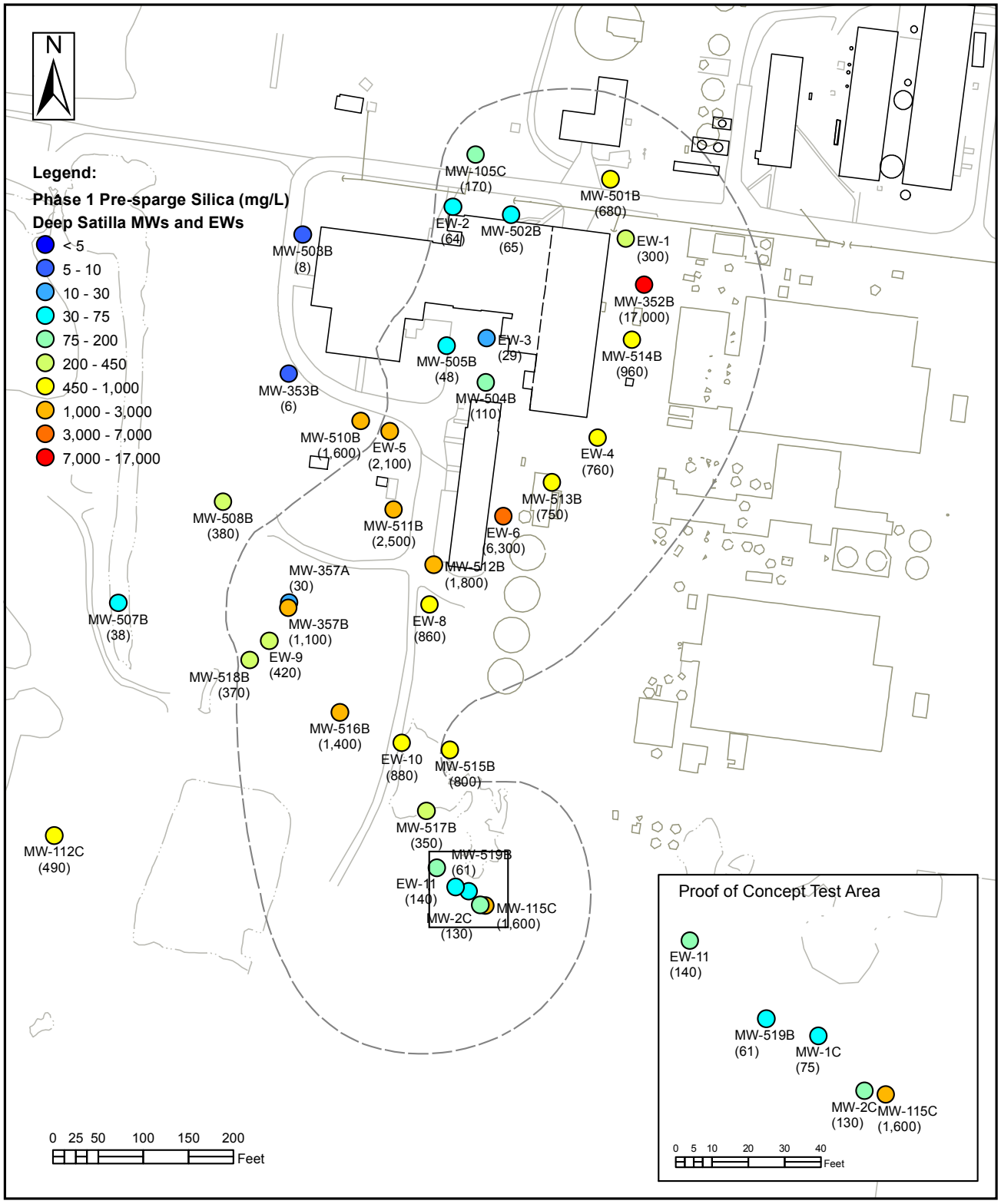
Mercury versus pH relationship for deep Satilla monitoring points.

FIGURE 4-34

LCP Chemicals Site, Brunswick, GA



Pre-sparge silica in deep Satilla monitoring points (data from Aug/Sept 2013).

FIGURE 4-35

LCP Chemicals Site, Brunswick, GA

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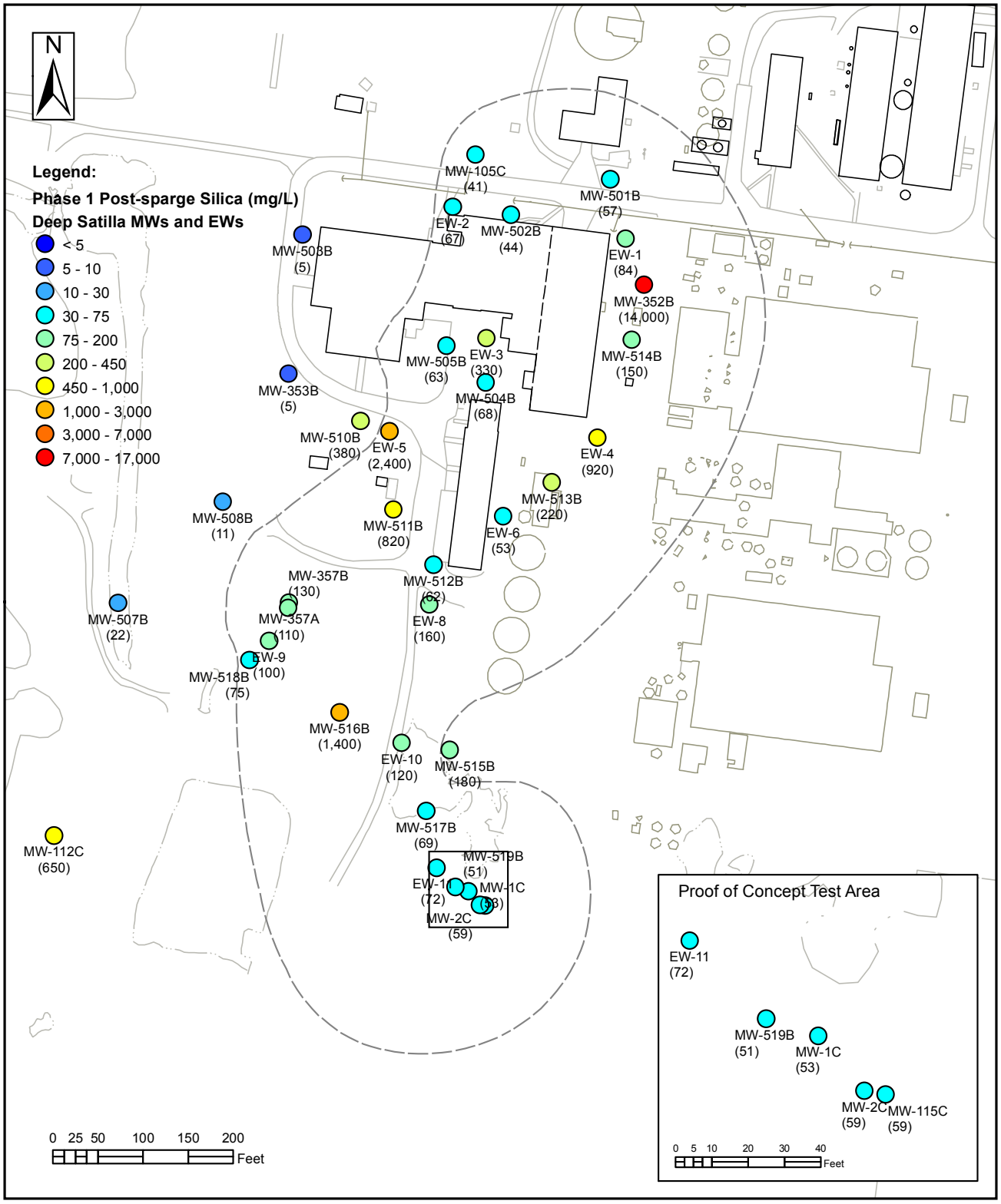

Post-sparge silica in deep Satilla monitoring points (data from Feb/Mar 2014).

FIGURE 4-36

LCP Chemicals Site, Brunswick, GA

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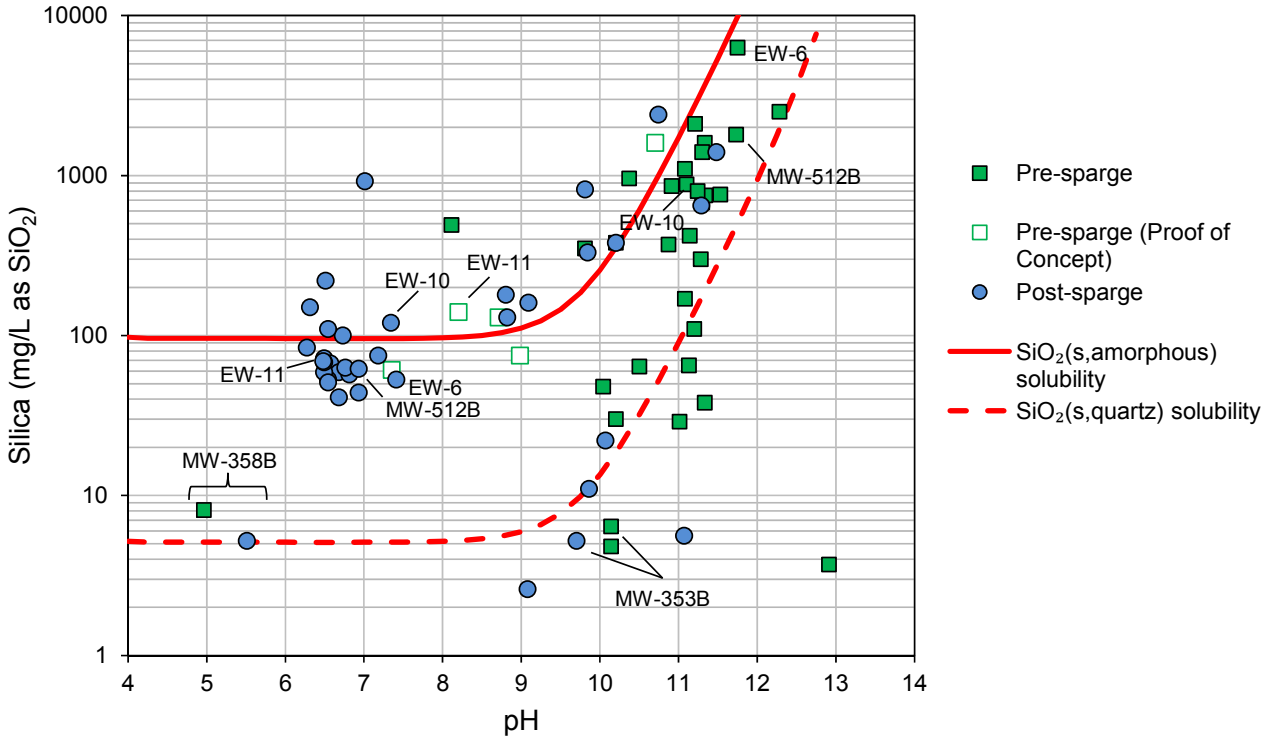

Note: Solid lines represent model calculated silica solubility.

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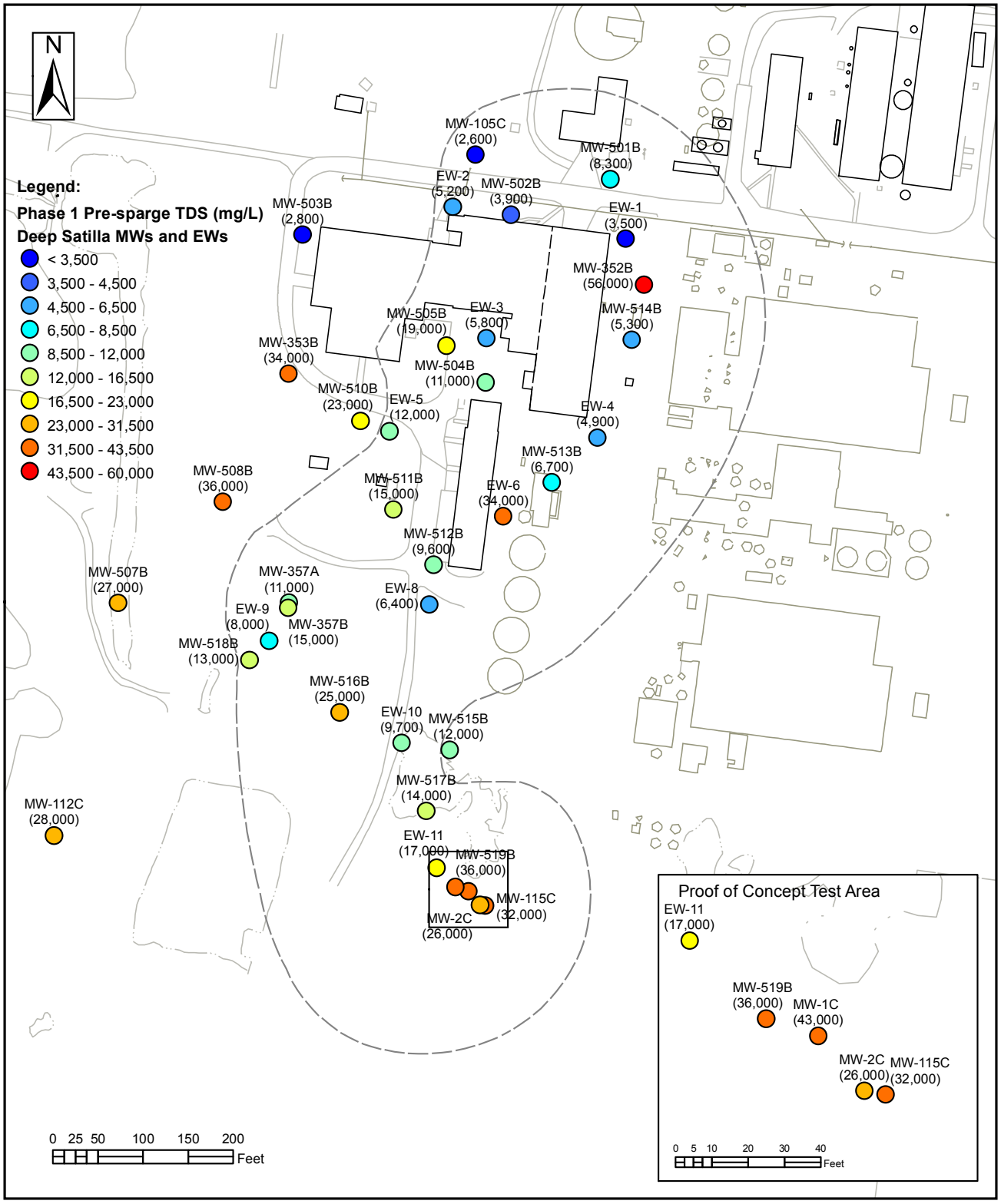
Silica versus pH for deep Satilla monitoring points.

FIGURE 4-37

LCP Chemicals Site, Brunswick, GA



Pre-sparge TDS in deep Satilla monitoring points (data from Aug/Sept 2013).

FIGURE 4-38

LCP Chemicals Site, Brunswick, GA

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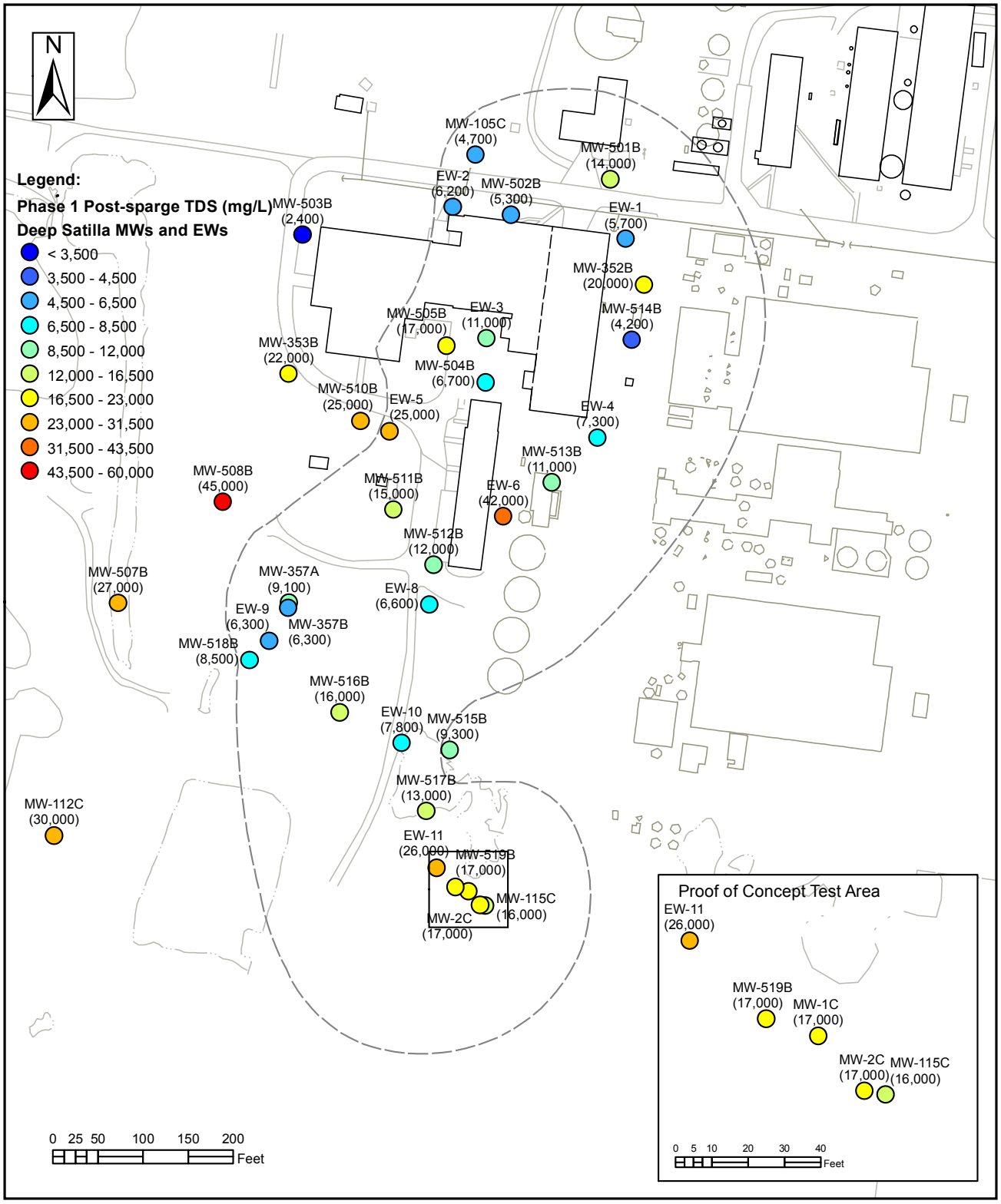

Post-sparge TDS in deep Satilla monitoring points (data from Feb/Mar 2014).

FIGURE 4-39

LCP Chemicals Site, Brunswick, GA

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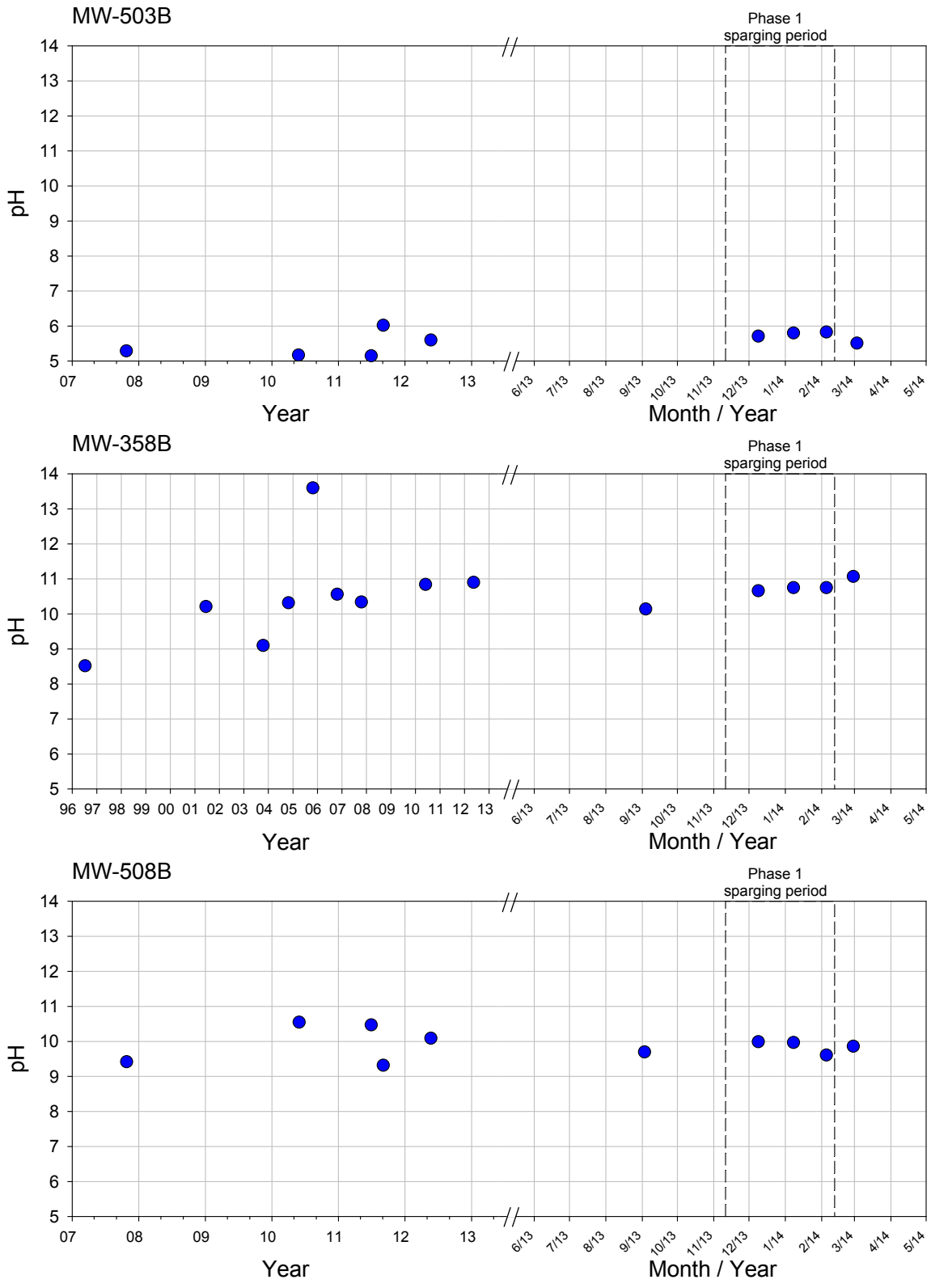

Comparison of historical and Phase 1 pH results for MW-503B, MW-358B and MW-508B.

FIGURE 4-40

LCP Chemicals Site, Brunswick, GA

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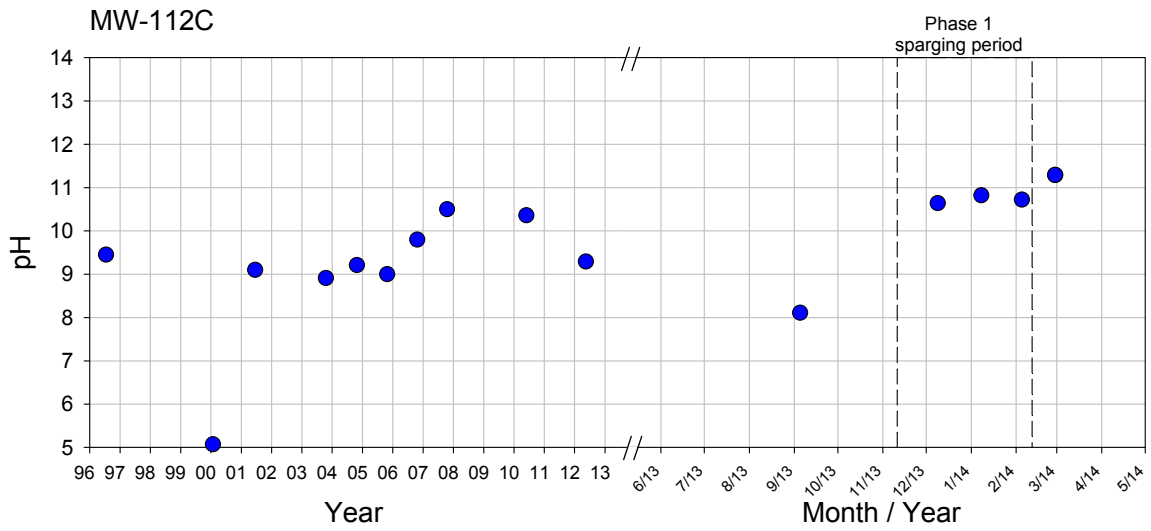

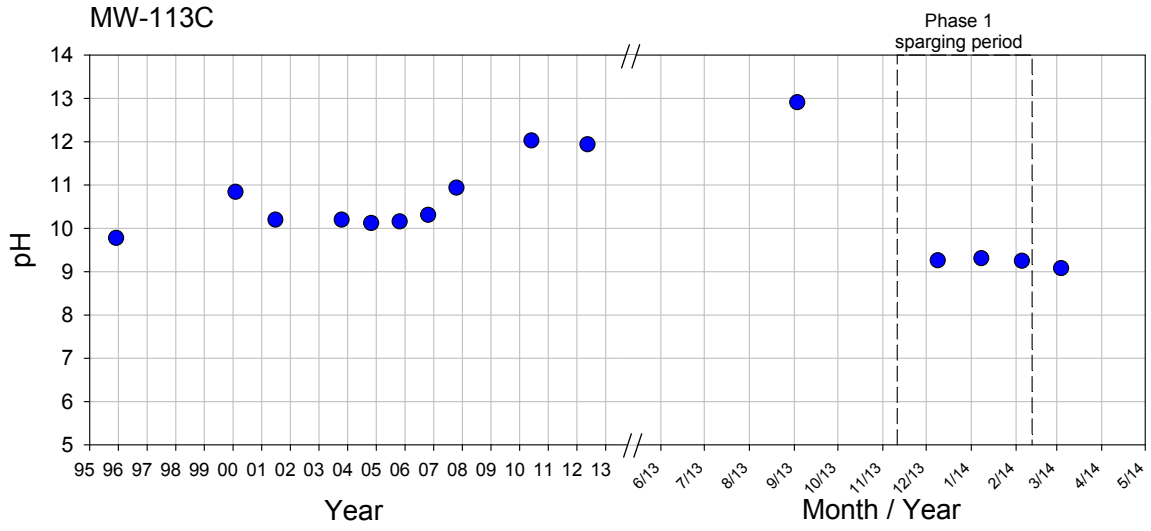

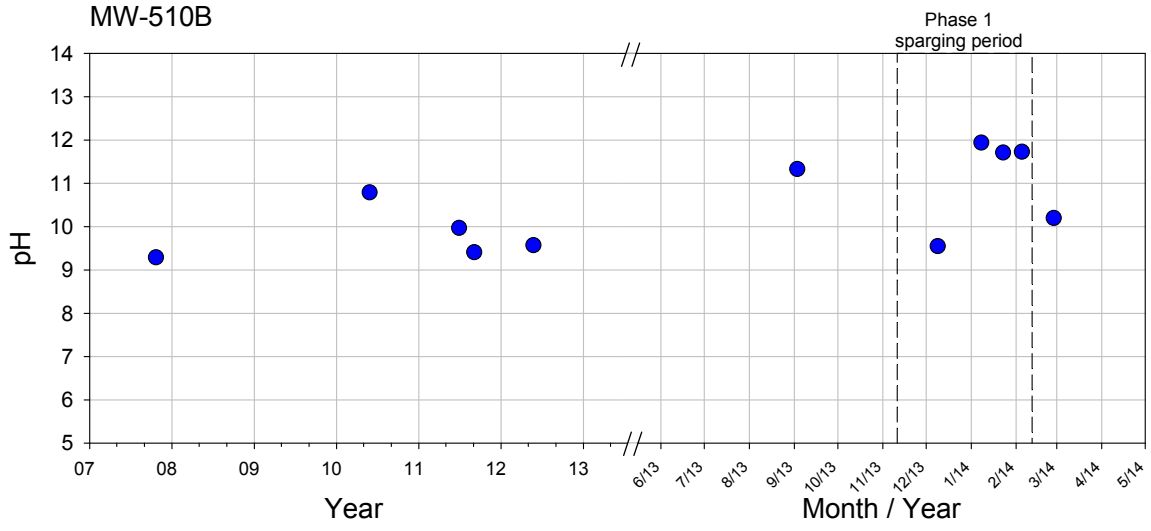

Comparison of historical and Phase 1 pH results for MW-112C, MW-113C and MW-510B.

FIGURE 4-41

LCP Chemicals Site, Brunswick, GA

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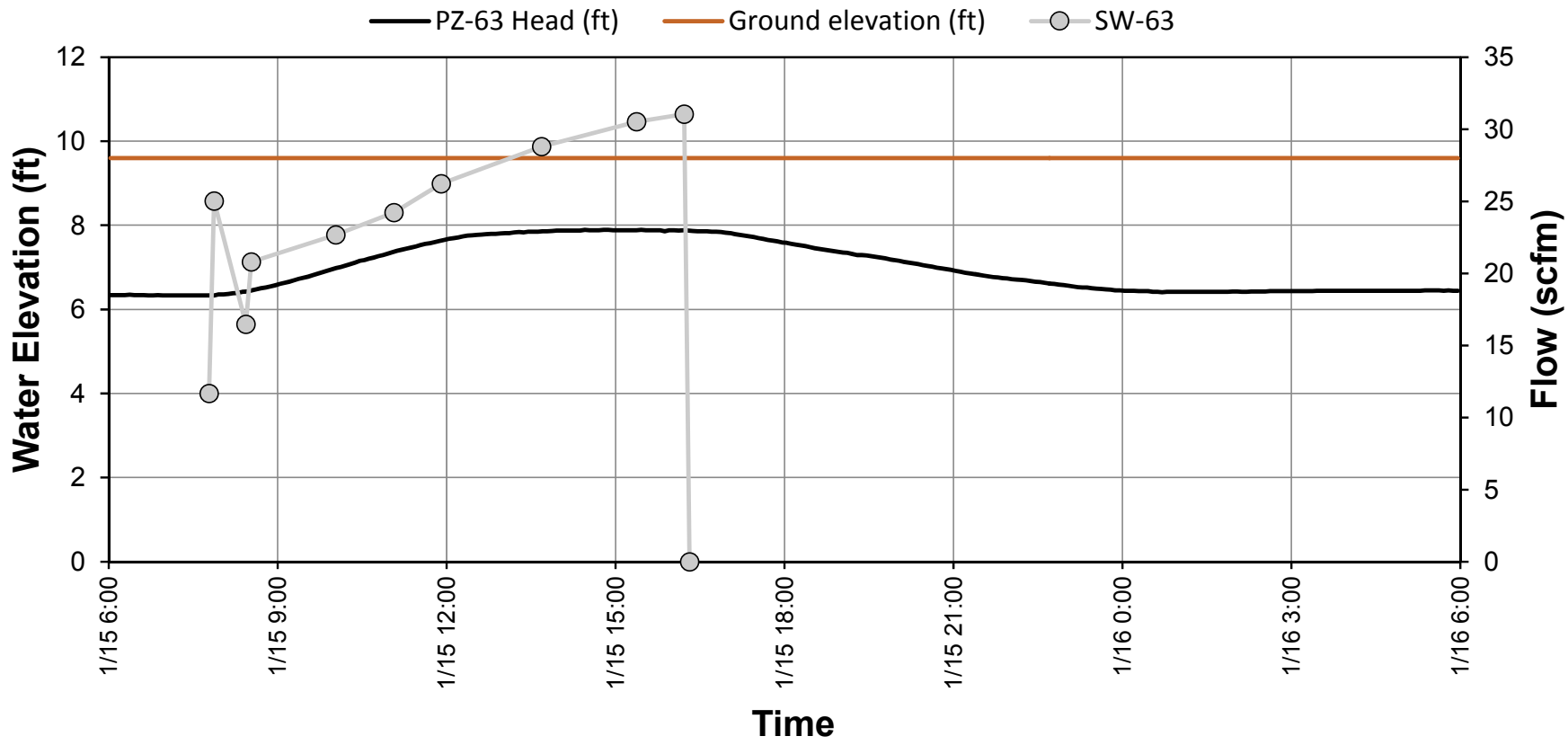
PZ-63 water level response to CO_2 injection in SW-63



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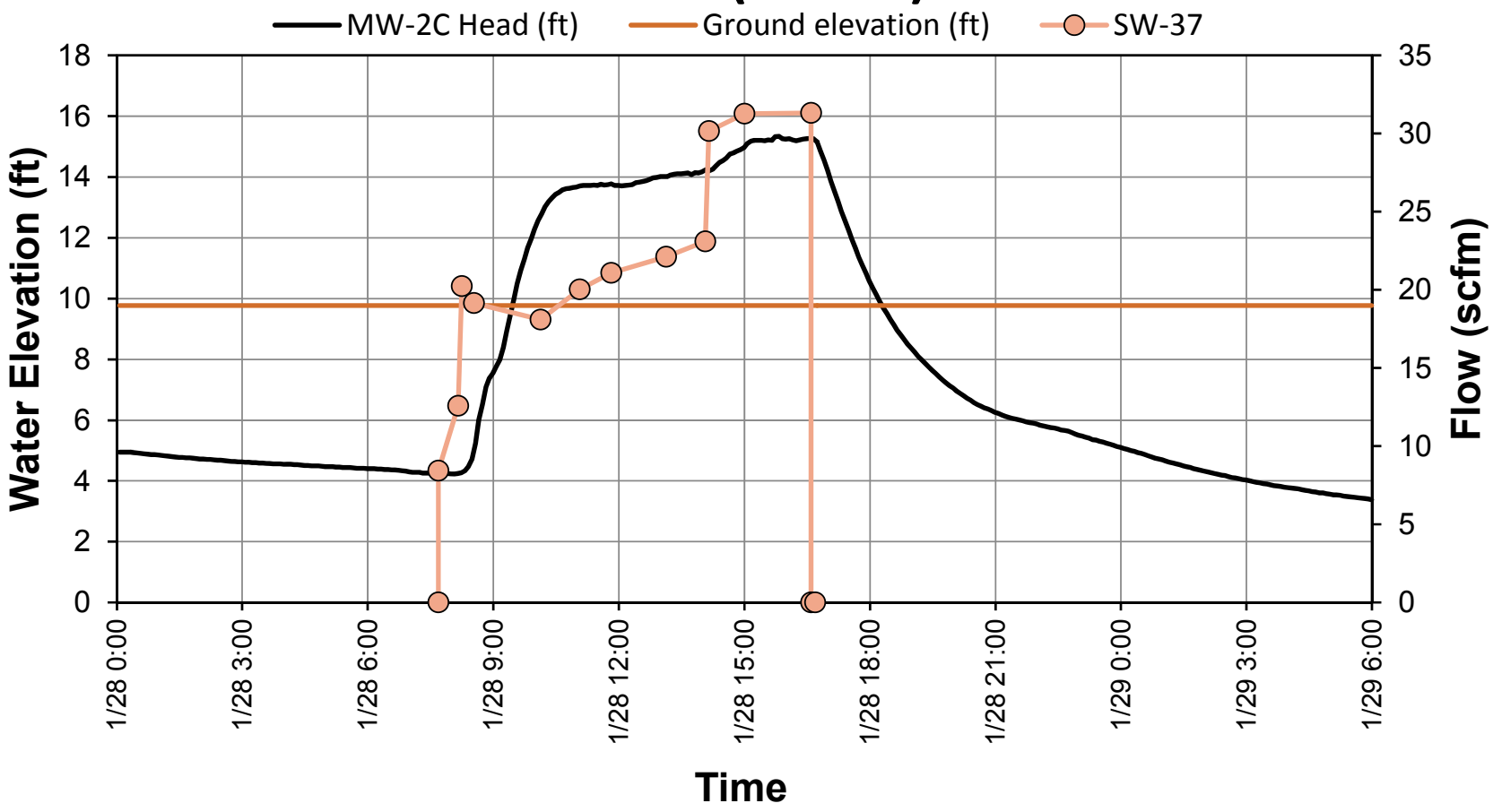
Water elevation in PZ-63 in response to SW-63, 3.4 feet away, on January 15, 2014.

FIGURE 4-42

LCP Chemicals Site, Brunswick, GA

MW-2C piezometric surface in response to CO_2 injection in SW-37 (22.7 ft)



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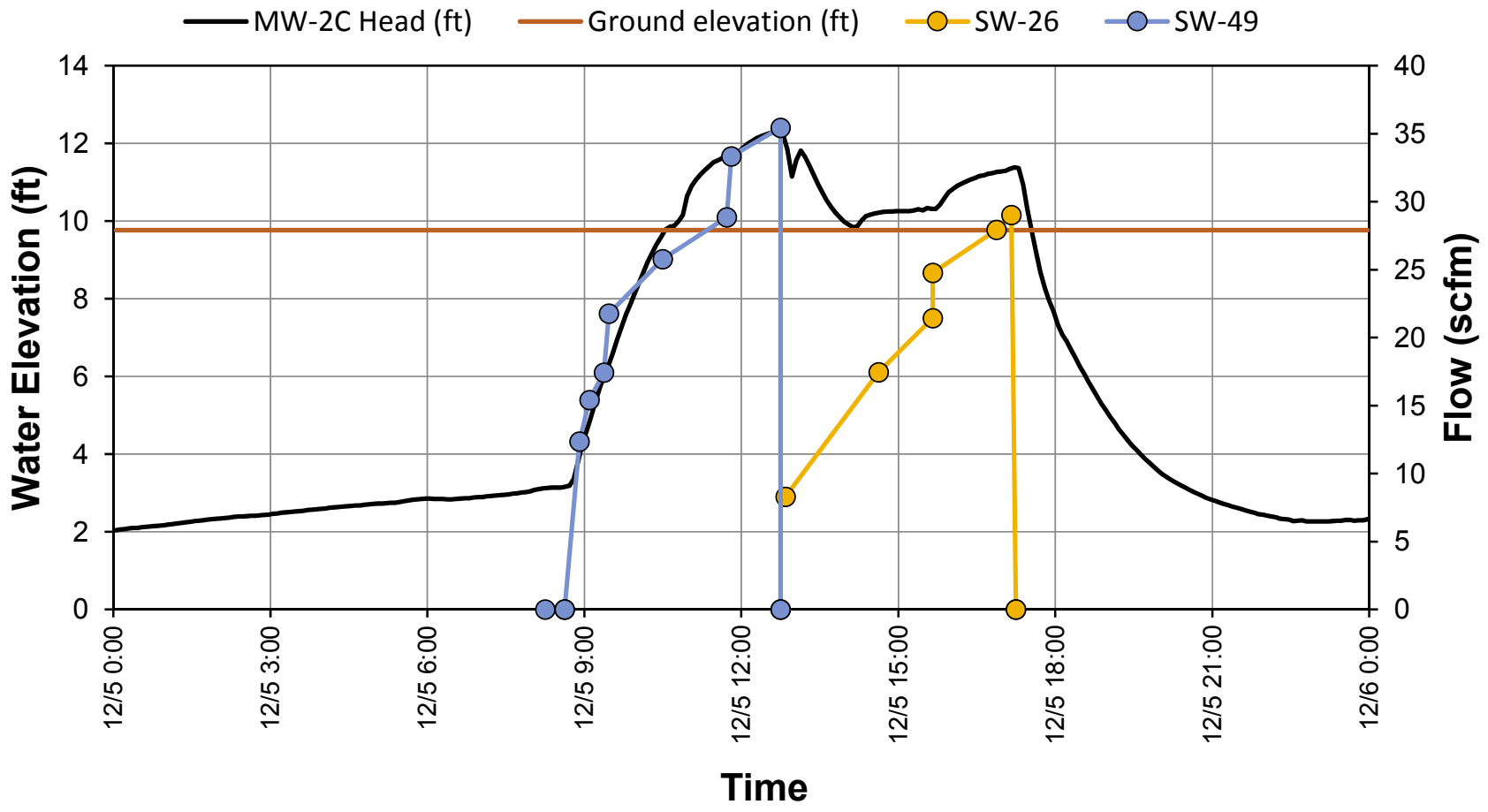
Piezometric surface elevation in MW-2C in response to SW-37 on January 28, 2014.

FIGURE 4-43

LCP Chemicals Site, Brunswick, GA

MW-2C piezometric surface in response to CO_2 injection in SW-26 (64 ft), SW-49 (104 ft)



Piezometric surface elevation in MW-2C on December 5, 2013 with sparge wells operating within 105 feet.

FIGURE 4-44

LCP Chemicals Site, Brunswick, GA

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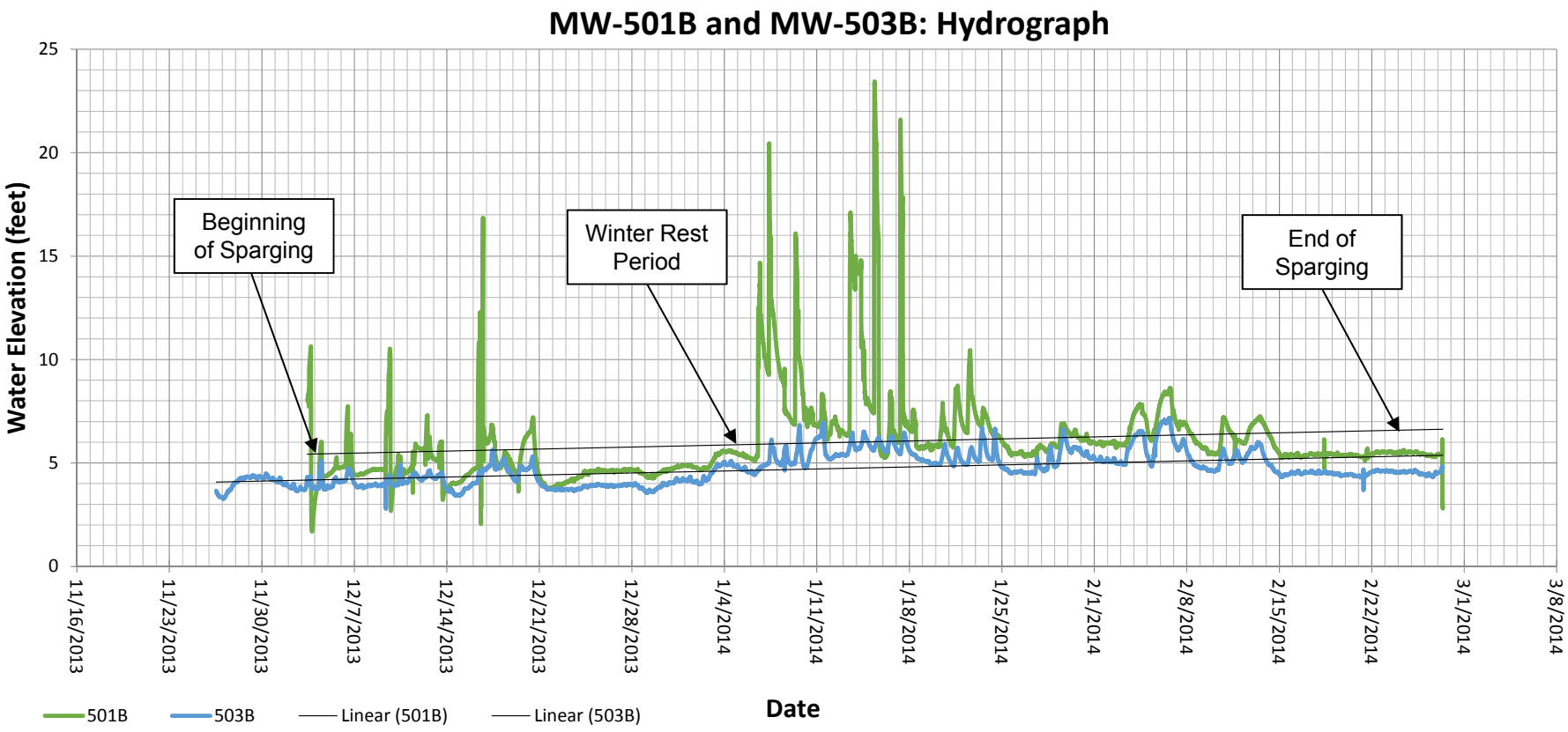

Mutch Associates, LLC
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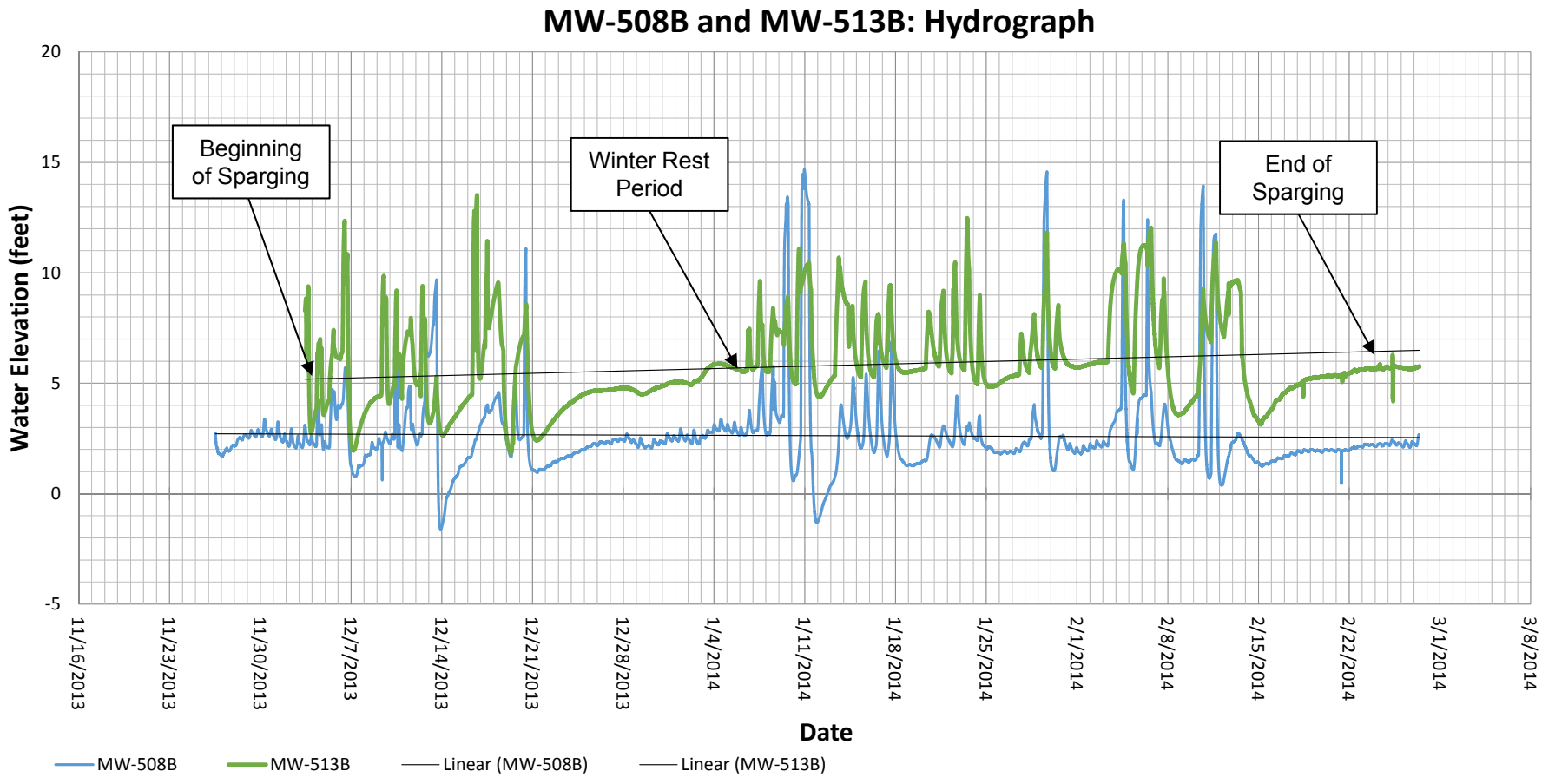
MW-501B and MW-503B well pair hydrograph.

FIGURE 4-45

LCP Chemicals Site, Brunswick, GA



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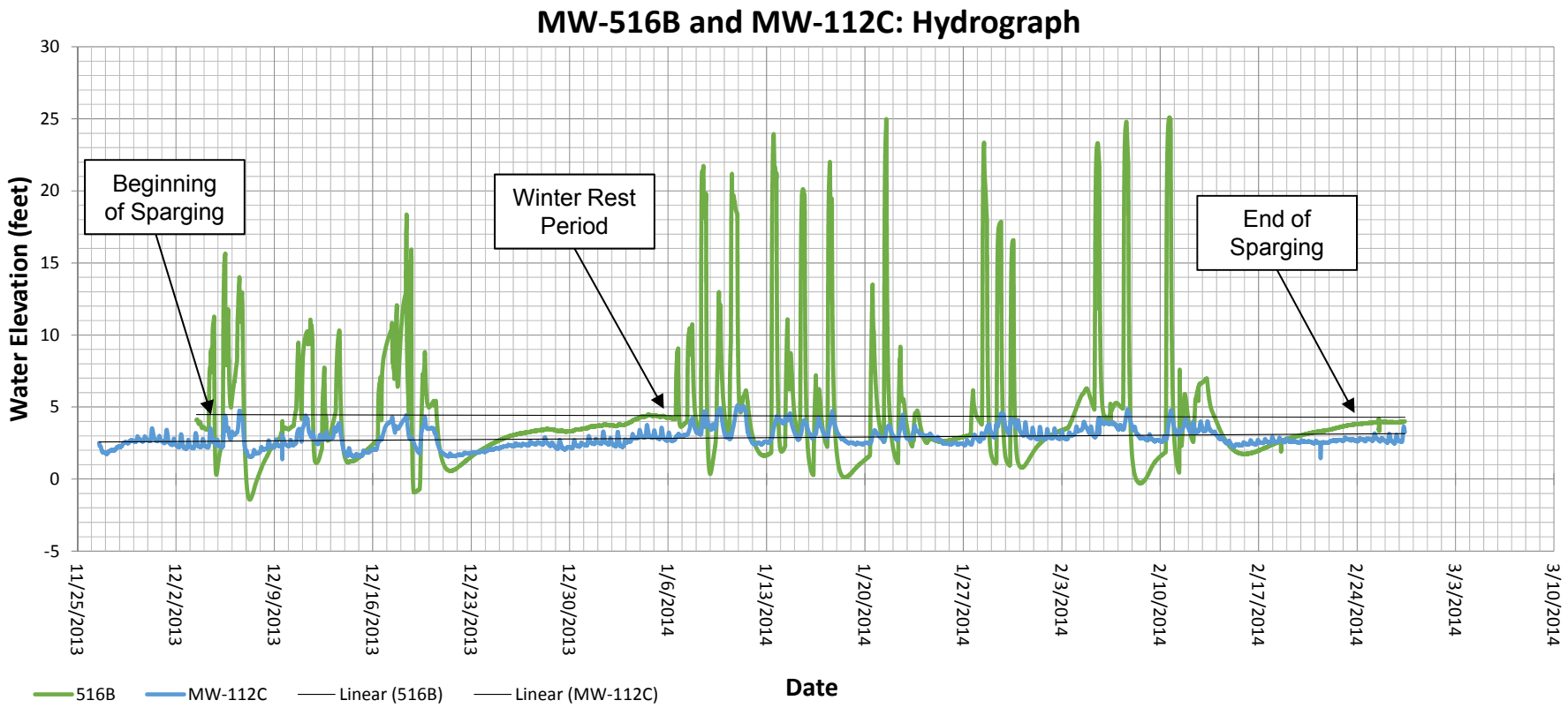
MW-508B and MW-513B well pair hydrograph

FIGURE 4-46

LCP Chemicals Site, Brunswick, GA



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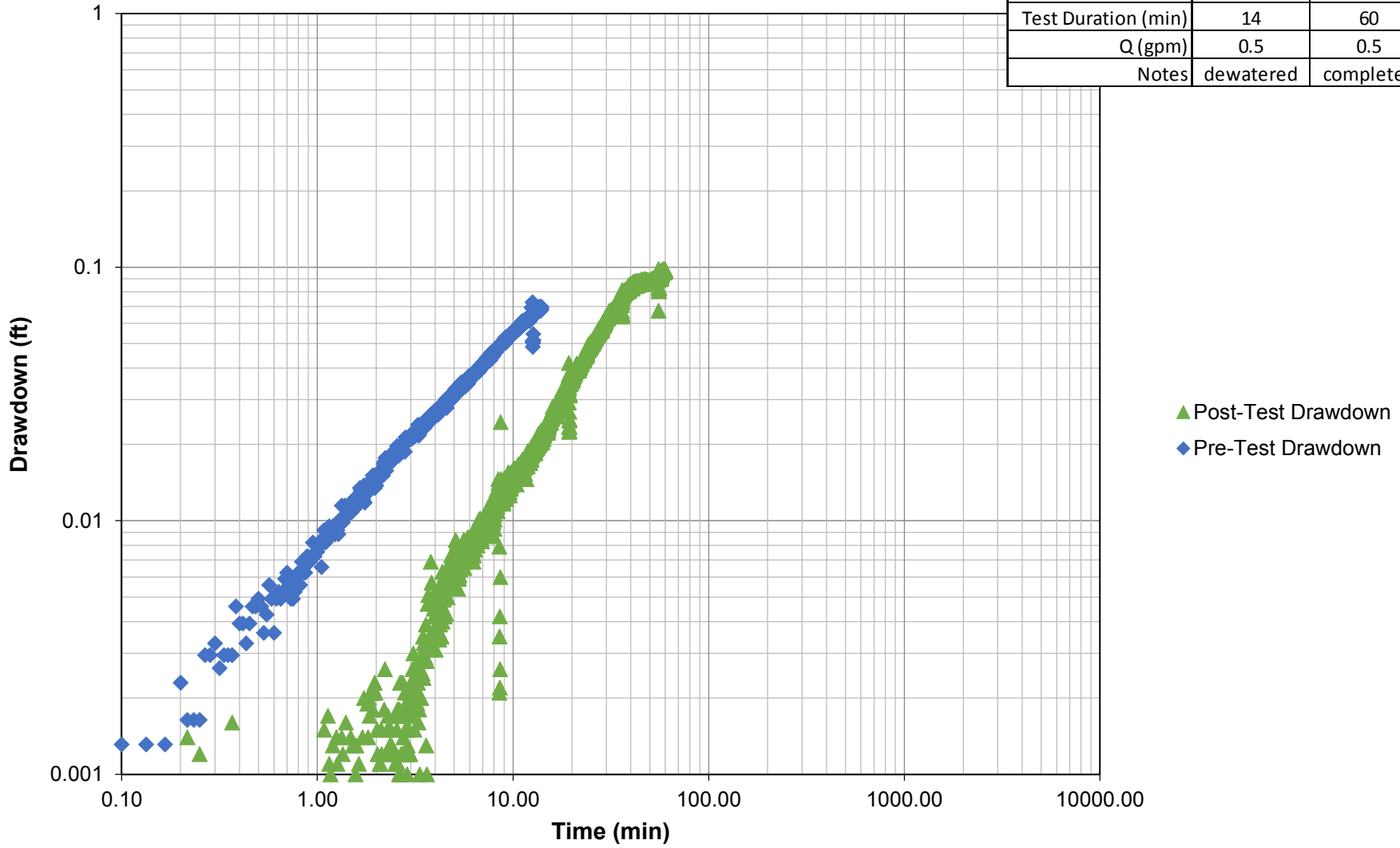
MW-516B and MW-112C well pair hydrograph

FIGURE 4-47

LCP Chemicals Site, Brunswick, GA

Sparge well: SW-4, Monitoring well: MW-518B

SW-4	MW-518B	
Radial Distance (ft)	30.7	
	Pre	**Post**
Test Duration (min)	14	60
Q (gpm)	0.5	0.5
Notes	dewatered	completed



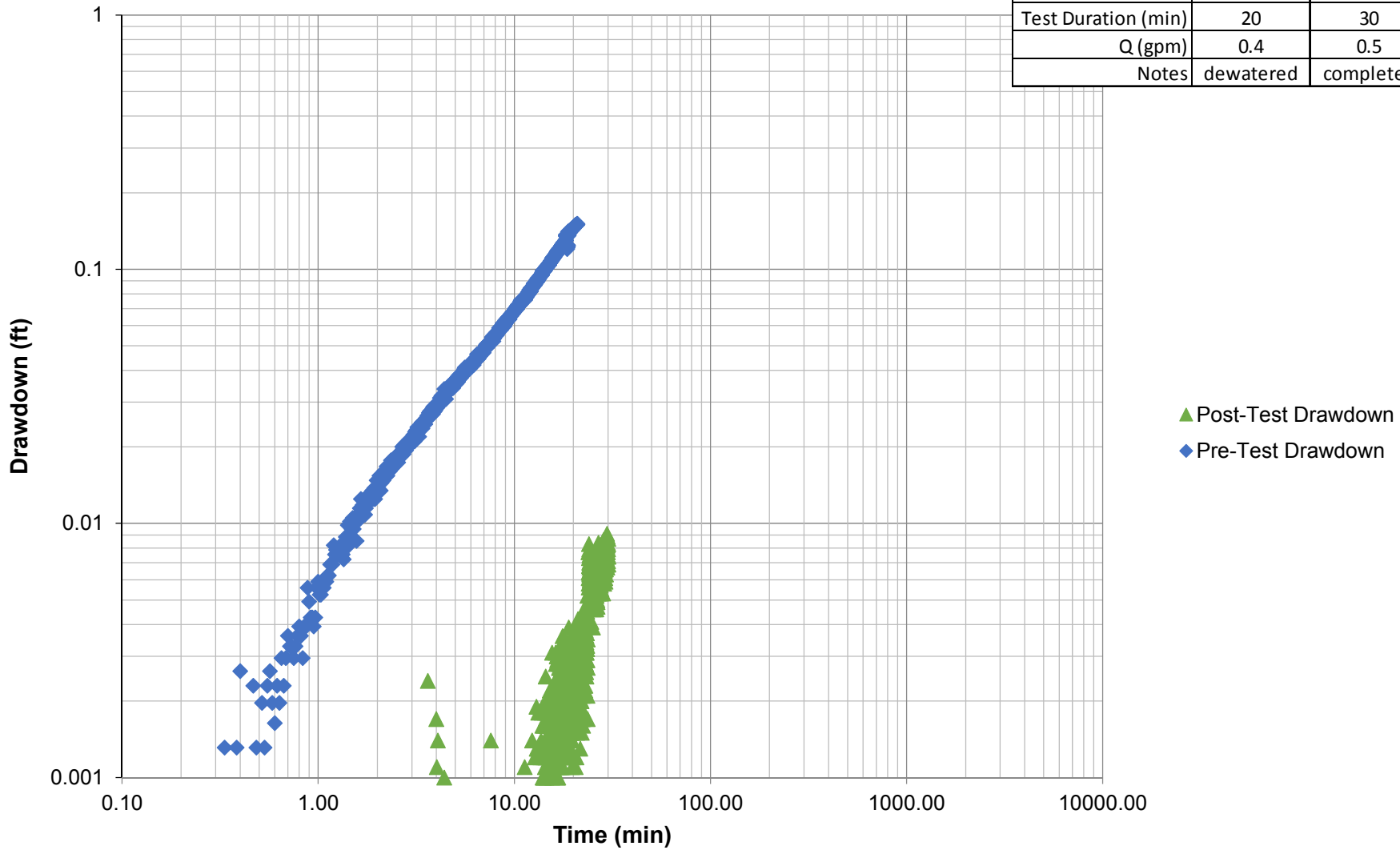
Mutch Associates, LLC
Environmental Engineers and Scientists

SW-4 pre- and post- sparge aquifer test monitoring well transducer drawdown plot.

FIGURE 4-48

LCP Chemicals Site, Brunswick, GA

SW-11	MW-516B	
Radial Distance (ft)	29.3	
	Pre	**Post**
Test Duration (min)	20	30
Q (gpm)	0.4	0.5
Notes	dewatered	completed



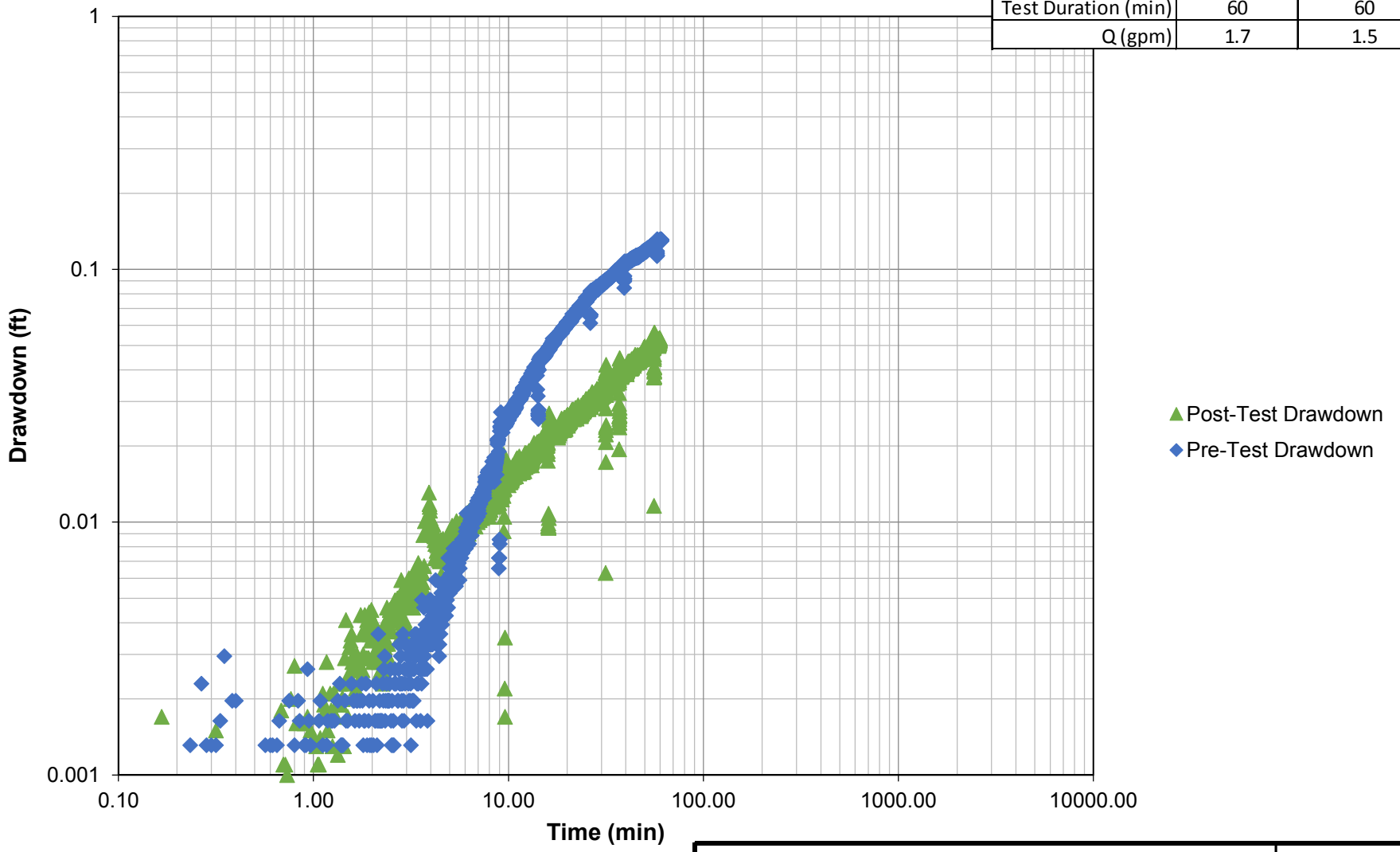
Mutch Associates, LLC
Environmental Engineers and Scientists

SW-11 pre- and post- sparge aquifer test monitoring well transducer drawdown plot.

FIGURE 4-49

LCP Chemicals Site, Brunswick, GA

SW-22	MW-511B	
Radial Distance (ft)	39.4	
	Pre	**Post**
Test Duration (min)	60	60
Q (gpm)	1.7	1.5

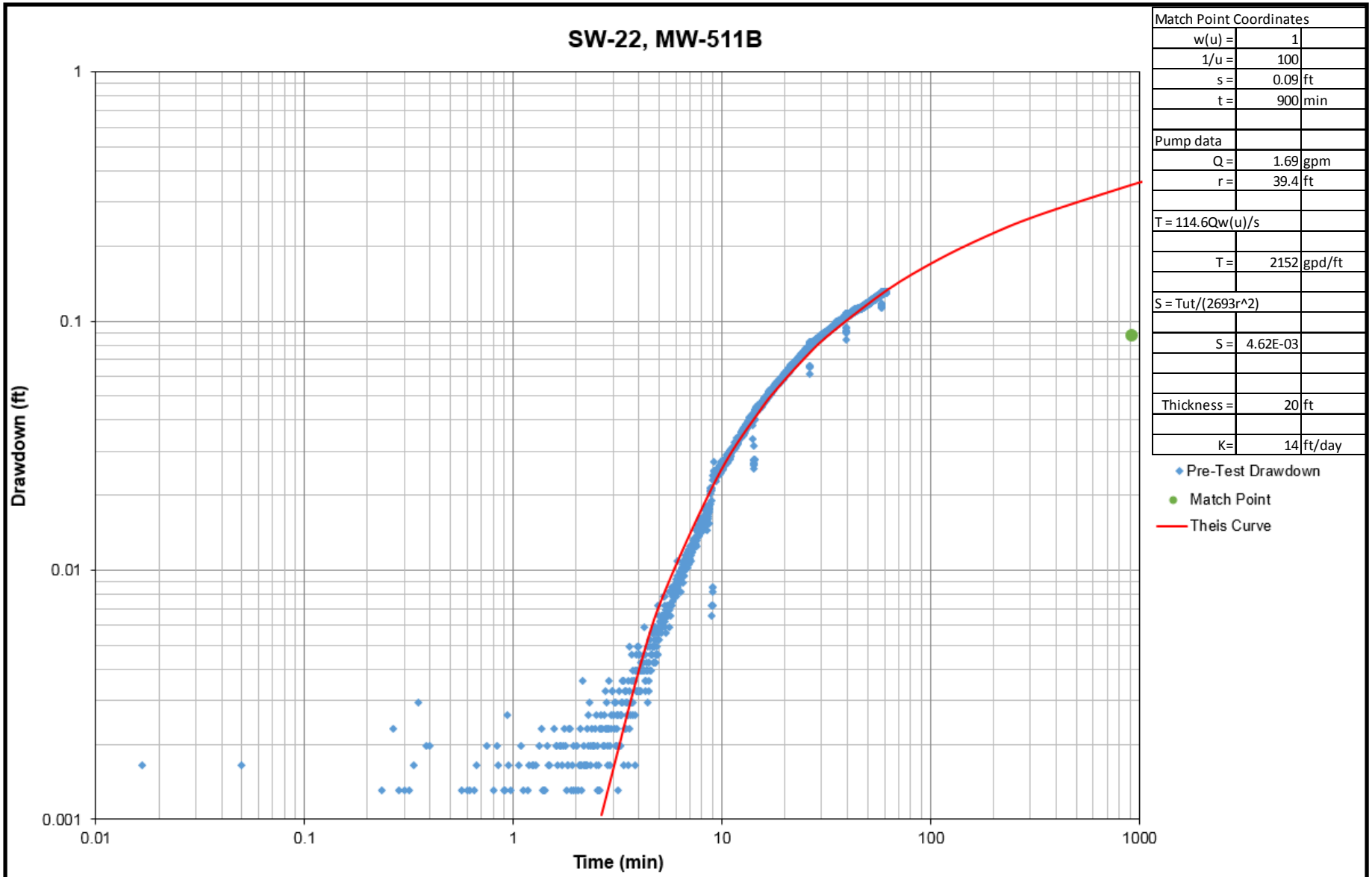


Mutch Associates, LLC
Environmental Engineers and Scientists

SW-22 pre- and post-sparge aquifer test monitoring well transducer drawdown plot.

FIGURE 4-50

LCP Chemicals Site, Brunswick, GA



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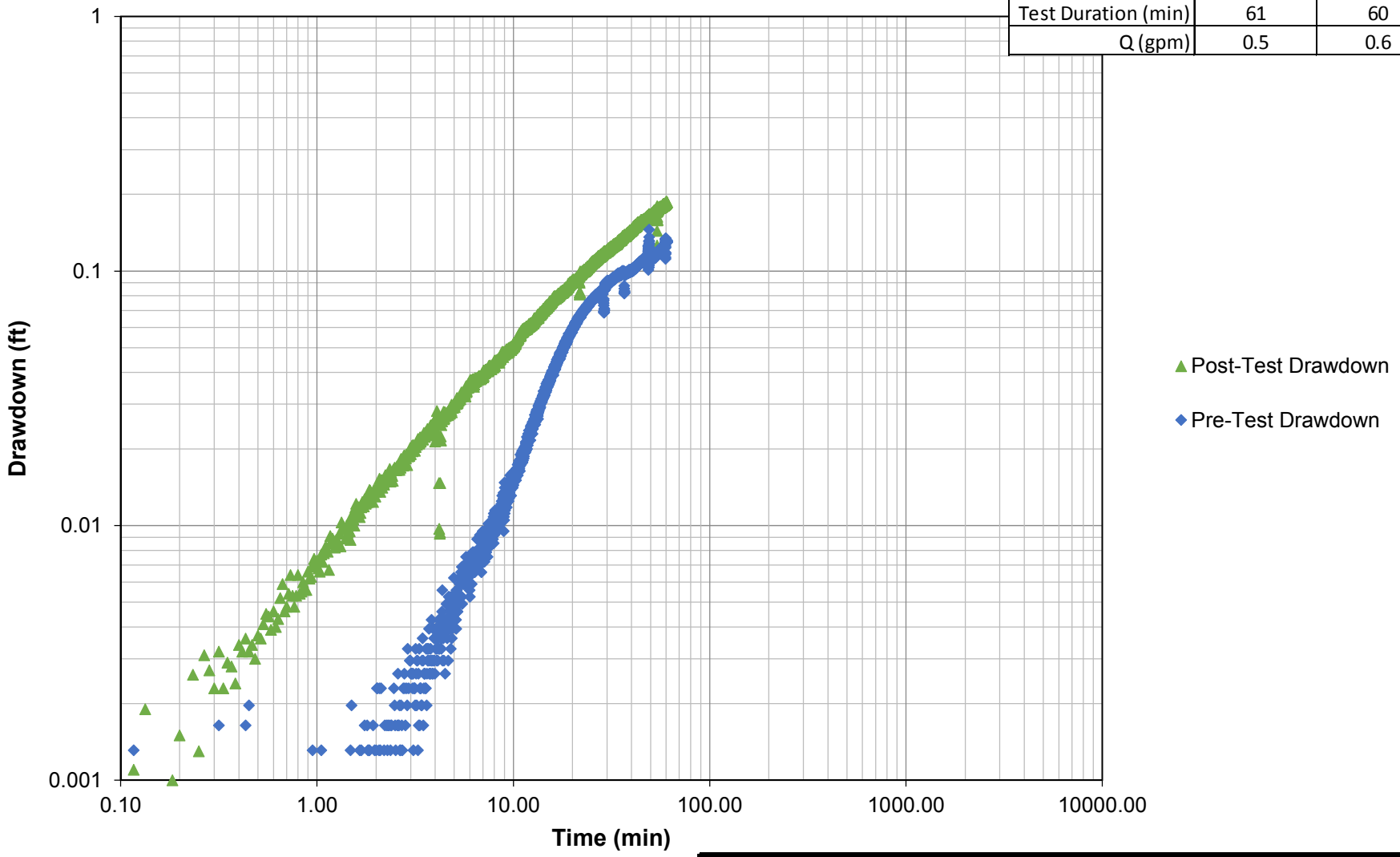
Environmental Engineers and Scientists

SW-22 pre-sparge aquifer test Theis match point analysis.

FIGURE 4-51

LCP Chemicals Site, Brunswick, GA

SW-30	MW-512B	
Radial Distance (ft)	15.9	
	Pre	**Post**
Test Duration (min)	61	60
Q (gpm)	0.5	0.6

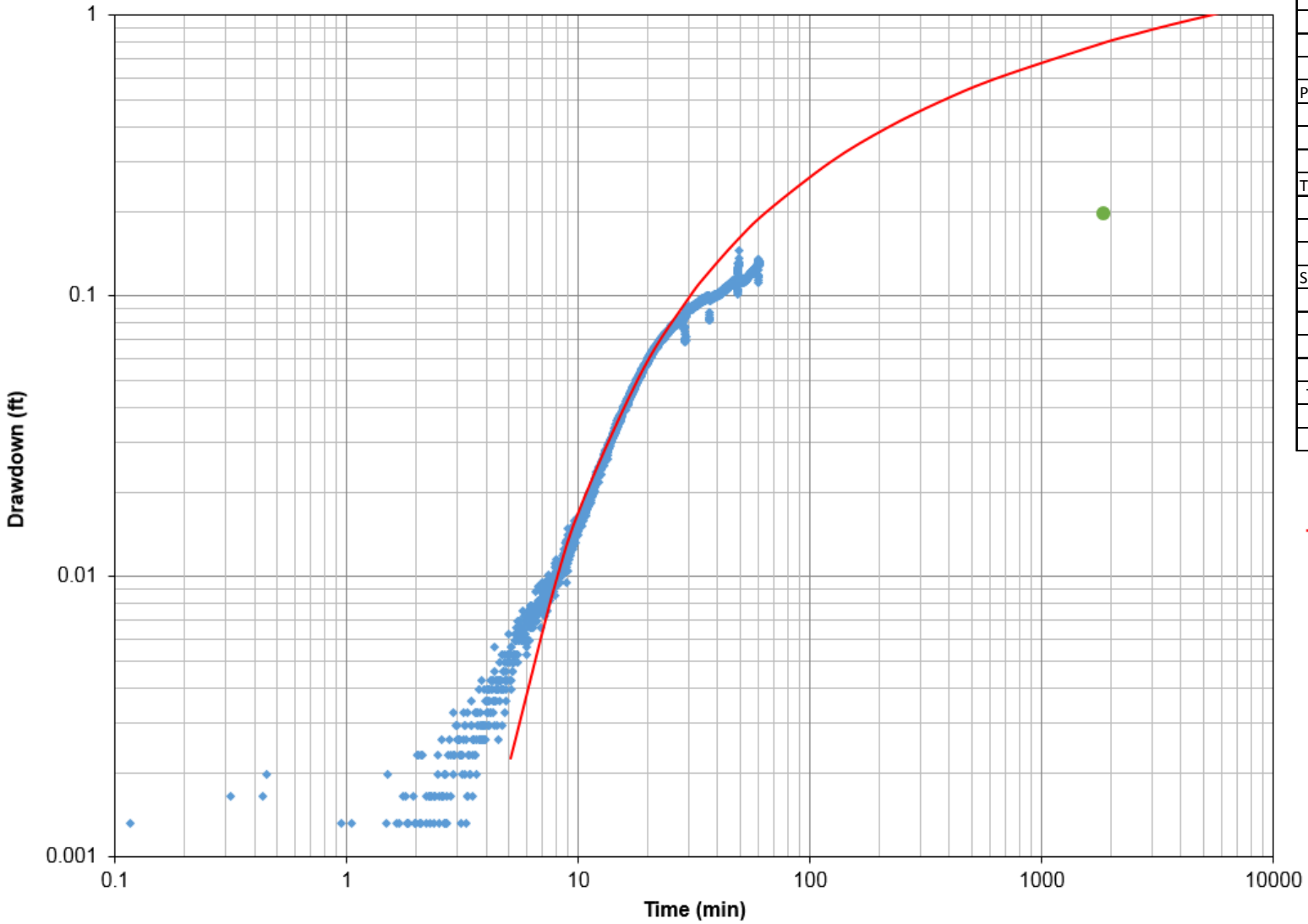


Mutch Associates, LLC
Environmental Engineers and Scientists

SW-30 pre- and post- sparge aquifer test monitoring well transducer drawdown plot.

FIGURE 4-52

LCP Chemicals Site, Brunswick, GA



Match Point Coordinates		
w(u) =	1	
1/u =	100	
s =	0.2	ft
t =	1800	min
Pump data		
Q =	0.52	gpm
r =	15.9	ft
T = 114.6Qw(u)/s		
T =	298	gpd/ft
S = Tut/(2693r^2)		
S =	7.88E-03	
Thickness =	20	ft
K=	2.0	ft/day

Pre-Test Drawdown
Match Point
Theis Curve

Mutch Associates, LLC
Environmental Engineers and Scientists

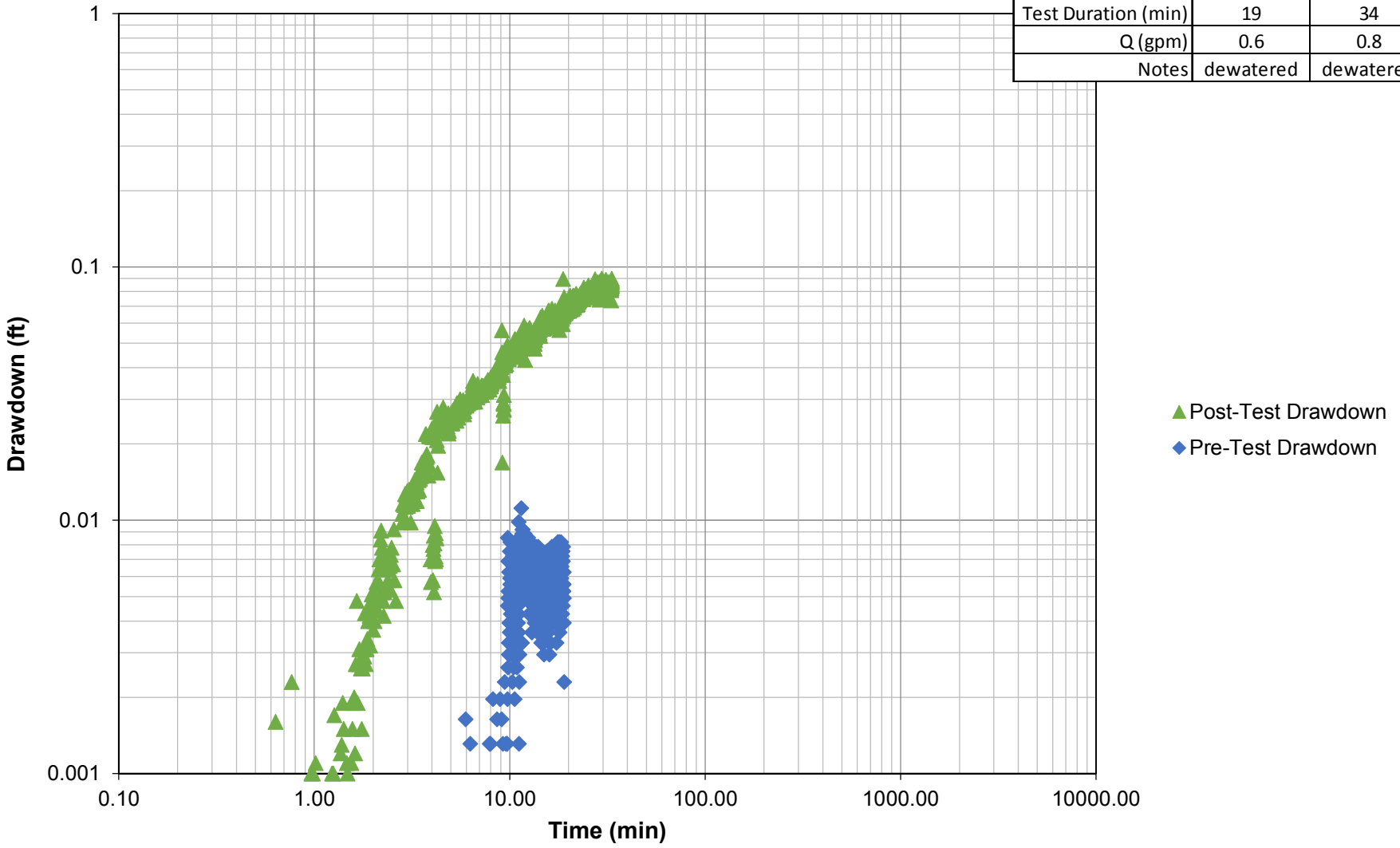
SW-30 pre-sparge aquifer test Theis match point analysis.

FIGURE 4-53

LCP Chemicals Site, Brunswick, GA

Sparge well: SW-33, Monitoring well: MW-505B

SW-33	MW-505B	
Radial Distance (ft)	18.8	
	Pre	**Post**
Test Duration (min)	19	34
Q (gpm)	0.6	0.8
Notes	dewatered	dewatered



Mutch Associates, LLC
Environmental Engineers and Scientists

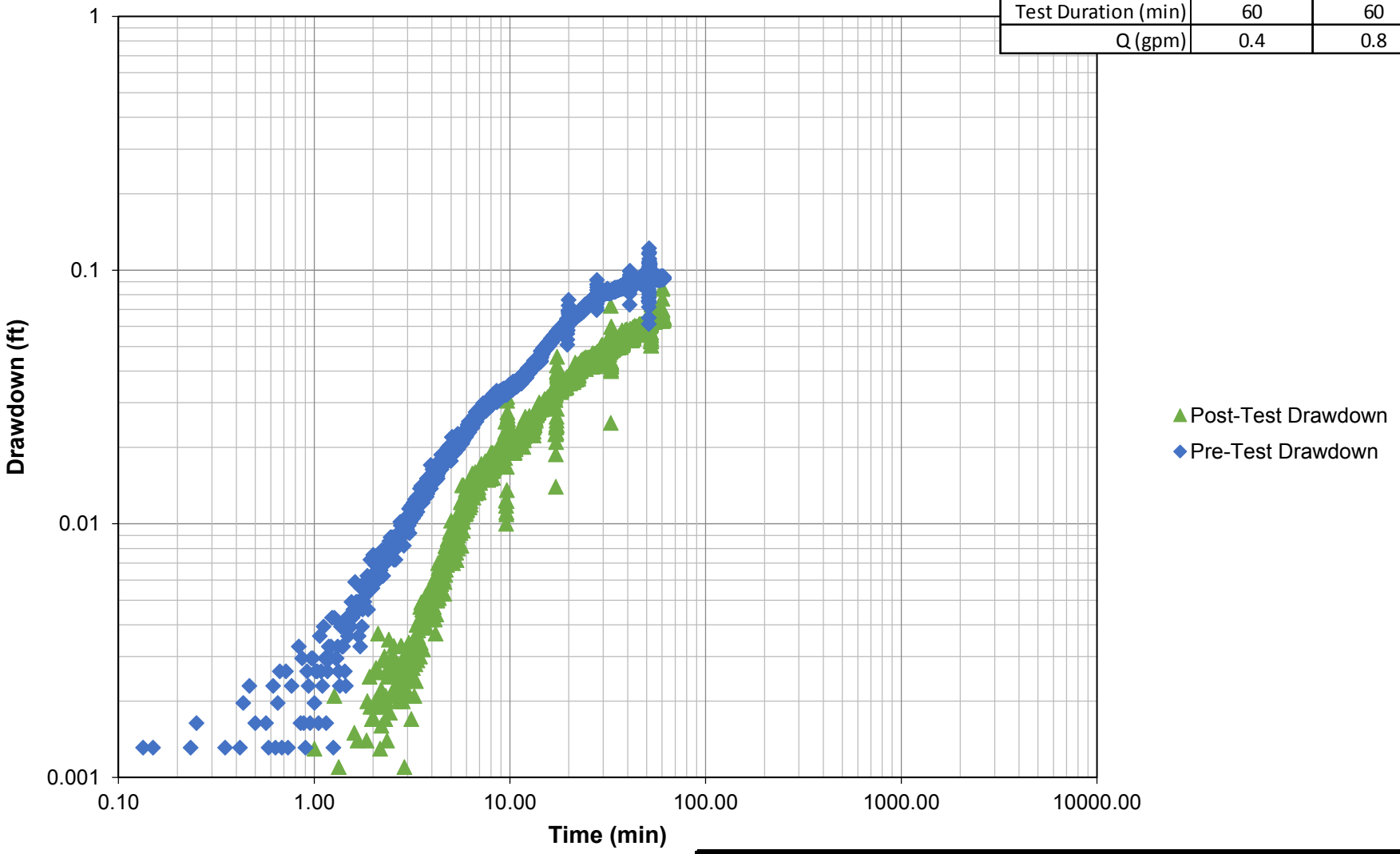
SW-33 pre- and post- sparge aquifer test monitoring well transducer drawdown plot.

FIGURE 4-54

LCP Chemicals Site, Brunswick, GA

SW-43	MW-504B	
Radial Distance (ft)	24.9	
	Pre	**Post**
Test Duration (min)	60	60
Q (gpm)	0.4	0.8

Sparge well: SW-43, Monitoring well: MW-504B

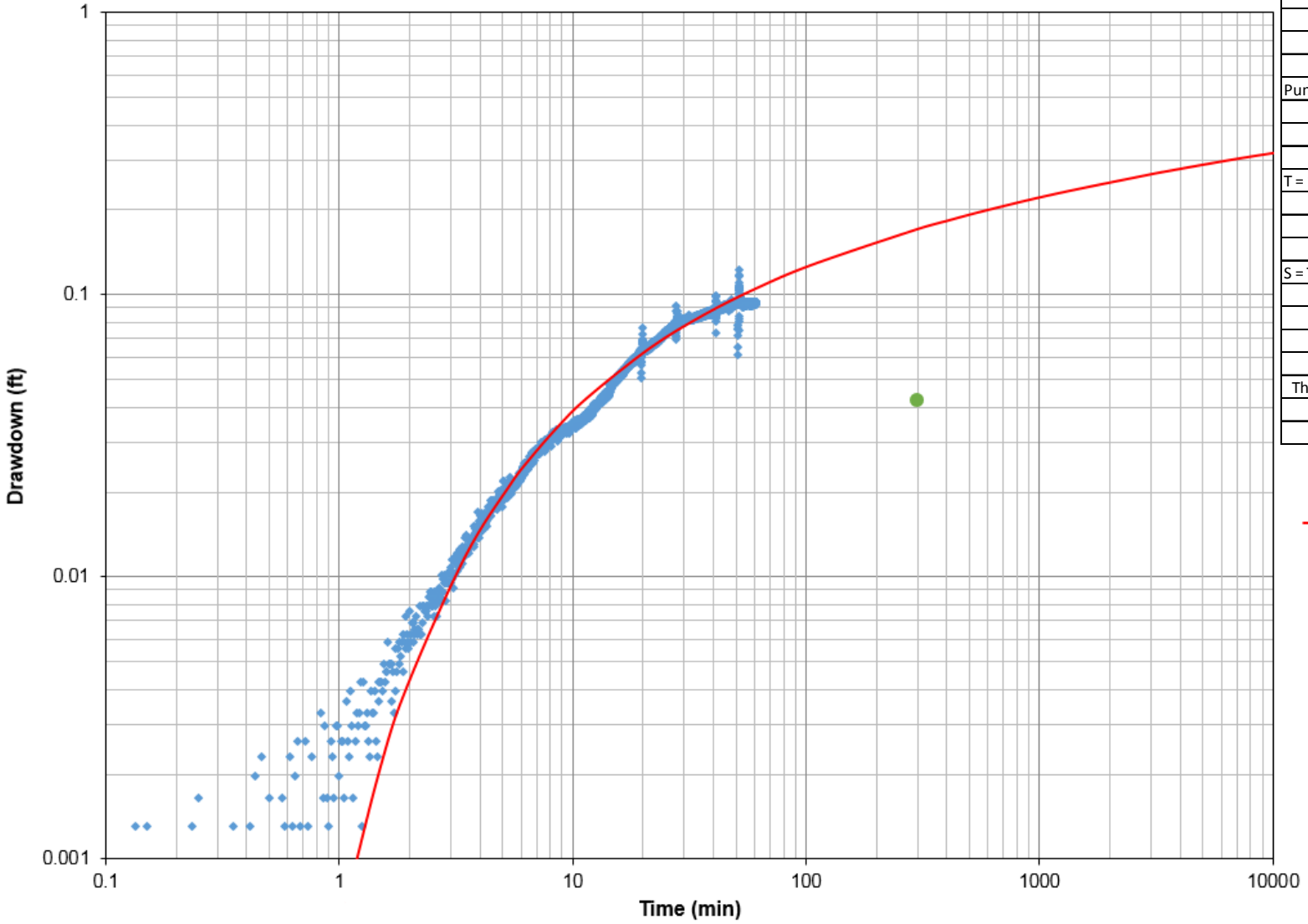


Mutch Associates, LLC
Environmental Engineers and Scientists

SW-43 pre- and post- sparge aquifer test monitoring well transducer drawdown plot.

FIGURE 4-55

LCP Chemicals Site, Brunswick, GA



Match Point Coordinates		
w(u) =	1	
1/u =	100	
s =	0.041	ft
t =	300	min
Pump data		
Q =	0.36	gpm
r =	24.9	ft
T = 114.6Qw(u)/s		
T =	1006	gpd/ft
S = Tut/(2693r^2)		
S =	1.81E-03	
Thickness =	20	ft
K=	6.7	ft/day

Pre-Test Drawdown
Match Point
Theis Curve

Mutch Associates, LLC
Environmental Engineers and Scientists

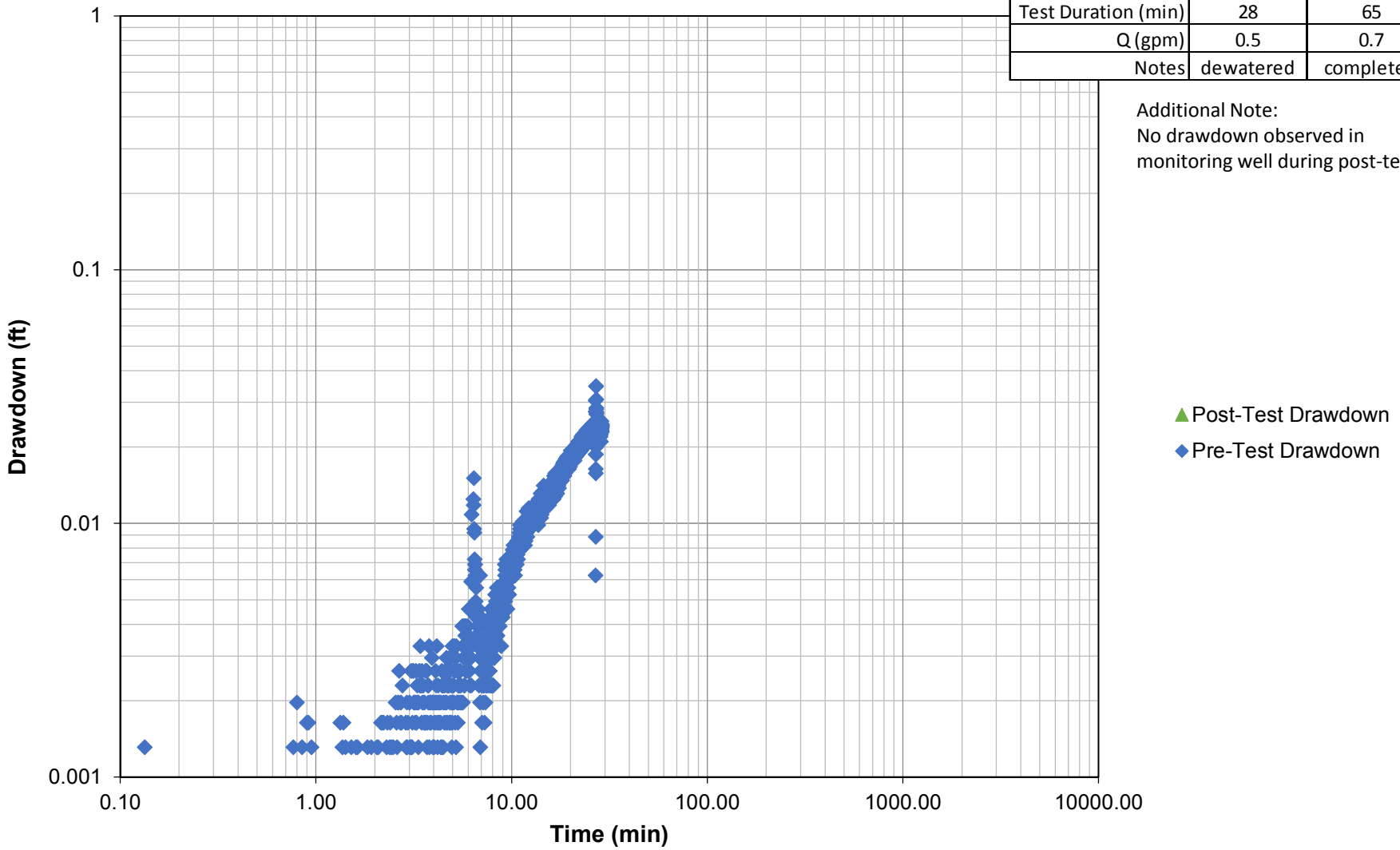
SW-43 pre-sparge aquifer test Theis match point analysis.

FIGURE 4-56

LCP Chemicals Site, Brunswick, GA

SW-46	MW-502B	
Radial Distance (ft)	45.1	
	Pre	**Post**
Test Duration (min)	28	65
Q (gpm)	0.5	0.7
Notes	dewatered	completed

Additional Note:
No drawdown observed in monitoring well during post-test



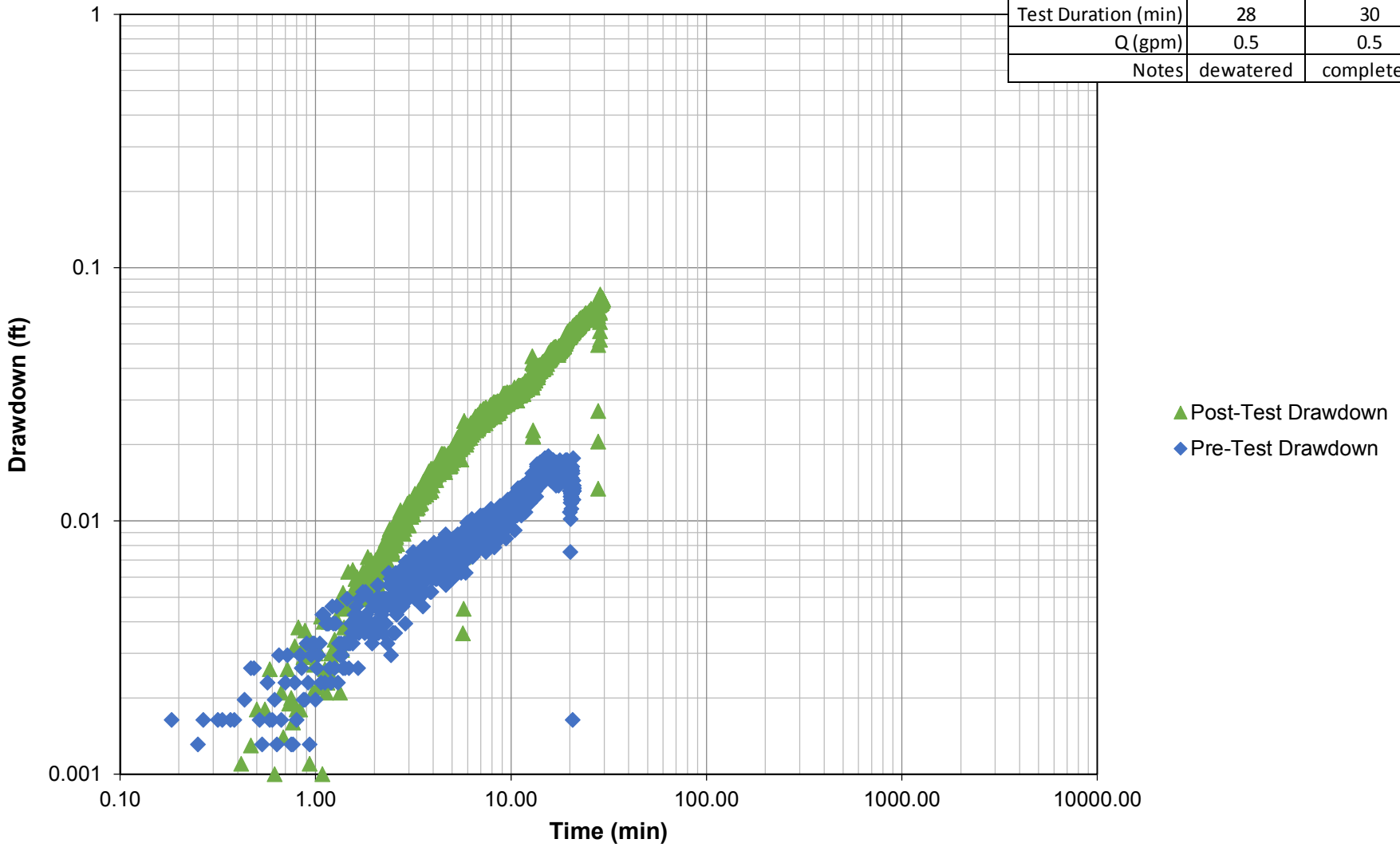
Mutch Associates, LLC
Environmental Engineers and Scientists

SW-46 pre- and post- sparge aquifer test monitoring well transducer drawdown plot.

FIGURE 4-57

LCP Chemicals Site, Brunswick, GA

SW-59	MW-513B	
Radial Distance (ft)	21.9	
	Pre	**Post**
Test Duration (min)	28	30
Q (gpm)	0.5	0.5
Notes	dewatered	completed



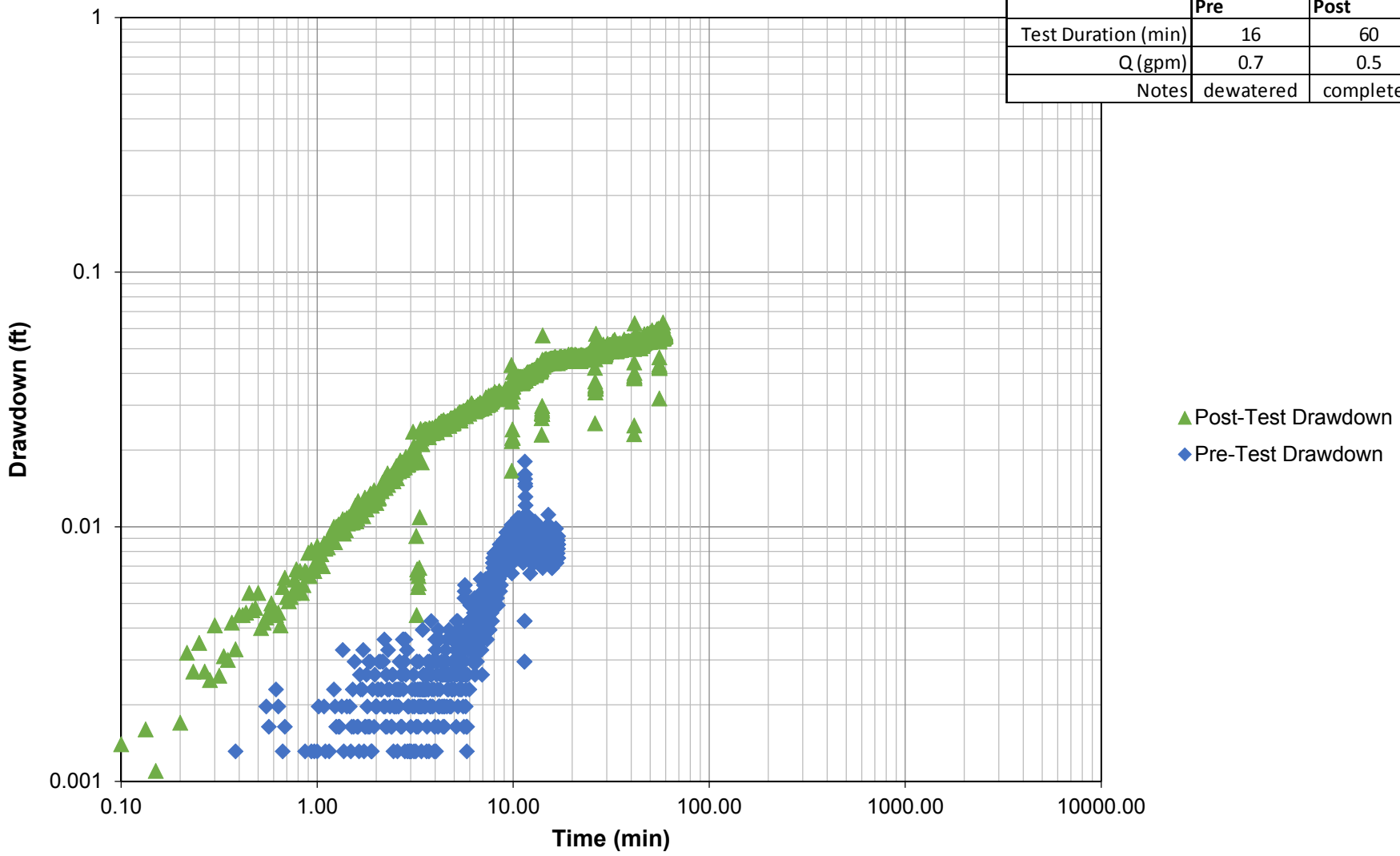
Mutch Associates, LLC
Environmental Engineers and Scientists

SW-59 pre- and post- sparge aquifer test monitoring well transducer drawdown plot.

FIGURE 4-58

LCP Chemicals Site, Brunswick, GA

SW-61	MW-514B	
Radial Distance (ft)	15.4	
	Pre	**Post**
Test Duration (min)	16	60
Q (gpm)	0.7	0.5
Notes	dewatered	completed



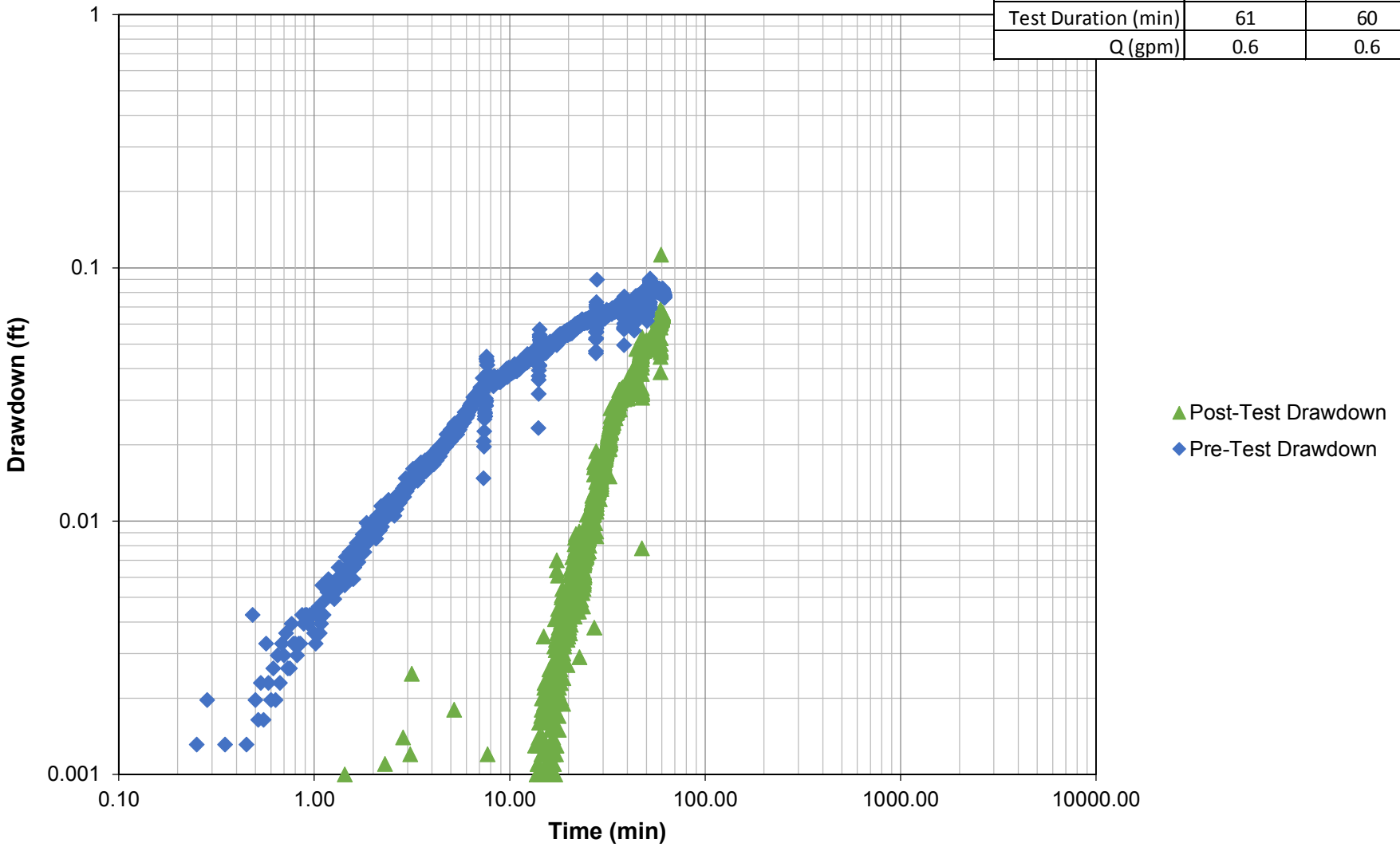
Mutch Associates, LLC
Environmental Engineers and Scientists

SW-61 pre- and post- sparge aquifer test monitoring well transducer drawdown plot.

FIGURE 4-59

LCP Chemicals Site, Brunswick, GA

SW-63	MW-501B	
Radial Distance (ft)	9.9	
	Pre	**Post**
Test Duration (min)	61	60
Q (gpm)	0.6	0.6

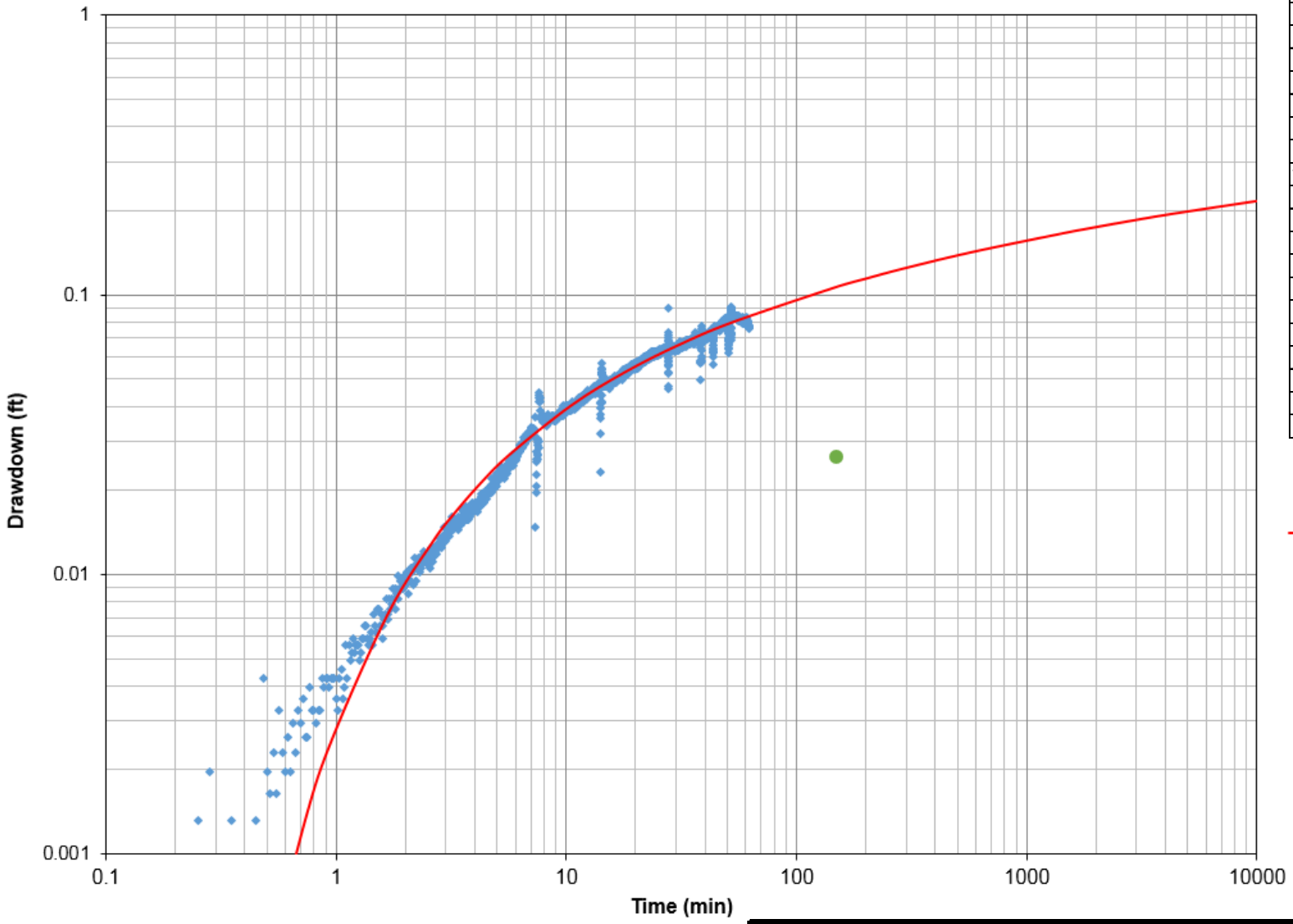


Mutch Associates, LLC
Environmental Engineers and Scientists

SW-63 pre- and post- sparge aquifer test monitoring well transducer drawdown plot.

FIGURE 4-60

LCP Chemicals Site, Brunswick, GA



Match Point Coordinates		
w(u) =	1	
1/u =	100	
s =	0.028	ft
t =	145	min
Pump data		
Q =	0.61	gpm
r =	9.9	ft
T = 114.6Qw(u)/s		
T =	2497	gpd/ft
S = Tut/(2693r^2)		
S =	1.37E-02	
Thickness =	20	ft
K=	16.7	ft/day

Pre-Test Drawdown
Match Point
Theis

Mutch Associates, LLC
Environmental Engineers and Scientists

SW-63 pre-sparge aquifer test Theis match point analysis.

FIGURE 4-61

LCP Chemicals Site, Brunswick, GA

Appendix A:

Boring Logs/Well Construction Diagrams

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-2
Diameter: 8 in
Date: 08/08/2013

Northing: 431594.89
Easting: 861479.17
Elevation: 9.75
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 49.5 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
0						SM	Hand cleared to 5 feet. Installed with a stick up above ground surface. Gray brown fine to medium SAND, trace silt.	
5							Brown gray drilling MUD, pH 7 to 8.	
10				1.6	0			
15								
20								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-2
Diameter: 8 in
Date: 08/08/2013

Northing: 431594.89
Easting: 861479.17
Elevation: 9.75
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 49.5 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
20							Brown gray drilling MUD, pH 7 to 8.	
25								
30				1.6	0			
35								
40								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-2
Diameter: 8 in
Date: 08/08/2013

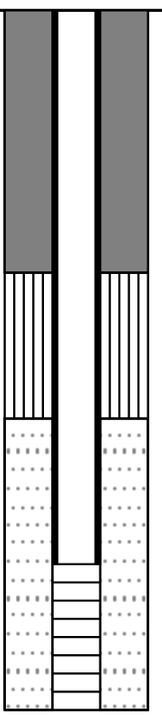
Northing: 431594.89
Easting: 861479.17
Elevation: 9.75
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 49.5 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description
40			9	0	0	SM	Gray fine to coarse SAND, trace silt.
			12				
			13			SM/ML	Gray fine to coarse SAND, trace silt, layer 2 inch clay and silt.
			14				
			11	0	0	SM	Gray fine to coarse SAND, trace silt.
			10				
			11			CL	Gray CLAY and silt, little sand, some white shell fragments.
			12				
			12	0	0	SM	Gray fine to coarse SAND, trace silt, trace white shell fragments.
			19				
45			19			SM	Gray fine to medium SAND, little silt, little white shell fragments.
			23				
			14	0	0	SM	Gray fine to medium SAND, trace silt, trace white shell fragments.
			19				
			20			SM	Gray fine to medium SAND, trace silt, trace white shell fragments.
			23				
			10	0	0	SM	Gray fine to medium SAND, trace silt.
			17				
			50			SM/R	4 in Gray fine to coarse SAND, little silt, 2 in weakly cemented sandstone.
49.6							

Well Construction Diagram



Well Set at 49.5 ft.

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-3
Diameter: 8 in
Date: 08/08/2013

Northing: 431675.46
Easting: 861477.79
Elevation: 9.10
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 49.0 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
0						SM	Hand cleared to 5 feet. Installed with a stick up above ground surface. Gray brown fine to medium SAND, trace silt.	
5							Brown gray drilling MUD, pH 7 to 8.	
10				7.7	0			
15								
20								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-3
Diameter: 8 in
Date: 08/08/2013

Northing: 431675.46
Easting: 861477.79
Elevation: 9.10
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 49.0 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
20							Brown gray drilling MUD, pH 7 to 8.	
25								
30				7.7	0			
35								
40								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-3
Diameter: 8 in
Date: 08/08/2013

Northing: 431675.46
Easting: 861477.79
Elevation: 9.10
Datum: Unknown

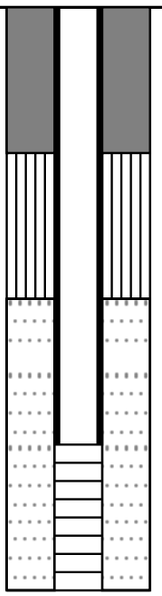
Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 49.0 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description
40			11	0	0	SC	Gray fine to medium SAND, and silt and clay.
			10				
			10			SC	Gray fine to medium SAND, and silt and clay.
			13				
			12	0	0	SM	Gray fine to medium SAND, trace silt, trace white shell fragments.
			13				
			19			SM	Gray fine to medium SAND, trace silt, trace white shell fragments.
			25				
			13	0	0	SM	Gray fine to medium SAND, trace silt, trace white shell fragments.
			17				
45			24			SM	Gray fine to medium SAND, trace silt, trace white shell fragments.
			30				
			17	0	0	SM	Gray fine to medium SAND, trace silt, trace white shell fragments.
			26				
			37			SM	Gray fine to medium SAND, trace silt, trace white shell fragments.
			42				
			14	0	0	SM/R	Gray fine to medium SAND, some silt, trace white shell fragments, cemented sandstone in tip.
49.0			32				

Well Set at 48 ft.

Well Construction Diagram



BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-4
Diameter: 8 in
Date: 07/31/2013

Northing: 431752.69
Easting: 861478.76
Elevation: 9.01
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 50.42 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
0						SM	Hand cleared to 5 feet. Installed with a stick up above ground surface. Gray brown fine to medium SAND, trace silt.	
5							Brown gray drilling MUD, pH is 7.	
10				0.5	0			
15								
20								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-4
Diameter: 8 in
Date: 07/31/2013

Northing: 431752.69
Easting: 861478.76
Elevation: 9.01
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 50.42 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
20							Brown gray drilling MUD, pH is 7.	
25								
30				0.5	0			
35								
40								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-4
Diameter: 8 in
Date: 07/31/2013

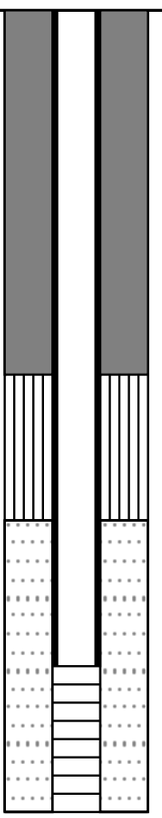
Northing: 431752.69
Easting: 861478.76
Elevation: 9.01
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 50.42 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description
40			17	0	0	CL	Gray CLAY, medium plasticity.
			15				
			11			SM	Gray fine to coarse SAND, trace silt.
			11				
			11	0	0	SM	Gray fine to coarse SAND, trace silt, trace gravel, trace white shell fragments.
			17				
			25			SM	Gray fine to coarse SAND, trace silt, trace gravel, trace white shell fragments.
			22				
			15	0	0	SM	Gray fine to coarse SAND, trace silt, trace white shell fragments.
			21				
45			27			SM	Gray fine to coarse SAND, trace silt, trace white shell fragments.
			29				
			13	0	0	SM	Gray fine to medium SAND, trace silt, trace white shell fragments.
			22				
			28			SM	Gray fine to medium SAND, trace silt, trace white shell fragments.
			31				
			15	0	0	SM	Gray fine to medium SAND, trace silt, trace white shell fragments.
			22				
			14			SM	Gray fine to medium SAND, trace silt, trace white shell fragments, pH 10.
			14				
50			50	0	0	SM	Gray fine to coarse SAND, trace gravel, weakly cemented sandstone.
51.0							

Well Construction Diagram



Well Set at 50.5 ft.

BORING LOG

Honeywell

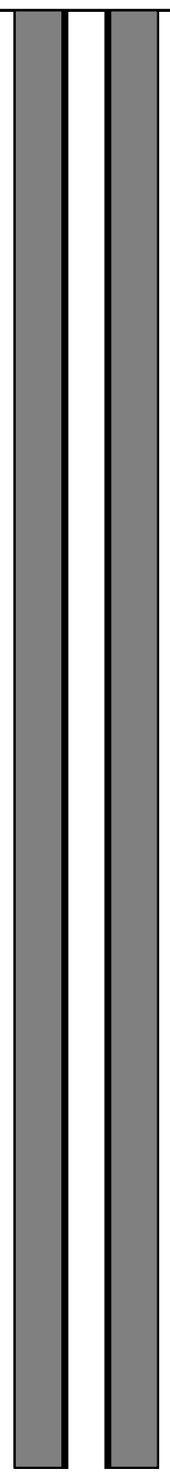
Site: LCP Brunswick
Boring No: SW-5
Diameter: 8 in
Date: 07/30/2013

Northing: 431835.72
Easting: 861478.13
Elevation: 9.00
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: S. Dillman (Parsons)
Project No: Field Book No: 2

Total Depth: 50.9 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
0							Hand cleared to 5 feet. Installed with a stick up above ground surface. pH is 7 to 7.5.	
5								
10				0.0	0.000			
15								
20								



BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-5
Diameter: 8 in
Date: 07/30/2013

Northing: 431835.72
Easting: 861478.13
Elevation: 9.00
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: S. Dillman (Parsons)
Project No:
Field Book No: 2

Total Depth: 50.9 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
20								
25								
30				0.0	0.000			
35								
40								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-5
Diameter: 8 in
Date: 07/30/2013

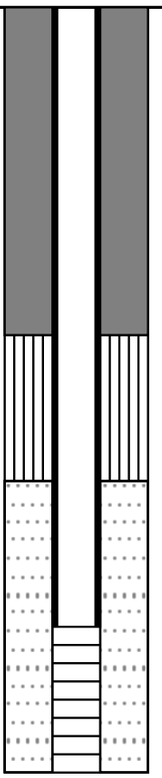
Northing: 431835.72
Easting: 861478.13
Elevation: 9.00
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: S. Dillman (Parsons)
Project No: Field Book No: 2

Total Depth: 50.9 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description
40			6	0.0	0.000		Medium to coarse SAND, trace fine sand, fine medium sand at bottom of sample, little silt, trace shells, wet.
			7			SM	
			8				
			5				
			3	0.0	0.000		Gray fine to medium SAND, soft, wet.
			3			SM	
			6				
			6				
			3	0.0	0.000		Coarse SAND over greenish gray fine to medium sand, little silt, trace clay in lenses, soft, wet.
			4			SM	
45			4				
			5				
			3	0.0	0.000		Fine to medium SAND, trace silt, soft, wet.
			17			SM	
			8				
			14				
			22	0.0	0.000	SM	Trace white carbonate rocks in shoe.
			32	0.0	0.000	SM	Gray fine to medium SAND, trace shells, trace silt, soft, wet.
			50	0.0	0.000	SM	Same as above, noted slight sheen on mud.
			25	0.0	0.000	SM	Same as above.
50			20	0.0	0.000	SM	Gray fine SAND, some silt, trace shells, wet.
			50	0.0	0.000	SM	Same as above over trace sandstone, poor recovery in top, hard refusal.
51.0							

Well Construction Diagram



BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-6
Diameter: 8 in
Date: 07/30/2013

Northing: 431915.23
Easting: 861477.25
Elevation: 7.95
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: S. Dillman (PARSONS)
Project No:
Field Book No: 2

Total Depth: 51.0 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
0							Hand cleared to 5 feet. Installed with a stick up above ground surface. pH is 7.	
5				0.0	0.000			
10							Mud rotary 5-40 feet, no samples. pH is 7.	
15				0.0	0.000			
20								

BORING LOG

Honeywell

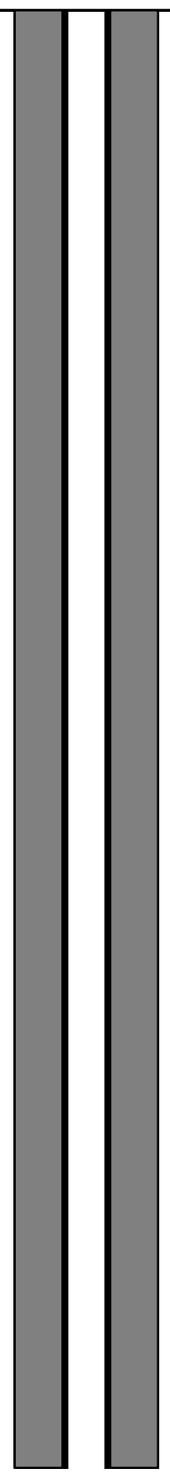
Site: LCP Brunswick
Boring No: SW-6
Diameter: 8 in
Date: 07/30/2013

Northing: 431915.23
Easting: 861477.25
Elevation: 7.95
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: S. Dillman (PARSONS)
Project No: Field Book No: 2

Total Depth: 51.0 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
20							Mud rotary 5-40 feet, no samples. pH is 7.	
25				0.0	0.000			
30							pH is 7.	
35				0.0	0.000			
40								



BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-6
Diameter: 8 in
Date: 07/30/2013

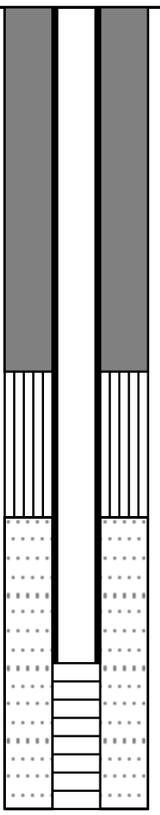
Northing: 431915.23
Easting: 861477.25
Elevation: 7.95
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: S. Dillman (PARSONS)
Project No: Field Book No: 2

Total Depth: 51.0 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description
40			9	0.0	0.000	SM	Gray medium to coarse SAND, bottom 3 inches fine to medium sand, little silt, little clay, wet.
			11				
			12				
			12				
			8	0.0	0.000	SM	Gray medium to coarse SAND, over medium gray SAND, thin lenses of silty clay, wet.
			8				
			9				
			12				
			9	0.0	0.000	SM	Gray fine to medium SAND, wet.
			8				
45			10				
			9				
			8	0.0	0.000	SM	Gray fine to medium SAND, little silt, trace shells, trace carbonate rock pebble, wet.
			9				
			12				
			11				
			20	0.0	0.000	SM	Gray fine to medium SAND, little silt, trace shells, trace carbonate rock pebble, wet.
			15	0.0	0.000		
			18	0.0	0.000		
			40	0.0	0.000	SM	Same as above, trace bedrock pebbles in bottom of sample sandstone.
50			18	0.0	0.000	SM	Same as above, trace bedrock pebbles in bottom of sample sandstone.
			50/2	0.0	0.000		
51.0							

Well Construction Diagram



BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-7
Diameter: 8 in
Date: 08/09/2013

Northing: 431394.30
Easting: 861547.34
Elevation: 9.64
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 50.5 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
0						SM	Hand cleared to 5 feet. Installed with a stick up above ground surface. Gray brown fine to medium SAND, trace silt.	
5							Brown gray drilling MUD, pH 7 to 8.	
10				80	0			
15								
20								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-7
Diameter: 8 in
Date: 08/09/2013

Northing: 431394.30
Easting: 861547.34
Elevation: 9.64
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 50.5 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
20							Brown gray drilling MUD, pH 7 to 8.	
25								
30				80	0			
35								
40								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-7
Diameter: 8 in
Date: 08/09/2013

Northing: 431394.30
Easting: 861547.34
Elevation: 9.64
Datum: Unknown

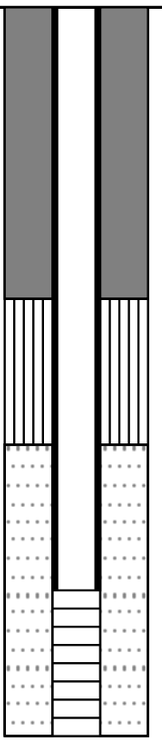
Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 50.5 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description
40			5	0	0	SM	Gray fine to coarse SAND, trace silt.
			7				
			6			SM	Gray fine to coarse SAND, trace silt.
			6				
			4	0	0	SM	Gray fine to coarse SAND, trace silt.
			6				
			10			CL	Gray CLAY and silt, little sand.
			12				
			7	0	0	SM	Gray fine to coarse SAND, trace silt.
			8				
45			11			SM	Gray fine to coarse SAND, trace silt.
			17				
			3	0	0	SM	Gray brown fine to medium SAND, trace silt, trace white shell fragments.
			4				
			7			SM	Gray brown fine to medium SAND, trace silt, trace white shell fragments.
			11				
			8	0	0	SM	Gray brown fine to medium SAND, trace silt.
			15				
			13			SM	Gray brown fine to medium SAND, trace silt.
			10				
50			50			SM	3 in Gray brown fine to medium SAND, little silt, 3 in weakly cemented sandstone.
50.5							

Well Set at 50 ft.

Well Construction Diagram



BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-8
Diameter: 8 in
Date: 08/05/2013

Northing: 431473.97
Easting: 861547.59
Elevation: 9.53
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 50.25 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
0						GM/SM	Hand cleared to 5 feet. Installed with a stick up above ground surface. 0 ft to 3 ft White packed road GRAVEL, 3 ft to 5 ft Brown fine to medium SAND, trace silt.	
5							Brown gray drilling MUD, pH 7.	
10				0	0			
15								
20								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-8
Diameter: 8 in
Date: 08/05/2013

Northing: 431473.97
Easting: 861547.59
Elevation: 9.53
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 50.25 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
20							Brown gray drilling MUD, pH 7.	
25								
30				0	0			
35								
40								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-8
Diameter: 8 in
Date: 08/05/2013

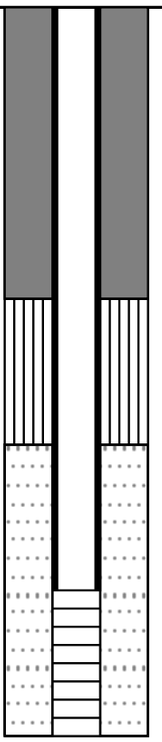
Northing: 431473.97
Easting: 861547.59
Elevation: 9.53
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 50.25 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description
40			8	0	0	SM	Gray fine to coarse SAND, trace silt.
			8				
			12			SM	Gray fine to medium SAND, little silt.
			13				
			4	0	0	SM	Gray fine to medium SAND, little silt.
			4				
			5			SM	Gray fine to medium SAND, little silt.
			7				
			9	0	0	SM	Gray fine to medium SAND, little silt, little layers of shells, occasional lens clay.
			12				
45			15			SC	Gray fine to medium SAND, little silt, little layers of shells, occasional lens clay.
			50				
			18	0	0	SM	Gray fine to medium SAND, trace silt, trace white shell fragments.
			18				
			20			SM	Gray fine to medium SAND, trace silt, trace white shell fragments.
			22				
			12	0	0	SM	Gray fine to medium SAND, trace silt, trace white shell fragments.
			18				
			11			SM	49 ft to 49 ft 6 in Gray fine to medium SAND, trace silt, trace white shell fragments, 49 ft 6 in to 50 ft Gray fine to coarse SAND, little silt, trace gravel.
			9				
50			50	0	0	SM/R	Gray weakly cemented SANDSTONE, some fine to coarse sand.
50.25							

Well Construction Diagram



Well Set at 50 ft.

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-9
Diameter: 8 in
Date: 08/06/2013

Northing: 431555.73
Easting: 861546.71
Elevation: 9.27
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 49.75 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
0						SM	Hand cleared to 5 feet. Installed with a stick up above ground surface. Brown fine to medium SAND, trace silt.	
5							Brown gray drilling MUD, pH is 7.	
10				0	0			
15								
20								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-9
Diameter: 8 in
Date: 08/06/2013

Northing: 431555.73
Easting: 861546.71
Elevation: 9.27
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 49.75 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
20							Brown gray drilling MUD, pH is 7.	
25								
30				0	0			
35								
40								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-9
Diameter: 8 in
Date: 08/06/2013

Northing: 431555.73
Easting: 861546.71
Elevation: 9.27
Datum: Unknown

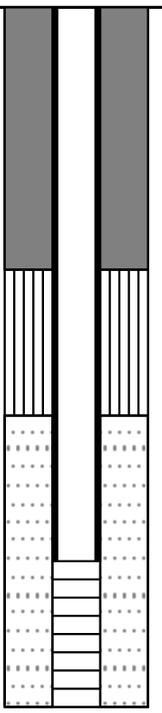
Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 49.75 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description
40			8	0	0	SM	Gray fine to coarse SAND, trace silt.
			7				
			8			SM	Gray fine to coarse SAND, trace silt.
			15				
			11	0	0	SM	Gray fine to coarse SAND, trace silt.
			15				
			16			SM	Gray fine to medium SAND, little silt, little white shell fragments.
			17				
			15	0	0	SM	Gray fine to medium SAND, trace silt, trace layers of shells.
			17				
45			20			SM	Gray fine to medium SAND, trace silt, trace layers of shells.
			26				
			11	0	0	SM	Gray fine to medium SAND, trace silt, trace white shell fragments, pH 10.
			15				
			17				Gray fine to medium SAND, trace silt, trace white shell fragments, pH 10.
			15				
			8	0	0	SM	Gray fine to coarse SAND, trace silt.
			12				
			18			SM/R	49 ft to 49 ft 6 in Gray fine to coarse SAND, trace silt, 49 ft 6 in to 9 in 2 in fine to coarse SAND, trace silt, 1 in weakly cemented sandstone.
49.75			50				

Well Set at 49.5 ft.

Well Construction Diagram



BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-10
Diameter: 8 in
Date: 08/06/2013

Northing: 431634.58
Easting: 861547.06
Elevation: 9.27
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 49.67 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
0						SM	Hand cleared to 5 feet. Installed with a stick up above ground surface. Brown fine to medium SAND, trace silt.	
5							Brown gray drilling MUD, pH 7.	
10				0	0			
15								
20								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-10
Diameter: 8 in
Date: 08/06/2013

Northing: 431634.58
Easting: 861547.06
Elevation: 9.27
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 49.67 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
20							Brown gray drilling MUD, pH 7.	
25								
30				0	0			
35								
40								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-10
Diameter: 8 in
Date: 08/06/2013

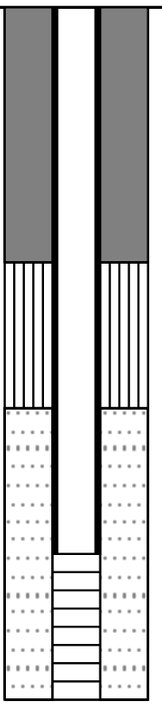
Northing: 431634.58
Easting: 861547.06
Elevation: 9.27
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 49.67 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description
40			5	0	0	SC	Gray fine to coarse SAND, trace silt, 2 in layer of Gray clay.
			6				
			18			SC	Gray fine to coarse SAND, some silty clay, trace white shell fragments.
			24				
			11	0	0	SC	Gray fine to coarse SAND, little clayey silt, trace white shell fragments.
			11				
			15			SC	Gray fine to coarse SAND, little clayey silt, trace white shell fragments.
			17				
			10	0	0	SM	Gray brown fine to medium SAND, trace silt, little white shell fragments.
			19				
45			26			SM	Gray brown fine to medium SAND, trace silt, little white shell fragments.
			31				
			13	0	0	SM	Gray fine to medium SAND, trace silt, trace white shell fragments.
			21				
			20			SM	Gray fine to medium SAND, trace silt, trace white shell fragments.
			19				
			8	0	0	SM	Gray fine to medium SAND, trace silt, trace white shell fragments.
			9				
			8			SM/R	49 ft to 49 ft 6 in Gray fine to coarse SAND, little silt, pH over 10, 49 ft 6 in to 49 ft 8 in weakly cemented SANDSTONE.
49.75			50				

Well Construction Diagram



Well Set at 49.5 ft.

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-11
Diameter: 8 in
Date: 07/31/2013 - 08/05/2013

Northing: 431713.54
Easting: 861547.45
Elevation: 8.80
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 51.5 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
0						SM	Hand cleared to 5 feet. Installed with a stick up above ground surface. Gray brown fine to coarse SAND, trace silt.	
5							Brown gray drilling MUD, pH is 7.	
10				0	0			
15								
20								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-11
Diameter: 8 in
Date: 07/31/2013 - 08/05/2013

Northing: 431713.54
Easting: 861547.45
Elevation: 8.80
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 51.5 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
20							Brown gray drilling MUD, pH is 7.	
25								
30				0	0			
35								
40								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-11
Diameter: 8 in
Date: 07/31/2013 - 08/05/2013

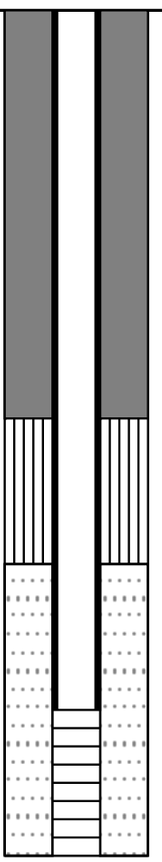
Northing: 431713.54
Easting: 861547.45
Elevation: 8.80
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 51.5 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description
40			9	0	0	SM	Gray fine to coarse SAND, trace silt.
			5				
			7			SC	Gray fine to coarse SAND, little clayey silt, layer 2 in gray clay.
			10				
			11	0	0	SM	Gray fine to medium SAND, trace silt, trace white shell fragments.
			13				
			15			SM	Gray fine to medium SAND, trace silt, trace white shell fragments.
			20				
			9	0	0	SM	Gray fine to medium SAND, trace silt, trace white shell fragments.
			15				
45			17			SM	Gray fine to medium SAND, trace silt, trace white shell fragments.
			23				
			10	0	0	SM	Gray fine to medium SAND, trace silt, trace white shell fragments.
			17				
			19			SM	Gray fine to medium SAND, trace silt, trace white shell fragments.
			20				
			12	0	0	SM	Gray fine to medium SAND, trace silt, trace white shell fragments.
			17				
			7			SM	Gray fine to medium SAND, trace silt, trace white shell fragments.
			14				
50			14	0	0	SM	Gray fine to medium SAND, trace silt, trace white shell fragments, note 50 ft 6 in to 51 ft little silt.
			13				
			50			SM/R	Gray fine to coarse SAND, little silt, trace white shell fragments, pieces weakly cemented stone in tip.
51.6							

Well Construction Diagram



Well Set at 51.5 ft.

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-12
Diameter: 8 in
Date: 07/27/2013

Northing: 431794.62
Easting: 861546.84
Elevation: 9.18
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 51.25 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
0						OL/SM	Hand cleared to 5 ft. Installed with a stick up above ground surface. 0 ft to 2 ft Brown TOP SOIL organic, little Gray coarse gravel, 2 ft to 5 ft Brown fine to medium SAND, trace silt.	
5							Brown drilling MUD, pH 7 to 8.	
10				28.5	0			
15								
20								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-12
Diameter: 8 in
Date: 07/27/2013

Northing: 431794.62
Easting: 861546.84
Elevation: 9.18
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 51.25 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
20							Brown drilling MUD, pH 7 to 8.	
25								
30				28.5	0			
35								
40								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-12
Diameter: 8 in
Date: 07/27/2013

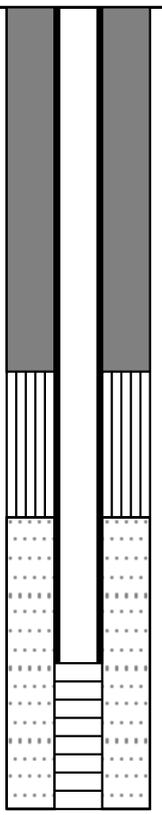
Northing: 431794.62
Easting: 861546.84
Elevation: 9.18
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 51.25 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description
40			6	0	0	SC	Gray brown fine to coarse SAND, trace silt, occasional lens clay.
			10				
			12			SC	41 ft to 41 ft 6 in Gray brown fine to coarse SAND, trace silt, occasional lens clay, 41 ft 6 in to 42 ft graduated fine to medium SAND, some clay and silt.
			14				
			5	0	0	SM	Gray brown fine coarse SAND, trace silt.
			9				
			11			SM	43 ft to 43 ft 6 in Gray brown fine to coarse SAND, trace silt, 43 ft 6 in to 44 ft Gray fine to medium SAND, trace silt and clay.
			10				
			4	0	0	SM	44 ft 6 in to 45 ft Gray fine to medium SAND, trace silt, trace white shell fragments.
			4				
45			30			SM	Gray fine to medium SAND, trace silt, trace white shell fragments.
			50				
			34	0	0	SM	Fine to medium SAND, trace silt, trace white shell fragments.
			50				
						SM	Fine to medium SAND, trace silt, trace white shell fragments, pH 10.
			33	0	0	SC	48 ft to 48 ft 6 in Gray fine to medium SAND, some silty clay, 48 ft 6 in to 49 ft Gray CLAY, some sand.
			21				
			20			SM	Fine to medium SAND, trace silt, trace white shell fragments.
			15				
50			15	0	0	SM	Fine to medium SAND, trace silt, trace white shell fragments, sandstone in tip of spoon.
			14				
51.25			50			SM/R	Fine to medium SAND. Gray sandstones weakly cemented.

Well Construction Diagram



Well Set at 51 ft.

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-13
Diameter: 8 in
Date: 07/27/2013

Northing: 431874.76
Easting: 861546.56
Elevation: 8.69
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 50.5 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
0						OL/SM	Hand cleared to 5 ft. Installed with a stick up above ground surface. 0 ft to 2 ft Brown TOP SOIL organic, 2 ft to 5 ft Brown fine to medium SAND, trace silt.	
5							Brown drilling MUD, pH 7 to 8.	
10				0.5	0			
15								
20								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-13
Diameter: 8 in
Date: 07/27/2013

Northing: 431874.76
Easting: 861546.56
Elevation: 8.69
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 50.5 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
20							Brown drilling MUD, pH 7 to 8.	
25								
30				0.5	0			
35								
40								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-13
Diameter: 8 in
Date: 07/27/2013

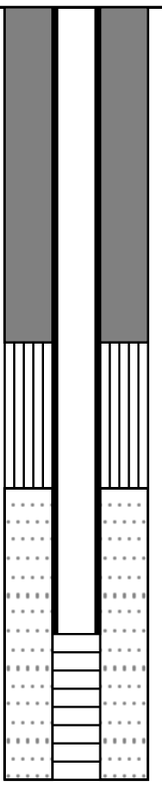
Northing: 431874.76
Easting: 861546.56
Elevation: 8.69
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 50.5 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description
40			6	0	0	SC	Gray brown fine to coarse SAND, trace silt, occasional lens clay.
			13				
			13			SC	Gray brown fine to coarse SAND, trace silt, occasional lens clay.
			6	0	0	SC	Gray brown fine to coarse SAND, trace silt, occasional lens clay.
			6				
			8			SC	Gray brown fine to coarse SAND, trace silt, occasional lens clay.
			7				
			4	0	0	SM	Gray fine to medium SAND, trace silt.
			4				
45			8			SM	Gray fine to medium SAND, trace silt.
			8				
			5	0	0	SM	Gray fine to medium SAND, trace silt.
			13				
			50			SM	Gray fine to medium SAND, trace silt.
			6	0	0	SM	Gray fine to medium SAND, trace silt, trace white shell fragments.
			34				
			16			SM	49 ft to 49 ft 6 in Gray fine to medium SAND, little clayey silt, trace white shell fragments, 49 ft 6 in to 50 ft Gray fine to medium SAND, little silt, 1/8 inch layers of white shell fragments
			13				
50			50	0	0	SM	Gray fine to coarse SAND, trace silt, sandstone fragments in tip of spoon.
50.6							

Well Construction Diagram



Well Set at 50.5 ft.

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-14
Diameter: 8 in
Date: 07/27/2013

Northing: 431955.20
Easting: 861545.79
Elevation: 8.25
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: S. Dillman (PARSONS)
Project No: Field Book No: 2

Total Depth: 48.9 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
0							Hand cleared to 5 ft. Installed with a stick up above ground surface. pH is 7.	
5				0.4	0.0			
10							pH is 7.	
15				0.5	0.0			
20								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-14
Diameter: 8 in
Date: 07/27/2013

Northing: 431955.20
Easting: 861545.79
Elevation: 8.25
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: S. Dillman (PARSONS)
Project No:
Field Book No: 2

Total Depth: 48.9 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
20								
25								
30							Drilled to 40 ft with mud rotary, no sampling to 40 ft. pH is 7.	
35				0.4	0.0			
40								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-14
Diameter: 8 in
Date: 07/27/2013

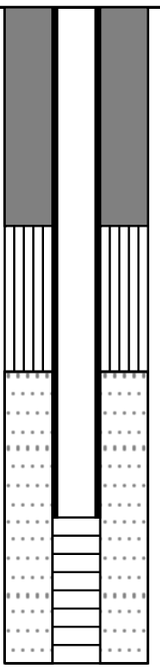
Northing: 431955.20
Easting: 861545.79
Elevation: 8.25
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: S. Dillman (PARSONS)
Project No: Field Book No: 2

Total Depth: 48.9 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description
40			10	0.0	0.00	SM	Light medium gray medium to coarse SAND, little fine sand, 1 inch lense of fine to medium sand, little clay, wet, swampy odor, no stain or sheen.
			14				
			13				
			8				
			7			SM	Light gray and gray medium to coarse SAND, 2 inch lense of clay, little silt, bottom 5 inches gray fine sand, little silt, trace clay, wet.
			6	0.0	0.000		
			4				
			4				
			8			SM	Gray medium SAND, some fine sand, bottom 7 inches has trace broken shells, wet.
			21	0.0	0.00		
45			18				
			20				
			23			SM	Gray medium SAND, some fine sand, trace shells broken, wet, swampy odor, still no stain or odor.
			18	0.0	0.00		
			19				
			24				
			11	0.2	0.00	SM	Gray fine SAND, little shells, some silt, little trace clay, wet.
			50/5	0.0	0.00	SM	Gray fine to medium SAND, trace sandstone gravel, bottom cemented sand sandstone, wet. Refusal, stop drilling and set well.
49.0							

Well Construction Diagram



BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-15
Diameter: 8 in
Date: 08/11/2013 - 08/12/2013

Northing: 431354.05
Easting: 861616.43
Elevation: 9.16
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 48.83 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
0						SM	Hand cleared to 5 feet. Installed with a stick up above ground surface. Brown fine to medium SAND, trace silt.	
5							Brown gray drilling MUD, pH 7. While over drilling the initial pilot hole, hard debris (cement footer?) was encountered by the 8 in. bit around 7 ft bgs. The pipe walked slightly east but got down.	
10				25	0			
15								
20								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-15
Diameter: 8 in
Date: 08/11/2013 - 08/12/2013

Northing: 431354.05
Easting: 861616.43
Elevation: 9.16
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 48.83 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
20							Brown gray drilling MUD, pH 7. While over drilling the initial pilot hole, hard debris (cement footer?) was encountered by the 8 in. bit around 7 ft bgs. The pipe walked slightly east but got down.	
25								
30				25	0			
35								
40								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-15
Diameter: 8 in
Date: 08/11/2013 - 08/12/2013

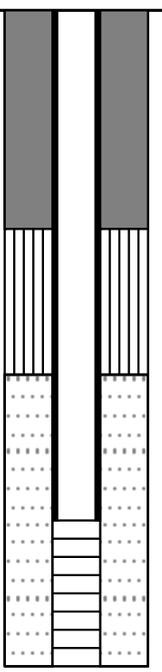
Northing: 431354.05
Easting: 861616.43
Elevation: 9.16
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 48.83 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description
40			3	0	0	SM	Gray fine to medium SAND, trace silt.
			4				
			7			SM	Gray fine to medium SAND, trace silt.
			12				
			7	0	0	SM	Gray fine to medium SAND, trace silt.
			12				
			12			SC	Gray fine to medium SAND, trace silt, layers of 1/4 inch clayey silt.
			20				
			8	0	0	SC	Gray fine to medium SAND, trace silt, occasional lens clayey silt.
			16				
45			17			CL	Gray CLAY, stiff, layers of 1/4 inch fine to medium sand, trace silt.
			18				
			13	0	0	SM	Gray fine to coarse SAND, trace silt.
			17				
			20			SM	Gray fine to coarse SAND, trace silt, trace white shell fragments.
			20				
			9	0	0	SM/R	Gray fine to coarse SAND, trace silt, trace travel, cemented sandstone in tip of spoon.
			50				
49.0							

Well Construction Diagram



Well Set at 49 ft.

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-16
Diameter: 8 in
Date: 08/07/2013

Northing: 431434.89
Easting: 861616.53
Elevation: 9.84
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 51.5 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
0						GW	Hand cleared to 5 ft. Installed with a stick up above ground surface. 0 ft to 4 ft Coarse compacted GRAVEL road bed material, 4 ft to 5 ft Brown fine to medium SAND, trace silt.	
5							Brown gray drilling MUD, pH 7.	
10				2.3	0			
15								
20								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-16
Diameter: 8 in
Date: 08/07/2013

Northing: 431434.89
Easting: 861616.53
Elevation: 9.84
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 51.5 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
20							Brown gray drilling MUD, pH 7.	
25								
30				2.3	0			
35								
40								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-16
Diameter: 8 in
Date: 08/07/2013

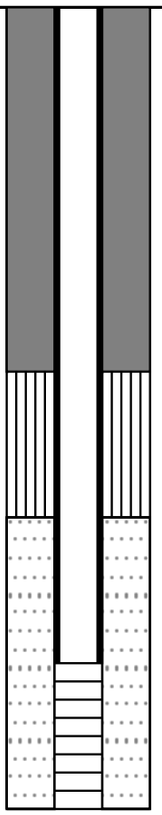
Northing: 431434.89
Easting: 861616.53
Elevation: 9.84
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 51.5 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description
40			8	0	0	SM	Gray fine to medium SAND, trace silt.
			8				
			9			SM	Gray fine to medium SAND, trace silt.
			9				
			6	0	0	SM	Gray fine to medium SAND, trace silt, occasional piece of 1/2 inch white jagged rock.
			8				
			9			SM	Gray fine to medium SAND, trace silt, occasional piece of 1/2 inch white jagged rock.
			13				
			9	0	0	SM	Gray brown fine to coarse SAND, little silt, occasional piece of 1/2 inch white rock.
			17				
45			15			SC	Gray fine SAND, little silt, layer 2 inch Gray silty clay, stiff.
			17				
			5	0	0	SC	Gray brown fine to coarse SAND, little silt, trace white shell fragments, layer 2 inch Gray silty clay.
			4				
			9			SM	Gray brown fine to coarse SAND, little silt, trace white shell fragments.
			20				
			17	0	0	SM	Gray brown fine to coarse SAND, trace silt, trace white shell fragments.
			20				
			24			SM	Gray brown fine to medium SAND, trace silt, trace white shell fragments.
			24				
50			8	0	0	SM	Gray fine to coarse SAND, little silt.
			11				
51.5			50			SM/R	3 in Gray fine to coarse SAND, little silt, 3 in weakly cemented Sandstone.

Well Construction Diagram



Well Set at 51 ft.

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-17
Diameter: 8 in
Date: 08/06/2013 - 08/07/2013

Northing: 431515.71
Easting: 861616.70
Elevation: 9.85
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 50.75 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
0						SM	Hand cleared to 5 ft. Installed with a stick up above ground surface. Brown fine to medium SAND, trace silt, 10 pieces of 2 inch diameter stones or coarse gravel.	
5							Brown gray drilling MUD, pH 7.	
10				0.2	0			
15								
20								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-17
Diameter: 8 in
Date: 08/06/2013 - 08/07/2013

Northing: 431515.71
Easting: 861616.70
Elevation: 9.85
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 50.75 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
20							Brown gray drilling MUD, pH 7.	
25								
30				0.2	0			
35								
40								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-17
Diameter: 8 in
Date: 08/06/2013 - 08/07/2013

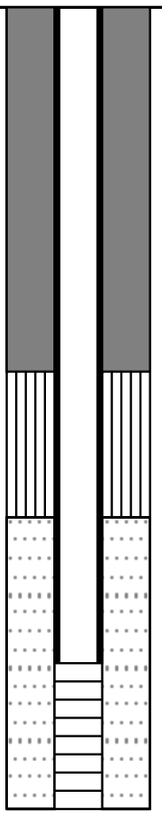
Northing: 431515.71
Easting: 861616.70
Elevation: 9.85
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 50.75 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description
40			6	0	0	SM	Gray fine to coarse SAND, trace silt.
			6				
			10			SM	Gray fine to coarse SAND, trace silt.
			11				
			4	0	0	SM	Gray fine to coarse SAND, trace silt.
			11				
			6			SM	Gray fine to coarse SAND, trace silt.
			8				
			10	0	0	SC	Gray fine to coarse SAND, trace silt, occasional lens clay and silt.
			9				
45			6			SC	Gray fine to coarse SAND, trace silt, occasional lens clay and silt.
			6				
			4	0	0	SM	Gray fine to coarse SAND, trace silt.
			4				
			8			SM	Gray fine to medium SAND, trace silt.
			11				
			7	0	0	SM	Gray fine to medium SAND, trace silt.
			13				
			17			SM	Gray fine to medium SAND, trace silt.
			18				
50			9	0	0	SM/R	50 ft to 50 ft 6 in Gray fine to medium SAND, little silt, 50 ft 6 in to 50 ft 8 in Gray cemented sandstone.
			50				
51.0							

Well Construction Diagram



Well Set at 50.5 ft.

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-18
Diameter: 8 in
Date: 07/24/2013

Northing: 431595.13
Easting: 861614.16
Elevation: 10.04
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: T. Murphy (PARSONS)
Project No:
Field Book No: 1

Total Depth: 53.0 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
0				0.0	0.000	SM	Hand cleared to 5 ft. Installed with a stick up above ground surface. Brown black fine to very fine SAND, and silt, trace rock fragments, dry.	
5							Mud rotary drilling, mud ph 7.	
10								
15								
20								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-18
Diameter: 8 in
Date: 07/24/2013

Northing: 431595.13
Easting: 861614.16
Elevation: 10.04
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: T. Murphy (PARSONS)
Project No:
Field Book No: 1

Total Depth: 53.0 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
20							Mud rotary drilling, mud ph 7.	
25								
30								
35								
40								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-18
Diameter: 8 in
Date: 07/24/2013

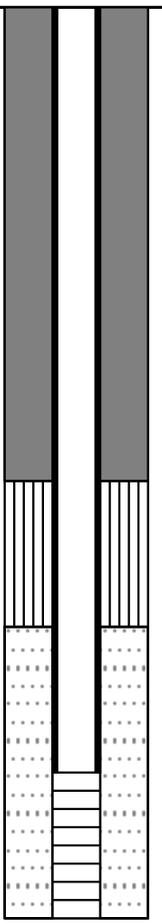
Northing: 431595.13
Easting: 861614.16
Elevation: 10.04
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: T. Murphy (PARSONS)
Project No: Field Book No: 1

Total Depth: 53.0 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description
40			11	0.0	0.000	SM	Gray medium to coarse SAND.
			11				
			9	0.0	0.000	CL/SM	Black CLAY and fine SAND lense, then gray medium to coarse sand.
			13				
			8	0.0	0.000	SM	Gray medium to coarse SAND, trace silt, wet.
			7				
			8	0.0	0.000	SM	Gray medium to coarse SAND, trace silt, wet.
			8				
			6	0.0	0.000	SM	Gray medium to coarse SAND, trace silt, trace gravel, wet.
			7				
45			9	0.0	0.000	SM	Gray medium to coarse SAND, trace silt, trace gravel, wet.
			10				
			2	0.0	0.000	SM	Gray to black fine to medium SAND, little silt, wet.
			3				
			10	0.0	0.000	SM	Gray to black fine to medium SAND, little silt, wet.
			7				
			8	0.0	0.000	SM	Gray fine to medium SAND, little silt, wet.
			7				
			9	0.0	0.000	SM	Gray fine to medium SAND, little silt, wet.
			8				
50			7	0.0	0.000	SM	Gray fine to medium SAND, trace silt, wet.
			4	0.0	0.000	SM	Gray fine to medium SAND, trace silt, wet.
			5	0.0	0.000	SM	Gray fine to medium SAND, trace silt, wet.
			6	0.0	0.000	SM	Gray fine to medium SAND, trace silt, trace gravel, wet.
			6	0.0	0.000	SM	Gray fine to medium SAND, trace silt, trace gravel, cemented material in spoon tip.
53.0			50/1	0.0	0.000	CL	Gray CLAY and sandstone, dry to moist.

Well Construction Diagram



Well set at 52.5 ft, ground elevation 9.59 ft.

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-19
Diameter: 8 in
Date: 07/24/2013

Northing: 431678.01
Easting: 861610.69
Elevation: 9.74
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: T. Murphy (PARSONS)
Project No:
Field Book No: 1

Total Depth: 46.5 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
0				0.0	0.000	GM/SM	Hand cleared to 5 ft. Installed with a stick up above ground surface. Limerock road base material to 2 feet then black very fine to fine sand, some silt, dry.	
5							Mud rotary drilling, mud ph 7.	
10								
15								
20								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-19
Diameter: 8 in
Date: 07/24/2013

Northing: 431678.01
Easting: 861610.69
Elevation: 9.74
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: T. Murphy (PARSONS)
Project No:
Field Book No: 1

Total Depth: 46.5 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
20							Mud rotary drilling, mud ph 7.	
25								
30								
35								
40								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-19
Diameter: 8 in
Date: 07/24/2013

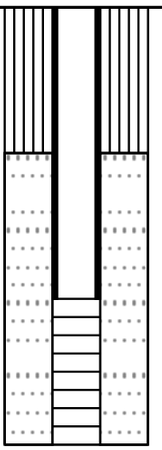
Northing: 431678.01
Easting: 861610.69
Elevation: 9.74
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: T. Murphy (PARSONS)
Project No: Field Book No: 1

Total Depth: 46.5 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description
40			8	0.0	0.000	SM	Black and gray medium to coarse SAND, trace silt, wet.
			11				
			16	0.0	0.000	SM	Black and gray medium to coarse SAND, trace silt, wet.
			14				
			12	0.0	0.000	SM	Black and gray medium to coarse SAND, trace silt, wet.
			11				
			9	0.0	0.000	SM	Black and gray medium to coarse SAND, trace silt, wet.
			8				
			8	0.0	0.000	SM	Black and gray medium to coarse SAND, trace silt, wet.
			8				
45			9	0.0	0.000	SC	Gray fine SAND, trace clay, wet.
			11				
46.5			50/1	0.0	0.000	GM	Gray coarse to very coarse SAND, and shells at 46.2 feet, mudstone and sand.

Well Construction Diagram



Well set at 46 ft, ground elevation 9.23 ft.

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-20
Diameter: 8 in
Date: 07/25/2013

Northing: 431754.07
Easting: 861615.36
Elevation: 8.98
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: T. Murphy (PARSONS)
Project No: Field Book No: 1

Total Depth: 51.5 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
0						GM/SM	Hand cleared to 5 ft. Installed with a stick up above ground surface. Limerock road base material, rock debris, brick to 2 feet, then brown fine sand and silt, dry.	
5							Mud rotary drilling, mud pH 7.	
10								
15								
20								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-20
Diameter: 8 in
Date: 07/25/2013

Northing: 431754.07
Easting: 861615.36
Elevation: 8.98
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: T. Murphy (PARSONS)
Project No:
Field Book No: 1

Total Depth: 51.5 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
20							Mud rotary drilling, mud pH 7.	
25								
30								
35								
40								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-20
Diameter: 8 in
Date: 07/25/2013

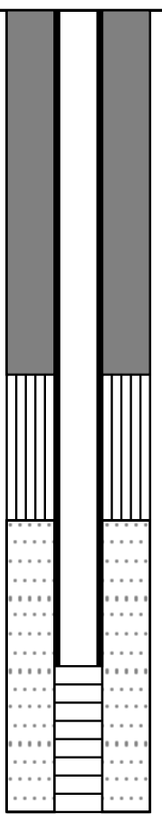
Northing: 431754.07
Easting: 861615.36
Elevation: 8.98
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: T. Murphy (PARSONS)
Project No: Field Book No: 1

Total Depth: 51.5 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description
40			11	0.0	0.000	SW	Gray coarse to very coarse SAND, wet.
			12				
			11	0.0	0.000	SW	Gray coarse to very coarse SAND, wet.
			11				
			8	0.0	0.000	SW	Gray coarse to very coarse SAND, wet.
			7				
			7	0.0	0.000	SM	Black medium to coarse SAND, trace silt.
			8				
			10	0.0	0.000	SC	Gray fine SAND, some clay, moist.
			13				
45			15	0.0	0.000	SC	Gray fine SAND, some clay, moist.
			50				
			27	0.0	0.000	SC	Gray fine SAND, some shells, trace clay, moist.
			30				
			37	0.0	0.000	SC	Gray fine SAND, some shells, trace clay, moist.
			30				
			24	0.0	0.000	SC	Gray fine SAND, some shells, trace clay, moist.
			16	0.0	0.000	SC	Gray fine SAND, some shells, trace clay, moist.
			18	0.0	0.000	SC	Gray fine SAND, trace shells, trace clay, moist.
			16	0.0	0.000	SC	Gray fine SAND, trace shells, trace clay, moist.
50			24	0.0	0.000	SC	Gray fine SAND, trace shells, trace clay, moist.
			20	0.0	0.000	SM	Gray fine SAND, some shells, laminated, moist.
51.5			44	0.0	0.000	SM	Gray fine sand, some shells, laminated, moist, cemented sandstone at 51.3 feet.

Well Construction Diagram



Well set at 51 ft, ground elevation 8.42 ft.

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-21
Diameter: 8 in
Date: 07/25/2013

Northing: 431835.20
Easting: 861616.10
Elevation: 9.25
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: T. Murphy (PARSONS)
Project No:
Field Book No: 1

Total Depth: 46.5 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
0				0.0	0.000	GM/SM	Hand cleared to 5 ft. Installed with a stick up above ground surface. Limerock road base material, debris, gravel to 2 feet, then brown fine to medium sand and silt, dry.	
5							Mud rotary drilling, mud ph 7.	
10								
15								
20								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-21
Diameter: 8 in
Date: 07/25/2013

Northing: 431835.20
Easting: 861616.10
Elevation: 9.25
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: T. Murphy (PARSONS)
Project No: Field Book No: 1

Total Depth: 46.5 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
20							Mud rotary drilling, mud ph 7.	
25								
30								
35								
40								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-21
Diameter: 8 in
Date: 07/25/2013

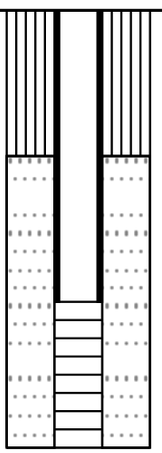
Northing: 431835.20
Easting: 861616.10
Elevation: 9.25
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: T. Murphy (PARSONS)
Project No: Field Book No: 1

Total Depth: 46.5 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description
40			6	0.0	0.000	SW	Gray medium to coarse SAND, trace gravel, wet.
			9				
			12	0.0	0.000	SW	Gray medium to coarse SAND, trace gravel, wet.
			12				
			8	0.0	0.000	SW	Gray medium to coarse SAND, trace gravel, wet.
			10				
			10	0.0	0.000	SM	Gray fine to medium SAND, trace clay.
			12				
			5	0.0	0.000	SM	Gray fine to medium SAND, trace silt, wet.
			7				
45			7	0.0	0.000	SM	Gray fine to medium SAND, trace silt, wet.
			13				
46.5			50	0.0	0.000	SM	SAND as above to 46.2 feet, then tan cemented sandstone.

Well Construction Diagram



Well set at 46 ft, ground elevation 8.58 ft.

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-22
Diameter: 8 in
Date: 07/27/2013

Northing: 431915.78
Easting: 861615.57
Elevation: 8.95
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: S. Dillman (PARSONS)
Project No: Field Book No: 2

Total Depth: 50.25 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
0							Hand cleared to 5 ft. Installed with a stick up above ground surface. pH is 7.5.	
5				0.0	0.000			
10							pH is 7.0.	
15				0.0	0.000			
20								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-22
Diameter: 8 in
Date: 07/27/2013

Northing: 431915.78
Easting: 861615.57
Elevation: 8.95
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: S. Dillman (PARSONS)
Project No: Field Book No: 2

Total Depth: 50.25 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
20							Drilled to 40 ft with mud rotary. No sampling to 40 ft. pH is 7.5	
25								
30				0.0	0.000			
35								
40								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-22
Diameter: 8 in
Date: 07/27/2013

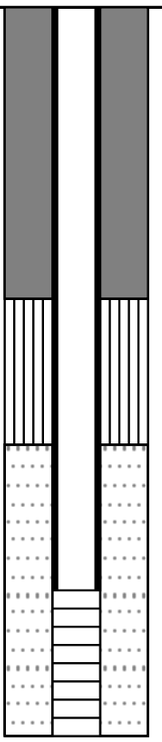
Northing: 431915.78
Easting: 861615.57
Elevation: 8.95
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: S. Dillman (PARSONS)
Project No: Field Book No: 2

Total Depth: 50.25 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description
40			7	0.0	0.000	SM	Light gray coarse SAND, 1/4 inch silty clay layers, wet upper 6 inches. Bottom 6 inches, gray medium coarse SAND, little fine sand and silt, wet, no stain or sheen. pH is 7.0 to 7.5.
			14				
			11				
			10				
			7	0.0	0.000	SM	Same as above, lense of gray clay, little silt, swampy odor.
			8				
			12				
			11				
			8	0.0	0.000	SP	Gray medium to coarse SAND over fine to medium SAND, over gray brown silt, fine sand, trace shells broken, wet.
45			9				
			11				
			18				
			8	0.0	0.000	SM	Brown gray fine to medium SAND, little shells broken, trace clay, wet.
			8				
			21				
			31	0.0	0.000	SM	Gray fine to medium SAND, trace shells, wet.
			21	0.0	0.000	SM	Gray brown fine to medium SAND, little shells, trace clay, wet.
			22	0.0	0.000	SM	Gray brown fine to medium SAND, little shells, trace clay, wet.
				0.0	0.000	SM	Gray brown fine to medium SAND, little shells, trace clay, with little mudstone clasts, wet.
50			50/3	0.0	0.000	SM	Sandstone with mudstone clasts in upper, very dense, refusal.
50.25							

Well Construction Diagram



BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-23
Diameter: 8 in
Date: 07/29/2013

Northing: 431994.55
Easting: 861615.07
Elevation: 8.94
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: S. Dillman (PARSONS)
Project No: Field Book No: 2

Total Depth: 50.0 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
0							Hand cleared to 5 ft. Installed with a stick up above ground surface. pH is 7.	
5				0.0	0.000			
10							Volatile organic compounds from rig exhaust. Mud rotary drilling to 40 ft. No sampling to 40 ft. pH is 7.	
15				2.0	0.000			
20								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-23
Diameter: 8 in
Date: 07/29/2013

Northing: 431994.55
Easting: 861615.07
Elevation: 8.94
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: S. Dillman (PARSONS)
Project No: Field Book No: 2

Total Depth: 50.0 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
20							Volatile organic compounds from rig exhaust. Mud rotary drilling to 40 ft. No sampling to 40 ft. pH is 7.	
25								
30				2.0	0.000			
35								
40								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-23
Diameter: 8 in
Date: 07/29/2013

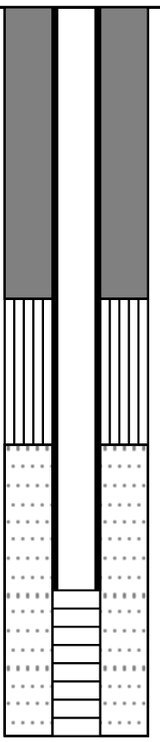
Northing: 431994.55
Easting: 861615.07
Elevation: 8.94
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: S. Dillman (PARSONS)
Project No: Field Book No: 2

Total Depth: 50.0 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description
40			8	0.0	0.000	SM	Gray medium to coarse SAND, little fine sand, wet. pH is 7.
			12				
			11				
			13				
			7	0.0	0.000	SM	Gray medium to coarse SAND, thin lense of fine sand and silt, little clay, wet.
			8				
			10				
			12				
			8	0.0	0.000	SM	Gray medium to coarse SAND, bottom 3 inches fine to medium sand, darker gray, wet.
			7				
45			6				
			7				
			6	0.0	0.000	SM	Same as above, darker gray SAND, bottom 8 inches gray fine SAND and SILT, clay lenses 1/4 inch, trace shells bottom 3 inches.
			8				
			12				
			11				
			12	0.0	0.000	SM	Fine SAND, little silt, trace shells, soft, wet. Bottom inch top of rock, sandstone lighter gray, cemented.
			17	0.0	0.000		
			10	0.0	0.000		
50.0			50/5	0.0	0.000		

Well Construction Diagram



BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-24
Diameter: 8 in
Date: 08/10/2013 - 08/11/2013

Northing: 431398.89
Easting: 861681.89
Elevation: 9.75
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 50.5 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
0						GP/SM	Hand cleared to 5 ft. Installed with a stick up above ground surface. 0 ft to 4 ft road GRAVEL, railroad ballast, black sand, 4 ft to 5 ft Brown fine to medium SAND, trace silt.	
5							Brown gray drilling mud, pH 7.	
10				19.6	0			
15								
20								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-24
Diameter: 8 in
Date: 08/10/2013 - 08/11/2013

Northing: 431398.89
Easting: 861681.89
Elevation: 9.75
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 50.5 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
20							Brown gray drilling mud, pH 7.	
25								
30				19.6	0			
35								
40								

BORING LOG

Honeywell

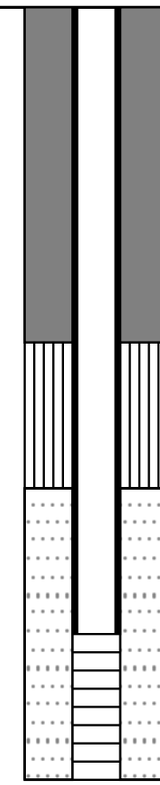
Site: LCP Brunswick
Boring No: SW-24
Diameter: 8 in
Date: 08/10/2013 - 08/11/2013

Northing: 431398.89
Easting: 861681.89
Elevation: 9.75
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 50.5 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description
40			7	0	0	SM	Gray fine to coarse SAND, trace silt.
			9				
			11			SM	41 ft to 41 ft 4 in Gray fine to coarse SAND, trace silt, 41 ft 4 in to 42 ft Gray fine to medium SAND, some silt.
			18				
			12	0	0	SM	Gray fine to coarse SAND, trace silt.
			16				
			16			SM	Gray fine to coarse SAND, trace silt.
			19				
			9	0	0	SM	Gray fine to medium SAND, trace silt.
			9				
45			13			SM	45 ft to 45 ft 8 in Gray fine to medium SAND, little silt, 45 ft 8 in to 46 ft Gray CLAY and silt, little sand.
			16				
			12	0	0	SM	Gray fine to medium SAND, trace silt.
			14				
			22			SC	47 ft to 47 ft 4 in Gray fine to medium SAND, trace silt, 47 ft 4 in to 47 ft 10 in Gray CLAY, stiff, 47 ft 10 in to 48 ft Gray fine to coarse SAND, trace silt.
			19				
			5	0	0	SM	Gray fine to medium SAND, little silt.
			7				
			9			SM	49 ft to 49 ft 6 in Gray fine to medium SAND, little silt, 49 ft 6 in to 50 ft Gray fine to coarse SAND, trace silt.
			15				
50			50			SM/R	Gray fine to coarse SAND, trace silt, cemented sandstone in tip of spoon.
50.6							



Well Set at 50.5 ft. While over drilling the initial pilot hole, a void (likely pipe or tank) was encountered by the 8 in. bit and drained the neck of the mud tub down to 7 ft. bgs. The rig was moved 5 ft. W to avoid the void.

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-25
Diameter: 9 in
Date: 08/07/2013 - 08/08/2013

Northing: 431475.35
Easting: 861685.55
Elevation: 9.85
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 51.0 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
0						SM	Hand cleared to 5 ft. Installed with a stick up above ground surface. Gray brown fine to medium SAND, trace silt, 2 in layer of organic top soil.	
5							Brown gray drilling mud, pH 7.	
10				0	0			
15								
20								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-25
Diameter: 9 in
Date: 08/07/2013 - 08/08/2013

Northing: 431475.35
Easting: 861685.55
Elevation: 9.85
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 51.0 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
20							Brown gray drilling mud, pH 7.	
25								
30				0	0			
35								
40								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-25
Diameter: 9 in
Date: 08/07/2013 - 08/08/2013

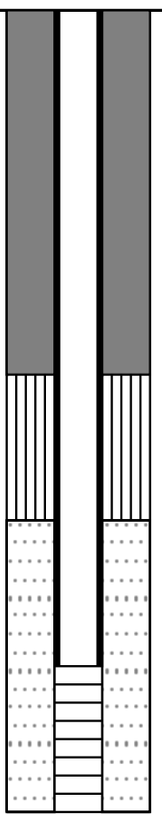
Northing: 431475.35
Easting: 861685.55
Elevation: 9.85
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 51.0 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description
40			11	0	0	SM	Gray fine to coarse SAND, trace silt.
			12				
			12			SM	Gray fine to coarse SAND, trace silt.
			13				
			10	0	0	SM	Gray fine to coarse SAND, trace silt.
			12				
			16			SM	Gray fine to coarse SAND, trace silt.
			12				
			11	0	0	SM	Gray fine to medium SAND, little silt.
			6				
45			17			SM	Gray fine to medium SAND, little silt.
			17				
			7	0	0	SM	Gray fine to medium SAND, trace silt.
			7				
			9			SC	Gray fine to medium SAND, some silt and clay.
			8				
			4	0	0	SM	Gray fine to medium SAND, little silt.
			6				
			8			SM	Gray fine to medium SAND, little silt.
			12				
50			7	0	0	SM/R	Gray fine to coarse SAND, little silt, 2 in of weakly cemented sandstone in tip of spoon.
51.0			45				

Well Construction Diagram



Well Set at 51 ft.

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-26
Diameter: 8 in
Date: 07/23/2013

Northing: 431557.34
Easting: 861686.52
Elevation: 10.65
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: T. Murphy (PARSONS)
Project No: Field Book No:

Total Depth: 52.5 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
0				0.0	0.000	SM	Hand cleared to 5 ft. Installed with a stick up above ground surface. Brown fine to medium SAND, dry.	
5							Mud rotary drilling, mud ph 7.	
10								
15								
20								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-26
Diameter: 8 in
Date: 07/23/2013

Northing: 431557.34
Easting: 861686.52
Elevation: 10.65
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: T. Murphy (PARSONS)
Project No: Field Book No:

Total Depth: 52.5 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
20							Mud rotary drilling, mud ph 7.	
25								
30								
35								
40								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-26
Diameter: 8 in
Date: 07/23/2013

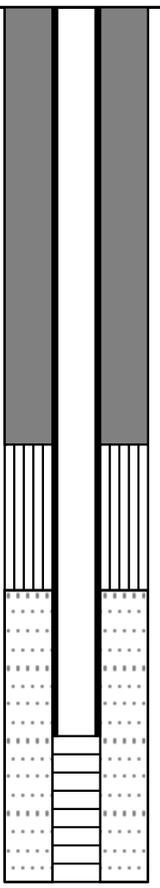
Northing: 431557.34
Easting: 861686.52
Elevation: 10.65
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: T. Murphy (PARSONS)
Project No: Field Book No:

Total Depth: 52.5 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description
40			9			SM	Gray fine to medium SAND, trace silt, wet.
			11				
			8			SM	Gray fine to medium SAND, trace silt, wet.
			11				
			4			CL/SW	Gray CLAY to 42.5 feet, then gray medium to coarse SAND, wet.
			11				
			9			SW	Gray medium to coarse SAND, wet.
			3				
			7				
			5				
45			6				
			8				
			10			SW	Gray medium to coarse SAND.
			4	0.0	0.000		
			5			CL/SC	Gray CLAY, soft to 47.4 feet then gray SAND, some clay.
			5	0.0	0.000		
			1			CL	Gray CLAY and shells, very soft.
			2	0.0	0.000		
			2			SM	Gray fine to medium SAND, little silt.
			3	0.0	0.000		
50			3	0.0	0.000	SM	Gray fine to medium SAND, little to some silt, trace shell fragments, trace gravel.
			5				No Recovery in split spoon.
			1	0.0	0.000	SM	Gray fine to coarse SAND, trace silt, trace gravel, wet.
			1	0.0	0.000	SM	Gray fine to coarse SAND, trace silt, trace gravel, wet.
52.5			50/1	0.0	0.000	SM	Partially lithified fine to coarse SAND, trace gravel, trace silt, dry.

Well Construction Diagram



Set well at 52 ft, ground elevation 10.10 ft.

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-27
Diameter: 8 in
Date: 07/22/2013 - 07/23/2013

Northing: 431635.01
Easting: 861685.01
Elevation: 10.57
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: T. Murphy (PARSONS)
Project No:
Field Book No: 1

Total Depth: 52.5 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
0				0.0	0.000	SM	Hand cleared to 5 ft. Installed with a stick up above ground surface. Brown fine to medium SAND, little silt, dry.	
5							Mud rotary drilling, mud pH 7-8.	
10								
15								
20								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-27
Diameter: 8 in
Date: 07/22/2013 - 07/23/2013

Northing: 431635.01
Easting: 861685.01
Elevation: 10.57
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: T. Murphy (PARSONS)
Project No: Field Book No: 1

Total Depth: 52.5 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
20							Mud rotary drilling, mud pH 7-8.	
25								
30			4	0.0	0.000	SW	Gray coarse to very coarse SAND, trace gravel, wet.	
			8					
			11	0.0	0.000	SM	Black very fine to fine SAND, trace silt, wet.	
			11					
			9	0.0	0.000	SW	Gray coarse to very coarse SAND, trace gravel.	
			10					
			12	0.0	0.000	SM	Black fine to medium SAND, trace silt.	
			14					
			10	0.0	0.000	SW	Gray very coarse to coarse SAND, trace gravel, wet.	
			10					
35			12	0.0	0.000	SM	Gray very fine to medium SAND, wet.	
			13					
			16	0.0	0.000	SW	Gray very coarse SAND, trace silt, wet.	
			14					
			14	0.0	0.000	SM	Gray fine SAND, wet.	
			15					
			14	0.0	0.000	SM	Gray fine SAND, wet.	
			14					
			11	0.0	0.000	SC	Gray fine SAND, little black clay, laminated.	
40			12					

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-27
Diameter: 8 in
Date: 07/22/2013 - 07/23/2013

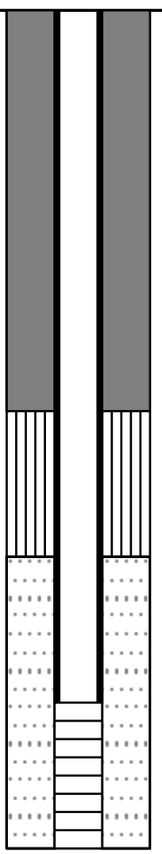
Northing: 431635.01
Easting: 861685.01
Elevation: 10.57
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: T. Murphy (PARSONS)
Project No: Field Book No: 1

Total Depth: 52.5 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description
40			8	0.0	0.000	SC	Gray coarse SAND, with 3 inch clay lense, wet.
			7				
			10	0.0	0.000	SM	Gray fine to coarse SAND, wet.
			14				
			4	0.0	0.000	SM	Gray fine to coarse SAND, wet.
			4				
			4	0.0	0.000	SW	Gray medium to coarse SAND, wet.
			7				
			10	0.0	0.000	SW	Gray coarse to very coarse SAND, wet.
			10				
45			7	0.0	0.000	SP	Black very coarse SAND, trace silt.
			10				
			9	0.3	0.000	SW	Gray coarse to very coarse SAND.
			9				
			15	0.3	0.000	SM	Black fine to medium SAND, trace silt, wet.
			24				
			5	0.0	0.000	SW	Gray coarse to very coarse SAND and gravel, wet.
			8				
			9	0.0	0.000	SM	Black fine to medium SAND, little silt.
			13				
50			9	0.0	0.000	SM	Gray fine to medium SAND, little silt, wet.
			4	0.0	0.000		No Recovery in split spoon.
			5	0.0	0.000	SM	Gray fine to medium SAND, trace clay.
			22	0.0	0.000	CL	Clay lenses and shell fragments, dry to moist.
52.5			40	0.0	0.000	SW	Gray coarse SAND and gravel.

Well Construction Diagram



Well set at 51.5 ft, gound elevation 9.83 ft.

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-28
Diameter: 8 in
Date: 07/22/2013 - 07/23/2013

Northing: 431715.38
Easting: 861685.72
Elevation: 10.27
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 52.5 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
0						SM	Hand cleared to 5 ft. Installed with a stick up above ground surface. Brown medium to coarse SAND, trace silt.	
5							Brown drilling MUD, pH 7 to 8.	
10								
15								
20								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-28
Diameter: 8 in
Date: 07/22/2013 - 07/23/2013

Northing: 431715.38
Easting: 861685.72
Elevation: 10.27
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 52.5 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
20							Brown drilling MUD, pH 7 to 8.	
25								
30			7	0	0	SM	Brown fine to medium SAND, some silt.	
			7					
			7			SM	Gray fine to coarse SAND, little silt, pH 7.	
			9					
			5	0	0	SM	Gray fine to coarse SAND, little silt.	
			7					
			6			SM	Gray fine to coarse SAND, little silt.	
			12					
			9	0.0	0	SM	Gray fine to medium SAND, trace silt.	
			8					
35			13			SM	Gray fine to medium SAND, some silt.	
			14					
			7	0.0	0	SM	Gray fine to medium SAND, trace silt.	
			7					
			7			SM	Brown fine SAND, trace silt.	
			6					
			6	0	0	SM	38 ft to 38 ft 6 in Brown fine SAND, trace silt, 38 ft 6 in to 38 ft 9 in Gray CLAY, some sand, 38 ft 9 in to 40 ft Gray fine to coarse SAND, trace silt.	
			12					
			7			SM	Gray fine to coarse SAND, trace silt.	
40			6					

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-28
Diameter: 8 in
Date: 07/22/2013 - 07/23/2013

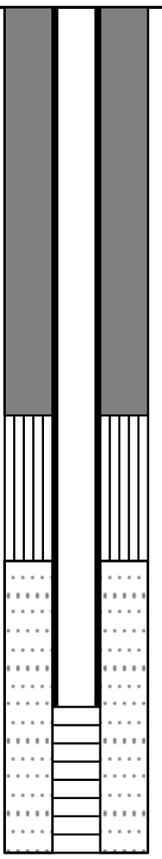
Northing: 431715.38
Easting: 861685.72
Elevation: 10.27
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 52.5 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description
40			15	0	0	SM	Gray medium to coarse SAND, trace silt.
			12				
			14			SM	Gray fine to coarse SAND, little silt.
			15				
			14	0	0	SM	Gray medium to coarse SAND, trace silt, occasionally 1/2 inch beds medium to coarse sand, little silt.
			12				
			14			SM	Gray medium to coarse SAND, trace silt, occasionally 1/2 inch beds medium to coarse sand, little silt.
			15				
			5	0	0	SM	Gray medium to coarse SAND, trace silt.
			6				
45			6			SC	45 ft to 45 ft 3 in Gray CLAY stiff, 45 ft 3 in to 46 ft fine to medium SAND, little silt.
			5				
			5	0	0	SM	Gray brown fine to coarse SAND, trace silt.
			6				
			7			SM	Gray brown fine to coarse SAND, trace silt.
			33				
			18			SM	Gray fine to medium SAND, little silt, 1/4 inch white shell layers.
			24				
			25			SM	Gray fine to medium SAND, little silt, 1/4 inch white shell layers.
			18				
50			16			SM	Gray fine to medium SAND, little silt, 1/4 inch white shell layers.
			27				
			16			SM	51 ft to 51 ft 6 in no recovery, 51 ft 6 in to 52 ft Gray fine to medium SAND, some silt, 1/4 inch white shell layers.
			13				
52.5			50			SM/R	52 ft to 52 ft 4 in Gray fine to medium SAND, some silt, 1/4 inch white shells, 52 ft 5 in refusal.

Well Construction Diagram



Well Set at 51.5 ft.

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-29
Diameter: 8 in
Date: 07/24/2013

Northing: 431794.84
Easting: 861685.51
Elevation: 10.02
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 52.75 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
0						SM	Hand cleared to 5 ft. Installed with a stick up above ground surface. Brown medium to coarse SAND, trace silt.	
5							Brown drilling MUD, pH 7 to 8.	
10								
15								
20								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-29
Diameter: 8 in
Date: 07/24/2013

Northing: 431794.84
Easting: 861685.51
Elevation: 10.02
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 52.75 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
20							Brown drilling MUD, pH 7 to 8.	
25								
30								
35								
40								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-29
Diameter: 8 in
Date: 07/24/2013

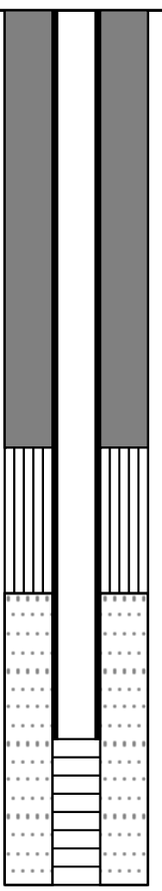
Northing: 431794.84
Easting: 861685.51
Elevation: 10.02
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 52.75 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description
40			12	0	0	SM	Brown medium to coarse SAND, trace silt.
			15				
			22			SM	Brown medium to coarse SAND, trace silt.
			23				
			11	0	0	SM	Brown medium to coarse SAND, trace silt.
			15				
			16			SM	43 ft to 43 ft 3 in Gray CLAY dense, 43 ft 3 in to 44 ft Gray medium to coarse SAND, trace silt, pH 10.
			18				
			10	0.0	0	SM	Gray medium to coarse SAND, trace silt, trace gravel, pH 10.
			12				
45			13			SM	Gray medium to coarse SAND, trace silt, trace gravel, pH 10.
			20				
			5	0.0	0	SM	Gray fine to medium SAND, trace silt.
			6				
			11			SM	Gray fine to medium SAND, trace silt.
			13				
			8			SC/SM	48 ft to 48 ft 6 in Gray fine to medium SAND, trace silt, clay lenses, 48 ft 6 in to 49 ft Gray fine to medium SAND, trace silt.
			12				
			15			SM	Gray fine to medium SAND, trace silt.
			16				
50			1			SC	Gray fine to medium SAND, trace silt, thin clay lenses.
			1				
			7			SM	Gray fine to medium SAND, trace silt.
			16				
			35			SM/R	52 ft to 52 ft 6 in Gray fine to medium SAND, little silt, trace white shell fragments, 52 ft 6 in to 52 ft 9 in Gray fine to medium SAND, little silt, weakly cemented sandstone, refusal.
52.75			50				

Well Construction Diagram



Well Set at 52 ft.

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-30
Diameter: 8 in
Date: 07/25/2013

Northing: 431874.71
Easting: 861685.50
Elevation: 9.57
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 52.33 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
0						OL/AS/SM	Hand cleared to 5 ft. Installed with a stick up above ground surface. 0 ft to 2 ft Brown TOP SOIL organic, little gravel, 2 ft to 4 ft ASPHALT, little coarse gravel, 4 steel flanges, 4 ft to 5 ft Gray SAND.	
5							Brown drilling MUD, pH 7.	
10				0.5				
15								
20								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-30
Diameter: 8 in
Date: 07/25/2013

Northing: 431874.71
Easting: 861685.50
Elevation: 9.57
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 52.33 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
20							Brown drilling MUD, pH 7.	
25								
30				0.5				
35								
40								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-30
Diameter: 8 in
Date: 07/25/2013

Northing: 431874.71
Easting: 861685.50
Elevation: 9.57
Datum: Unknown

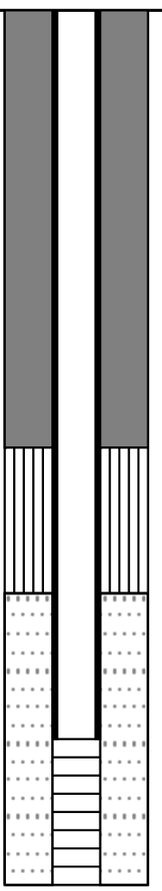
Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 52.33 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description
40			6	0	0	SM	Brown coarse SAND, trace silt.
			12				
			16			SM	Gray fine to medium SAND, trace silt.
			18				
			6	0	0	SM	42 ft 6 in to 43 ft Gray fine to medium SAND, trace silt.
			11				
						CL/SC	43 ft to 43 ft 6 in Gray CLAY, stiff, 43 ft 6 in to 44 ft Gray fine to medium SAND, little silt and clay.
			27	0	0	SM	Gray fine to medium SAND, trace silt, little white shell fragments.
			50				
45							Note Due to refusal of spoon to layer white shells this was drilled through.
			11	0	0	SM	Gray fine to medium SAND, trace silt, little white shell fragments.
			17				
			27			SM	Gray fine to medium SAND, trace silt, little white shell fragments.
			50				
			21	0	0	SM	Gray fine to medium SAND, trace silt, little white shell fragments.
			34				
			41			SM	Gray fine to medium SAND, trace silt, little white shell fragments.
			50				
50			13	0	0	SM	Gray fine to medium SAND, trace silt, little white shell fragments.
			19				
			16			SM	Gray fine to medium SAND, trace silt, little white shell fragments.
			20				
52.33			50	0	0	SM/R	Black SANDSTONE weakly cemented, some Gray fine to medium sand, trace silt.

Well Set at 52 ft.

Well Construction Diagram



BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-31
Diameter: 8 in
Date: 07/29/2013

Northing: 431954.74
Easting: 861684.83
Elevation: 9.27
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: S. Dillman (PARSONS)
Project No: Field Book No: 2

Total Depth: 48.8 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
0							Hand cleared to 5 ft. Installed with a stick up above ground surface. pH is 7.	
10				0.00	0.000			
20								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-31
Diameter: 8 in
Date: 07/29/2013

Northing: 431954.74
Easting: 861684.83
Elevation: 9.27
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: S. Dillman (PARSONS)
Project No: Field Book No: 2

Total Depth: 48.8 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
20							pH is 7.5.	
25								
30				0.000	0.000			
35								
40								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-31
Diameter: 8 in
Date: 07/29/2013

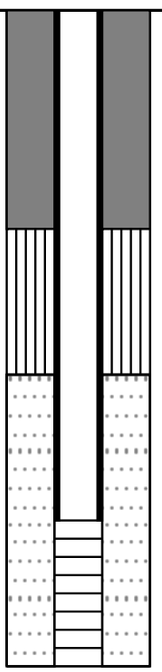
Northing: 431954.74
Easting: 861684.83
Elevation: 9.27
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: S. Dillman (PARSONS)
Project No: Field Book No: 2

Total Depth: 48.8 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description
40				0.0	0.000	SM	Gray medium to coarse SAND, little fine sand, wet.
				0.0	0.000	SM	Gray medium to coarse SAND, little fine sand, wet.
				0.0	0.000	SM	Gray medium to coarse SAND, little fine sand, wet.
45				0.0	0.000	SM	Gray medium to coarse SAND, little fine sand, wet with thin silty clay lenses at bottom of sample.
				0.0	0.000	SM	Gray fine to medium SAND, trace coarse sand over gray fine sand, trace shells, wet.
			50/4			SM	Gray fine to medium SAND, trace coarse sand over gray fine sand, trace shells, wet with pebble size clasts of bedrock.
49.0							

Well Construction Diagram



BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-32
Diameter: 8 in
Date: 07/26/2013

Northing: 432036.94
Easting: 861683.88
Elevation: 8.78
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: S. Dillman (PARSONS)
Project No: Field Book No: 2

Total Depth: 49.5 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
0							Hand cleared to 5 feet, concrete 4 inches over tan sand, wet at 4-5 feet. Installed with a stick up above ground surface. pH is 7 to 8.	
10				0.0	0.00		Drilled from 5 to 40 feet with mud rotary, no sampling. pH is 7.	
20								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-32
Diameter: 8 in
Date: 07/26/2013

Northing: 432036.94
Easting: 861683.88
Elevation: 8.78
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: S. Dillman (PARSONS)
Project No: Field Book No: 2

Total Depth: 49.5 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
20							Drilled from 5 to 40 feet with mud rotary, no sampling. pH is 7.	
25								
30				0.0	0.00			
35								
40								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-32
Diameter: 8 in
Date: 07/26/2013

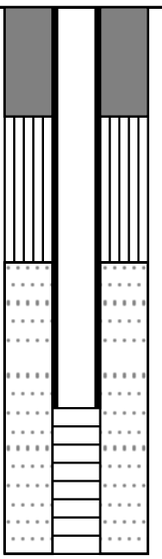
Northing: 432036.94
Easting: 861683.88
Elevation: 8.78
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: S. Dillman (PARSONS)
Project No: Field Book No: 2

Total Depth: 49.5 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description
40			10	0.0	0.00	SM	Light gray to gray coarse to medium SAND, little fine sand, little silt, wet, swampy odor, no stain or sheen.
			9				
			9				
			12				
			6	0.0	0.00	SM	Same as above.
			7				
			7				
			6				
			4	0.0	0.000	SM	Top 18 inches same as above, bottom 6 inches dark gray fine to medium SAND, some coarse sand, silty sand, trace clay in end of sample, wet.
			6				
45			7				
			9				
			6	0.0	0.000	ML	Gray medium to coarse SAND as above top 4 inches wet, over dark gray medium to coarse SAND, bottom 8 inches dark gray CLAY stiff, little silt, fine to medium sand lenses
			6				
			8				
			13				
			5	0.0	0.00	SM	Brown fine to medium SAND, little shells fragments, wet.
			3	0.0	0.00	SM	Brown fine to medium SAND, more shells, wet.
49.5			50/5	0.0	0.00	SM	Brown fine to medium SAND, little shells, trace silt and clay, wet.

Well Construction Diagram



BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-33
Diameter: 8 in
Date: 08/08/2013 - 08/09/2013

Northing: 432115.61
Easting: 861685.36
Elevation: 8.90
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: S. Dillman (PARSONS)
Project No: Field Book No: 2

Total Depth: 49.4 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
0							Hand cleared to 5 ft. Installed with a stick up above ground surface. pH is 7.	
10				0.0	0.000			
20								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-33
Diameter: 8 in
Date: 08/08/2013 - 08/09/2013

Northing: 432115.61
Easting: 861685.36
Elevation: 8.90
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: S. Dillman (PARSONS)
Project No: Field Book No: 2

Total Depth: 49.4 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
20							pH is 7.5.	
25								
30				0.0	0.000			
35								
40								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-33
Diameter: 8 in
Date: 08/08/2013 - 08/09/2013

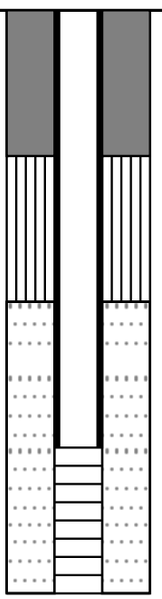
Northing: 432115.61
Easting: 861685.36
Elevation: 8.90
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: S. Dillman (PARSONS)
Project No: Field Book No: 2

Total Depth: 49.4 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description
40			8	0.0	0.000	SM	Dark gray medium to coarse SAND, trace clay in thin lenses, wet.
			14				
			13				
			21				
			16	0.0	0.000	SM	Medium gray medium SAND, trace clay in lenses, wet.
			15				
			18				
			24				
			9	0.0	0.000	SM	Sand as above over dark gray medium SAND, trace clay in lenses, wet.
			16				
45			19				
			21				
			14	0.0	0.000	SM	Medium gray fine to medium SAND 7 inches over darker gray fine to medium SAND, trace to little clay in lenses, bottom 2 inches stiff silt and clay, wet.
			16				
			19				
			20				
			5	0.0	0.000	SM	Gray fine SAND, wet.
			6	0.0	0.000	CL	Gray CLAY, trace to little silt, stiff, wet.
49.4			50/5	0.0	0.000	CL	Clay as above over weathered sandstone, wet.

Well Construction Diagram



BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-34
Diameter: 8 in
Date: 08/12/2013

Northing: 432197.50
Easting: 861689.45
Elevation: 9.48
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: S. Dillman (PARSONS)
Project No: Field Book No: 2

Total Depth: 50.8 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
0							Hand cleared to 5 ft. Installed with a stick up above ground surface. pH is 7.	
5								
10								
15								
20								

BORING LOG

Honeywell

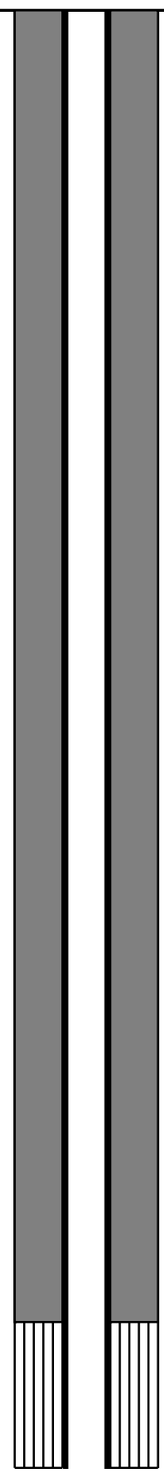
Site: LCP Brunswick
Boring No: SW-34
Diameter: 8 in
Date: 08/12/2013

Northing: 432197.50
Easting: 861689.45
Elevation: 9.48
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: S. Dillman (PARSONS)
Project No: Field Book No: 2

Total Depth: 50.8 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
20							pH is 7.5.	
25								
30								
35								
40								



BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-34
Diameter: 8 in
Date: 08/12/2013

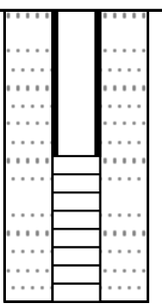
Northing: 432197.50
Easting: 861689.45
Elevation: 9.48
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: S. Dillman (PARSONS)
Project No: Field Book No: 2

Total Depth: 50.8 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description
40			11	0.0	0.000	SM	Tan and gray medium to coarse SAND, wet.
			17				
			17				
			19				
			10	0.0	0.000	SM	Tan medium SAND over 4 inches gray coarse medium SAND, wet.
			13				
			15				
			18				
			3	0.0	0.000	CL	Greenish gray CLAY, semi stiff over 4 inches fine medium sand, some clay.
			3				
45			5				
			7				
			7	0.0	0.000	CL	Clay as above 4 inches over fine to medium SAND, little clay in lenses 4 inches over more clay, thin lenses of fine sand scattered.
			12				
			13				
			12				
			12	0.0	0.000	SM	Fine medium SAND, trace shells, some clay upper 4 inches, wet. Greenish gray clay with thin lenses of fine sand bottom 4 inches.
			15				
			12				
			8				
50			11	0.0	0.000		Same as bottom of last sample, trace weathered sandstone in bottom.
50.8			50/4	0.0	0.000		Gray weathered sandstone, trace quartz, pebbles, broken sandstone.

Well Construction Diagram



BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-35
Diameter: 8 in
Date: 08/09/2013 - 08/11/2013

Northing: 432274.82
Easting: 861685.16
Elevation: 9.00
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: S. Dillman (PARSONS)
Project No:
Field Book No: 2

Total Depth: 51.5 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
0							Hand cleared to 5 ft. Installed with a stick up above ground surface. pH is 7.	
5								
10								
15								
20								

BORING LOG

Honeywell

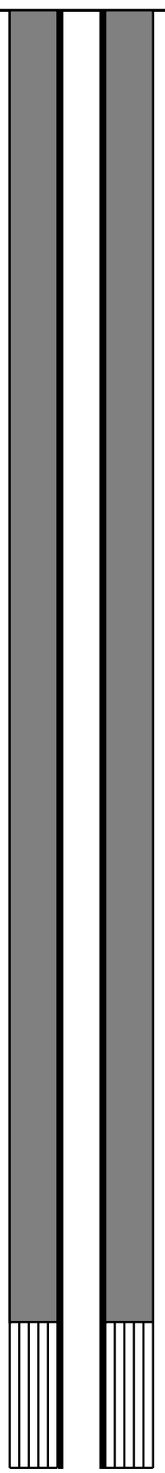
Site: LCP Brunswick
Boring No: SW-35
Diameter: 8 in
Date: 08/09/2013 - 08/11/2013

Northing: 432274.82
Easting: 861685.16
Elevation: 9.00
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: S. Dillman (PARSONS)
Project No: Field Book No: 2

Total Depth: 51.5 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
20							pH is 7.	
25								
30								
35								
40								



BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-35
Diameter: 8 in
Date: 08/09/2013 - 08/11/2013

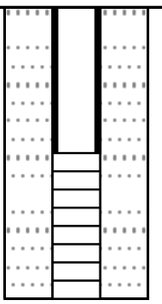
Northing: 432274.82
Easting: 861685.16
Elevation: 9.00
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: S. Dillman (PARSONS)
Project No: Field Book No: 2

Total Depth: 51.5 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description
40			10	0.0	0.000	SM	Medium gray medium to coarse SAND, trace clay in thin lenses, scattered, wet.
			15				
			20				
			22				
			5	0.0	0.000	SM	Tan medium to coarse SAND, wet.
			6				
			25				
			11				
			8			CL	Greenish gray CLAY, trace sand in thin lenses, semi stiff, wet, bottom 4 inches fine medium sand, trace clay in thin lense.
			10				
45			14				
			12				
			5	0.0	0.000	CL/SM	Clay 7 inches over fine to medium SAND 10 inches, over gray clay, trace sand in lenses 7 inches, semi stiff, wet.
			14				
			10				
			10				
			5	0.0	0.000	CL	Greenish gray CLAY, trace sand 3 inch lense, over more clay, bottom 2 inches fine medium sand, trace shells, wet.
			10				
			11				
			10				
50			1				Weathered sandstone, hard.
			1				
51.5			50/3				

Well Construction Diagram



BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-36
Diameter: 8 in
Date: 08/10/2013

Northing: 431431.32
Easting: 861751.31
Elevation: 9.74
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 50.5 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
0						GP/SM	Hand cleared to 5 feet. Installed with a stick up above ground surface. 0 ft to 3 ft Road GRAVEL, railroad ballast, Black sand, 3 ft to 5 ft Brown fine to medium SAND, trace silt.	
5							Brown gray drilling MUD, pH 7.	
10				0	0			
15								
20								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-36
Diameter: 8 in
Date: 08/10/2013

Northing: 431431.32
Easting: 861751.31
Elevation: 9.74
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 50.5 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
20							Brown gray drilling MUD, pH 7.	
25								
30				0	0			
35								
40								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-36
Diameter: 8 in
Date: 08/10/2013

Northing: 431431.32
Easting: 861751.31
Elevation: 9.74
Datum: Unknown

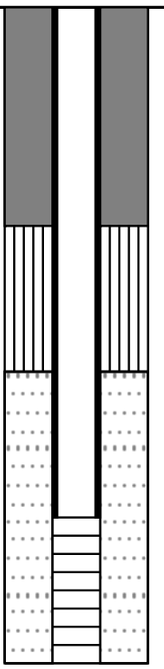
Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 50.5 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description
40			5	0	0	SC	Gray fine to coarse SAND, trace silt, two 1 inch layers of silty clay.
			8				
			11			SM	Gray fine to coarse SAND, trace silt.
			15				
			11	0	0	SM	Gray fine to coarse SAND, trace silt.
			12				
			11			SM	Gray fine to coarse SAND, trace silt.
			11				
			15	0	0		No recovery, rock blocked front of spoon.
			13				
45			12				No recovery, rock blocked front of spoon.
			16				
			3	0	0	SC	46 ft to 46 ft 2 in Gray fine to medium SAND, 46 ft 2 in to 46 ft 8 in Gray silty CLAY, 46 ft 8 in to 47 ft Gray fine to coarse SAND, trace silt.
			9				
			13			SC	Gray fine to coarse SAND, trace silt, occasional lens silt and clay.
			13				
			11	0	0	SC	Gray fine to coarse SAND, trace silt, occasional lens silt and clay.
			10				
			13			SC	Gray fine to medium SAND, some clayey silt, trace white shell fragments.
			20				
50			50			SM/R	50 ft to 50 ft 6 in Gray fine to coarse SAND, little silt, cemented sandstone in tip of spoon.
50.5							

Well Set at 49 ft.

Well Construction Diagram



BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-37
Diameter: 8 in
Date: 08/09/2013

Northing: 431514.59
Easting: 861752.65
Elevation: 10.05
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 51.25 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
0						SM	Hand cleared to 5 ft. Installed with a stick up above ground surface. Gray brown fine to medium SAND, trace silt.	
5							Brown gray drilling MUD, pH 7 to 8.	
10				0	0			
15								
20								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-37
Diameter: 8 in
Date: 08/09/2013

Northing: 431514.59
Easting: 861752.65
Elevation: 10.05
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 51.25 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
20							Brown gray drilling MUD, pH 7 to 8.	
25								
30				0	0			
35								
40								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-37
Diameter: 8 in
Date: 08/09/2013

Northing: 431514.59
Easting: 861752.65
Elevation: 10.05
Datum: Unknown

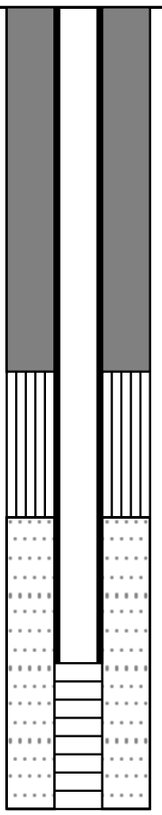
Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 51.25 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description
40			4	0	0	SC	Gray fine to coarse SAND, trace silt, occasional lens clay and silt.
			5				
			8			SC	Gray fine to coarse SAND, trace silt, occasional lens clay and silt.
			8				
			5	0	0	SM	Gray fine to coarse SAND, trace silt.
			6				
			9			SC	Gray fine to coarse SAND, trace silt, 2 inch layer of silty clay.
			12				
			6	0	0	SM	Gray fine to coarse SAND, trace silt.
			13				
45			12			SM	Gray fine to coarse SAND, trace silt.
			14				
			8	0	0	SM	Gray fine to medium SAND, trace silt.
			12				
			9			SM	Gray fine to medium SAND, trace silt.
			11				
			5	0	0	SM	Gray fine to medium SAND, trace silt.
			5				
			11			SM	Gray fine to medium SAND, trace silt.
			15				
50			5			SM	50 ft to 50 ft 6 in Gray fine to medium SAND, trace silt, 50 ft 6 in to 51 ft Gray, fine to coarse SAND, little silt.
			5				
51.25			50			SM/R	Gray fine to medium SAND, little silt, cemented sandstone in tip of spoon.

Well Set at 51 ft.

Well Construction Diagram



BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-38
Diameter: 8 in
Date: 08/10/2013

Northing: 431594.67
Easting: 861754.38
Elevation: 10.26
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 51.5 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
0						SM	Hand cleared to 5 ft. Installed with a stick up above ground surface. Gray brown fine to medium SAND, trace silt.	
5							Brown gray drilling MUD, pH 7.	
10				0	0			
15								
20								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-38
Diameter: 8 in
Date: 08/10/2013

Northing: 431594.67
Easting: 861754.38
Elevation: 10.26
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 51.5 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
20							Brown gray drilling MUD, pH 7.	
25								
30				0	0			
35								
40								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-38
Diameter: 8 in
Date: 08/10/2013

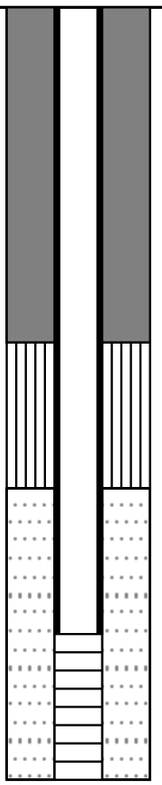
Northing: 431594.67
Easting: 861754.38
Elevation: 10.26
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 51.5 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description
40			11	0	0	SM	Gray fine to coarse SAND, trace silt.
			15				
			17			SM	Gray fine to coarse SAND, trace silt.
			17				
			9	0	0	SM	Gray fine to coarse SAND, trace silt.
			11				
			14			SM	Gray fine to coarse SAND, trace silt.
			16				
			9	0	0	SM	Gray fine to coarse SAND, trace silt.
			13				
45			26			SM	Gray fine to coarse SAND, trace silt.
			22				
			7	0	0	SM	Gray fine to medium SAND, trace silt.
			7				
			9			SM	Gray fine to medium SAND, trace silt.
			13				
			9	0	0	SM	Gray fine to medium SAND, trace silt.
			12				
			16			SM	Gray fine to medium SAND, trace silt.
			18				
50			7			SM	50 ft to 50 ft 6 in Gray fine to medium SAND, trace silt, 50 ft 6 in to 51 ft Gray, fine to coarse SAND, little silt.
			7				
51.5			50			SM/R	Gray fine to medium SAND, some silt, cemented sandstone in tip of spoon.

Well Construction Diagram



Well Set at 50.5 ft.

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-39
Diameter: 8 in
Date: 07/24/2013

Northing: 431754.86
Easting: 861753.89
Elevation: 10.43
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 52.92 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
0						SM	Hand cleared to 5 ft. Installed with a stick up above ground surface. Gray brown fine to coarse SAND, trace silt, dense.	
5							Brown drilling MUD, pH 7 to 8.	
10				0.5				
15								
20								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-39
Diameter: 8 in
Date: 07/24/2013

Northing: 431754.86
Easting: 861753.89
Elevation: 10.43
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 52.92 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
20							Brown drilling MUD, pH 7 to 8.	
25								
30				0.5				
35								
40								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-39
Diameter: 8 in
Date: 07/24/2013

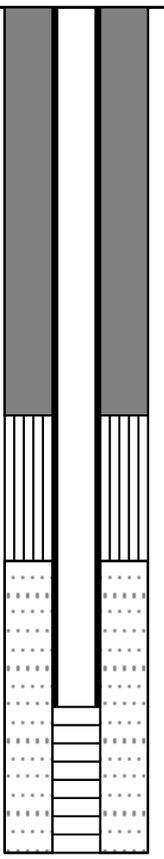
Northing: 431754.86
Easting: 861753.89
Elevation: 10.43
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 52.92 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description
40			12	0	0	SM	Gray medium to coarse SAND, trace silt.
			14				
			18			SM	Dark Gray fine to medium SAND, trace silt.
			16				
			12	0	0	SM	Dark Gray fine to medium SAND, trace silt.
			11				
			19			SM	Dark Gray fine to medium SAND, trace silt.
			19				
			7	0	0	SM	44 ft to 44 ft 5 in Gray fine to medium SAND, trace silt, 44 ft 5 in to 44 ft 8 in Gray fine to medium SAND, trace silt, lenses clay, 44 ft 8 in to 45 ft Gray silty CLAY.
			7				
45			8			SC	Gray fine to medium SAND, little silt, occasional lens clay.
			13				
			1	0	0	SM	Gray fine to medium SAND, some silt.
			2				
			4			SM	Gray fine to medium SAND, trace silt.
			8				
			5	0	0	GM	48 ft to 48 ft 6 in Gray fine GRAVEL, trace sand, trace silt, 48 ft 6 in to 49 ft Gray fine to medium SAND, trace salt.
			7				
			11			SM	Gray fine to medium SAND, trace silt.
			14				
50			4	0	0	SM	Gray fine to medium SAND, trace silt.
			8				
			9			SM	Gray fine to medium SAND, trace silt, trace white shell fragments, note from 51 ft 6 in to 52 ft trace silt.
			11				
			12	0	0	SM	52 ft to 52 ft 6 in Gray fine to medium SAND, little silt, 1/4 inch white shell fragments, 52 ft 6 in to 52 ft 11 in Gray fine to medium SAND, little silt, occasional medium gravel, refusal.
52.92			50				

Well Construction Diagram



Well Set at 51.5 ft.

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-40
Diameter: 8 in
Date: 07/25/2013

Northing: 431835.00
Easting: 861754.21
Elevation: 10.50
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 52.33 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
0						SM	Hand cleared to 5 ft. Installed with a stick up above ground surface. Gray brown medium to coarse SAND, trace silt.	
5							Brown drilling MUD, pH 7 to 8.	
10				0.5				
15								
20								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-40
Diameter: 8 in
Date: 07/25/2013

Northing: 431835.00
Easting: 861754.21
Elevation: 10.50
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 52.33 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
20							Brown drilling MUD, pH 7 to 8.	
25								
30				0.5				
35								
40								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-40
Diameter: 8 in
Date: 07/25/2013

Northing: 431835.00
Easting: 861754.21
Elevation: 10.50
Datum: Unknown

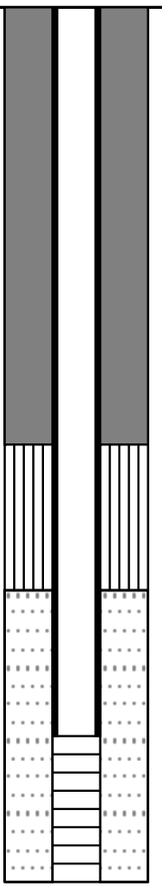
Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 52.33 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description
40			12	0	0	SM	Gray fine to coarse SAND, trace silt.
			15				
			22			SM	Dark Gray medium to fine SAND, trace silt.
			20				
			14	0	0	SM	Gray brown medium to coarse SAND, trace silt.
			20				
			27			SM	Gray fine to coarse SAND, trace silt.
			31				
			12	0	0	SC	44 ft to 44 ft 6 in Gray brown medium coarse SAND, trace silt, 44 ft 6 in to 45 ft Gray fine to coarse SAND, trace silt, occasional lens clay.
			18				
45			17			SC	45 ft to 45 ft 4 in Gray fine to coarse SAND, trace silt, occasional lens clay, 45 ft 4 in to 45 ft 8 in Gray CLAY, stiff, 45 ft 8 in to 46 ft Gray fine to medium SAND, some clayey silt.
			18				
			13	0	0	SM	46 ft to 46 ft 6 in Gray medium to coarse SAND, trace silt, 46 ft 6 in to 47 ft Gray fine to coarse SAND, trace silt.
			19				
			22			SM	Gray brown fine to medium SAND, little silt.
			23				
			4	0	0	SM	Gray fine to coarse SAND, little silt.
			6				
			13			SM	49 ft to 49 ft 4 in Gray fine to medium SAND, trace silt, pH 10, 49 ft 4 in to 50 ft Gray fine to medium SAND, trace silt, trace white shell fragments.
			27				
50			33	0	0	SM	Gray fine to medium SAND, trace silt, trace white shell fragments.
			23				
			17			SM	Gray fine to medium SAND, trace silt, trace white shell fragments.
			12				
52.33			50	0	0	SM/R	Black SANDSTONE weakly cemented, some Gray fine to medium sand, trace silt.

Well Set at 52 ft.

Well Construction Diagram



BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-41
Diameter: 8 in
Date: 07/28/2013

Northing: 431915.25
Easting: 861754.85
Elevation: 9.99
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: S. Dillman (PARSONS)
Project No: Field Book No: 2

Total Depth: 51.4 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
0							Hand cleared to 5 ft. Installed with a stick up above ground surface. Drilled to 40 feet with mud rotary, no sampling to 40 feet. pH is 7.5.	
10				0.0	0.000			
20								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-41
Diameter: 8 in
Date: 07/28/2013

Northing: 431915.25
Easting: 861754.85
Elevation: 9.99
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: S. Dillman (PARSONS)
Project No: Field Book No: 2

Total Depth: 51.4 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
20							Hand cleared to 5 ft. Installed with a stick up above ground surface. Drilled to 40 feet with mud rotary, no sampling to 40 feet. pH is 7.5.	
25								
30				0.0	0.000			
35								
40								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-41
Diameter: 8 in
Date: 07/28/2013

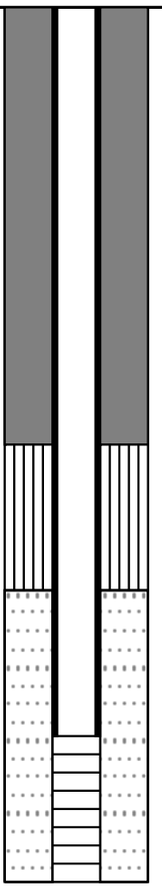
Northing: 431915.25
Easting: 861754.85
Elevation: 9.99
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: S. Dillman (PARSONS)
Project No: Field Book No: 2

Total Depth: 51.4 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description
40			10	0.0	0.000	SM	Gray medium to coarse SAND, little fine to medium sand, wet, swampy odor.
			18				
			25				
			19				
			9	0.0	0.000	SM	Gray medium to coarse SAND, little fine to medium sand, wet, swampy odor, clay lenses at 43.2-43.8 feet, little silt, soft, can roll in fingers, wet.
			11				
			16				
			20				
			5	0.0	0.000	CL	Greenish gray CLAY, lenses of fine to medium sand 1/2-1 inch, little silt in clay, soft, wet.
			4				
45			7				
			8				
			3	0.0	0.000	SM	Fine to medium SAND, trace silt over fine sand, little clay, trace shells, low yield, wet.
			7				
			12				
			10				
			9	0.0	0.000	SM	Fine to medium SAND, trace silt, trace shells, no clay, wet, mud pH 7.5-8.
			8				
			8				
			14				
50			15	0.0	0.000	SM	Fine to medium SAND, trace silt, trace shells, no clay, wet, mud.
			14	0.0	0.007		
			50/5	0.0	0.000	SM	Fine to medium SAND, trace silt, trace shells, no clay, wet, mud, sandstone pebbles in sample, hard, refusal on bottom.
52.0							

Well Construction Diagram



BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-42
Diameter: 8 in
Date: 07/26/2013

Northing: 431998.47
Easting: 861755.04
Elevation: 9.87
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 51.75 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
0						GM/SM	Hand cleared to 5 ft. Installed with a stick up above ground surface. 0 ft to 2 ft Gray coarse GRAVEL, little sand, trace silt, 2 ft to 5 ft Brown fine to coarse SAND, little silt.	
5							Brown drilling MUD, pH 7 to 8.	
10				542	0			
15								
20								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-42
Diameter: 8 in
Date: 07/26/2013

Northing: 431998.47
Easting: 861755.04
Elevation: 9.87
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 51.75 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
20							Brown drilling MUD, pH 7 to 8.	
25								
30				542	0			
35								
40								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-42
Diameter: 8 in
Date: 07/26/2013

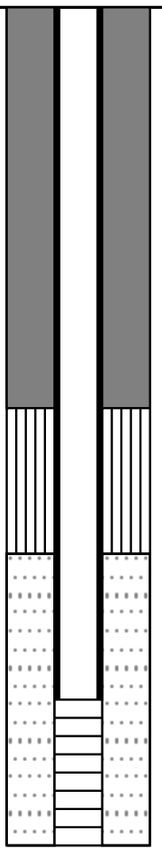
Northing: 431998.47
Easting: 861755.04
Elevation: 9.87
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 51.75 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description
40			14	0	0	SM	40 ft 6 in to 41 ft Gray fine to coarse SAND, trace silt.
			14				
			16			SM	Gray fine to coarse SAND, trace silt.
			16				
			8	0	0	SC	Gray fine to coarse SAND, trace silt, occasional layer fine to medium sand, occasional lens clay, pH 10 to 11.
			12				
			14			SC	Gray fine to coarse SAND, trace silt, occasional layer fine to medium sand, occasional lens clay, pH 10 to 11.
			16				
			6	0	0	SC	44 ft to 44 ft 6 in Gray fine to coarse SAND, trace silt, 44 ft 6 in to 45 ft Gray CLAY and silt, occasional layer clay and sand.
			9				
45			12			CL	Gray CLAY and silt, medium plasticity, occasional layer clay and sand.
			13				
			16	0	0	SM	Gray fine to medium SAND, trace silt.
			20				
			48			ML	Gray clayey SILT, trace sand, trace white shell fragments.
			23				
			12	0	0	SC	Gray fine to coarse SAND, some silty clay, little white shell fragments, brown sheen.
			17				
			20			SC	Gray fine to coarse SAND, some silty clay, little white shell fragments, brown sheen.
			19				
50			8	0	0	SC	50 ft to 50 ft 6 in Gray clayey SILT, trace sand, trace white shell fragments, wet, 50 ft 6 in to 51 ft fine to medium SAND, little silt, trace white shell fragments.
			27				
			17			SM/R	51 ft to 51 ft 6 in fine to medium SAND, little silt, mudstone in tip, 51 ft 6 in to 51 ft 8 in bouncing spoon mudstone in tip.
51.75							

Well Construction Diagram



Well Set at 51.5 ft.

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-43
Diameter: 8 in
Date: 07/29/2013

Northing: 432075.11
Easting: 861755.08
Elevation: 9.18
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 50.33 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
0						SM	Hand cleared to 5 ft. Installed with a stick up above ground surface. 0 ft to 1 ft CONCRETE (saw and augur used), 1 ft to 5 ft Brown fine to medium SAND, trace silt, little asphalt.	
5							Brown drilling MUD, pH 8 to 9.	
10				17	0			
15								
20								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-43
Diameter: 8 in
Date: 07/29/2013

Northing: 432075.11
Easting: 861755.08
Elevation: 9.18
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 50.33 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
20							Brown drilling MUD, pH 8 to 9.	
25								
30				17	0			
35								
40								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-43
Diameter: 8 in
Date: 07/29/2013

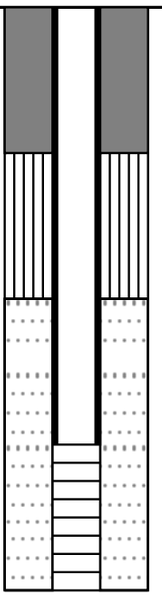
Northing: 432075.11
Easting: 861755.08
Elevation: 9.18
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 50.33 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description
40			7	0	0	SC	Gray brown fine to coarse SAND, trace silt, occasional lens clay.
			9				
			11			SC	Gray brown fine to coarse SAND, trace silt, occasional lens clay.
			14				
			8	0	0	SC	Gray brown fine to coarse SAND, trace silt, occasional lens clay.
			10				
			11			SM	Gray fine to coarse SAND, trace silt.
			13				
			7	0	0	SM	Gray brown fine to medium SAND, trace silt, occasional lens clay.
			10				
45			9			SM/SC	Gray fine to coarse SAND, trace silt, 2 inch layer of Gray clay.
			12				
			8	0	0	SM	Gray fine to coarse SAND, trace silt.
			12				
			27			SC	Gray fine to medium SAND, lenses Gray clay, odor sulfur like.
			28				
			6	0	0	CL	Gray CLAY and silt, stiff, 3 layers 1/4 inch Gray fine to coarse sand.
			5				
			8			CL	Gray CLAY and silt, stiff, 3 layers 1/4 inch Gray fine to coarse sand.
			7				
50			50	0	0	CL	Gray CLAY, drove 3 inches on 15 blows, then over 35 blows for 1 inch, refusal.
50.33							

Well Construction Diagram



Well Set at 48 ft.

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-44
Diameter: 8 in
Date: 07/31/2013

Northing: 432155.21
Easting: 861752.75
Elevation: 9.48
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: S. Dillman (PARSONS)
Project No: Field Book No: 2

Total Depth: 52.0 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
0							Hand cleared to 5 feet, up to 75 ppm on PID in hole. Installed with a stick up above ground surface. Fluctuating in breathing zone 0.5 to 3.	
				75				
5							Mud rotary 5-40 feet, no samples. pH is 7.	
				3	0.000			
10								
15				3	0.000			
20								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-44
Diameter: 8 in
Date: 07/31/2013

Northing: 432155.21
Easting: 861752.75
Elevation: 9.48
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: S. Dillman (PARSONS)
Project No:
Field Book No: 2

Total Depth: 52.0 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
20							Mud rotary 5-40 feet, no samples. pH is 7.	
25								
30				3	0.000			
35								
40								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-44
Diameter: 8 in
Date: 07/31/2013

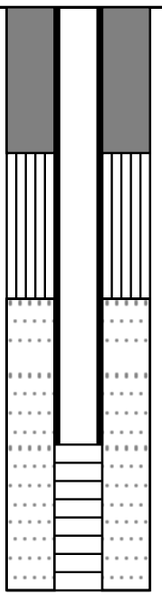
Northing: 432155.21
Easting: 861752.75
Elevation: 9.48
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: S. Dillman (PARSONS)
Project No: Field Book No: 2

Total Depth: 52.0 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description
40			8	0.5	0.000	SM	Gray medium coarse SAND, trace fine sand, wet.
			9				
			13				
			11				
			5	0.0	0.000	SM	Gray dark gray medium to coarse SAND, fine to medium bottom 8 inches, trace silt and clay at bottom in lense, wet.
			7				
			11				
			12				
			4	0.0	0.000	SM	Greenish gray fine to medium SAND, 1 inch clay lense over dense fine sand, little silt, trace shells, wet.
			5				
45			5				
			10				
			6	0.0	0.000	SM/CL	SAND as above upper 10 inches over greenish gray CLAY, some to little silt, trace shells in lenses, trace fine sand in lenses.
			9				
			16				
			12				
			6	0.0	0.000	ML	Gray SILT and fine SAND, little clay, clay lenses, wet.
			8				
			7				
			9				
50			3	0.0	0.000	CL	Greenish gray CLAY, little silt, trace shells, silt in thin lenses, bottom 6 inches all clay, med stiff.
			3	0.0	0.000		
			4	0.0	0.000		
52.0			50/6	0.0	0.000		Gray fine to medium SAND, some silt, little coarse sand, gravel, bedrock pebbles, wet. Hard refusal at 52 feet.

Well Construction Diagram



BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-45
Diameter: 8 in
Date: 08/09/2013 - 08/11/2013

Northing: 432237.41
Easting: 861751.45
Elevation: 9.12
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: S. Dillman (PARSONS)
Project No: Field Book No: 2

Total Depth: 50.4 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
0							Hand cleared to 5 feet. Installed with a stick up above ground surface. pH is 7.	
5								
10				0.0	0.000			
15								
20								

BORING LOG

Honeywell

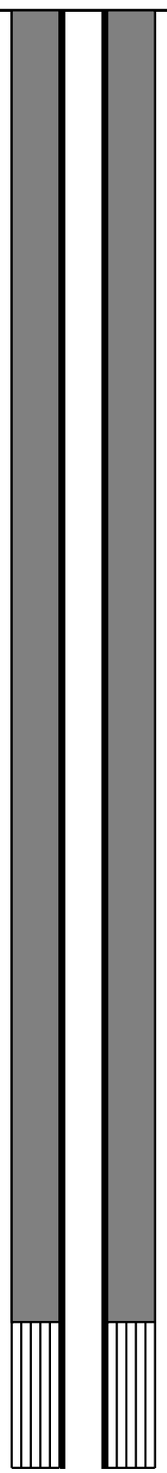
Site: LCP Brunswick
Boring No: SW-45
Diameter: 8 in
Date: 08/09/2013 - 08/11/2013

Northing: 432237.41
Easting: 861751.45
Elevation: 9.12
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: S. Dillman (PARSONS)
Project No:
Field Book No: 2

Total Depth: 50.4 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
20								
25								
30				0.0	0.000			
35								
40								



BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-45
Diameter: 8 in
Date: 08/09/2013 - 08/11/2013

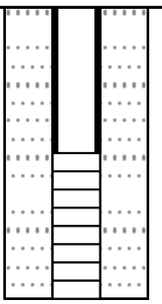
Northing: 432237.41
Easting: 861751.45
Elevation: 9.12
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: S. Dillman (PARSONS)
Project No: Field Book No: 2

Total Depth: 50.4 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description
40			10	0.0	0.000	SM	Light gray medium SAND, over coarse sand, over medium sand, wet.
			16				
			21				
			23				
			6	0.0	0.000	SM	SAND as above, trace clay in thin lense near bottom of sample, greenish gray clay in shoe, wet.
			13				
			15				
			19				
			5	0.0	0.000	CL	Greenish gray CLAY, some silt in bottom 4 inches, stiff, moist.
			7				
45			7				
			10				
			10	0.0	0.000	SM/CL	CLAY 2 inches as above over fine coarse SAND 10 inches, trace small shells, over dark gray silt and clay with thin interbedded sand layers.
			19				
			18				
			13				
			3	0.0	0.000	CL	Greenish gray CLAY, trace sand in thin layers, scattered.
			3				
			5				
			10				
50			50/5	0.0	0.000		Gray weathered sandstone bedrock, wet. Hard refusal, pieces of broken rock in lower sample.
50.4							

Well Construction Diagram



BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-46
Diameter: 8 in
Date: 08/06/2013 - 08/07/2013

Northing: 432322.48
Easting: 861757.45
Elevation: 8.65
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: S. Dillman (PARSONS)
Project No:
Field Book No: 2

Total Depth: 52.0 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
0							Hand cleared to 5 ft. Installed with a stick up above ground surface. pH is 7.	
10				0.0	0.000			

BORING LOG

Honeywell

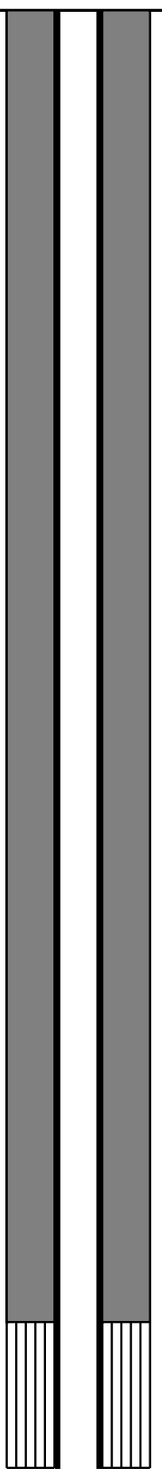
Site: LCP Brunswick
Boring No: SW-46
Diameter: 8 in
Date: 08/06/2013 - 08/07/2013

Northing: 432322.48
Easting: 861757.45
Elevation: 8.65
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: S. Dillman (PARSONS)
Project No: Field Book No: 2

Total Depth: 52.0 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
20							pH is 7.	
25								
30				0.0	0.000			
35								
40								



BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-46
Diameter: 8 in
Date: 08/06/2013 - 08/07/2013

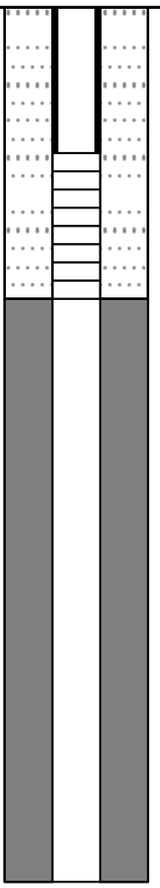
Northing: 432322.48
Easting: 861757.45
Elevation: 8.65
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: S. Dillman (PARSONS)
Project No: Field Book No: 2

Total Depth: 52.0 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description
40			12	0.0	0.000	SM	Gray medium to coarse SAND, trace clay in lense at bottom of sample, wet.
			15				
			11				
			12				
			4	0.0	0.000	SM/CL	Gray SAND as above grading to fine to medium sand, layer of silty clay near bottom 5 inches, bottom fine sand, wet.
			9				
			19				
			16				
			18	0.0	0.000	SM/CL	Tan gray SAND, over 8 inches of greenish gray CLAY, semi stiff, wet.
			18				
45			17				
			15				
			12	0.0	0.000	SM/CL	Same as above, fine SAND over greenish gray CLAY 8 inches, very thin sand layers in clay, thin clay layers in upper sand.
			9				
			11				
			10				
			7	0.0	0.000	CL	Greenish gray CLAY, scattered thin sand lenses, semi stiff, moist.
			8				
			14				
			13				
50			10	0.0	0.000	SM/CL	Light gray fine SAND, over 10 inches of semi stiff gray CLAY, thin sand lenses scattered in clay.
			12				
			21				
52.0			15				

Well Construction Diagram



BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-47
Diameter: 8 in
Date: 08/05/2013

Northing: 432395.12
Easting: 861754.60
Elevation: 9.82
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: S. Dillman (PARSONS)
Project No: Field Book No: 2

Total Depth: 53.3 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
0							Hand cleared to 5 ft. Installed with a stick up above ground surface.	
5								
10							pH is 7.5.	
15				0.0	0.000			
20								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-47
Diameter: 8 in
Date: 08/05/2013

Northing: 432395.12
Easting: 861754.60
Elevation: 9.82
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: S. Dillman (PARSONS)
Project No: Field Book No: 2

Total Depth: 53.3 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
20							pH is 7.	
25				0.0	0.000			
30							pH is 7.	
35				0.0	0.000			
40								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-47
Diameter: 8 in
Date: 08/05/2013

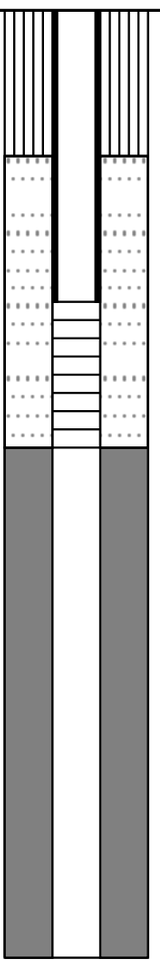
Northing: 432395.12
Easting: 861754.60
Elevation: 9.82
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: S. Dillman (PARSONS)
Project No: Field Book No: 2

Total Depth: 53.3 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description
40			17	0.0	0.000	SM	Gray medium to coarse SAND, lenses of fine to medium sand and silty clay lenses, thin layers sparse, wet. pH is 7 to 7.5.
			22				
			21				
			20				
			7	0.0	0.000	SM	Gray medium to coarse SAND, bottom 3 inches greenish gray fine to medium sand, little silt, trace clay, trace pebbles, wet.
			12				
			13				
			20				
			12	0.0	0.000	SM	Gray medium to coarse SAND, fine to medium sand bottom 1/2, wet.
			24				
45			20				
			23				
			7	0.0	0.000	CL	Gray CLAY, trace silt, thin sand lenses, semi stiff, moist to wet.
			11				
			10				
			7				
			4	0.0	0.000	CL	Gray CLAY, thin fine sand lenses 1/2 inch at bottom of sample, wet.
			5				
			8				
			6				
50			4	0.0	0.000	CL	Gray CLAY, thin fine sand lenses, thin and scattered, wet.
			4				
			3				
			12	0.0	0.000	CL	Gray CLAY, thin fine sand lenses, thin and scattered, wet.
			8	0.0	0.000	CL	Clay as above, alternating with fine to medium SAND 1-1.5 inch layers.
53.3			54/4	0.0	0.000	SM	Gray fine to medium SAND, trace silt, sandstone at bottom of sample, wet.

Well Construction Diagram



BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-48
Diameter: 8 in
Date: 08/12/2013 - 08/13/2013

Northing: 431469.81
Easting: 861833.84
Elevation: 10.29
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 50.33 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
0						SM	Hand cleared to 5 ft. Installed with a stick up above ground surface. Brown fine to medium SAND, trace silt.	
5							Brown gray drilling MUD, pH is 7 to 8.	
10				0.5	0			
15								
20								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-48
Diameter: 8 in
Date: 08/12/2013 - 08/13/2013

Northing: 431469.81
Easting: 861833.84
Elevation: 10.29
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 50.33 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
20							Brown gray drilling MUD, pH is 7 to 8.	
25								
30				0.5	0			
35								
40								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-48
Diameter: 8 in
Date: 08/12/2013 - 08/13/2013

Northing: 431469.81
Easting: 861833.84
Elevation: 10.29
Datum: Unknown

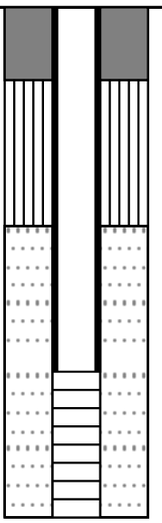
Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 50.33 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description
40			6	0	0	SM	Gray fine to coarse SAND, trace silt.
			9				
			12			SM	Gray fine to coarse SAND, trace silt.
			12				
			13	0	0	SC	Gray fine to coarse SAND, trace silt, occasional lens clay .
			5				
			7			SC	Gray fine to coarse SAND, trace silt, occasional lens clay .
			9				
			7	0	0	SM	Gray fine to coarse SAND, trace silt.
			7				
45			11			SC	Gray fine to medium SAND, trace silt, 3 inch layer clay, stiff.
			15				
			7	0	0	SM	Gray fine to coarse SAND, trace silt.
			13				
			17			SC	Gray fine to medium SAND, some clayey silt.
			22				
			12	0	0	SM/SC	48 ft to 48 ft 6 in Gray fine to coarse SAND, trace silt, 48 ft 6 in to 49 ft Gray fine to medium SAND and clayey silt.
			18				
			20			SM/SC	49 ft to 49 ft 6 in Gray fine to medium SAND, and clayey silt, 49 ft 6 in to 50 ft fine to coarse SAND, little silt.
			20				
50			50			SM/R	Gray fine to coarse SAND, little silt, 2 inch weakly cemented sandstone.
50.33							

Well Set at 47 ft.

Well Construction Diagram



BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-49
Diameter: 8 in
Date: 08/13/2013

Northing: 431551.26
Easting: 861825.95
Elevation: 13.30
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 54.33 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
0						SM	Hand cleared to 5 ft. Installed with a stick up above ground surface. Brown fine to medium SAND, trace silt.	
5							Brown gray drilling MUD, pH 7 to 8.	
10				0.5	0			
15								
20								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-49
Diameter: 8 in
Date: 08/13/2013

Northing: 431551.26
Easting: 861825.95
Elevation: 13.30
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 54.33 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
20							Brown gray drilling MUD, pH 7 to 8.	
25								
30				0.5	0			
35								
40								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-49
Diameter: 8 in
Date: 08/13/2013

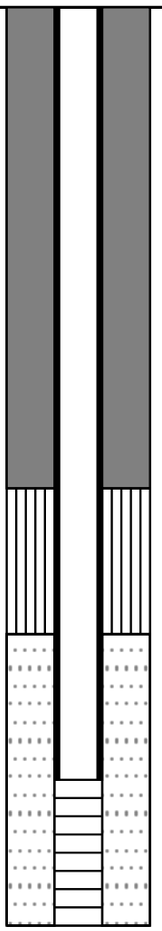
Northing: 431551.26
Easting: 861825.95
Elevation: 13.30
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 54.33 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description
40			12	0	0	SM	Gray fine to medium SAND, trace silt.
			17				
			17			SM	Gray fine to medium SAND, trace silt.
			12				
			5	0	0	SM	Gray fine to medium SAND, trace silt.
			5				
			8			SM	Gray fine to medium SAND, trace silt.
			8				
			5	0	0	SM	Gray fine to medium SAND, trace silt.
			10				
45			15			SM	Gray fine to coarse SAND, trace silt, occasional piece of coarse gravel.
			16				
			8	0	0	SM	Gray fine to coarse SAND, trace silt.
			13				
			13			SM	Gray fine to coarse SAND, trace silt.
			19				
			7	0	0	SM	Gray fine to coarse SAND, trace silt.
			11				
			13			SM	Gray fine to coarse SAND, trace silt.
			17				
50			4			SM	Gray fine to coarse SAND, trace silt.
			8				
			11			SM	Gray fine to coarse SAND, trace silt.
			20				
			25			SM	52 ft to 52 ft 6 in Gray fine to medium SAND, 52 ft 6 in to 53 ft Gray fine to coarse SAND, trace white shell fragments, little clayey silt.
			26				
			8			SM	Gray fine to medium SAND, little silt.
			12				
			50			SM/R	54 ft to 54 ft 4 in fine to medium SAND, some silt, 1/4 inch
54.7							layer Gray cemented stone.

Well Construction Diagram



Well Set at 52.5 ft. Well moved 5 ft. SE because of incline of hill and proximity to infiltration galleries.

BORING LOG

Honeywell

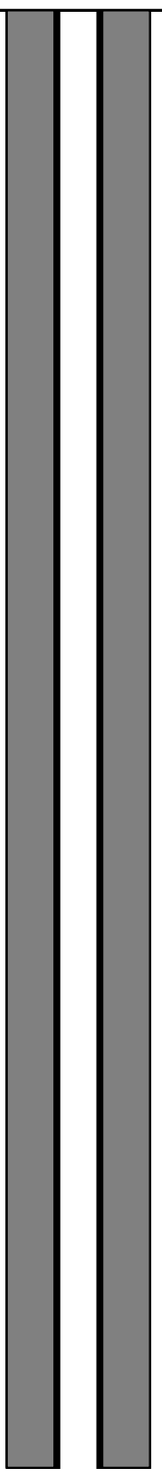
Site: LCP Brunswick
Boring No: SW-50
Diameter: 8 in
Date: 07/31/2013 - 08/05/2013

Northing: 431794.98
Easting: 861827.26
Elevation: 10.19
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: S. Dillman (PARSONS)
Project No:
Field Book No: 2

Total Depth: 52.0 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
0							Hand cleared to 5 ft. Installed with a stick up above ground surface. pH is 7.0.	
5								
10				0.0	0.000			
15								
20								



BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-50
Diameter: 8 in
Date: 07/31/2013 - 08/05/2013

Northing: 431794.98
Easting: 861827.26
Elevation: 10.19
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: S. Dillman (PARSONS)
Project No: Field Book No: 2

Total Depth: 52.0 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
20							pH is 7.5 to 8.	
25								
30				0.0	0.000			
35								
40								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-50
Diameter: 8 in
Date: 07/31/2013 - 08/05/2013

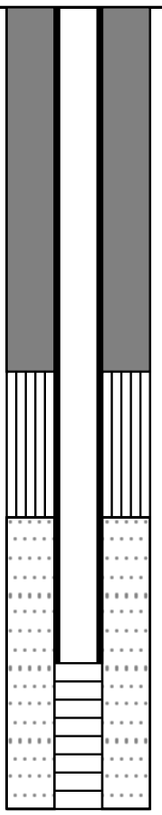
Northing: 431794.98
Easting: 861827.26
Elevation: 10.19
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: S. Dillman (PARSONS)
Project No: Field Book No: 2

Total Depth: 52.0 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description
40			11	0.0	0.000		Gray medium to coarse SAND, fine to medium sand, darker gray at bottom, wet. pH is 7.0 to 8.
			14			SM	
			18				
			28				
			20	0.0	0.000		Gray medium to coarse SAND, bottom 2 inches silt and clay lense, semi stiff, wet.
			25			SM	
			20				
			19				
			12	0.0	0.000		Gray medium to coarse SAND, thin silt and clay lense 1/4 inch, wet.
			13			SM	
45			11				
			13				
			3	0.0	0.000		Same as above, grading to fine to medium SAND.
			4			SM	
			9				
			16				
			9	0.0	0.000		Same as above, grading to fine SAND, trace silt, trace shells, trace thin lenses of silt and clay, upper sample.
			36			SM	
			50/5				
50			29	0.0	0.000	SM	Gray fine SAND, some silt, trace clay, wet.
			50/6	0.0	0.000		
			35	0.0	0.000	SM	Gray fine SAND, some silt, trace shells, more dense, trace pebbles, wet.
52.0			50/5				Same as above over dark gray hard sandstone, hard refusal.

Well Construction Diagram



BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-51
Diameter: 8 in
Date: 07/28/2013

Northing: 431876.55
Easting: 861825.02
Elevation: 10.16
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: S. Dillman (PARSONS)
Project No: Field Book No: 2

Total Depth: 53.0 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
0							Hand cleared to 5 ft. Installed with a stick up above ground surface. pH is 7.	
5				0.0	0.000			
10							pH is 7.	
15				0.0	0.000			
20								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-51
Diameter: 8 in
Date: 07/28/2013

Northing: 431876.55
Easting: 861825.02
Elevation: 10.16
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: S. Dillman (PARSONS)
Project No: Field Book No: 2

Total Depth: 53.0 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
20							pH is 7. PID fluctuating.	
25				1.0	0.000			
30							pH is 7.	
35				0.5	0.000			
40								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-51
Diameter: 8 in
Date: 07/28/2013

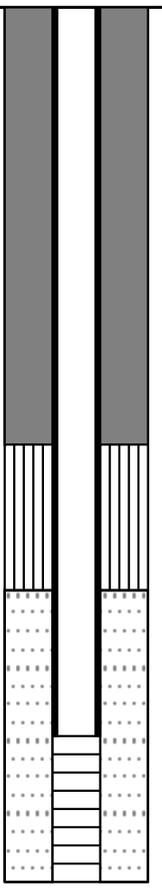
Northing: 431876.55
Easting: 861825.02
Elevation: 10.16
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: S. Dillman (PARSONS)
Project No: Field Book No: 2

Total Depth: 53.0 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description
40			15	0.0	0.000	SM	Gray medium to coarse SAND, trace fine sand, thin lense silty clay at base of sample, wet, swampy odor, no stain or sheen.
			24				
			21				
			24				
			10	0.0	0.000	SM	Gray medium to coarse SAND, bottom 6 inches fine to medium sand, little silt, little clay, wet, swampy odor, no stain or sheen.
			15				
			21				
			19				
			8	0.0	0.000	ML	Gray medium to coarse SAND, little fine sand, trace silt, wet, swampy odor, no stain or sheen.
			10				
45			10				
			7				
			6	0.1	0.008	SM	Same as above top 14 inches, bottom 6 inches fine SAND, some silt, lenses of gray clay, little silt.
			10				
			13				
			12				
			7	0.1	0.000	SM	Gray medium to coarse SAND, lenses of fine to medium sand, bottom 6 inches gray silt, fine SAND, trace clay, trace shells broken, wet.
			21				
			25				
			21				
50			20	0.00	0.004	SM	Brown fine SAND, little silt, trace broken shells, wet.
			20	0.2	0.009	SM	Brown fine SAND, little silt, trace broken shells, wet.
			18	0.1	0.000		
			18	0.1	0.003	SM	Same as above, trace mudstone, rock clast in bottom.
			50/4	0.1	0.005		Brown SILT, some fine sand, trace shells, wet.
53.0				0.0	0.000		

Well Construction Diagram



BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-52
Diameter: 8 in
Date: 07/29/2013

Northing: 431955.28
Easting: 861824.23
Elevation: 10.12
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 51.5 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
0						OL/SM	Hand cleared to 5 ft. Installed with a stick up above ground surface. 0 ft to 1 ft Brown TOP SOIL, roots, 1 ft to 5 ft Brown fine to medium SAND, trace silt.	
5							Brown drilling MUD, pH 8 to 9.	
10				328	0			
15								
20								

BORING LOG

Honeywell

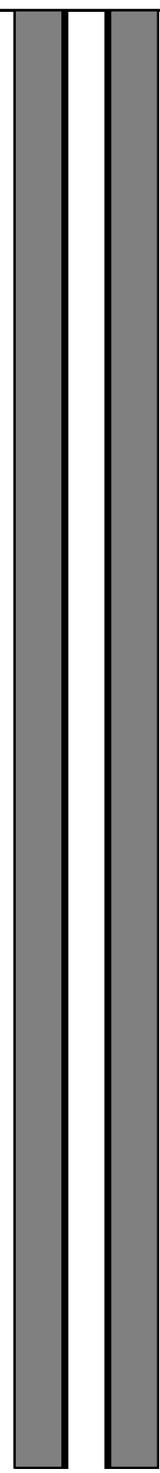
Site: LCP Brunswick
Boring No: SW-52
Diameter: 8 in
Date: 07/29/2013

Northing: 431955.28
Easting: 861824.23
Elevation: 10.12
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 51.5 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
20							Brown drilling MUD, pH 8 to 9.	
25								
30				328	0			
35								
40								



BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-52
Diameter: 8 in
Date: 07/29/2013

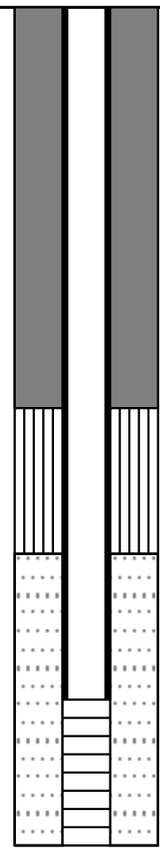
Northing: 431955.28
Easting: 861824.23
Elevation: 10.12
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 51.5 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description
40			12	0	0	SM	Gray fine to coarse SAND, trace silt.
			15				
			15			SM	Gray fine to coarse SAND, trace silt.
			16				
			8	0	0	SC	Gray fine to coarse SAND, trace silt, occasional lens clay.
			11				
			13			SC	Gray fine to coarse SAND, trace silt, occasional lens clay.
			11				
			4	0	0	SM	Gray fine to coarse SAND, trace silt.
			4				
45			6			CL	Gray CLAY, little sand.
			7				
			5	0	0	SM/SC	46 ft to 46 ft 6 in Gray fine to coarse SAND, trace silt, 46 ft 6 in to 47 ft Gray brown fine to medium SAND, trace silt, occasional lens clay, a 1 inch layer clay, odor sulfur like.
			12				
			28			SC	Gray brown fine to medium SAND, occasional lens clay, odor sulfur like.
			35				
			7	0	0	SC	Gray SAND, some clay and silt, 3 inch layer of clay, stiff, odor sulfur like.
			5				
			8			SC	Gray SAND, some clay and silt, trace white shell fragments.
			12				
50			14	0	0	SC	Gray brown fine to medium SAND, occasional lens clay, little silt, trace white shell fragments, odor sulfur like.
			7				
51.5			50			SM/R	Gray brown fine to medium SAND, some silt, first 4 inches 7 blows, last 2 inches over 43, refusal.

Well Construction Diagram



Well Set at 51.5 ft.

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-53
Diameter: NA
Date: 07/28/2013

Northing: 432027.09
Easting: 861823.43
Elevation: 9.36
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 51.0 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
0						OL/SM	Hand cleared to 5 ft. Installed with a stick up above ground surface. 0 ft to 1 ft Brown TOP SOIL, roots, 1 ft to 5 ft Brown fine to medium SAND, trace silt.	
5							Brown drilling MUD, pH 7 to 8.	
10				147	0			
15								
20								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-53
Diameter: NA
Date: 07/28/2013

Northing: 432027.09
Easting: 861823.43
Elevation: 9.36
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 51.0 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
20							Brown drilling MUD, pH 7 to 8.	
25								
30				147	0			
35								
40								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-53
Diameter: NA
Date: 07/28/2013

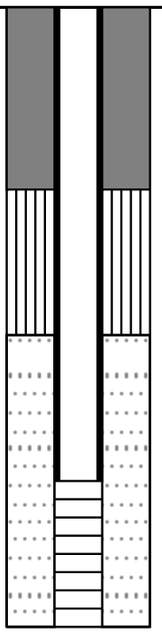
Northing: 432027.09
Easting: 861823.43
Elevation: 9.36
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 51.0 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description
40			9	0	0	SM	Gray brown fine to coarse SAND, trace silt.
			11				
			15			SM	Gray brown fine to coarse SAND, trace silt.
			20				
			11	0	0	SM	Gray brown fine to coarse SAND, trace silt.
			14				
			17			SM	Gray brown fine to coarse SAND, trace silt.
			22				
			10	0	0	SM	Gray brown fine to coarse SAND, trace silt.
			12				
45			16			SM/CL	45 ft to 45 ft 6 in Gray fine to coarse SAND, trace silt, 45 ft 6 in to 46 ft Gray CLAY, stiff, occasional 1/2 inch layers of clayey sand, trace silt.
			19				
			12	0	0	SM	Gray fine to coarse SAND, trace silt.
			14				
			18			SM	47 ft to 47 ft 6 in Gray fine to coarse SAND, trace silt, 47 ft 6 in to 48 ft Gray brown fine to medium SAND, trace silt, brown liquid, sulfur like odor.
			28				
			30	0	0	SC	48 ft to 48 ft 10 in Gray brown fine to medium SAND, trace silt, occasional lens clay, 48 ft 10 in to 49 ft Gray CLAY, stiff.
			13				
			15			SC/SM	49 ft to 49 ft 6 in Gray fine to medium SAND, little clayey silt, trace white shell fragments, 49 ft 6 in to 50 ft Gray fine to medium SAND, little silt, 1/8 inch layers of white shell fragments.
			18				
50			11	0	0	SC	Gray SILT, little fine to medium sand, occasional lens clay.
			14				
			6			SC/R	51 ft to 51 ft 6 in Gray fine to medium SAND, some silt, occasional lens of clay, 51 ft 6 in to 52 ft Gray CLAY, stiff, dry, piece of stone in tip of spoon.
52.0			50				

Well Construction Diagram



Well Set at 48.5 ft.

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-54
Diameter: 8 in
Date: 08/10/2013 - 08/11/2013

Northing: 432116.27
Easting: 861782.23
Elevation: 9.24
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: S. Dillman (PARSONS)
Project No:
Field Book No: 2

Total Depth: 51.5 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
0							Hand cleared to 5 feet. Installed with a stick up above ground surface. pH is 7.	
5								
10								
15								
20								

BORING LOG

Honeywell

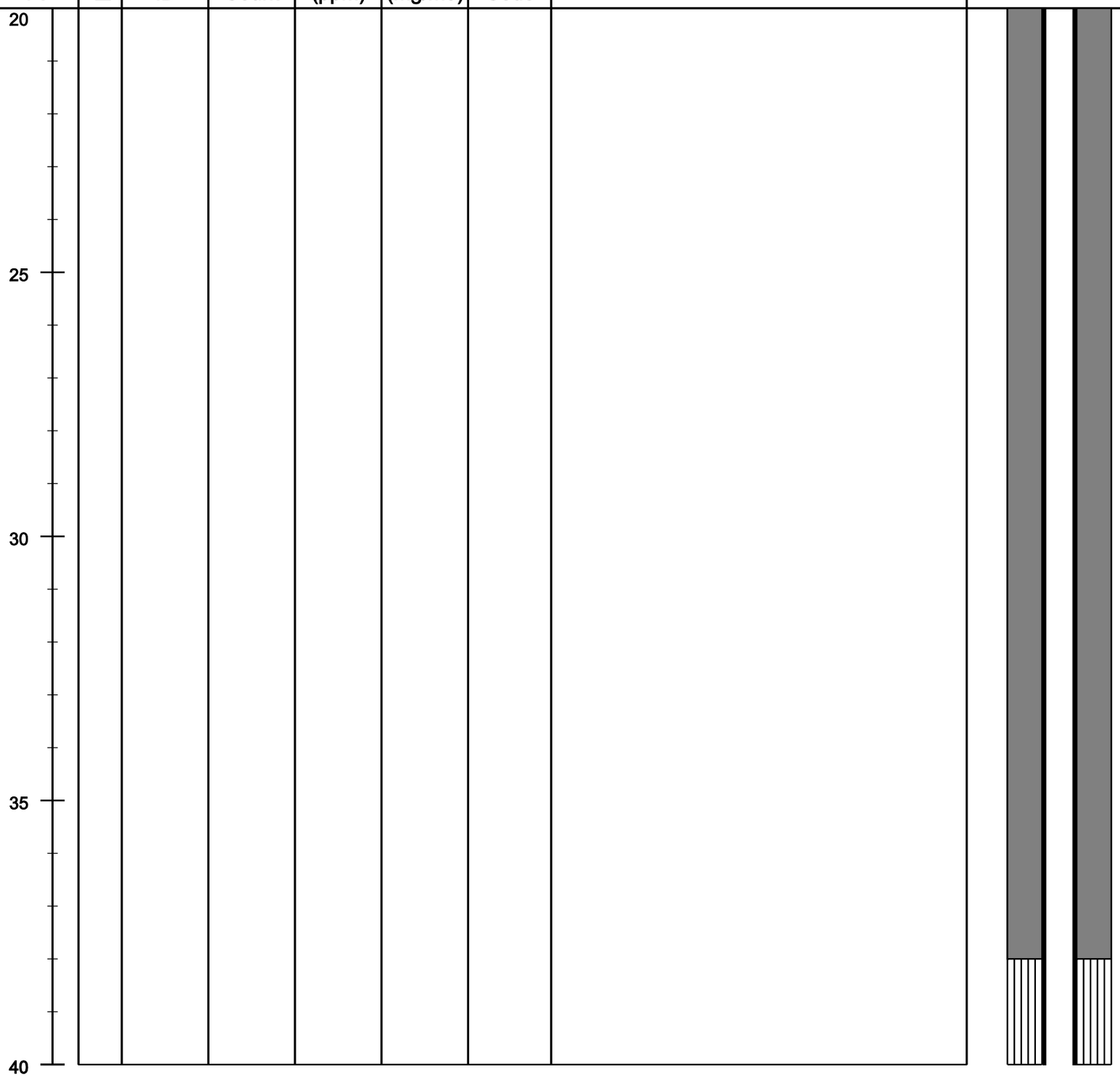
Site: LCP Brunswick
Boring No: SW-54
Diameter: 8 in
Date: 08/10/2013 - 08/11/2013

Northing: 432116.27
Easting: 861782.23
Elevation: 9.24
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: S. Dillman (PARSONS)
Project No:
Field Book No: 2

Total Depth: 51.5 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram



BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-54
Diameter: 8 in
Date: 08/10/2013 - 08/11/2013

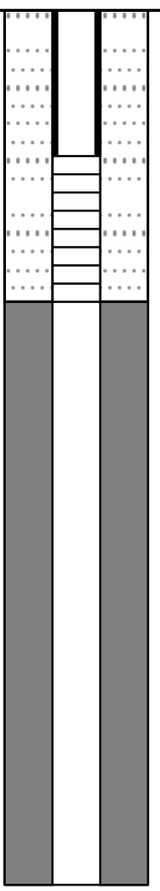
Northing: 432116.27
Easting: 861782.23
Elevation: 9.24
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: S. Dillman (PARSONS)
Project No: Field Book No: 2

Total Depth: 51.5 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description
40			11	0.5	0.000	SM	Gray medium to coarse SAND, trace clay in thin lenses, wet, slight odor.
			13				
			16				
			17				
			6	0.0	0.000	SM	Gray coarse SAND, grading to medium sand, trace gravel in upper, wet.
			10				
			13				
			12				
			5	0.0	0.000	CL	Greenish gray CLAY, interbedded with thin fine sand lenses, coarse sand, fine gravel in top, wet.
			10				
45			13				
			7				
			9			SM/CL	Medium to coarse SAND, mixed with silt and clay over greenish gray CLAY, little silt, wet.
			7				
			8				
			9				
			5	0.0	0.000	CL	Greenish gray CLAY, little silt, moist.
			8				
			3	0.0	0.000	CL	Greenish gray CLAY, little silt, moist.
			3	0.0	0.000		
50			5	0.0	0.000		Upper 5 inches same as above, bottom gray weathered sandstone, chunks of sandstone in sample.
			4	0.0	0.000		Weathered SANDSTONE, fine to medium sand, little silt and clay, chunks of sandstone in sample.
			50/1				Weathered sandstone, dense, hard refusal.
52.0							

Well Construction Diagram



BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-55
Diameter: 8 in
Date: 08/12/2013

Northing: 432199.50
Easting: 861787.16
Elevation: 9.10
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: S. Dillman (PARSONS)
Project No: Field Book No: 2

Total Depth: 52.25 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
0							Hand cleared to 5 ft. Installed with a stick up above ground surface. pH is 7.	
5								
10				0.0	0.000			
15								
20								

BORING LOG

Honeywell

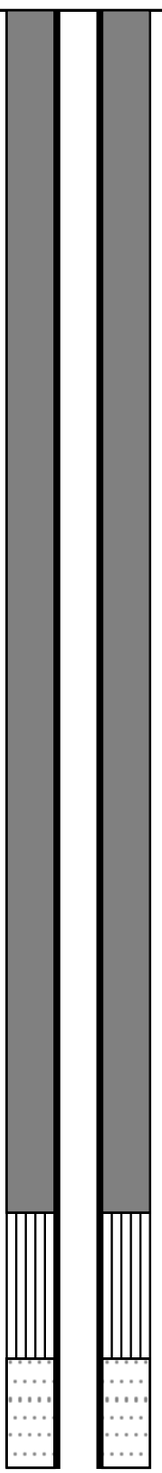
Site: LCP Brunswick
Boring No: SW-55
Diameter: 8 in
Date: 08/12/2013

Northing: 432199.50
Easting: 861787.16
Elevation: 9.10
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: S. Dillman (PARSONS)
Project No: Field Book No: 2

Total Depth: 52.25 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
20								
25								
30				0.0	0.000			
35								
40								



BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-55
Diameter: 8 in
Date: 08/12/2013

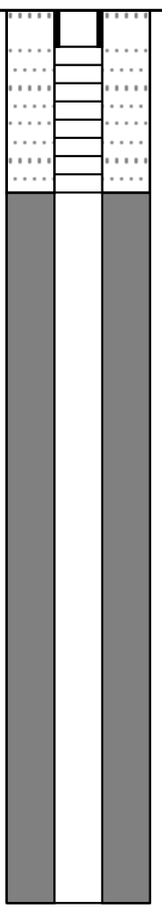
Northing: 432199.50
Easting: 861787.16
Elevation: 9.10
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: S. Dillman (PARSONS)
Project No: Field Book No: 2

Total Depth: 52.25 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description
40							
			5	0.00	0.000	SM/CL	Gray fine to medium SAND, trace silt and clay at bottom of sand, greenish gray CLAY semi stiff, wet.
			11				
			15				
			11				
			6	0.0	0.000	CL	Greenish gray CLAY, semi stiff, wet.
			8				
45			7				
			6				
			4	0.0	0.000	SM/CL	Tan fine to medium SAND 6 inches over clay as above 5 inches, over fine medium SAND, little clay in thin lenses, wet.
			7				
			15				
			16				
			4	0.0	0.000	SM/CL	Sand as above 3 inches over greenish gray CLAY.
			6				
			8				
			8				
50			7	0.0	0.000	CL	Clay as above 4 inches over gray fine to medium SAND, grading to weathered sandstone.
			14				
			14				
			17				
52.25			50/3				Drove 3 inches, weathered sandstone as above, hard refusal.

Well Construction Diagram



BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-56
Diameter: 8 in
Date: 08/08/2013 - 08/09/2013

Northing: 432265.58
Easting: 861808.22
Elevation: 8.70
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: S. Dillman (PARSONS)
Project No:
Field Book No: 2

Total Depth: 52.5 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
0							Hand cleared to 5 ft. Installed with a stick up above ground surface. pH is 7.5.	
5								
10				0.0	0.000			
15								
20								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-56
Diameter: 8 in
Date: 08/08/2013 - 08/09/2013

Northing: 432265.58
Easting: 861808.22
Elevation: 8.70
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: S. Dillman (PARSONS)
Project No: Field Book No: 2

Total Depth: 52.5 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
20							pH is 7.	
25								
30				0.0	0.000			
35								
40								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-56
Diameter: 8 in
Date: 08/08/2013 - 08/09/2013

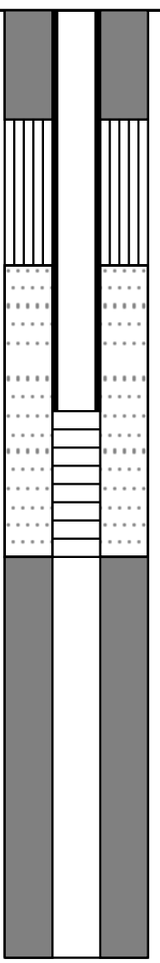
Northing: 432265.58
Easting: 861808.22
Elevation: 8.70
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: S. Dillman (PARSONS)
Project No: Field Book No: 2

Total Depth: 52.5 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description
40			11	0.0	0.000	SM	Gray medium to coarse SAND, trace clay at bottom, trace fine sand, wet.
			20				
			15				
			13				
			11	0.0	0.000	SM	Light gray coarse SAND, over medium gray medium sand bottom 8 inches, trace clay bottom 2 inches, wet.
			19				
			16				
			17				
			10	0.0	0.000	CL	Gray medium SAND 2 inches, trace clay over 20 inches greenish gray CLAY, some silt grading to clay, 2 inches sand, little clay at bottom, wet.
			14				
45			9				
			11				
			5	0.0	0.000	GM/CL	Gray GRAVEL, little sand, trace clay 10 inches, over greenish gray CLAY, bottom 2 inches trace silt, wet.
			6				
			6				
			11				
			4	0.0	0.000	CL	Greenish gray CLAY, trace silt in lenses, semi stiff, wet.
			6				
			6				
			11				
50			4	0.0	0.000		
			5	0.0	0.000	ML/CL	Greenish gray SILT and CLAY, wet.
			10	0.0	0.000		Light gray fine SAND, heavily weathered, wet.
			4	0.0	0.000		
			50/3	0.0	0.000		Same as above, stiffening to sandstone, hard refusal.
53.0							

Well Construction Diagram



BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-57
Diameter: 8 in
Date: 08/06/2013

Northing: 432355.26
Easting: 861823.47
Elevation: 10.20
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: S. Dillman (PARSONS)
Project No:
Field Book No: 2

Total Depth: 53.6 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
0							Hand cleared to 5 ft. Installed with a stick up above ground surface. pH is 7.	
5				0.0	0.000			
10							pH is 7.	
15				0.0	0.000			
20								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-57
Diameter: 8 in
Date: 08/06/2013

Northing: 432355.26
Easting: 861823.47
Elevation: 10.20
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: S. Dillman (PARSONS)
Project No: Field Book No: 2

Total Depth: 53.6 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
20							pH is 7.	
25								
30				0.0	0.000			
35								
40								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-57
Diameter: 8 in
Date: 08/06/2013

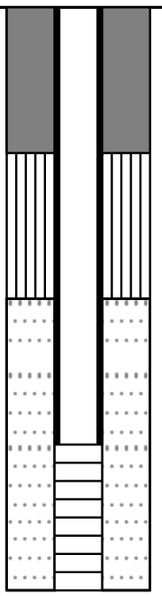
Northing: 432355.26
Easting: 861823.47
Elevation: 10.20
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: S. Dillman (PARSONS)
Project No: Field Book No: 2

Total Depth: 53.6 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description
40			12	0.0	0.000	SM	Gray medium to coarse SAND, wet.
			14				
			18				
			19				
			9	0.0	0.000	SM	Same as above, trace silt and clay in thin lenses.
			17				
			16				
			11				
			6	0.0	0.000	SM	Gray medium to coarse SAND, some silt and clay throughout, wet.
			10				
45			13				
			16				
			7	0.0	0.000	SM	Gray fine to coarse SAND, little silt and clay in lenses, wet.
			8				
			10				
			12				
			4	0.0	0.000	CL	Greenish gray CLAY, bottom 5 inches fine to coarse sand, some silt and clay, medium stiff.
			2				
			3				
			4				
50			8	0.0	0.000	CL	Greenish gray CLAY, lense of fine to medium sand 5 inches thick, thinner lenses of similar sand below, medium stiff.
			7				
			12				
			19				
			13	0.0	0.000	CL	CLAY as above in shoe, fine to medium sand above, looks like caved wash sand?
			11	0.0	0.000	SM	Gray fine SAND, wet.
			8	0.0	0.000	SM	Gray fine SAND, some silt, little clay.
53.6			50/1				

Well Construction Diagram



BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-58
Diameter: 8 in
Date: 07/26/2013

Northing: 431954.66
Easting: 861754.70
Elevation: 10.11
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: T. Murphy (PARSONS)
Project No:
Field Book No: 1

Total Depth: 51.5 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
0				0.0	0.000	SC	Hand cleared to 5 ft. Installed with a stick up above ground surface. Black fine to medium SAND, and silt, clay.	
5							Mud rotary drilling, mud pH is 7.	
10								
15								
20								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-58
Diameter: 8 in
Date: 07/26/2013

Northing: 431954.66
Easting: 861754.70
Elevation: 10.11
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: T. Murphy (PARSONS)
Project No:
Field Book No: 1

Total Depth: 51.5 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
20							Mud rotary drilling, mud pH is 7.	
25								
30								
35								
40								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-58
Diameter: 8 in
Date: 07/26/2013

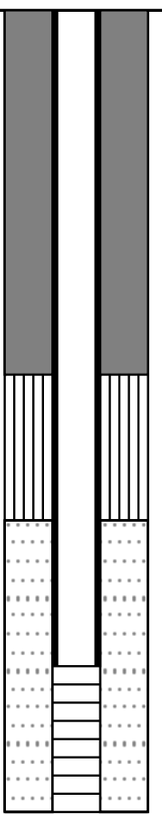
Northing: 431954.66
Easting: 861754.70
Elevation: 10.11
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: T. Murphy (PARSONS)
Project No: Field Book No: 1

Total Depth: 51.5 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description
40			9	0.0	0.000	SM	Gray medium to coarse SAND, trace silt, wet.
			23				
			26	0.0	0.000	SM	Gray medium to coarse SAND, trace silt, wet.
			24				
			15	0.0	0.000	SM	Gray medium to coarse SAND, trace silt, wet.
			20				
			22	0.0	0.000	SM	Black fine to medium SAND, little silt, trace clay laminations.
			20				
			18	0.0	0.000	CL	Gray CLAY, dense, dry.
			20				
45			21	0.0	0.000	SC	Gray fine SAND, and clay, dry.
			20				
			14	0.0	0.000	SM	Gray fine to medium SAND, moist.
			36				
			20	0.0	0.000	CL	Gray CLAY, trace sand, dense, dry.
			20				
			5	0.0	0.000	SC	Gray fine SAND, some shells, laminated, trace clay, moist.
			12				
			21	0.0	0.000	SC	Gray fine SAND, some shells, laminated, trace clay, moist.
			29				
50			20	0.0	0.000	SM	Gray fine to medium SAND, some shells, laminated, trace silt, moist.
			15	0.0	0.000	SM	Gray fine to medium SAND, little shells, laminated, trace silt, moist.
51.5			50	0.0	0.000	SM	Gray fine to medium SAND, sandstone fragments in top of spoon.

Well Construction Diagram



Well set at 51 ft, ground elevation 9.36 ft.

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-59
Diameter: 8 in
Date: 07/28/2013

Northing: 431974.44
Easting: 861788.85
Elevation: 10.47
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 50.75 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
0						OL/SM	Hand cleared to 5 ft. Installed with a stick up above ground surface. 0 ft to 1 ft Brown TOP SOIL, roots, 1 ft to 5 ft Brown fine to medium SAND, trace silt.	
5							Brown drilling MUD, pH 9 to 11, at 8 ft hit brick and other fill material, use different cutter head.	
10				30	0			
15								
20								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-59
Diameter: 8 in
Date: 07/28/2013

Northing: 431974.44
Easting: 861788.85
Elevation: 10.47
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 50.75 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
20							Brown drilling MUD, pH 9 to 11, at 8 ft hit brick and other fill material, use different cutter head.	
25								
30				30	0			
35								
40								

BORING LOG

Honeywell

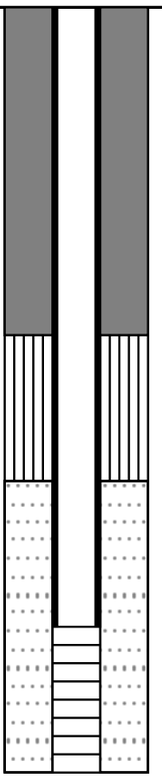
Site: LCP Brunswick
Boring No: SW-59
Diameter: 8 in
Date: 07/28/2013

Northing: 431974.44
Easting: 861788.85
Elevation: 10.47
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 50.75 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description
40			10	0	0	SM	Gray brown fine to coarse SAND, trace silt.
			11				
			11			SM	Gray brown fine to coarse SAND, trace silt.
			15				
			9	0	0	SM	Gray brown fine to coarse SAND, trace silt.
			11				
			10			SC	43 ft to 43 ft 6 in Gray brown fine to coarse SAND, trace silt, 43 ft 6 in to 44 ft Gray fine to medium SAND, trace silt, occasional lens clay.
			11				
			4	0	0	SC/CL	44 ft to 44 ft 6 in Gray fine to coarse SAND, trace silt, occasional lens clay, 44 ft 6 in to 45 ft Gray CLAY and silt, occasional layer of 1/2 inch Brown fine to coarse SAND, trace silt, wet.
			4				
45			6			CL	Gray CLAY and silt, occasional layer 0.5 inch Brown fine to coarse sand, trace silt, wet.
			9				
			6	0	0	SC	Gray brown fine to medium SAND, trace silt, occasional lens clay.
			15				
			14			SC	47 ft to 47 ft 4 in Gray fine to medium SAND, trace silt, occasional lens clay, 47 ft 4 in to 48 ft Gray fine to medium SAND, trace silt, trace white shell fragments, 4 inch layer Gray silt and clay.
			15				
			10	0	0	ML	Gray clayey SILT, trace fine to medium sand, trace white shell fragments.
			15				
			17			ML/SM	49 ft to 49 ft 6 in Gray clayey SILT, trace fine to medium sand, trace white shell fragments, 49 ft 6 in to 50 ft Gray brown fine to medium SAND, little silt, trace white shell fragments.
			17				
50			27	0	0	SM/R	Gray brown fine to medium SAND, little silt, trace white shell fragments, refusal.
50.75			50				



Well Set at 50.5 ft.

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-60
Diameter: 8 in
Date: 07/26/2013

Northing: 432076.62
Easting: 861887.87
Elevation: 11.53
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 52.83 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
0						OL/SM	Hand cleared to 5 ft. Installed with a stick up above ground surface. 0 ft to 2 ft Brown TOP SOIL organic, Gray silt, 2 ft to 5 ft Brown red fine to medium SAND, trace silt .	
5							Brown drilling MUD, pH 7 to 8.	
10				30	0			
15								
20								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-60
Diameter: 8 in
Date: 07/26/2013

Northing: 432076.62
Easting: 861887.87
Elevation: 11.53
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 52.83 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
20							Brown drilling MUD, pH 7 to 8.	
25								
30				30	0			
35								
40								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-60
Diameter: 8 in
Date: 07/26/2013

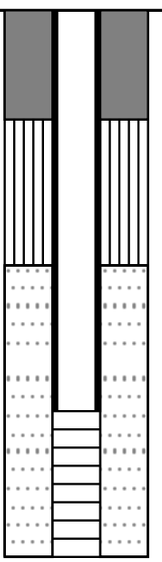
Northing: 432076.62
Easting: 861887.87
Elevation: 11.53
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 52.83 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description
40			12	0	0		
			18				
			18			SM	Gray brown fine to coarse SAND, trace silt.
			19				
			11	0	0	SC	Gray brown fine to coarse SAND, little silt, occasional lens clay.
			14				
			14			SM	Gray fine to coarse SAND, trace silt.
			14				
			9	0	0	SM	Gray fine to coarse SAND, trace silt.
			13				
45			15			SM	Gray fine to coarse SAND, trace silt.
			14				
			10	0	0	SM	Gray fine to coarse SAND, trace silt.
			14				
			16			SM/CL	47 ft to 47 ft 8 in Gray fine to coarse SAND, trace silt, 47 ft 8 in to 48 ft silty CLAY, trace sand.
			21				
			7	0	0	SC	48 ft to 48 ft 6 in Gray SAND, some silty clay, 48 ft 6 in to 49 ft Gray silty clay.
			9				
			8			CL	Gray silty CLAY.
			11				
50			8	0	0	CL	Gray CLAY, stiff, occasional layer fine to medium sand, some silt.
			6				
			7			SC	Gray coarse SAND, some silt and clay, wet.
			9				
			7			SM/R	Gray fine to coarse SAND, trace shell fragments, dark Gray pieces of weakly cemented sandstone in tip of spoon.
52.833			50				

Well Construction Diagram



Well Set at 47.5 ft.

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-61
Diameter: 8 in
Date: 07/30/2013

Northing: 432153.94
Easting: 861902.30
Elevation: 11.86
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 53.33 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
0						SM	Hand cleared to 5 ft. Installed with a stick up above ground surface. Gray brown fine to medium SAND, trace silt.	
5							Brown gray drilling MUD, pH 11 to 12, at 8 ft bgs hit concrete and dense fill used 8 inch drill bit for 2 1/2 hours, moved hole 5 ft East.	
10				0.5	0			
15								
20								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-61
Diameter: 8 in
Date: 07/30/2013

Northing: 432153.94
Easting: 861902.30
Elevation: 11.86
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 53.33 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
20							Brown gray drilling MUD, pH 11 to 12, at 8 ft bgs hit concrete and dense fill used 8 inch drill bit for 2 1/2 hours, moved hole 5 ft East.	
25								
30				0.5	0			
35								
40								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-61
Diameter: 8 in
Date: 07/30/2013

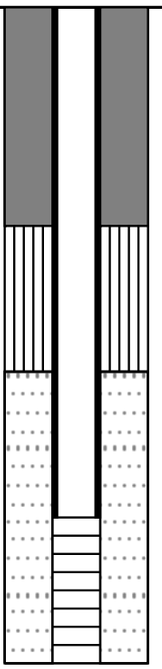
Northing: 432153.94
Easting: 861902.30
Elevation: 11.86
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 53.33 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description
40			14	0	0	SM	Gray brown fine to coarse SAND, trace silt.
			16				
			17			SM	Gray brown fine to coarse SAND, trace silt.
			17				
			8	0	0	SM	Gray brown fine to coarse SAND, trace silt.
			14				
			18			SM	Gray brown fine to coarse SAND, trace silt.
			21				
			12	0	0	SM	Gray brown fine to medium SAND, trace silt.
			11				
45			14			CL	Gray CLAY, stiff, 1/2 inch layer fine to coarse sand, dry.
			21				
			7	0	0	SC	Gray brown fine to medium SAND, lens clay.
			10				
			10			SC	Gray fine to coarse SAND, trace silt, 2 inch layer of Gray clay and silt.
			11				
			9	0	0	SM	Gray fine to coarse SAND, trace silt.
			8				
			9			SM/SC	49 ft to 49 ft 4 in Gray fine to coarse SAND, trace silt, 49 ft 4 in to 50 ft SILT and clay.
			9				
50			15	0	0	SM	Gray fine to coarse SAND, trace silt.
			18				
			18			SC	51 ft to 51 ft 6 in Gray fine to coarse SAND, trace silt, occasional lens of clay, 51 ft 6 in to 52 ft Gray CLAY, little sand.
			22				
			4			SM	Gray fine to medium SAND, some silt, trace white shell fragments, 2 inch layer of clay.
			14				
53.33			47			SM/R	Gray fine to medium SAND, little silt, layers of white shells, layers of weakly cemented stone, moved 3 inches then started bouncing.

Well Construction Diagram



Well Set at 49 ft.

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-62
Diameter: 8 in
Date: 08/10/2013 - 08/11/2013

Northing: 432235.20
Easting: 861893.45
Elevation: 10.58
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: S. Dillman (PARSONS)
Project No: Field Book No: 2

Total Depth: 53.25 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
0							Hand clear to 5 feet. Installed with stick up above ground surface. pH is 7.	
5								
10				0.0	0.000			
15								
20								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-62
Diameter: 8 in
Date: 08/10/2013 - 08/11/2013

Northing: 432235.20
Easting: 861893.45
Elevation: 10.58
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: S. Dillman (PARSONS)
Project No:
Field Book No: 2

Total Depth: 53.25 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
20								
25								
30				0.0	0.000			
35								
40								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-62
Diameter: 8 in
Date: 08/10/2013 - 08/11/2013

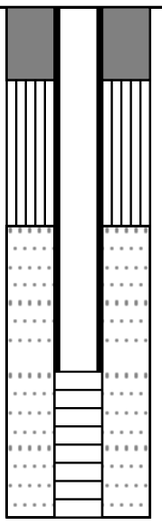
Northing: 432235.20
Easting: 861893.45
Elevation: 10.58
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: S. Dillman (PARSONS)
Project No: Field Book No: 2

Total Depth: 53.25 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description
40			9	0.0	0.000		Gray medium to coarse SAND, wet.
			17			SM	
			15				
			13				
			6	0.0	0.000		Gray medium to coarse SAND, trace clay in upper lenses, wet.
			7			SM	
			13				
			18				
			4	0.0	0.000		Gray fine to medium SAND, trace clay in thin lenses upper sample, wet.
			8			SM	
45			13				
			11				
			4	0.0	0.000		SAND as above over 7 inches greenish gray CLAY, little silt, semi stiff.
			9			SM/CL	
			13				
			13				
			5				Fine to medium SAND, trace rounded pebbles, coarse sand over 6 inches greenish gray clay, trace fine sand in lenses, wet.
			7			SM/CL	
			7				
			10				
50			3	0.0	0.000		Same as above 6 inches.
			1/2	0.0	0.000	CL	
			1/2	0.0	0.000		
			3	0.0	0.000	CL	Greenish gray CLAY, trace fine sand in thin lenses, semi stiff.
			19	0.0	0.000	CL	Clay as above, bottom inch fine SAND.
			5	0.0	0.000	SM	Gray fine SAND, wet.
53.25			50/3	0.0	0.000		

Well Construction Diagram



BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-63
Diameter: 8 in
Date: 08/07/2013

Northing: 432318.74
Easting: 861884.81
Elevation: 9.86
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: S. Dillman (PARSONS)
Project No:
Field Book No: 2

Total Depth: 53.0 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
0							Hand cleared to 5 ft. Installed with a stick up above ground surface. pH is 7.	
5								
10								
15								
20								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-63
Diameter: 8 in
Date: 08/07/2013

Northing: 432318.74
Easting: 861884.81
Elevation: 9.86
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: S. Dillman (PARSONS)
Project No: Field Book No: 2

Total Depth: 53.0 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
20							pH is 7.	
25								
30								
35								
40								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-63
Diameter: 8 in
Date: 08/07/2013

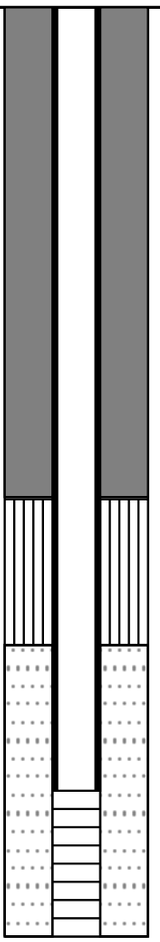
Northing: 432318.74
Easting: 861884.81
Elevation: 9.86
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: S. Dillman (PARSONS)
Project No: Field Book No: 2

Total Depth: 53.0 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description
40			10	0.0	0.000	SM	Gray medium to coarse SAND, over darker gray medium sand, wet.
			15				
			19				
			16				
			13	0.0	0.000	SM	Gray fine to medium SAND, little clay in 2 inch lense, wet.
			16				
			14				
			10				
			8	0.0	0.000	SM	Same as above, trace silt near bottom.
			9				
45			9				
			13				
			7	0.0	0.000	SM/CL	Same as above, thin clay lenses in lower sand, bottom 6 inches greenish gray CLAY, stiff, moist to wet.
			9				
			14				
			8				
			7	0.0	0.000	CL	Same as in the bottom of last spoon.
			6				
			2	0.0	0.000	SM/CL	Fine SAND 12 inches, over 12 inches of greenish gray CLAY, very thin sand lenses scattered, semi stiff, wet.
			3				
50			4				
			6				
			5	0.0	0.000	SM/CL	Upper 3 inches fine SAND, some clay over 14 inches fine tan SAND, little medium sand, over 6 inches semi stiff greenish gray clay. Shoe had gray weathered sandstone, dense, trace coarse sand, pebbles, hard refusal.
			8				
			11				
53.0			50/4				

Well Construction Diagram



BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-64
Diameter: 8 in
Date: 08/07/2013 - 08/08/2013

Northing: 432393.53
Easting: 861905.21
Elevation: 10.42
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: S. Dillman (PARSONS)
Project No:
Field Book No: 2

Total Depth: 53.5 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
0							Hand cleared to 5 ft. Installed with a stick up above ground surface. pH is 7	
5								
10								
15								
20								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-64
Diameter: 8 in
Date: 08/07/2013 - 08/08/2013

Northing: 432393.53
Easting: 861905.21
Elevation: 10.42
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: S. Dillman (PARSONS)
Project No:
Field Book No: 2

Total Depth: 53.5 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
20							pH is 7.	
25								
30								
35								
40								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-64
Diameter: 8 in
Date: 08/07/2013 - 08/08/2013

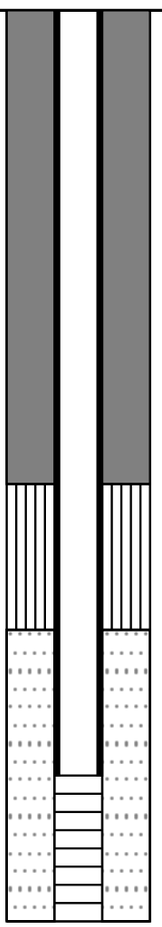
Northing: 432393.53
Easting: 861905.21
Elevation: 10.42
Datum: Unknown

Driller: Jeff Zeigler (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: S. Dillman (PARSONS)
Project No: Field Book No: 2

Total Depth: 53.5 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description
40			15	0.0	0.000	SM	Gray medium to coarse SAND, trace silt and clay in thin lenses at top, wet.
			15				
			16				
			20				
			16	0.0	0.000	SM	Gray medium to coarse SAND, grading to medium sand bottom 1/2 of sample, wet.
			17				
			19				
			24				
			7	0.0	0.000	SM	Gray fine to medium SAND, wet.
			4				
45			6				
			14				
			13	0.0	0.000	SM/CL	Greenish gray fine to medium SAND, little clay, cohesive, wet.
			15				
			14				
			24				
			6	0.0	0.000	SM	Light gray fine to medium SAND, no clay, wet.
			16				
			21				
			23				
50			7	0.0	0.000	SM/CL	Greenish gray CLAY interbedded with tan brown fine SAND, fishy odor bottom 6 inches over tan fine to medium sand, wet.
			6				
			9				
			7				
			15	0.0	0.000	SM/CL	Light gray fine SAND, over 8 inches of gray SAND and CLAY, and gray weathered sandstone in tip, wet.
			16				
53.5			50/5				

Well Construction Diagram



BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-65
Diameter: 8 in
Date: 08/12/2013

Northing: 431513.80
Easting: 861477.74
Elevation: 10.15
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 50.08 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
0						SM	Hand cleared to 5 ft. Installed with a stick up above ground surface. Brown fine to medium SAND, trace silt.	
5							Brown gray drilling MUD, pH 7 to 8.	
10				0.0	0.000			
				7.8	0			
15								
20								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-65
Diameter: 8 in
Date: 08/12/2013

Northing: 431513.80
Easting: 861477.74
Elevation: 10.15
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 50.08 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description	Well Construction Diagram
20							Brown gray drilling MUD, pH 7 to 8.	
25								
30				7.8	0			
35								
40								

BORING LOG

Honeywell

Site: LCP Brunswick
Boring No: SW-65
Diameter: 8 in
Date: 08/12/2013

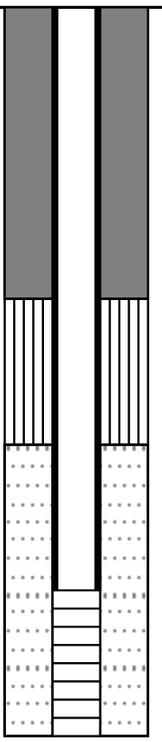
Northing: 431513.80
Easting: 861477.74
Elevation: 10.15
Datum: Unknown

Driller: Jared Link (Groundwater Protection Inc)
Method: Mud Rotary
Consultant: David Changa-Moon (Mutch Associates)
Project No: Field Book No:

Total Depth: 50.08 Ft
GW Depth: 0.0 Ft

Depth Ft	Recov	Sample ID	Blow Count	PID (ppm)	Mercury (mg/m3)	USCS Code	Soil Description
40			6	0	0	SM	Gray fine to coarse SAND, trace silt.
			7				
			9			SM	Gray fine to coarse SAND, trace silt.
			12				
			2	0	0	SM	Gray fine to coarse SAND, trace silt.
			9				
			22			SM	Gray fine to coarse SAND, trace silt, layer 7 inch fine to medium sand, trace silt.
			20				
			16	0	0	SC	Gray fine to coarse SAND, little clayey silt, trace white shell fragments.
			17				
45			20			SM	Gray fine to coarse SAND, trace silt, trace white shell fragments.
			28				
			9	0	0	SM	Gray fine to medium SAND, trace silt, trace white shell fragments.
			20				
			26			SM	Gray fine to medium SAND, trace silt, trace white shell fragments.
			28				
			10	0	0	SM	Gray fine to medium SAND, trace silt, trace white shell fragments.
			13				
			15			SM/R	49 ft to 49 ft 6 in Gray fine to medium SAND, trace silt, 49 ft 6 in to 50 ft Gray fine to coarse SAND, little silt, 1/4 inch cemented sandstone in tip of spoon.
50			50			R	No recovery, spoon bouncing on formation.
50.08							

Well Construction Diagram



Well Set at 50 ft.

Appendix B:

Well Development Logs

Sparge Well Drilling Summary Sheet, LCP Chemicals Site, Brunswick, GA

	Well Development					Total Number of Wells Developed	64
Sparge Well #	**Total Purge Volume (gal)**	**Sustained Flow Rate (gpm)**	**Flow-rate after Surge Block (gpm)**	**Final pH**	**Final Conductivity (mS/cm)**	**Final Turbidity (NTU)**	**Date Developed**
2	70	0.5		11.74	55.97	2.85	8/10/2013
3	80	1		11.72	52.53	1.96	8/10/2013
4	82.5	1.5		10.46	22.65	318	8/5/2013
5	71.25	1.5		11.65	29.23	53.8	8/6/2013
6	75	1.5		11.51	42.34	8.73	8/6/2013
7	112.5	1		10.6	61.24	4.25	8/11/2013
8	75	1.5		11.54	54.93	11.9	8/5/2013
9	75	1.5		11.5	50.51	10.8	8/7/2013
10	75	1.5		11.63	40.99	2.63	8/7/2013
11	82.5	1.5		11.45	38.9	14.1	8/5/2013
12	85	1.25		11.7	37.88	9.06	7/28/2013
13	82.5	1.5		11.66	26.04	32.3	7/28/2013
14	31	< 0.5	0.47	11.26	35.89	45.2	7/28/2013
15	87.5	1		11.44	78.5	12.6	8/12/2013
16	75	1.5		11	42.27	138	8/8/2013
17	82.5	1.5		11.67	68.1	4.25	8/7/2013
18	82.5	1.5		11.26	>20.00	low	7/26/2013
19	71.25	1.25		11.2	19.35	2.6	7/26/2013
20	78.5	1.5		11.23	>20.00	2.48	7/26/2013
21	52	< 0.5	0.45	11.17	12.93	44	7/27/2013
22	76.5	1.5		11.67	32.13	9.55	7/29/2013
23	77	< 0.5	0.3	10.55	34.47	113	7/29/2013

Sparge Well Drilling Summary Sheet, LCP Chemicals Site, Brunswick, GA

	Well Development					Total Number of Wells Developed	64
Sparge Well #	**Total Purge Volume (gal)**	**Sustained Flow Rate (gpm)**	**Flow-rate after Surge Block (gpm)**	**Final pH**	**Final Conductivity (mS/cm)**	**Final Turbidity (NTU)**	**Date Developed**
24	62	< 0.5	0.57	11.58	88.29	34.8	8/12/2013
25	11	< 0.5	0.34	10.81	46.07	391	8/9/2013
26	80	1		6.83	>20.00	3.08	7/25/2013
27	76.6	0.46		6.84	>20.00	-	7/25/2013
28	-	< 0.5	< 0.5	10.44	23.04	58.9	7/27/2013
29	87	1		9.87	29.54	36	7/28/2013
30	65	< 0.5	1	11.35	21.22	172	7/29/2013
31	80	0.5		12.03	67.36	4.14	8/8/2013
32	29	< 0.5	0.5	11.79	41.75	73.9	8/8/2013
33	80	1		11.44	37.46	over range	8/10/2013
34	37	< 0.5		11.9	40.76	25.3	8/13/2013
35	67.5	1		8.75	12.68	97	8/13/2013
36	72.5	1		11.78	68.19	29.1	8/12/2013
37	90	1		11.44	61.06	48.2	8/10/2013
38	80	1		11.62	51.5	150	8/12/2013
39	79.5	1.5		8.99	44.91	2.99	7/27/2013
40	85.5	1.5		10.36	40.36	32.1	7/29/2013
41	81	1.5		10.77	65.29	9.66	7/30/2013
42	52	< 0.5	0.38	11.46	65.09	1.24	7/31/2013
43	70	0.4	0.38	12.17	64.62	4.05	8/8/2013
44	75	0.5		9.97	33.09	over range	8/9/2013
45	72	0.5		11.89	22.18	65.5	8/13/2013

Sparge Well Drilling Summary Sheet, LCP Chemicals Site, Brunswick, GA

	Well Development					Total Number of Wells Developed	64
Sparge Well #	**Total Purge Volume (gal)**	**Sustained Flow Rate (gpm)**	**Flow-rate after Surge Block (gpm)**	**Final pH**	**Final Conductivity (mS/cm)**	**Final Turbidity (NTU)**	**Date Developed**
46	67.5	1.5		11.75	39.66	63.8	8/8/2013
47	80	1		10.85	18	70.2	8/9/2013
48	77.5	1		10.66	11.83	309	8/14/2013
49	102.5	1		11.49	47.54	15.5	8/14/2013
50	70	0.5		11.78	55.95	4.6	8/9/2013
51	79.5	1.5		11.17	86.31	19.3	7/30/2013
52	27	< 0.5		10.16	17.06	40.55	7/30/2013
53	84	1.5		11.83	59.19	43.6	8/5/2013
54	15	< 0.5		9.26	1.069	907	8/13/2013
55	65	1		11.89	21.91	60.2	8/13/2013
56	72.5	1		11.51	36.95	over range	8/10/2013
57	60	1		11.88	53.34	6.85	8/8/2013
58	76.5	1.5		11.1	80.59	4.74	7/31/2013
59	37	< 0.5		11.52	28.19	492	7/30/2013
60	82.5	1.5		11.66	32.43	over range	8/8/2013
61	83	1.25		11.56	22.06	over range	8/5/2013
62	67.5	1		10.47	7.214	389	8/13/2013
63	87.5	1		11.83	47.43	56.6	8/9/2013
64	67.5	1		11.71	56.55	59.1	8/9/2013
65	26	< 0.5		10.84	33.68	89.2	8/14/2013

Appendix C:

Piezometer Construction Diagrams

WELL COMPLETION LOG

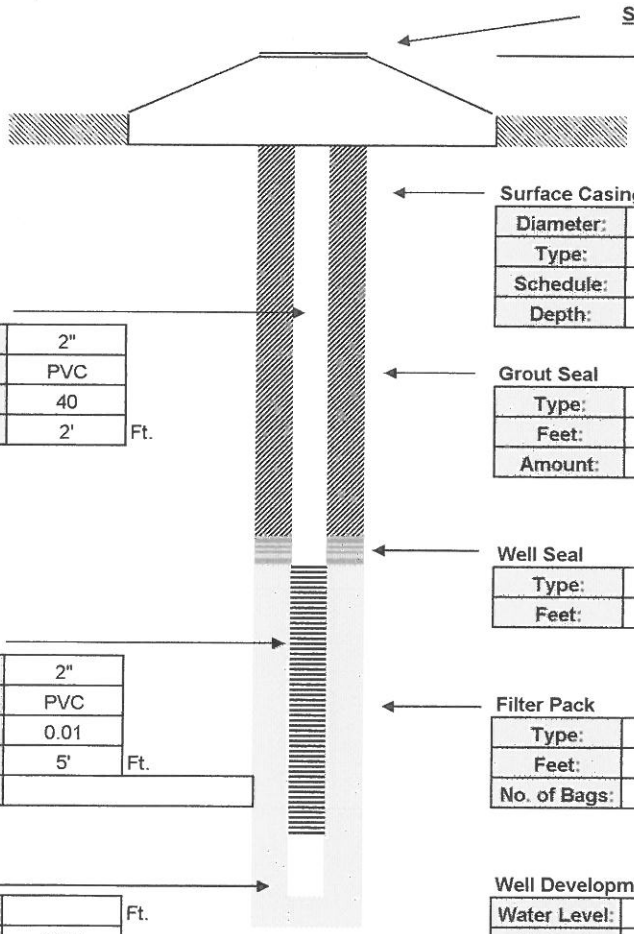
Water Mgmt. Dist.:
Permit Number:

Work Order: 713041
Type of Well: Piezometer
Well Number: PZ 5
Method Used: H S A
Borehole Diaz. 8"

Site Information:
Name: Honeywell
Address: 4125 ross Rd.
C,S,Z: Brunswick, GA
S/T/R:

Client / Consultant Information
Consultant: Parsons
Field Rep: David Changa-Moon

Well Diameter	Well Type	Well Depth	Screen Length	Casing Length	Bags Grout	Sand Bags/Weight	Filter Type	Well Seal
2"	PVC	7'	5'	2'	1	4 / 50 lbs.	20/30	30/65
40 ← Schedule	Slot Size: →		0.01		0.5'	← Feet →	6'	0.5'



Surface Completion
Stick Up

Surface Casing

Diameter:	
Type:	
Schedule:	
Depth:	

Intermediate Casing

Diameter:	
Type:	
Schedule:	
Depth:	

Well Casing

Diameter:	2"
Type:	PVC
Schedule:	40
Length:	2' Ft.

Grout Seal

Type:	I PORTLAND
Feet:	0.5'
Amount:	1 Bags

Well Seal

Type:	30/65
Feet:	0.5'

Well Screen

Diameter:	2"
Type:	PVC
Slot:	0.01
Length:	5' Ft.
Note:	

Filter Pack

Type:	20/30
Feet:	6'
No. of Bags:	4 / 50 lbs.

Sump

Length:	Ft.
Type:	PVC

Well Development

Water Level:			
Method:			
Start:	Dark Brown	Finish:	Light Brown
Time:			
GPM:			

Contractor Information

Contractor #:	9311
Completion:	8/16/2013
Driller:	Jeff Zeigler
Lead Hand:	Jon Yarema
3rd Man:	Jason Bergeron
Drill Rig:	D120A

Company:	Drillpro LLC d/b/a Groundwater Protection
Address:	2300 Silver Star Road
C,S,Z:	Orlando, Florida 32804-3310
Phone/FAX:	(407) 426-7885 / (407) 426-7586

WELL COMPLETION LOG

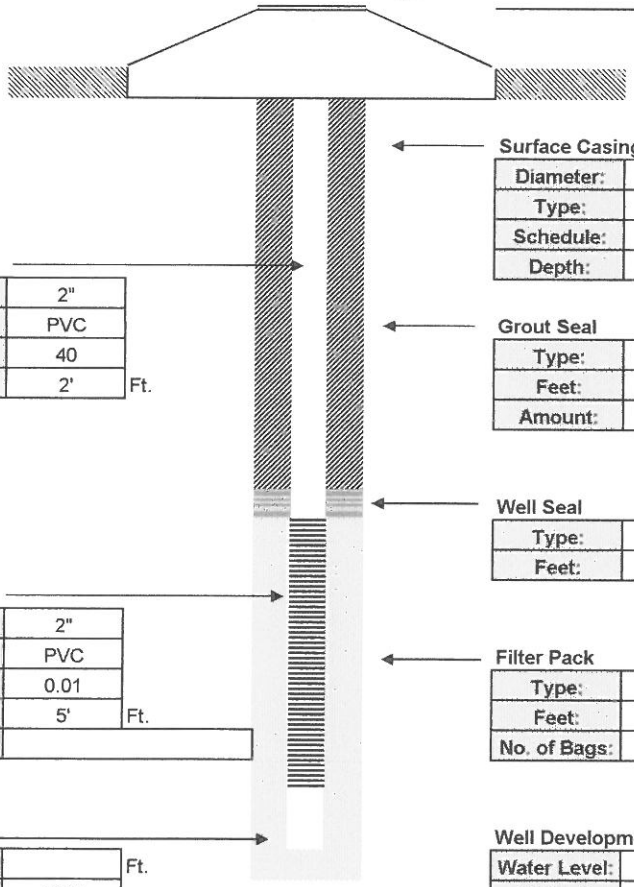
Water Mgmt. Dist.:
Permit Number:

Work Order: 713041
Type of Well: Piezometer
Well Number: PZ 11
Method Used: H S A
Borehole Diaz. 8"

Site Information:
Name: Honeywell
Address: 4125 ross Rd.
C,S,Z: Brunswick, GA
S/T/R:

Client / Consultant Information
Consultant: Parsons
Field Rep: David Changa-Moon

Well Diameter	Well Type	Well Depth	Screen Length	Casing Length	Bags Grout	Sand Bags/Weight	Filter Type	Well Seal
2"	PVC	7'	5'	2'	1	4 / 50 lbs.	20/30	30/65
40 ←	Schedule	Slot Size: →	0.01		0.5'	← Feet →	6'	0.5'



Surface Completion
Stick Up

Surface Casing

Diameter:	
Type:	
Schedule:	
Depth:	

Intermediate Casing

Diameter:	
Type:	
Schedule:	
Depth:	

Well Casing

Diameter:	2"
Type:	PVC
Schedule:	40
Length:	2' Ft.

Grout Seal

Type:	I PORTLAND
Feet:	0.5'
Amount:	1 Bags

Well Seal

Type:	30/65
Feet:	0.5'

Well Screen

Diameter:	2"
Type:	PVC
Slot:	0.01
Length:	5' Ft.
Note:	

Filter Pack

Type:	20/30
Feet:	6'
No. of Bags:	4 / 50 lbs.

Sump

Length:	Ft.
Type:	PVC

Well Development

Water Level:			
Method:			
Start:	Dark Brown	Finish:	Light Brown
Time:			
GPM:			

Contractor Information

Contractor #:	9311
Completion:	8/16/2013
Driller:	Jeff Zeigler
Lead Hand:	Jon Yarema
3rd Man:	Jason Bergeron
Drill Rig:	D120A

Company:	Drillpro LLC d/b/a Groundwater Protection
Address:	2300 Silver Star Road
C,S,Z:	Orlando, Florida 32804-3310
Phone/FAX:	(407) 426-7885 / (407) 426-7586

WELL COMPLETION LOG

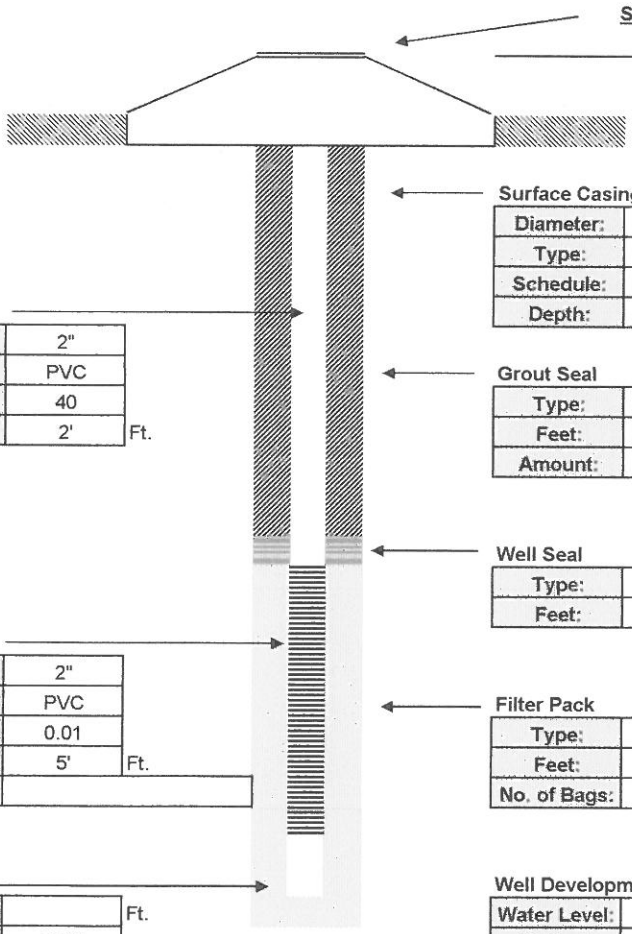
Water Mgmt. Dist.:
Permit Number:

Work Order: 713041
Type of Well: Piezometer
Well Number: PZ 13
Method Used: H S A
Borehole Diaz. 8"

Site Information:
Name: Honeywell
Address: 4125 ross Rd.
C,S,Z: Brunswick, GA
S/T/R:

Client / Consultant Information
Consultant: Parsons
Field Rep: David Changa-Moon

Well Diameter	Well Type	Well Depth	Screen Length	Casing Length	Bags Grout	Sand Bags/Weight	Filter Type	Well Seal
2"	PVC	7'	5'	2'	1	4 / 50 lbs.	20/30	30/65
40 ←	Schedule	Slot Size: →	0.01		0.5'	← Feet →	6'	0.5'



Surface Casing

Diameter:	
Type:	
Schedule:	
Depth:	

Intermediate Casing

Diameter:	
Type:	
Schedule:	
Depth:	

Well Casing

Diameter:	2"
Type:	PVC
Schedule:	40
Length:	2' Ft.

Grout Seal

Type:	I PORTLAND
Feet:	0.5'
Amount:	1 Bags

Well Seal

Type:	30/65
Feet:	0.5'

Well Screen

Diameter:	2"
Type:	PVC
Slot:	0.01
Length:	5' Ft.
Note:	

Filter Pack

Type:	20/30
Feet:	6'
No. of Bags:	4 / 50 lbs.

Sump

Length:	Ft.
Type:	PVC

Well Development

Water Level:			
Method:			
Start:	Dark Brown	Finish:	Light Brown
Time:			
GPM:			

Contractor Information

Contractor #:	9311
Completion:	8/16/2013
Driller:	Jeff Zeigler
Lead Hand:	Jon Yarema
3rd Man:	Jason Bergeron
Drill Rig:	D120A

Company:	Drillpro LLC d/b/a Groundwater Protection
Address:	2300 Silver Star Road
C,S,Z:	Orlando, Florida 32804-3310
Phone/FAX:	(407) 426-7885 / (407) 426-7586

WELL COMPLETION LOG

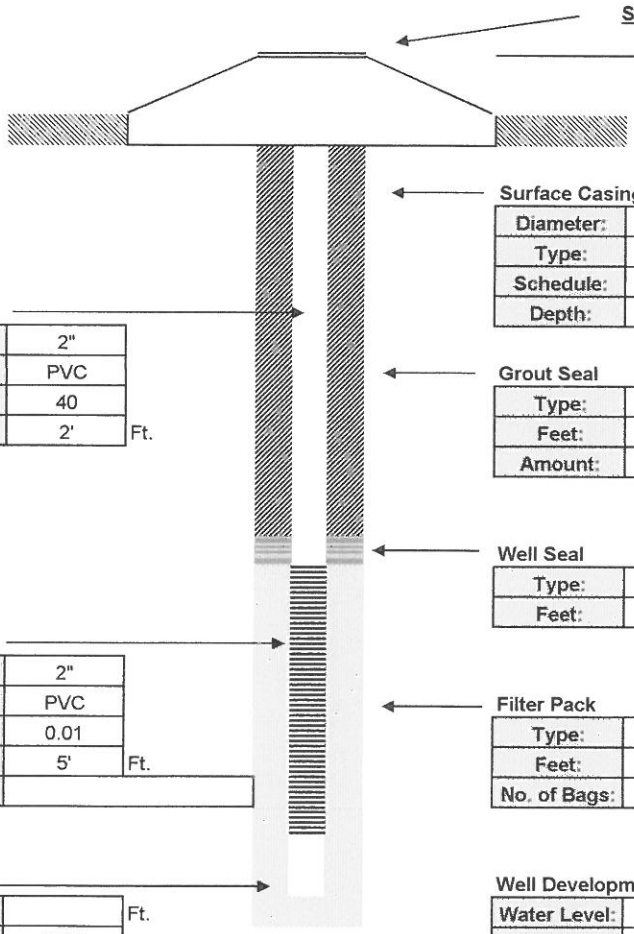
Water Mgmt. Dist.:
Permit Number:

Work Order: 713041
Type of Well: Piezometer
Well Number: PZ 14
Method Used: H S A
Borehole Diaz. 8"

Site Information:
Name: Honeywell
Address: 4125 ross Rd.
C,S,Z: Brunswick, GA
S/T/R:

Client / Consultant Information
Consultant: Parsons
Field Rep: David Changa-Moon

Well Diameter	Well Type	Well Depth	Screen Length	Casing Length	Bags Grout	Sand Bags/Weight	Filter Type	Well Seal
2"	PVC	7'	5'	2'	1	4 / 50 lbs.	20/30	30/65
40 ← Schedule		Slot Size: →	0.01		0.5'	← Feet →	6'	0.5'



Surface Casing

Diameter:	
Type:	
Schedule:	
Depth:	

Intermediate Casing

Diameter:	
Type:	
Schedule:	
Depth:	

Well Casing

Diameter:	2"
Type:	PVC
Schedule:	40
Length:	2' Ft.

Grout Seal

Type:	I PORTLAND
Feet:	0.5'
Amount:	1 Bags

Well Seal

Type:	30/65
Feet:	0.5'

Well Screen

Diameter:	2"
Type:	PVC
Slot:	0.01
Length:	5' Ft.
Note:	

Filter Pack

Type:	20/30
Feet:	6'
No. of Bags:	4 / 50 lbs.

Sump

Length:	Ft.
Type:	PVC

Well Development

Water Level:			
Method:			
Start:	Dark Brown	Finish:	Light Brown
Time:			
GPM:			

Contractor Information

Contractor #:	9311
Completion:	8/16/2013
Driller:	Jeff Zeigler
Lead Hand:	Jon Yarema
3rd Man:	Jason Bergeron
Drill Rig:	D120A

Company:	Drillpro LLC d/b/a Groundwater Protection
Address:	2300 Silver Star Road
C,S,Z:	Orlando, Florida 32804-3310
Phone/FAX:	(407) 426-7885 / (407) 426-7586

WELL COMPLETION LOG

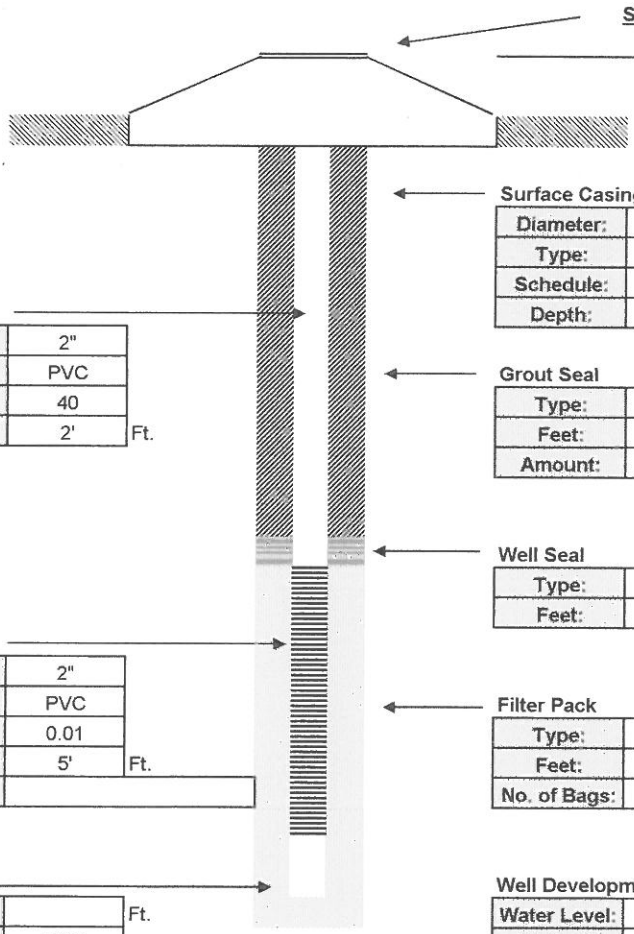
Water Mgmt. Dist.:
Permit Number:

Work Order: 713041
Type of Well: Piezometer
Well Number: PZ 16
Method Used: H S A
Borehole Diaz. 8"

Site Information:
Name: Honeywell
Address: 4125 ross Rd.
C,S,Z: Brunswick, GA
S/T/R:

Client / Consultant Information
Consultant: Parsons
Field Rep: David Changa-Moon

Well Diameter	Well Type	Well Depth	Screen Length	Casing Length	Bags Grout	Sand Bags/Weight	Filter Type	Well Seal
2"	PVC	7'	5'	2'	1	4 / 50 lbs.	20/30	30/65
40 ←	Schedule	Slot Size: →	0.01		0.5'	← Feet →	6'	0.5'



Surface Casing		Intermediate Casing	
Diameter:		Diameter:	
Type:		Type:	
Schedule:		Schedule:	
Depth:		Depth:	

Well Casing		
Diameter:	2"	
Type:	PVC	
Schedule:	40	
Length:	2'	Ft.

Grout Seal		
Type:	I PORTLAND	
Feet:	0.5'	
Amount:	1	Bags

Well Seal	
Type:	30/65
Feet:	0.5'

Well Screen		
Diameter:	2"	
Type:	PVC	
Slot:	0.01	
Length:	5'	Ft.
Note:		

Filter Pack	
Type:	20/30
Feet:	6'
No. of Bags:	4 / 50 lbs.

Sump		
Length:		Ft.
Type:	PVC	

Well Development			
Water Level:			
Method:			
Start:	Dark Brown	Finish:	Light Brown
Time:			
GPM:			

Contractor Information

Contractor #:	9311
Completion:	8/16/2013
Driller:	Jeff Zeigler
Lead Hand:	Jon Yarema
3rd Man:	Jason Bergeron
Drill Rig:	D120A

Company:	Drillpro LLC d/b/a Groundwater Protection
Address:	2300 Silver Star Road
C,S,Z:	Orlando, Florida 32804-3310
Phone/FAX:	(407) 426-7885 / (407) 426-7586

WELL COMPLETION LOG

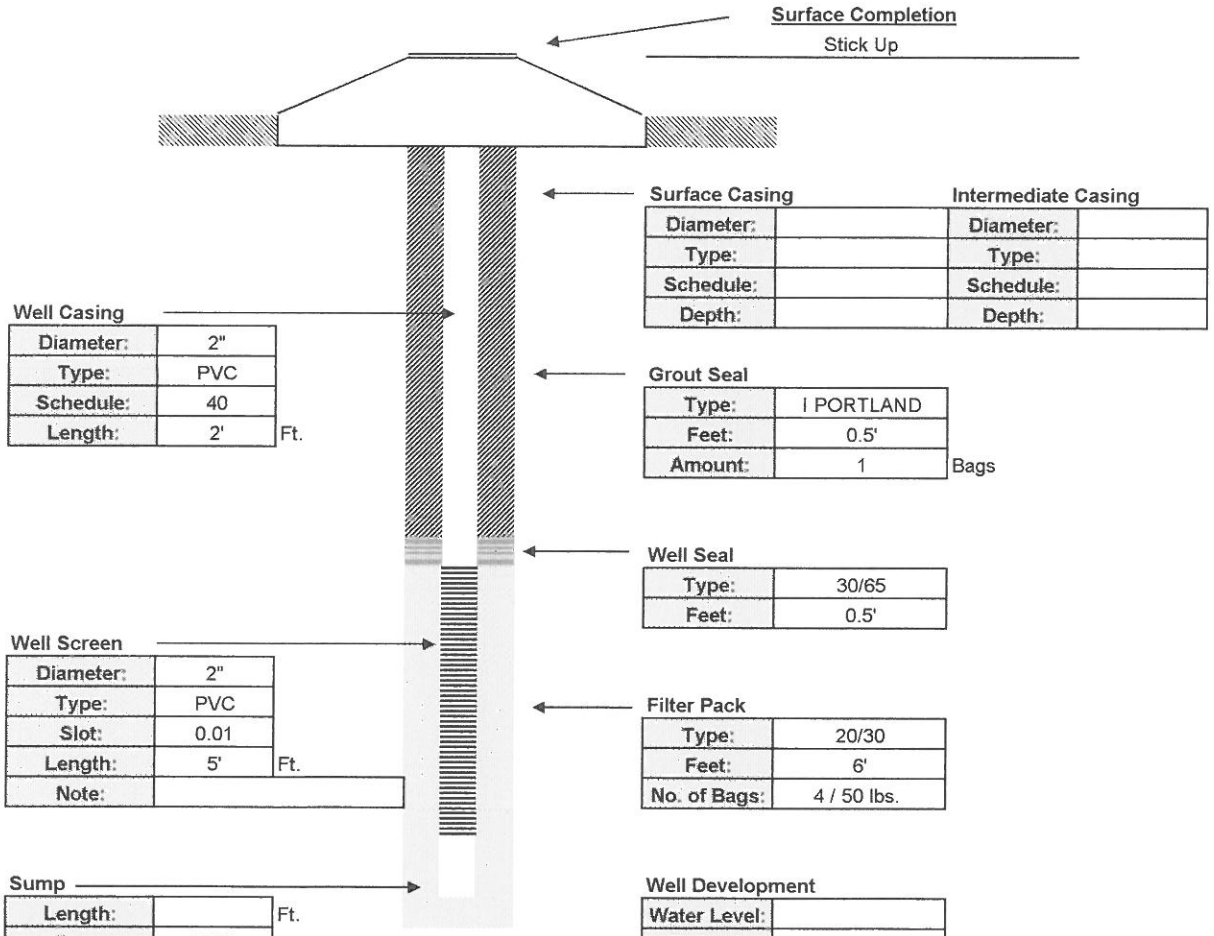
Water Mgmt. Dist.:
Permit Number:

Work Order: 713041
Type of Well: Piezometer
Well Number: PZ 20
Method Used: H S A
Borehole Diaz. 8"

Site Information:
Name: Honeywell
Address: 4125 ross Rd.
C,S,Z: Brunswick, GA
S/T/R:

Client / Consultant Information
Consultant: Parsons
Field Rep: David Changa-Moon

Well Diameter	Well Type	Well Depth	Screen Length	Casing Length	Bags Grout	Sand Bags/Weight	Filter Type	Well Seal
2"	PVC	7'	5'	2'	1	4 / 50 lbs.	20/30	30/65
40 ← Schedule		Slot Size: →	0.01		0.5'	← Feet →	6'	0.5'



Surface Casing		Intermediate Casing	
Diameter:		Diameter:	
Type:		Type:	
Schedule:		Schedule:	
Depth:		Depth:	

Well Casing		
Diameter:	2"	
Type:	PVC	
Schedule:	40	
Length:	2'	Ft.

Grout Seal		
Type:	I PORTLAND	
Feet:	0.5'	
Amount:	1	Bags

Well Seal	
Type:	30/65
Feet:	0.5'

Well Screen		
Diameter:	2"	
Type:	PVC	
Slot:	0.01	
Length:	5'	Ft.
Note:		

Filter Pack	
Type:	20/30
Feet:	6'
No. of Bags:	4 / 50 lbs.

Sump		
Length:		Ft.
Type:	PVC	

Well Development			
Water Level:			
Method:			
Start:	Dark Brown	Finish:	Light Brown
Time:			
GPM:			

Contractor Information

Contractor #:	9311
Completion:	8/16/2013
Driller:	Jeff Zeigler
Lead Hand:	Jon Yarema
3rd Man:	Jason Bergeron
Drill Rig:	D120A

Company:	Drillpro LLC d/b/a Groundwater Protection
Address:	2300 Silver Star Road
C,S,Z:	Orlando, Florida 32804-3310
Phone/FAX:	(407) 426-7885 / (407) 426-7586

WELL COMPLETION LOG

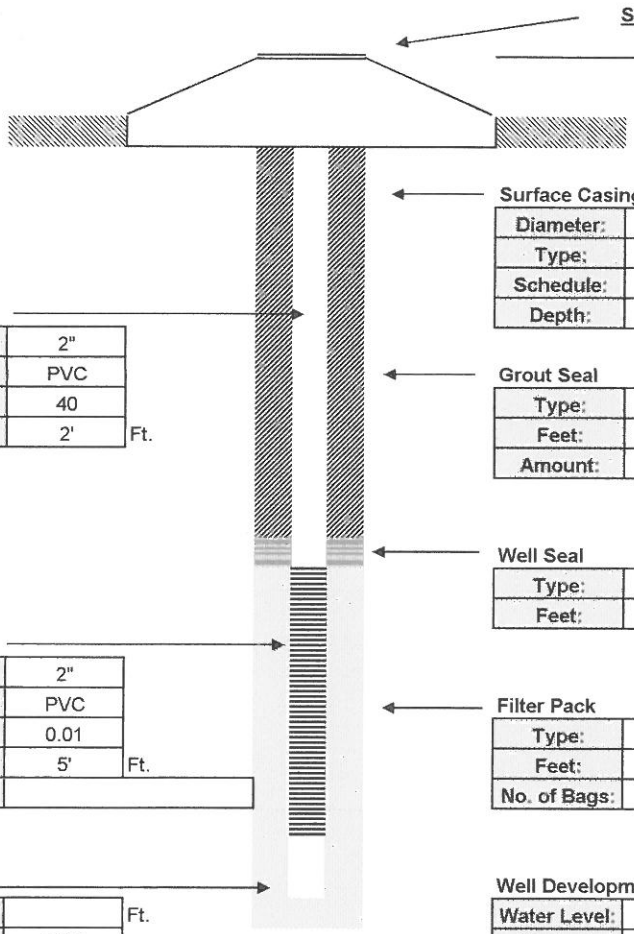
Water Mgmt. Dist.:
Permit Number:

Work Order: 713041
Type of Well: Piezometer
Well Number: PZ 22
Method Used: H S A
Borehole Diaz. 8"

Site Information:
Name: Honeywell
Address: 4125 ross Rd.
C,S,Z: Brunswick, GA
S/T/R:

Client / Consultant Information
Consultant: Parsons
Field Rep: David Changa-Moon

Well Diameter	Well Type	Well Depth	Screen Length	Casing Length	Bags Grout	Sand Bags/Weight	Filter Type	Well Seal
2"	PVC	7'	5'	2'	1	4 / 50 lbs.	20/30	30/65
40 ← Schedule	Slot Size: →		0.01		0.5'	← Feet →	6'	0.5'



Surface Casing

Diameter:	
Type:	
Schedule:	
Depth:	

Intermediate Casing

Diameter:	
Type:	
Schedule:	
Depth:	

Well Casing

Diameter:	2"
Type:	PVC
Schedule:	40
Length:	2' Ft.

Grout Seal

Type:	I PORTLAND
Feet:	0.5'
Amount:	1 Bags

Well Seal

Type:	30/65
Feet:	0.5'

Well Screen

Diameter:	2"
Type:	PVC
Slot:	0.01
Length:	5' Ft.
Note:	

Filter Pack

Type:	20/30
Feet:	6'
No. of Bags:	4 / 50 lbs.

Sump

Length:	Ft.
Type:	PVC

Well Development

Water Level:			
Method:			
Start:	Dark Brown	Finish:	Light Brown
Time:			
GPM:			

Contractor Information

Contractor #:	9311
Completion:	8/16/2013
Driller:	Jeff Zeigler
Lead Hand:	Jon Yarema
3rd Man:	Jason Bergeron
Drill Rig:	D120A

Company:	Drillpro LLC d/b/a Groundwater Protection
Address:	2300 Silver Star Road
C,S,Z:	Orlando, Florida 32804-3310
Phone/FAX:	(407) 426-7885 / (407) 426-7586

WELL COMPLETION LOG

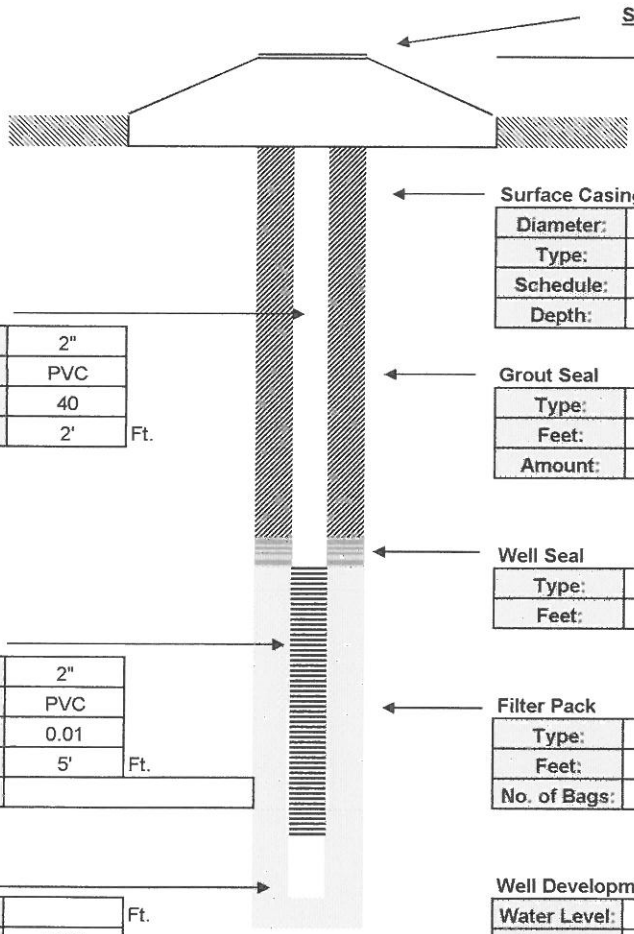
Water Mgmt. Dist.:
Permit Number:

Work Order: 713041
Type of Well: Piezometer
Well Number: PZ 28
Method Used: H S A
Borehole Diaz. 8"

Site Information:
Name: Honeywell
Address: 4125 ross Rd.
C,S,Z: Brunswick, GA
S/T/R:

Client / Consultant Information
Consultant: Parsons
Field Rep: David Changa-Moon

Well Diameter	Well Type	Well Depth	Screen Length	Casing Length	Bags Grout	Sand Bags/Weight	Filter Type	Well Seal
2"	PVC	7'	5'	2'	1	4 / 50 lbs.	20/30	30/65
40 ←	Schedule	Slot Size: →	0.01		0.5'	← Feet →	6'	0.5'



Surface Casing

Diameter:	
Type:	
Schedule:	
Depth:	

Intermediate Casing

Diameter:	
Type:	
Schedule:	
Depth:	

Well Casing

Diameter:	2"
Type:	PVC
Schedule:	40
Length:	2' Ft.

Grout Seal

Type:	I PORTLAND
Feet:	0.5'
Amount:	1 Bags

Well Seal

Type:	30/65
Feet:	0.5'

Well Screen

Diameter:	2"
Type:	PVC
Slot:	0.01
Length:	5' Ft.
Note:	

Filter Pack

Type:	20/30
Feet:	6'
No. of Bags:	4 / 50 lbs.

Sump

Length:	Ft.
Type:	PVC

Well Development

Water Level:			
Method:			
Start:	Dark Brown	Finish:	Light Brown
Time:			
GPM:			

Contractor Information

Contractor #:	9311
Completion:	8/16/2013
Driller:	Jeff Zeigler
Lead Hand:	Jon Yarema
3rd Man:	Jason Bergeron
Drill Rig:	D120A

Company:	Drillpro LLC d/b/a Groundwater Protection
Address:	2300 Silver Star Road
C,S,Z:	Orlando, Florida 32804-3310
Phone/FAX:	(407) 426-7885 / (407) 426-7586

WELL COMPLETION LOG

Water Mgmt. Dist.:
Permit Number:

Work Order: 713041
Type of Well: Piezometer
Well Number: PZ 32
Method Used: H S A
Borehole Diaz. 8"

Site Information:
Name: Honeywell
Address: 4125 ross Rd.
C,S,Z: Brunswick, GA
S/T/R:

Client / Consultant Information
Consultant: Parsons
Field Rep: David Changa-Moon

Well Diameter	Well Type	Well Depth	Screen Length	Casing Length	Bags Grout	Sand Bags/Weight	Filter Type	Well Seal
2"	PVC	7'	5'	2'	1	4 / 50 lbs.	20/30	30/65
40 ← Schedule		Slot Size: →	0.01		0.5'	← Feet →	6'	0.5'

Surface Completion
Stick Up

Surface Casing

Diameter:	
Type:	
Schedule:	
Depth:	

Intermediate Casing

Diameter:	
Type:	
Schedule:	
Depth:	

Well Casing

Diameter:	2"
Type:	PVC
Schedule:	40
Length:	2' Ft.

Grout Seal

Type:	I PORTLAND
Feet:	0.5'
Amount:	1 Bags

Well Seal

Type:	30/65
Feet:	0.5'

Well Screen

Diameter:	2"
Type:	PVC
Slot:	0.01
Length:	5' Ft.
Note:	

Filter Pack

Type:	20/30
Feet:	6'
No. of Bags:	4 / 50 lbs.

Sump

Length:	Ft.
Type:	PVC

Well Development

Water Level:			
Method:			
Start:	Dark Brown	Finish:	Light Brown
Time:			
GPM:			

Contractor Information

Contractor #:	9311
Completion:	8/16/2013
Driller:	Jeff Zeigler
Lead Hand:	Jon Yarema
3rd Man:	Jason Bergeron
Drill Rig:	D120A

Company:	Drillpro LLC d/b/a Groundwater Protection
Address:	2300 Silver Star Road
C,S,Z:	Orlando, Florida 32804-3310
Phone/FAX:	(407) 426-7885 / (407) 426-7586

WELL COMPLETION LOG

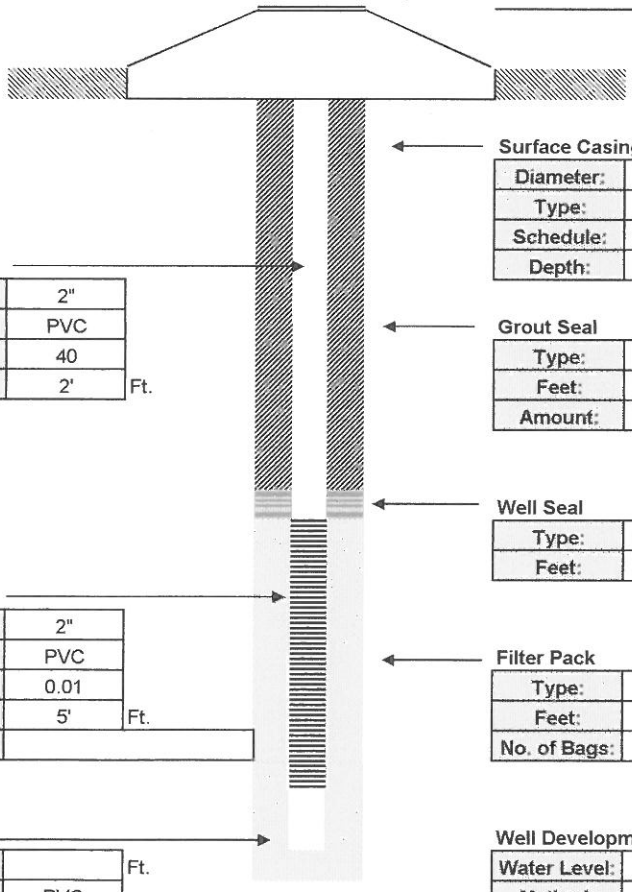
Water Mgmt. Dist.:
Permit Number:

Work Order: 713041
Type of Well: Piezometer
Well Number: PZ 35
Method Used: H S A
Borehole Diaz. 8"

Site Information:
Name: Honeywell
Address: 4125 ross Rd.
C,S,Z: Brunswick, GA
S/T/R:

Client / Consultant Information
Consultant: Parsons
Field Rep: David Changa-Moon

Well Diameter	Well Type	Well Depth	Screen Length	Casing Length	Bags Grout	Sand Bags/Weight	Filter Type	Well Seal
2"	PVC	7'	5'	2'	1	4 / 50 lbs.	20/30	30/65
40 ← Schedule		Slot Size: →	0.01		0.5'	← Feet →	6'	0.5'



Surface Casing

Diameter:	
Type:	
Schedule:	
Depth:	

Intermediate Casing

Diameter:	
Type:	
Schedule:	
Depth:	

Well Casing

Diameter:	2"
Type:	PVC
Schedule:	40
Length:	2' Ft.

Grout Seal

Type:	I PORTLAND
Feet:	0.5'
Amount:	1 Bags

Well Seal

Type:	30/65
Feet:	0.5'

Well Screen

Diameter:	2"
Type:	PVC
Slot:	0.01
Length:	5' Ft.
Note:	

Filter Pack

Type:	20/30
Feet:	6'
No. of Bags:	4 / 50 lbs.

Sump

Length:	Ft.
Type:	PVC

Well Development

Water Level:			
Method:			
Start:	Dark Brown	Finish:	Light Brown
Time:			
GPM:			

Contractor Information

Contractor #:	9311
Completion:	8/16/2013
Driller:	Jeff Zeigler
Lead Hand:	Jon Yarema
3rd Man:	Jason Bergeron
Drill Rig:	D120A

Company:	Drillpro LLC d/b/a Groundwater Protection
Address:	2300 Silver Star Road
C,S,Z:	Orlando, Florida 32804-3310
Phone/FAX:	(407) 426-7885 / (407) 426-7586

WELL COMPLETION LOG

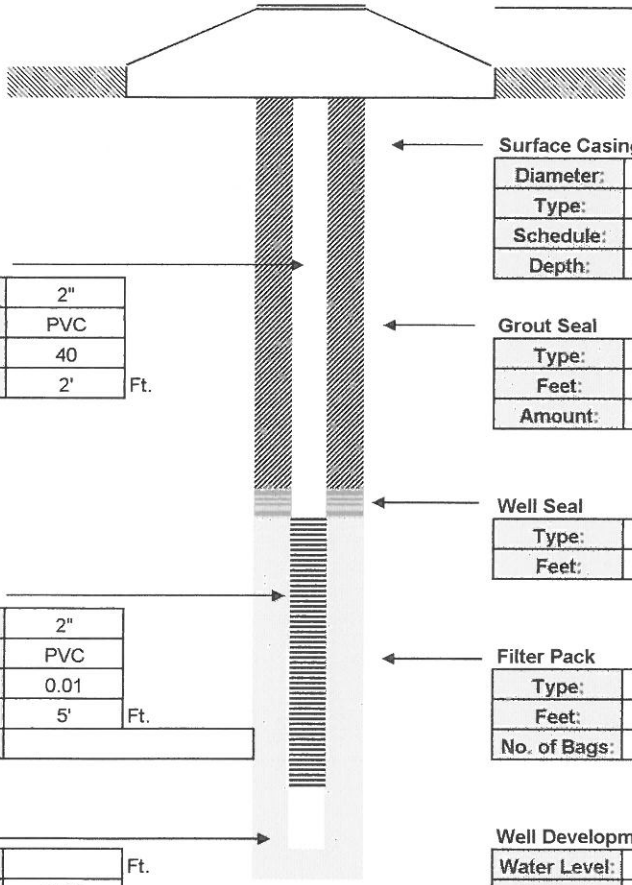
Water Mgmt. Dist.:
Permit Number:

Work Order: 713041
Type of Well: Piezometer
Well Number: PZ 40
Method Used: H S A
Borehole Diaz. 8"

Site Information:
Name: Honeywell
Address: 4125 ross Rd.
C,S,Z: Brunswick, GA
S/T/R:

Client / Consultant Information
Consultant: Parsons
Field Rep: David Changa-Moon

Well Diameter	Well Type	Well Depth	Screen Length	Casing Length	Bags Grout	Sand Bags/Weight	Filter Type	Well Seal
2"	PVC	7'	5'	2'	1	4 / 50 lbs.	20/30	30/65
40 ← Schedule	Slot Size: →		0.01		0.5'	← Feet →	6'	0.5'



Surface Completion
Stick Up

Surface Casing

Diameter:	
Type:	
Schedule:	
Depth:	

Intermediate Casing

Diameter:	
Type:	
Schedule:	
Depth:	

Well Casing

Diameter:	2"
Type:	PVC
Schedule:	40
Length:	2' Ft.

Grout Seal

Type:	I PORTLAND
Feet:	0.5'
Amount:	1 Bags

Well Seal

Type:	30/65
Feet:	0.5'

Well Screen

Diameter:	2"
Type:	PVC
Slot:	0.01
Length:	5' Ft.
Note:	

Filter Pack

Type:	20/30
Feet:	6'
No. of Bags:	4 / 50 lbs.

Sump

Length:	Ft.
Type:	PVC

Well Development

Water Level:			
Method:			
Start:	Dark Brown	Finish:	Light Brown
Time:			
GPM:			

Contractor Information

Contractor #:	9311
Completion:	8/16/2013
Driller:	Jeff Zeigler
Lead Hand:	Jon Yarema
3rd Man:	Jason Bergeron
Drill Rig:	D120A

Company:	Drillpro LLC d/b/a Groundwater Protection
Address:	2300 Silver Star Road
C,S,Z:	Orlando, Florida 32804-3310
Phone/FAX:	(407) 426-7885 / (407) 426-7586

WELL COMPLETION LOG

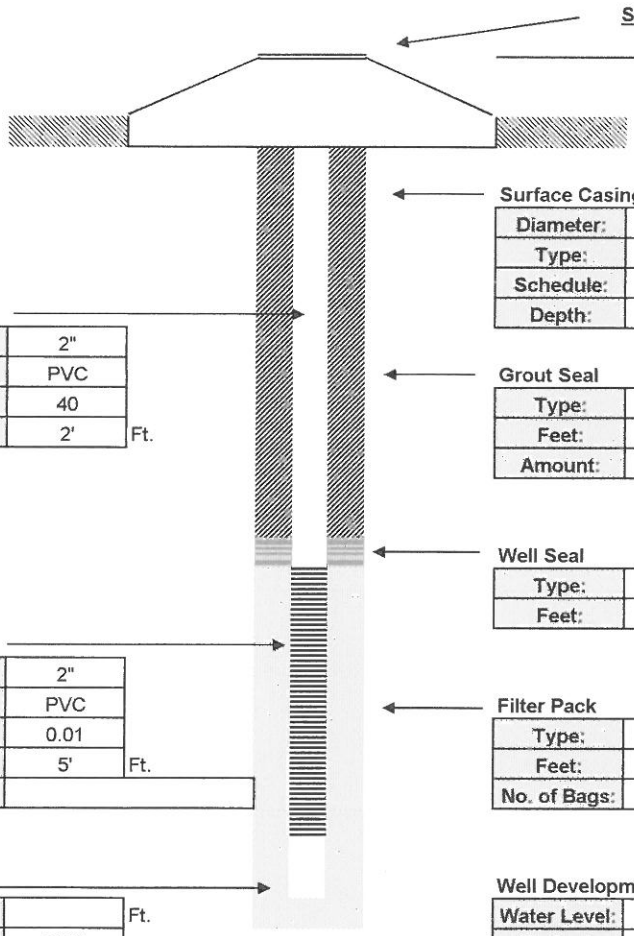
Water Mgmt. Dist.:
Permit Number:

Work Order: 713041
Type of Well: Piezometer
Well Number: PZ 43
Method Used: H S A
Borehole Diaz. 8"

Site Information:
Name: Honeywell
Address: 4125 ross Rd.
C,S,Z: Brunswick, GA
S/T/R:

Client / Consultant Information
Consultant: Parsons
Field Rep: David Changa-Moon

Well Diameter	Well Type	Well Depth	Screen Length	Casing Length	Bags Grout	Sand Bags/Weight	Filter Type	Well Seal
2"	PVC	7'	5'	2'	1	4 / 50 lbs.	20/30	30/65
40 ← Schedule		Slot Size: →	0.01		0.5'	← Feet →	6'	0.5'



Surface Casing

Diameter:	
Type:	
Schedule:	
Depth:	

Intermediate Casing

Diameter:	
Type:	
Schedule:	
Depth:	

Well Casing

Diameter:	2"
Type:	PVC
Schedule:	40
Length:	2' Ft.

Grout Seal

Type:	I PORTLAND
Feet:	0.5'
Amount:	1 Bags

Well Seal

Type:	30/65
Feet:	0.5'

Well Screen

Diameter:	2"
Type:	PVC
Slot:	0.01
Length:	5' Ft.
Note:	

Filter Pack

Type:	20/30
Feet:	6'
No. of Bags:	4 / 50 lbs.

Sump

Length:	Ft.
Type:	PVC

Well Development

Water Level:			
Method:			
Start:	Dark Brown	Finish:	Light Brown
Time:			
GPM:			

Contractor Information

Contractor #:	9311
Completion:	8/16/2013
Driller:	Jeff Zeigler
Lead Hand:	Jon Yarema
3rd Man:	Jason Bergeron
Drill Rig:	D120A

Company:	Drillpro LLC d/b/a Groundwater Protection
Address:	2300 Silver Star Road
C,S,Z:	Orlando, Florida 32804-3310
Phone/FAX:	(407) 426-7885 / (407) 426-7586

WELL COMPLETION LOG

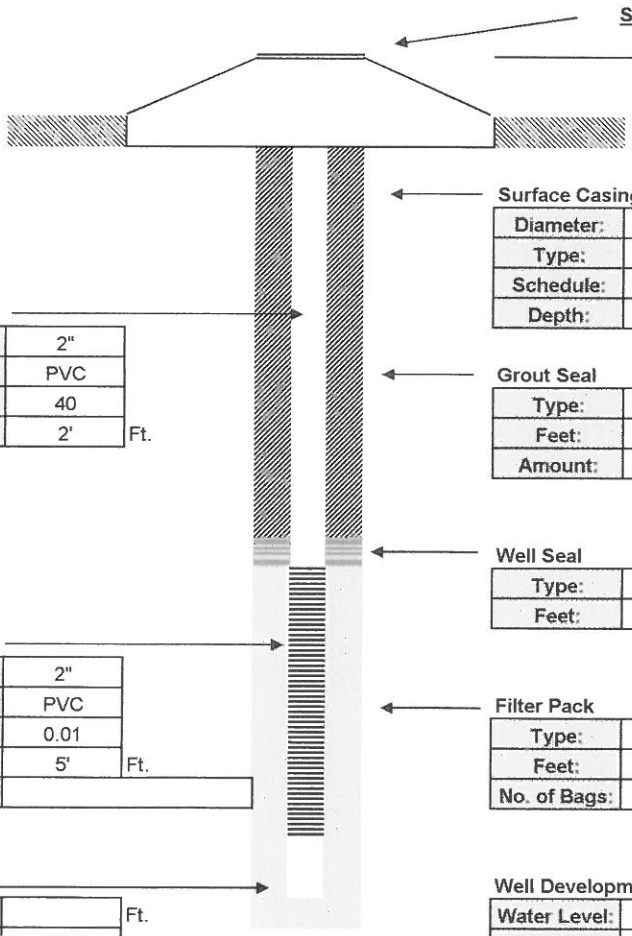
Water Mgmt. Dist.:
Permit Number:

Work Order: 713041
Type of Well: Piezometer
Well Number: PZ 58
Method Used: H S A
Borehole Diaz. 8"

Site Information:
Name: Honeywell
Address: 4125 ross Rd.
C,S,Z: Brunswick, GA
S/T/R:

Client / Consultant Information
Consultant: Parsons
Field Rep: David Changa-Moon

Well Diameter	Well Type	Well Depth	Screen Length	Casing Length	Bags Grout	Sand Bags/Weight	Filter Type	Well Seal
2"	PVC	7'	5'	2'	1	4 / 50 lbs.	20/30	30/65
40 ←	Schedule	Slot Size: →	0.01		0.5'	← Feet →	6'	0.5'



Surface Completion
Stick Up

Surface Casing

Diameter:	
Type:	
Schedule:	
Depth:	

Intermediate Casing

Diameter:	
Type:	
Schedule:	
Depth:	

Well Casing

Diameter:	2"
Type:	PVC
Schedule:	40
Length:	2' Ft.

Grout Seal

Type:	I PORTLAND
Feet:	0.5'
Amount:	1 Bags

Well Seal

Type:	30/65
Feet:	0.5'

Well Screen

Diameter:	2"
Type:	PVC
Slot:	0.01
Length:	5' Ft.
Note:	

Filter Pack

Type:	20/30
Feet:	6'
No. of Bags:	4 / 50 lbs.

Sump

Length:	Ft.
Type:	PVC

Well Development

Water Level:			
Method:			
Start:	Dark Brown	Finish:	Light Brown
Time:			
GPM:			

Contractor Information

Contractor #:	9311
Completion:	8/16/2013
Driller:	Jeff Zeigler
Lead Hand:	Jon Yarema
3rd Man:	Jason Bergeron
Drill Rig:	D120A

Company:	Drillpro LLC d/b/a Groundwater Protection
Address:	2300 Silver Star Road
C,S,Z:	Orlando, Florida 32804-3310
Phone/FAX:	(407) 426-7885 / (407) 426-7586

WELL COMPLETION LOG

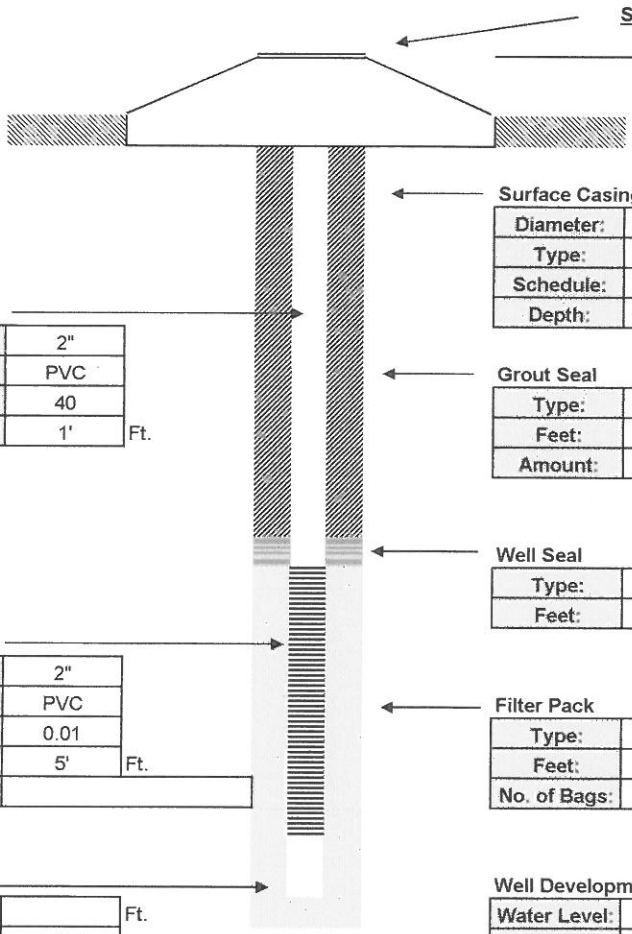
Water Mgmt. Dist.:
Permit Number:

Work Order: 713041
Type of Well: Piezometer
Well Number: PZ 63
Method Used: H S A
Borehole Diaz. 8"

Site Information:
Name: Honeywell
Address: 4125 ross Rd.
C,S,Z: Brunswick, GA
S/T/R:

Client / Consultant Information
Consultant: Parsons
Field Rep: David Changa-Moon

Well Diameter	Well Type	Well Depth	Screen Length	Casing Length	Bags Grout	Sand Bags/Weight	Filter Type	Well Seal
2"	PVC	6'	5'	1'	1	4 / 50 lbs.	20/30	30/65
40 ← Schedule	Slot Size: →		0.01		0.25'	← Feet →	5.5'	0.25'



Surface Casing

Diameter:	
Type:	
Schedule:	
Depth:	

Intermediate Casing

Diameter:	
Type:	
Schedule:	
Depth:	

Well Casing

Diameter:	2"
Type:	PVC
Schedule:	40
Length:	1' Ft.

Grout Seal

Type:	I PORTLAND
Feet:	0.25'
Amount:	1 Bags

Well Seal

Type:	30/65
Feet:	0.25'

Well Screen

Diameter:	2"
Type:	PVC
Slot:	0.01
Length:	5' Ft.
Note:	

Filter Pack

Type:	20/30
Feet:	5.5'
No. of Bags:	4 / 50 lbs.

Sump

Length:	Ft.
Type:	PVC

Well Development

Water Level:			
Method:			
Start:	Dark Brown	Finish:	Light Brown
Time:			
GPM:			

Contractor Information

Contractor #:	9311
Completion:	8/16/2013
Driller:	Jeff Zeigler
Lead Hand:	Jon Yarema
3rd Man:	Jason Bergeron
Drill Rig:	D120A

Company:	Drillpro LLC d/b/a Groundwater Protection
Address:	2300 Silver Star Road
C,S,Z:	Orlando, Florida 32804-3310
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Appendix D:

Purge Logs

Pre-Sparge Purge Logs

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **EW-1**	SAMPLE ID: **EW1**	DATE: **9/4/2013**

PURGING DATA

WELL DIAMETER (inches): **n/a**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc): **44 to 49**	STATIC DEPTH TO WATER (feet btoc): **n/a**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 44 feet) + 0.13 gallons = **0.21 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **~25**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **~25**	PURGING INITIATED AT: **1140**	PURGING ENDED AT: **1253**	TOTAL VOLUME PURGED (gallons): **3.46**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1143	0.21	0.21	0.02	n/a	11.00	31.39	5.290	105.0	177	-74.7	
1148	0.25	0.46	0.03	n/a	11.10	31.23	5.279	83.1	61.7	-90.2	
1153	0.25	0.71	0.03	n/a	11.18	31.68	5.284	70.0	34.4	-102.0	
1158	0.25	0.96	0.03	n/a	11.21	32.30	5.289	62.9	28.9	-106.0	
1203	0.25	1.21	0.03	n/a	11.23	32.49	5.295	52.3	25.5	-110.3	
1208	0.25	1.46	0.03	n/a	11.24	32.29	5.308	44.8	24.6	-115.7	
1213	0.25	1.51	0.03	n/a	11.24	31.96	5.288	38.2	25.8	-116.9	
1218	0.25	1.71	0.03	n/a	11.26	31.94	5.297	33.2	24.9	-116.9	
1223	0.25	1.96	0.03	n/a	11.25	31.33	5.284	29.1	24.3	-120.8	
1228	0.25	2.01	0.03	n/a	11.26	31.23	5.295	25.7	25.0	-121.1	
1233	0.25	2.21	0.03	n/a	11.26	30.55	5.283	21.7	25.0	-122.5	
1238	0.25	2.71	0.03	n/a	11.26	29.71	5.273	19.2	24.7	-120.6	
1243	0.25	2.96	0.03	n/a	11.26	28.37	5.259	17.6	25.6	-118.7	
1248	0.25	3.21	0.03	n/a	11.26	28.67	5.257	62.2	24.6	-119.8	
1253	0.25	3.46	0.03	n/a	11.28	29.27	5.267	56.0	25.0	-121.1	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Tanya Chuprikova	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1300**	SAMPLING ENDED AT: **1323**
PUMP OR TUBING DEPTH IN WELL (feet): **~25**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No** TUBING Y **No (replaced)**		DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION					
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
EW-1	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
EW-1	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
EW-1	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
EW-1	1	PE	125mL	--	--	--	9056A_28D Chloride & Sulfate	APP	
EW-1	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
EW-1	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
EW-1	1	PE	500mL	--	--	--	2540C TDS	APP	
EW-1	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
EW-1	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Depth of water cannot be recorded with recovery wells. Tubing can only go down about 25 feet.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings: **pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **EW-2**	SAMPLE ID: **EW-2**	DATE: **9/5/2013**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH(ft btoc): **32 to 56**	STATIC DEPTH TO WATER (ft btoc): **n/a**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= s (0.0026 gallons/foot X 47 feet) + 0.13 gallons = **0.25 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (ft btoc): **44**	FINAL PUMP OR TUBING DEPTH IN WELL (ft btoc): **44**	PURGING INITIATED AT: **0848**	PURGING ENDED AT: **0916**	TOTAL VOLUME PURGED (gallons): **1.5**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
0851	0.25	0.25	120	n/a	10.02	24.19	7.066	1.5	46.1	-167.6	
0856	0.25	0.5	120	n/a	10.38	23.72	7.074	0.3	40.8	-220.9	
0901	0.25	0.75	120	n/a	10.46	23.82	7.063	0.3	40.1	-205.9	
0906	0.25	1.00	120	n/a	10.50	24.10	7.086	0.3	29.8	-230.7	
0911	0.25	1.25	120	n/a	10.49	24.21	7.091	0.4	39.1	-151.1	
0916	0.25	1.50	120	n/a	10.50	24.27	7.091	0.5	38.6	-161.0	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Matt Scheuer	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **0927**	SAMPLING ENDED AT: **1005**
PUMP OR TUBING DEPTH IN WELL (feet): **44**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: Yes **SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No** TUBING Yes **No (replaced)**		DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
EW-2	1	PE	250mL	HNO3	--	--	6010B TAL Metals/ 7470A Hg	APP	
EW-2	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
EW-2	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
EW-2	1	PE	125mL	--	--	--	9056A_28D Chloride & Sulfate	APP	
EW-2	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
EW-2	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
EW-2	1	PE	500mL	--	--	--	2540C TDS	APP	
EW-2	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
EW-2	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Depth of water cannot be recorded with recovery wells.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings: **pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **EW-3**	SAMPLE ID: **EW-3**	DATE: **9/5/2013**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH(ft btoc): **39.2 to 42.2**	STATIC DEPTH TO WATER (ft btoc): **n/a**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= s (0.0026 gallons/foot X 47 feet) + 0.13 gallons = **0.25 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (ft btoc): **41.2**	FINAL PUMP OR TUBING DEPTH IN WELL (ft btoc): **41.2**	PURGING INITIATED AT: **0840**	PURGING ENDED AT: **0907**	TOTAL VOLUME PURGED (gallons): **1.25**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
0842	0.25	0.25	0.03	n/a	10.82	25.77	8.017	6.4	25.1	-116.8	
0847	0.20	0.45	0.02	n/a	10.91	25.76	7.817	2.6	23.9	-206.7	
0852	0.10	0.55	0.01	n/a	10.96	25.93	7.837	2.0	26.9	-220.9	
0857	0.20	0.75	0.02	n/a	10.97	25.86	7.853	1.7	24.1	-236.1	
0902	0.25	1.00	0.03	n/a	10.99	25.92	7.881	1.6	26.4	-242.1	
0907	0.25	1.25	0.03	n/a	11.01	25.98	7.923	1.5	22.6	-260.3	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Tanya Chuprikova	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **0913**	SAMPLING ENDED AT: **0934**
PUMP OR TUBING DEPTH IN WELL (feet): **41.2**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: Yes **SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No** TUBING Yes **No (replaced)**		DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
EW-3	1	PE	250mL	HNO3	--	--	6010B TAL Metals/ 7470A Hg	APP	
EW-3	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
EW-3	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
EW-3	1	PE	125mL	--	--	--	9056A_28D Chloride & Sulfate	APP	
EW-3	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
EW-3	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
EW-3	1	PE	500mL	--	--	--	2540C TDS	APP	
EW-3	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
EW-3	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Depth of water cannot be recorded with recovery wells.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings: **pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **EW-4**	SAMPLE ID: **EW-4**	DATE: **11/21/2013**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH(ft btoc): 38.2 to 43.2	STATIC DEPTH TO WATER (ft btoc): **n/a**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= s (0.0026 gallons/foot X 47 feet) + 0.13 gallons = **0.24 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (ft btoc): **35.85**	FINAL PUMP OR TUBING DEPTH IN WELL (ft btoc): **35.85**	PURGING INITIATED AT: **0816**	PURGING ENDED AT:**0856**	TOTAL VOLUME PURGED (gallons): **2.25**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
0821	0.24	0.24	0.03	n/a	11.48	21.62	15.63	1.3	27.6	-234.6	
0826	0.52	0.75	0.05	n/a	11.50	21.61	15.86	1.1	26.9	-275.9	
0831	0.25	1.00	0.03	n/a	11.52	21.41	16.15	1.0	24.7	-316.9	
0836	0.25	1.25	0.03	n/a	11.53	21.33	16.27	0.9	27.0	-337.9	
0841	0.25	1.5	0.03	n/a	11.53	21.38	16.23	0.8	25.3	-236.3	
0846	0.25	1.75	0.03	n/a	11.53	21.39	16.20	0.7	24.3	-247.8	
0851	0.25	2.0	0.03	n/a	11.53	21.43	16.18	0.8	24.4	-244.1	
0856	0.25	2.25	0.03	n/a	11.53	21.53	16.18	0.6	24.3	-213.1	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Matt Scheuer	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **0901**	SAMPLING ENDED AT: **0932**
PUMP OR TUBING DEPTH IN WELL (feet): **39.85**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: Yes **SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No**	TUBING Yes **No (replaced)**	DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
EW-4	1	PE	250mL	HNO3	--	--	6010B TAL Metals/ 7470A Hg	APP	
EW-4	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
EW-4	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
EW-4	1	PE	125mL	--	--	--	9056A_28D Chloride & Sulfate	APP	
EW-4	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
EW-4	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
EW-4	1	PE	500mL	--	--	--	2540C TDS	APP	
EW-4	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
EW-4	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Depth of water cannot be recorded with recovery wells. Purge water is brown, sulfur-like odor.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings:-**pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **EW-5**	SAMPLE ID: **EW-5**	DATE: **11/20/2013**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH(ft btoc): **46.1 to 51.1**	STATIC DEPTH TO WATER (ft btoc): **n/a**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= s (0.0026 gallons/foot X 47 feet) + 0.13 gallons = **0.23 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (ft btoc): **39.1**	FINAL PUMP OR TUBING DEPTH IN WELL (ft btoc): **39.1**	PURGING INITIATED AT: **1449**	PURGING ENDED AT: **1540**	TOTAL VOLUME PURGED (gallons): **2.75**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1455	0.23	0.23	0.02	n/a	11.19	21.71	60.22	1.0	7.19	-420.9	
1500	0.52	0.75	0.05	n/a	11.76	21.74	80.82	0.8	6.74	-484.6	
1505	0.25	1.0	0.03	n/a	11.79	21.73	83.44	0.6	4.83	-504.4	
1510	0.25	1.25	0.03	n/a	11.74	21.64	79.66	0.7	5.20	-518.4	
1515	0.25	1.5	0.03	n/a	11.54	21.63	70.57	0.6	6.54	-483.1	
1520	0.25	1.75	0.03	n/a	11.40	21.59	65.32	0.8	5.95	-478.8	
1525	0.25	2.0	0.03	n/a	11.33	21.61	63.67	0.6	6.64	-510.8	
1530	0.25	2.25	0.03	n/a	11.29	21.58	61.80	0.7	6.67	-484.7	
1535	0.25	2.5	0.03	n/a	11.22	21.48	60.05	0.6	6.42	-519.0	
1540	0.25	2.75	0.03	n/a	11.21	21.37	59.27	0.7	6.51	-518.0	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Matt Scheuer	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1542**	SAMPLING ENDED AT: **1607**
PUMP OR TUBING DEPTH IN WELL (feet): **39.1**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: Yes **SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No**	TUBING Yes **No (replaced)**	DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
EW-5	1	PE	250mL	HNO3	--	--	6010B TAL Metals/ 7470A Hg	APP	
EW-5	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
EW-5	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
EW-5	1	PE	125mL	--	--	--	9056A_28D Chloride & Sulfate	APP	
EW-5	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
EW-5	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
EW-5	1	PE	500mL	--	--	--	2540C TDS	APP	
EW-5	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
EW-5	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Depth of water cannot be recorded with recovery wells.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings:-**pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **EW-6**	SAMPLE ID: **EW-6**	DATE: **9/4/2013**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH(ft btoc): **46.2 to 51.2**	STATIC DEPTH TO WATER (ft btoc): **n/a**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= s (0.0026 gallons/foot X 47 feet) + 0.13 gallons = **0.27 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (ft btoc): **42.5**	FINAL PUMP OR TUBING DEPTH IN WELL (ft btoc): **42.5**	PURGING INITIATED AT: **0832**	PURGING ENDED AT: **0905**	TOTAL VOLUME PURGED (gallons):

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
0835	0.27	0.27	0.03	n/a	11.95	23.59	39.05	21.5	3.30	-286.6	
0840	0.33	0.6	0.03	n/a	11.47	24.03	39.4	5.3	3.64	-334.0	
0845	0.15	0.75	0.02	n/a	11.55	24.08	39.19	3.5	3.83	-348.6	
0850	0.35	1.1	0.04	n/a	11.61	24.07	39.21	3.0	3.56	-353.7	
0855	0.3	1.4	0.03	n/a	11.72	24.09	39.19	2.3	4.10	-357.4	
0900	0.2	1.6	0.02	n/a	11.77	24.10	39.16	2.0	4.08	-364.3	
0905	0.2	1.8	0.02	n/a	11.75	24.17	38.86	1.9	3.89	-385.6	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Ken Stuart	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **0905**	SAMPLING ENDED AT: **0929**
PUMP OR TUBING DEPTH IN WELL (feet): **42.5**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: Yes **SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No** TUBING Yes **No (replaced)**		DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
EW-6	1	PE	250mL	HNO3	--	--	6010B TAL Metals/ 7470A Hg	APP	
EW-6	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
EW-6	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
EW-6	1	PE	125mL	--	--	--	9056A_28D Chloride & Sulfate	APP	
EW-6	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
EW-6	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
EW-6	1	PE	500mL	--	--	--	2540C TDS	APP	
EW-6	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
EW-6	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Depth of water cannot be recorded with recovery wells.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings: **pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **EW-8**	SAMPLE ID: **EW-8**	DATE: **11/21/2013**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH(ft btoc): 46.6 to 51.6	STATIC DEPTH TO WATER (ft btoc): **n/a**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= s (0.0026 gallons/foot X 47 feet) + 0.13 gallons = **0.26 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (ft btoc): **44.2**	FINAL PUMP OR TUBING DEPTH IN WELL (ft btoc): **44.2**	PURGING INITIATED AT: **1611**	PURGING ENDED AT: **1638**	TOTAL VOLUME PURGED (gallons): **1.5**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1618	0.26	0.26	0.03	n/a	10.84	22.37	24.42	0.6	7.97	-282.4	
1623	0.49	0.75	0.05	n/a	10.88	22.36	25.10	0.6	5.17	-323.7	
1628	0.25	1.0	0.03	n/a	10.88	22.35	25.36	0.6	4.66	-357.7	
1633	0.25	1.25	0.03	n/a	10.90	22.31	25.44	0.5	4.38	-331.2	
1638	0.25	1.50	0.03	n/a	10.91	22.30	25.53	0.5	4.22	-298.7	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Matt Scheuer	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1642**	SAMPLING ENDED AT: **1704**
PUMP OR TUBING DEPTH IN WELL (feet): **44.2**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: Yes **SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	

FIELD DECONTAMINATION: PUMP Y **No** TUBING Yes **No (replaced)** DUPLICATE: **No**

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
EW-8	1	PE	250mL	HNO3	--	--	6010B TAL Metals/ 7470A Hg	APP	
EW-8	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
EW-8	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
EW-8	1	PE	125mL	--	--	--	9056A_28D Chloride & Sulfate	APP	
EW-8	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
EW-8	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
EW-8	1	PE	500mL	--	--	--	2540C TDS	APP	
EW-8	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
EW-8	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Depth of water cannot be recorded with recovery wells.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings: **pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **EW-9**	SAMPLE ID: **EW-9**	DATE: **11/21/2013**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH(ft btoc): **47 to 52**	STATIC DEPTH TO WATER (ft btoc): **n/a**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= s (0.0026 gallons/foot X 47 feet) + 0.13 gallons = **0.27 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (ft btoc): **44.15**	FINAL PUMP OR TUBING DEPTH IN WELL (ft btoc): **44.15**	PURGING INITIATED AT: **1045**	PURGING ENDED AT:**1111**	TOTAL VOLUME PURGED (gallons): **1.50**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1051	0.27	0.27	0.03	n/a	11.17	22.08	39.75	0.7	8.74	-345.7	
1056	0.48	0.75	0.05	n/a	11.17	22.15	39.37	0.5	8.47	-359.0	
1101	0.25	1.00	0.03	n/a	11.18	22.29	39.34	0.4	8.76	-353.7	
1106	0.25	1.25	0.03	n/a	11.15	22.29	39.23	0.4	8.81	-355.7	
1111	0.25	1.50	0.03	n/a	11.14	22.23	39.08	0.4	8.91	-342.7	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Matt Scheuer	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1119**	SAMPLING ENDED AT: **1139**
PUMP OR TUBING DEPTH IN WELL (feet): **44.15**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: Yes **SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No**	TUBING Yes **No (replaced)**	DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
EW-9	1	PE	250mL	HNO3	--	--	6010B TAL Metals/ 7470A Hg	APP	
EW-9	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
EW-9	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
EW-9	1	PE	125mL	--	--	--	9056A_28D Chloride & Sulfate	APP	
EW-9	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
EW-9	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
EW-9	1	PE	500mL	--	--	--	2540C TDS	APP	
EW-9	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
EW-9	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Depth of water cannot be recorded with recovery wells. Purge water is brown, sulfur-like odor.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings: **pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **EW-10**	SAMPLE ID: **EW-10**	DATE: **11/21/2013**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH(ft btoc): 45.3 to 50.3	STATIC DEPTH TO WATER (ft btoc): **n/a**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= s (0.0026 gallons/foot X 47 feet) + 0.13 gallons = **0.26 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (ft btoc): **42.95**	FINAL PUMP OR TUBING DEPTH IN WELL (ft btoc): **42.95**	PURGING INITIATED AT: **1250**	PURGING ENDED AT:**1314**	TOTAL VOLUME PURGED (gallons): **1.5**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1254	0.26	0.26	0.03	n/a	11.38	22.40	53.03	0.05	13.3	-363.7	
1259	0.49	0.75	0.05	n/a	11.40	22.35	52.92	0.04	8.99	-393.3	
1304	0.25	1.00	0.03	n/a	11.42	22.34	52.51	0.03	7.63	-373.5	
1309	0.25	1.25	0.03	n/a	11.42	22.27	52.20	0.04	6.85	-401.5	
1314	0.25	1.50	0.03	n/a	11.42	22.27	52.19	0.04	6.66	-446.2	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Matt Scheuer	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1321**	SAMPLING ENDED AT: **1342**
PUMP OR TUBING DEPTH IN WELL (feet): **42.95**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: Yes **SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No** TUBING Yes **No (replaced)**		DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
EW-10	1	PE	250mL	HNO3	--	--	6010B TAL Metals/ 7470A Hg	APP	
EW-10	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
EW-10	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
EW-10	1	PE	125mL	--	--	--	9056A_28D Chloride & Sulfate	APP	
EW-10	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
EW-10	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
EW-10	1	PE	500mL	--	--	--	2540C TDS	APP	
EW-10	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
EW-10	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Depth of water cannot be recorded with recovery wells.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings:-**pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **EW-11**	SAMPLE ID: **EW-11**	DATE: **11/21/2013**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH(ft btoc): 45.5 to 50.5	STATIC DEPTH TO WATER (ft btoc): **n/a**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= s (0.0026 gallons/foot X 47 feet) + 0.13 gallons = **0.26 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (ft btoc): **40.6**	FINAL PUMP OR TUBING DEPTH IN WELL (ft btoc): **40.6**	PURGING INITIATED AT: **1420**	PURGING ENDED AT:**1452**	TOTAL VOLUME PURGED (gallons): **1.75**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1427	0.26	0.26	0.03	n/a	8.23	22.80	83.97	1.1	9.87	-281.7	
1432	0.49	0.75	0.05	n/a	8.27	22.74	83.90	1.0	7.86	-310.5	
1437	0.25	1.00	0.03	n/a	8.24	22.74	83.81	1.0	7.22	-321.5	
1442	0.25	1.25	0.03	n/a	8.17	22.71	83.45	0.8	6.66	-326.8	
1447	0.25	1.50	0.03	n/a	8.15	22.67	83.22	0.7	6.76	-263.8	
1452	0.25	1.75	0.03	n/a	8.20	22.64	83.38	0.6	6.51	-329.4	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Matt Scheuer	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1458**	SAMPLING ENDED AT: **1522**
PUMP OR TUBING DEPTH IN WELL (feet): **40.6**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: Yes **SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No** TUBING Yes **No (replaced)**		DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
EW-11	1	PE	250mL	HNO3	--	--	6010B TAL Metals/ 7470A Hg	APP	
EW-11	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
EW-11	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
EW-11	1	PE	125mL	--	--	--	9056A_28D Chloride & Sulfate	APP	
EW-11	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
EW-11	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
EW-11	1	PE	500mL	--	--	--	2540C TDS	APP	
EW-11	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
EW-11	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Depth of water cannot be recorded with recovery wells.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings:-**pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-1A**	SAMPLE ID: **MW-1A**	DATE: **9/6/2013**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH(ft btoc): **18 to 23**	STATIC DEPTH TO WATER (ft btoc): **7.7**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= s (0.0026 gallons/foot X 47 feet) + 0.13 gallons = **0.18 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (ft btoc): **20.5**	FINAL PUMP OR TUBING DEPTH IN WELL (ft btoc): **20.5**	PURGING INITIATED AT: **0802**	PURGING ENDED AT: **0838**	TOTAL VOLUME PURGED (gallons): **1.5**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
0808	0.18	0.18	0.02	7.84	5.95	24.45	13.61	22.2	9.28	-124.6	
0813	0.32	0.5	0.03	7.85	5.93	24.48	13.58	10.2	11.5	-155.4	
0813	0.25	0.75	0.03	7.89	5.89	24.45	13.65	5.9	14.4	-174.5	
0823	0.25	1.00	0.03	7.89	5.86	24.48	13.77	4.5	13.0	-188.6	
0828	0.25	1.25	0.03	7.89	5.86	24.53	13.86	4.3	13.5	-196.1	
0833	0.25	1.5	0.03	7.89	5.84	24.54	13.93	3.8	12.8	-201.7	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Matt Scheuer	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **0842**	SAMPLING ENDED AT: **0901**
PUMP OR TUBING DEPTH IN WELL (feet): **20.5**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: Yes **SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No** TUBING Yes **No (replaced)**		DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
MW-1A	1	PE	250mL	HNO3	--	--	6010B TAL Metals/ 7470A Hg	APP	
MW-1A	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-1A	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-1A	1	PE	125mL	--	--	--	9056A_28D Chloride & Sulfate	APP	
MW-1A	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-1A	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-1A	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-1A	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-1A	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings: **pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-1B**	SAMPLE ID: **MW-1B**	DATE: **8/29/2013**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc) **33 to 38**	STATIC DEPTH TO WATER (feet btoc): **7.41**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 44 feet) + 0.13 gallons = **0.23 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **35.5**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **35.5**	PURGING INITIATED AT: **1010**	PURGING ENDED AT: **1046**	TOTAL VOLUME PURGED (gallons): **~3.75**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1011	0.23	0.23	0.03	7.65	6.14	28.0	8.742	17.9	12.5	-229.7	
1016	0.25	0.48	--Skipped--								
1021	1.25	1.73	--	7.53	6.04	24.61	8.953	3.1	13.9	-189.2	
1026	0.50	2.23	0.05	7.81	6.08	24.93	6.801	2.5	12.0	-181.7	
1031	0.50	2.73	0.05	7.5	6.10	24.95	6.644	2.0	13.4	-165.6	
1036	0.23	2.96	0.03	7.45	6.11	25.62	6.557	1.6	12.8	-155.1	
1041	0.52	3.48	0.05	7.5	6.10	25.90	6.539	1.4	12.6	-153.5	
1046	0.25	3.73	0.03	7.5	6.09	25.93	6.507	1.1	11.6	-145.3	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Tanya Chuprikova	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1050**	SAMPLING ENDED AT: **1108**
PUMP OR TUBING DEPTH IN WELL (feet): **35.5**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No** TUBING Y **No (replaced)**		DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
MW-1B	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-1B	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-1B	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-1B	1	PE	125mL	--	--	--	9056A_28D Chloride & Sulfate	APP	
MW-1B	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-1B	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-1B	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-1B	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-1B	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings:-**pH:** $\pm$ 0.1 unit **Specific Conductance:** $\pm$ 5% **Dissolved Oxygen:** all readings $\leq$ 10% saturation; optionally, $\pm$ 0.2 mg/L **Turbidity:** all readings $\leq$ 10 NTU; or $\pm$ 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-1C**	SAMPLE ID: **MW-1C**	DATE: **8/30/2013**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc): **48 to 53**	STATIC DEPTH TO WATER (feet btoc): **8.95**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 44 feet) + 0.13 gallons = **0.27 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **50.5**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **50.5**	PURGING INITIATED AT: **0924**	PURGING ENDED AT: **1001**	TOTAL VOLUME PURGED (gallons): **2.0**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
0926	0.27	0.27	0.03	9.5	8.51	24.21	49.78	6.1	15.5	-117.0	
0931	0.23	0.50	0.02	9.45	8.44	24.74	50.24	5.2	5.31	-167.5	
0936	0.25	0.75	0.03	9.45	8.46	24.86	51.37	4.1	4.85	-185.0	
0941	0.25	1.0	0.03	9.45	8.62	24.82	52.17	2.7	3.33	-184.3	
0946	0.25	1.25	0.03	9.45	8.88	24.91	52.51	1.8	3.63	-195.5	
0951	0.25	1.5	0.03	9.45	8.94	24.96	52.74	1.3	3.18	-206.1	
0956	0.25	1.75	0.03	9.45	8.98	24.95	52.90	1.0	2.98	-245.9	
1001	0.25	2.0	0.03	9.45	8.98	25.00	52.94	0.8	3.49	-260.0	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Tanya Chuprikova/Matt Scheauer	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1007**	SAMPLING ENDED AT: **1030**
PUMP OR TUBING DEPTH IN WELL (feet): **50.5**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No**	TUBING Y **No (replaced)**	DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION					
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
MW-1C	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-1C	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-1C	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-1C	1	PE	125mL	--	--	--	9056A_28D Chloride & Sulfate	APP	
MW-1C	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-1C	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-1C	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-1C	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-1C	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings:-**pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-2A**	SAMPLE ID: **MW-2A**	DATE: **9/6/2013**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc): **18 to 23**	STATIC DEPTH TO WATER (feet btoc): **n/a**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 37 feet) + 0.13 gallons = **0.20 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **23**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **23**	PURGING INITIATED AT: **0815**	PURGING ENDED AT: **0854**	TOTAL VOLUME PURGED (gallons): **~2.5**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
0819	0.2	0.2	0.02	7.79	7.07	23.75	7.157	43.1	8.35	-81.9	
0824	0.2	0.4	0.02	7.81	7.07	23.43	7.334	34.5	7.11	-119.7	
0829	0.3	0.7	0.03	7.81	7.09	23.22	7.468	31.5	8.54	-131.5	
0834	0.5	1.2	0.05	--Skipped--					9.54		
0839	0.4	1.6	0.04	7.81	6.73	23.94	8.123	14.4	8.79	-205.4	
0844	0.3	1.9	0.03	7.80	6.77	23.94	7.892	2.0	9.53	-221.3	
0849	0.25	2.15	0.03	7.81	6.82	23.99	7.885	0.8	8.76	-217.8	
0854	0.35	2.5	0.04	7.80	6.84	20.04	7.887	0.8	9.07	-221.0	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Ken Stuart	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **0854**	SAMPLING ENDED AT: **0915**
PUMP OR TUBING DEPTH IN WELL (feet): **23**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No**	TUBING Y **No (replaced)**	DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
MW-2A	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-2A	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-2A	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-2A	1	PE	125mL	--	--	--	9056A_28D Chloride & Sulfate	APP	
MW-2A	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-2A	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-2A	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-2A	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-2A	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings:-**pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-2B**	SAMPLE ID: **MW-2B**	DATE: **8/30/2013**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc): **33 to 38**	STATIC DEPTH TO WATER (feet btoc): **7.7**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 44 feet) + 0.13 gallons = **0.23 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **35.5**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **35.5**	PURGING INITIATED AT: **1203**	PURGING ENDED AT: **1157**	TOTAL VOLUME PURGED (gallons): **1.75**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1127	0.23	0.23	0.02	7.2	6.2	24.00	6.572	14.9	5.21	-75.0	
1132	0.27	0.50	0.03	7.16	6.18	24.01	6.856	3.1	4.46	-103.8	
1137	0.25	0.75	0.03	7.16	6.22	23.93	6.666	0.8	5.69	-122.5	
1142	0.25	1.0	0.03	7.16	6.29	23.94	6.525	0.4	5.67	-134.6	
1147	0.25	1.25	0.03	7.16	6.34	24.07	6.441	0.4	6.62	-140.7	
1152	0.25	1.5	0.03	7.16	6.38	24.24	6.395	0.4	6.47	-145.4	
1157	0.25	1.75	0.03	7.16	6.39	24.19	6.367	0.2	6.57	-150.3	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Matt Scheauer	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1203**	SAMPLING ENDED AT: **1219**
PUMP OR TUBING DEPTH IN WELL (feet): **25.5**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No** TUBING Y **No (replaced)**		DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION					
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
MW-2B	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-2B	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-2B	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-2B	1	PE	125mL	--	--	--	9056A_28D Chloride & Sulfate	APP	
MW-2B	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-2B	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-2B	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-2B	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-2B	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings:-**pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-2C**	SAMPLE ID: **MW-2C**	DATE: **8/27/2013**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc) **48 to 53**	STATIC DEPTH TO WATER (feet btoc): **7.1**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 44 feet) + 0.13 gallons = **0.27 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **50.5**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **50.5**	PURGING INITIATED AT: **1529**	PURGING ENDED AT: **1559**	TOTAL VOLUME PURGED (gallons): **~1.5**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1535	0.27	0.27	0.03	8.9	8.89	25.33	40.85	1.8	27.4	-241.3	
1539	0.25	0.52	0.03	9.9	8.74	27.67	41.11	0.4	9.64	-304.2	
1544	0.25	0.77	0.03	10.38	8.70	27.92	41.33	0.4	8.0	-323.8	
1549	0.25	1.02	0.03	10.8	8.69	27.15	41.37	0.5	8.36	-337.4	
1554	0.25	1.27	0.03	11.1	8.69	28.06	41.31	0.5	9.2	-344.5	
1559	0.25	1.52	0.03	11.35	8.71	28.15	41.47	0.5	8.53	-352.6	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Tanya Chuprikova	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1604**	SAMPLING ENDED AT: **1647**
PUMP OR TUBING DEPTH IN WELL (feet): **50.5**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No** TUBING Y **No (replaced)**		DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
MW-2C	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-2C	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-2C	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-2C	1	PE	125mL	--	--	--	9056A_28D Chloride & Sulfate	APP	
MW-2C	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-2C	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-2C	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-2C	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-2C	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level could not stabilize, pump was at lowest setting.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings:-**pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-3A**	SAMPLE ID: **MW-3A**	DATE: **9/6/2013**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc): **18 to 23**	STATIC DEPTH TO WATER (feet btoc): **8.00**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 44 feet) + 0.13 gallons = **0.20 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **20.5**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **20.5**	PURGING INITIATED AT: **0802**	PURGING ENDED AT: **0905**	TOTAL VOLUME PURGED (gallons): **3.20**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
805	0.20	0.20	0.02	9.05	7.16	24.53	35.06	25.1	64.0	-118.9	
810	0.25	0.45	0.03	9.4	7.20	24.54	35.27	4.2	39.8	-203.1	
815	0.25	0.70	0.03	9.37	7.21	24.64	35.28	2.3	39.4	-217.5	
820	0.25	0.95	0.03	9.35	6.57	24.63	35.21	1.9	33.1	-240.0	
825	0.25	1.20	0.03	9.32	6.64	24.68	35.0	3.8	29.2	-249.2	
830	0.25	1.45	0.03	9.35	6.68	24.70	34.57	4.5	23.9	-256.7	
835	0.25	1.75	0.03	9.3	6.69	24.70	34.22	6.7	21.6	-266.5	
840	0.25	1.95	0.03	9.28	6.70	24.71	33.94	6.8	21.7	-272.6	
845	0.25	2.20	0.03	9.27	7.22	24.76	33.56	8.4	19.9	-280.8	
850	0.25	2.45	0.03	9.26	7.19	24.78	33.12	7.7	19.0	-283.2	
855	0.25	2.70	0.03	9.26	7.16	24.81	32.80	7.9	17.0	-288.5	
900	0.25	2.95	0.03	9.26	7.14	24.87	32.32	7.4	16.9	-291.1	
905	0.25	3.20	0.03	9.26	7.14	24.93	31.82	8.7	n/a	-291.7	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Tanya Chuprikova	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **910**	SAMPLING ENDED AT: **n/a**
PUMP OR TUBING DEPTH IN WELL (feet): **20.5**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No** TUBING Y **No (replaced)**		DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
MW-3A	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-3A	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-3A	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-3A	1	PE	125mL	--	--	--	9056A_28D Chloride & Sulfate	APP	
MW-3A	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-3A	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-3A	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-3A	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-3A	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings:-**pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-105C**	SAMPLE ID: **MW-105C**	DATE: **8/30/2013**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc): **40.0 to 42.5**	STATIC DEPTH TO WATER (feet btoc): **5.96**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 44 feet) + 0.13 gallons = **0.25 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **41.5**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **41.5**	PURGING INITIATED AT: **1041**	PURGING ENDED AT: **1145**	TOTAL VOLUME PURGED (gallons):

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1045	0.25	0.25	0.03	6.21	6.37	27.60	3.360	49.0	69.5	-136.9	
1050	0.05	0.3	0.01	6.21	7.74	27.04	3.209	9.0	84.8	-131.7	
1055	0.15	0.45	0.02	6.21	10.83	26.60	3.155	3.4	94.8	-132.7	
1100	0.35	0.8	0.04	6.21	10.91	26.87	3.102	0.9	101.0	-152.5	
1105	0.25	1.05	0.03	6.21	10.95	27.09	3.097	0.6	100.0	-155.8	
1110	0.2	1.25	0.02	6.21	10.96	27.13	3.105	0.4	98.3	-165.4	
1115	0.3	1.55	0.03	6.21	11.0	27.16	3.142	0.3	99.2	-167.9	
1120	0.2	1.75	0.02	6.21	11.02	27.05	3.144	0.3	101.0	-170.9	
1125	0.25	2.00	0.03	6.21	11.03	27.16	3.149	0.4	98.7	-176.6	
1130	0.20	2.20	0.02	6.21	11.04	27.06	3.163	0.3	96.6	-176.6	
1135	0.15	2.35	0.02	6.21	11.05	27.31	3.169	0.3	95.0	-181.0	
1140	0.15	2.50	0.02	6.21	11.06	27.38	3.178	0.3	96.9	-183.5	
1145	0.3	2.90	0.03	6.21	11.08	27.20	3.193	0.4	95.4	-189.2	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Michael Epps	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1147**	SAMPLING ENDED AT: **1215**
PUMP OR TUBING DEPTH IN WELL (feet): **41.5**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No** TUBING Y **No (replaced)**		DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
MW-105C	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-105C	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-105C	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-105C	1	PE	125mL	--	--	--	9056A_28D Chloride & Sulfate	APP	
MW-105C	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-105C	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-105C	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-105C	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-105C	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters. 7470 Mercury (field filtered) sample collected due to high turbidity (above 50 NTU).

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings:-**pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-105A**	SAMPLE ID: **MW-105A**	DATE: **9/4/2013**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc): **9.4 to 19.4**	STATIC DEPTH TO WATER (feet btoc): **6.3**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 44 feet) + 0.13 gallons = **0.18 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **14.4**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **14.4**	PURGING INITIATED AT: **0912**	PURGING ENDED AT: **0959**	TOTAL VOLUME PURGED (gallons): **2.5**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
0914	0.32	0.18	0.03	6.37	5.20	26.00	0.543	19.4	1.85	-131.4	
0919	0.25	0.5	0.03	6.37	5.19	26.13	0.541	11.8	1.57	-157.6	
0924	0.25	0.75	0.03	6.37	5.29	26.24	0.536	8.0	0.68	-186.5	
0929	0.24	1.0	0.03	6.37	5.28	26.20	0.530	7.5	0.71	-200.1	
0934	0.25	1.25	0.03	6.37	5.29	26.37	0.527	6.2	0.66	-208.7	
0939	0.25	1.5	0.03	6.37	5.31	26.41	0.522	5.6	0.65	-216.6	
0944	0.25	1.75	0.03	6.37	5.30	26.43	0.521	5.6	0.63	-221.3	
0949	0.25	2.0	0.03	6.37	5.31	26.43	0.518	5.3	0.61	-224.2	
0954	0.25	2.25	0.03	6.37	5.28	26.45	0.515	5.4	0.69	-228.2	
0959	0.25	2.50	0.03	6.37	5.30	26.53	0.514	5.3	0.68	-231.0	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Matt Scheauer	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1007**	SAMPLING ENDED AT: **1027**
PUMP OR TUBING DEPTH IN WELL (feet): **14.4**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No** TUBING Y **No (replaced)**		DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION					
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
MW-105A	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-105A	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-105A	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-105A	1	PE	125mL	--	--	--	9056A_28D Chloride & Sulfate	APP	
MW-105A	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-105A	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-105A	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-105A	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-105A	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings: **pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-105B**	SAMPLE ID: **MW-105B**	DATE: **9/4/2013**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc): **26.9 to 28.4**	STATIC DEPTH TO WATER (feet btoc): **6.13**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 44 feet) + 0.13 gallons = **0.21 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **27.65**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **27.65**	PURGING INITIATED AT: **1110**	PURGING ENDED AT: **1158**	TOTAL VOLUME PURGED (gallons): **2.5**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1112	0.21	0.21	0.02	6.19	5.37	25.55	0.792	25.7	3.58	-174.4	
1117	0.29	0.5	0.03	6.18	5.66	26.03	0.966	9.1	2.47	-200.0	
1122	0.25	0.75	0.03	6.18	5.62	26.17	1.017	5.8	3.33	-210.7	
1127	0.25	1.0	0.03	6.18	6.44	26.01	1.038	5.5	2.65	-215.3	
1132	0.25	1.25	0.03	6.18	6.43	26.04	1.040	5.3	2.66	-224.4	
1137	0.25	1.5	0.03	6.18	6.42	26.10	1.038	4.7	2.83	-230.3	
1142	0.25	1.75	0.03	6.18	6.44	25.88	1.031	2.0	2.71	-230.9	
1147	0.25	2.0	0.03	6.18	6.44	26.09	1.027	2.7	3.02	-230.9	
1152	0.25	2.25	0.03	6.18	6.43	26.03	1.024	1.8	3.26	-235.9	
1157	0.25	2.50	0.03	6.18	6.44	26.13	1.025	2.3	2.97	-234.0	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Matt Scheuer	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1205**	SAMPLING ENDED AT: **1225**
PUMP OR TUBING DEPTH IN WELL (feet): **27.65**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No** TUBING Y **No (replaced)**		DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION					
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
MW-105B	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-105B	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-105B	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-105B	1	PE	125mL	--	--	--	9056A_28D Chloride & Sulfate	APP	
MW-105B	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-105B	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-105B	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-105B	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-105B	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters. Purge water is brown, sulfur-like odor.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings: **pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-112C**	SAMPLE ID: **MW-112C**	DATE: **9/5/2013**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc): **45.5 to 47.5**	STATIC DEPTH TO WATER (feet btoc): **n/a**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 37 feet) + 0.13 gallons = **0.26 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **47.5**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **47.5**	PURGING INITIATED AT: **0832**	PURGING ENDED AT: **0905**	TOTAL VOLUME PURGED (gallons): **~2**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1028	0.26	0.26	0.03	5.92	9.28	22.83	35.58	5.0	8.98	-373.2	
1033	0.24	0.5	0.02	5.93	8.51	22.83	38.23	4.0	10.3	-408.1	
1038	0.3	0.8	0.03	5.94	7.63	22.81	38.46	3.2	11.0	-428.7	
1043	0.45	1.25	0.05	5.94	7.69	22.85	38.25	2.5	11.8	-445.0	
1048	0.45	1.7	0.05	5.99	7.75	22.78	37.63	3.2	12.6	-472.5	
1053	0.4	2.1	0.04	5.98	7.85	22.81	37.17	2.3	12.4	-483.0	
1058	0.5	2.6	0.05	6.02	7.90	22.76	36.75	2.0	13.6	-472.1	
1106	0.5	3.1	0.05	6.03	7.91	22.70	36.16	2.6	11.9	-469.0	
1111	0.5	3.5	0.05	5.92	8.11	22.90	35.77	2.7	12.1	-438.9	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Ken Stuart	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **0905**	SAMPLING ENDED AT: **0929**
PUMP OR TUBING DEPTH IN WELL (feet): **47.5**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No**	TUBING Y **No (replaced)**	DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION					
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
MW-112C	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-112C	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-112C	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-112C	1	PE	125mL	--	--	--	9056A_28D Chloride & Sulfate	APP	
MW-112C	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-112C	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-112C	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-112C	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-112C	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings:-**pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-113C**	SAMPLE ID: **MW-113C**	DATE: **9/3/2013**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc): **46.7 to 48.2**	STATIC DEPTH TO WATER (feet btoc): **n/a**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 37 feet) + 0.13 gallons = **0.26 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **48.2**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **46**	PURGING INITIATED AT: **1355**	PURGING ENDED AT: **1425**	TOTAL VOLUME PURGED (gallons):

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1356	0.25	0.26	0.03	5.52	10.21	27.20	2.057	20.6	121	-118.0	
1401		--Skipped--									
1406	--	1.26	0.03	6.29	11.62	25.26	30.77	19.4	10.0	-130.6	
1411	0.25	1.51	0.03	8.99	12.03	25.90	31.12	3.1	6.72	-136.2	
1416	0.25	1.76	0.03	9.55	12.88	26.95	31.14	2.8	3.31	-155.0	
1421	0.24	2.0	0.03	10.31	12.88	27.41	31.33	3.0	4.26	-149.9	
1426	0.26	2.26	0.03	10.57	12.91	22.10	31.26	2.8	7.10	-163.0	
1431	0.25	2.51	0.03	10.77	12.91	27.57	31.37	2.3	3.18	-166.8	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Ken Stuart	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1435**	SAMPLING ENDED AT: **n/a**
PUMP OR TUBING DEPTH IN WELL (feet): **46**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No**	TUBING Y **No (replaced)**	DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION					
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
MW-113C	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-113C	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-113C	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-113C	1	PE	125mL	--	--	--	9056A_28D Chloride & Sulfate	APP	
MW-113C	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-113C	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-113C	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-113C	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-113C	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings:-**pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-115A**	SAMPLE ID: **MW-115A**	DATE: **9/6/2013**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc): **14.4 to 19.4**	STATIC DEPTH TO WATER (feet btoc): **n/a**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 37 feet) + 0.13 gallons = **0.19 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **19.4**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **19.4**	PURGING INITIATED AT: **1243**	PURGING ENDED AT: **1318**	TOTAL VOLUME PURGED (gallons): **~2.5**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1245	0.19	0.19	0.02	6.92	7.13	24.83	5.739	50.0	5.06	-186.5	
1250	0.41	0.6	0.04	6.86	5.84	24.14	5.160	4.7	5.06	-214.6	
1255	0.4	1.0	0.04	6.89	5.47	23.59	5.226	2.9	4.14	-225.4	
1300	0.4	1.4	0.04	6.91	5.37	23.41	5.228	2.3	7.34	-233.9	
1305	0.3	1.7	0.03	6.87	5.28	23.54	5.254	2.4	6.37	-235.6	
1310	0.4	2.1	0.04	6.86	5.25	23.50	5.285	2.3	8.16	-239.3	
1315	0.4	2.5	0.04	6.86	5.23	23.68	5.335	1.9	5.67	-236.8	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Ken Stuart	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1320**	SAMPLING ENDED AT: **n/a**
PUMP OR TUBING DEPTH IN WELL (feet): **19.4**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No** TUBING Y **No (replaced)**		DUPLICATE: **Yes**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION					
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
MW-115A	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-115A	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-115A	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-115A	1	PE	125mL	--	--	--	9056A_28D Chloride & Sulfate	APP	
MW-115A	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-115A	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-115A	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-115A	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-115A	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings:-**pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-115B**	SAMPLE ID: **MW-115B**	DATE: **9/5/2013**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH(ft btoc): **30.5 to 32**	STATIC DEPTH TO WATER (ft btoc): **6.16**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= s (0.0026 gallons/foot X 47 feet) + 0.13 gallons = **0.22 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (ft btoc): **31.25**	FINAL PUMP OR TUBING DEPTH IN WELL (ft btoc): **31.25**	PURGING INITIATED AT: **1427**	PURGING ENDED AT: **1451**	TOTAL VOLUME PURGED (gallons): **1.25**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1430	0.27	0.22	0.03	6.22	9.0	24.30	4.134	18.0	5.47	-90.6	
1435	0.28	0.5	0.03	6.22	8.98	23.48	4.528	0.7	4.88	-147.8	
1440	0.25	0.75	0.03	6.22	9.02	23.24	4.581	0.2	4.81	-136.0	
1445	0.25	1.00	0.03	6.22	9.03	23.29	4.617	0.2	4.82	-136.0	
1450	0.25	1.25	0.03	6.22	9.03	23.35	4.633	0.2	4.84	-137.3	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Matt Scheuer	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1457**	SAMPLING ENDED AT: **1516**
PUMP OR TUBING DEPTH IN WELL (feet): **31.25**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: Yes **SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No** TUBING Yes **No (replaced)**		DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
MW-115B	1	PE	250mL	HNO3	--	--	6010B TAL Metals/ 7470A Hg	APP	
MW-115B	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-115B	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-115B	1	PE	125mL	--	--	--	9056A_28D Chloride & Sulfate	APP	
MW-115B	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-115B	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-115B	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-115B	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-115B	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings: **pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-115C**	SAMPLE ID: **MW-115C**	DATE: **8/27/2013**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc): **42.7 to 44.2**	STATIC DEPTH TO WATER (feet btoc): **6.69**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 44 feet) + 0.13 gallons = **0.25 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **43.5**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **43.5**	PURGING INITIATED AT: **1531**	PURGING ENDED AT: **1605**	TOTAL VOLUME PURGED (gallons): **1.5**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1535	0.25	0.25	0.03	7.35	8.59	24.81	49.05	2.5	10.7	-157.8	
1540	0.25	0.5	0.03	7.32	8.59	24.87	48.58	1.8	8.75	-180.0	
1545	0.25	0.75	0.03	7.31	8.77	24.27	48.67	1.5	7.42	-244.9	
1550	0.25	1.0	0.03	7.31	8.89	24.21	48.41	1.8	6.19	-203.0	
1555	0.25	1.25	0.03	7.30	9.02	24.02	48.33	1.5	5.53	-192.7	
1600	0.15	1.4	0.02	7.30	9.08	24.59	48.51	1.6	4.83	-270.0	
1605	0.10	1.5	0.01	7.30	9.07	24.25	48.30	1.0	4.38	-298.1	1.030

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Michael Epps	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1606**	SAMPLING ENDED AT: **1636**
PUMP OR TUBING DEPTH IN WELL (feet): **43.5**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No**	TUBING Y **No (replaced)**	DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION					
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
MW-115C	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-115C	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-115C	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-115C	1	PE	125mL	--	--	--	9056A_28D Chloride & Sulfate	APP	
MW-115C	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-115C	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-115C	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-115C	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-115C	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings:-**pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-352A**	SAMPLE ID: **MW-352A**	DATE: **9/5/2013**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc): **30.4 to 31.9**	STATIC DEPTH TO WATER (feet btoc): **6.45**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 44 feet) + 0.13 gallons = **0.22 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **31.15**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **31.15**	PURGING INITIATED AT: **1052**	PURGING ENDED AT: **1154**	TOTAL VOLUME PURGED (gallons): **3.22**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1054	0.22	0.22	0.03	6.51	9.66	26.27	3.701	14.3	9.28	-52.6	
1059	0.25	0.47	0.03	6.53	11.09	25.80	3.585	2.1	72.8	-119.8	
1104	0.25	0.72	0.03	6.53	11.81	25.94	3.622	1.6	75.4	-447.5	
1109	0.25	0.97	0.03	6.5	12.48	26.90	3.584	1.4	77.1	-181.9	
1114	0.25	1.22	0.03	6.51	12.47	27.40	3.567	1.2	74.9	-188.6	
1119	0.25	1.47	0.03	6.5	12.44	27.64	3.547	1.2	74.7	-216.6	
1124	0.25	1.72	0.03	6.5	12.40	27.46	3.534	1.1	69.8	-238.1	
1129	0.25	1.97	0.03	6.5	12.38	27.44	3.507	1.0	75.4	-255.8	
1134	0.25	2.22	0.03	6.5	12.35	27.33	3.506	0.9	75.3	-266.6	
1139	0.25	2.47	0.03	6.51	12.33	26.99	3.478	0.8	76.2	-274.8	
1144	0.25	2.72	0.03	6.5	12.30	27.16	3.457	0.7	74.4	-280.0	
1149	0.25	2.97	0.03	6.5	12.28	27.54	3.465	0.7	78.4	-284.8	
1154	0.25	3.22	0.03	6.5	12.26	28.14	3.457	0.7	78.2	-285.6	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Tanya Chuprikova	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1154**	SAMPLING ENDED AT: **1255**
PUMP OR TUBING DEPTH IN WELL (feet): **31.15**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No** TUBING Y **No (replaced)**		DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
MW-352A	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-352A	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-352A	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-352A	1	PE	125mL	--	--	--	9056A_28D Chloride & Sulfate	APP	
MW-352A	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-352A	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-352A	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-352A	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-352A	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings:-**pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-352B**	SAMPLE ID: **MW-352B**	DATE: **9/3/2013**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc): **47.3 to 48.8**	STATIC DEPTH TO WATER (feet btoc): **7.0**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 44 feet) + 0.13 gallons = **0.26 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **48.1**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **48.1**	PURGING INITIATED AT: **1453**	PURGING ENDED AT: **1515**	TOTAL VOLUME PURGED (gallons): **1.5**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1455	0.26	0.26	0.03	7.35	9.51	26.19	18.73	44.0	51.6	-129.4	
1500	0.24	0.5	0.02	7.37	9.16	27.09	42.94	1.0	26.5	-245.5	
1505	0.5	1.0	0.05	7.35	11.50	26.90	52.32	0.1	7.39	-286.6	
1510	0.25	1.25	0.03	7.35	11.58	26.97	52.41	0.1	6.87	-296.8	
1515	0.25	1.5	0.03	7.34	11.53	26.94	52.44	0.1	6.01	-309.5	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Tanya Chuprikova	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1520**	SAMPLING ENDED AT: **1543**
PUMP OR TUBING DEPTH IN WELL (feet): **48.1**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No** TUBING Y **No (replaced)**		DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION					
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
MW-352B	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-352B	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-352B	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-352B	1	PE	125mL	--	--	--	9056A_28D Chloride & Sulfate	APP	
MW-352B	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-352B	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-352B	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-352B	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-352B	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters. Purge water is brown, sulfur-like odor.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings:-**pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-353B**	SAMPLE ID: **MW-353B**	DATE: **9/3/2013**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc): **42.2 to 43.7**	STATIC DEPTH TO WATER (feet btoc): **6.77**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 44 feet) + 0.13 gallons = **0.25 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **42.95**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **42.95**	PURGING INITIATED AT: **1115**	PURGING ENDED AT: **1143**	TOTAL VOLUME PURGED (gallons): **2.75**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1117	0.25	0.25	0.03	6.93	8.0	25.83	22.17	58.1	7.24	-29.7	
1122	0.25	0.50	0.03	7.0	9.90	23.71	45.21	0.2	7.33	-373.2	
1127	0.25	0.75	0.03	7.0	10.05	23.73	46.34	0.0	6.55	-418.8	
1132	0.25	1.0	0.03	7.03	10.09	23.73	46.77	0.0	6.82	-426.2	
1137	0.25	1.25	0.03	7.03	10.12	23.77	47.03	0.0	6.74	-434.6	
1142	0.25	1.5	0.03	7.03	10.14	23.78	47.16	0.0	6.81	-438.1	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Matt Scheauer	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1147**	SAMPLING ENDED AT: **1203**
PUMP OR TUBING DEPTH IN WELL (feet): **42.95**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No**	TUBING Y **No (replaced)**	DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION					
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
MW-353B	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-353B	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-353B	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-353B	1	PE	125mL	--	--	--	9056A_28D Chloride & Sulfate	APP	
MW-353B	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-353B	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-353B	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-353B	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-353B	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings:-**pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-357A**	SAMPLE ID: **MW-357A**	DATE: **8/28/2013**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc) **40.4 to 41.9**	STATIC DEPTH TO WATER (feet btoc): **5.85**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 44 feet) + 0.13 gallons = **0.24 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **41.15**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **41.15**	PURGING INITIATED AT: **1454**	PURGING ENDED AT: **1603**	TOTAL VOLUME PURGED (gallons): **~1.75**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1458	0.24	0.24	0.02	6.75	7.24	27.42	11.66	58.2	17.8	-237.9	
1503	0.1	0.34	0.01	7.39	15.48	26.32	16.31	5.7	19.5	-330.9	
1508	0.15	0.49	0.02	8.40	15.94	26.60	15.57	4.1	16.4	-339.7	
1513	0.05	0.54	0.01	8.85	14.16	26.46	15.00	3.7	16.7	-344.9	
1518	0.1	0.64	0.01	9.31	13.69	27.11	14.69	3.4	16.0	-350.0	
1523	0.1	0.74	0.01	9.85	13.83	28.69	14.23	2.8	14.5	-349.4	
1528	0.1	0.84	0.01	10.16	13.42	29.51	14.09	2.6	14.7	-349.1	
1533	0.1	0.94	0.01	10.67	13.72	30.28	13.86	2.1	13.3	-351.0	
1538	0.15	1.09	0.02	10.98	13.51	30.10	13.85	2.0	13.0	-351.8	
1543	0.2	1.29	0.02	11.28	13.56	29.89	13.81	1.9	15.3	-357.9	
1548	0.15	1.44	0.02	11.46	13.30	31.26	13.55	1.6	14.6	-362.7	
1553	0.1	1.54	0.01	11.63	14.55	31.80	14.53	1.4	13.5	-368.9	
1558	0.1	1.64	0.01	11.71	14.23	32.86	14.42	1.3	12.8	-358.4	
1603	0.1	1.74	0.01	11.83	14.01	33.09	14.43	1.4	13.1	-358.2	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Michael Epps	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1605**	SAMPLING ENDED AT: **1657**
PUMP OR TUBING DEPTH IN WELL (feet): **41.15**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No** TUBING Y **No (replaced)**		DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION					
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
MW-357A	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-357A	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-357A	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-357A	1	PE	125mL	--	--	--	9056A_28D Chloride & Sulfate	APP	
MW-357A	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-357A	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-357A	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-357A	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-357A	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level could not stabilize and pump purged as low as it can go.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings: **pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-357B**	SAMPLE ID: **MW-357B**	DATE: **8/28/2013**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc): **46.8 to 48.3**	STATIC DEPTH TO WATER (feet btoc): **6.59**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 44 feet) + 0.13 gallons = **0.26 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **47.55**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **47.55**	PURGING INITIATED AT: **1147**	PURGING ENDED AT: **1231**	TOTAL VOLUME PURGED (gallons): ~**2.25**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1151	0.26	0.26	0.03	7.08	14.10	25.77	4.410	58.1	24.4	-200.6	
1156	0.26	0.52	0.03	7.11	13.34	25.18	20.95	2.5	10.5	-358.4	
1201	0.24	0.76	0.03	7.08	13.18	24.42	21.34	2.3	7.58	-384.6	
1206	0.25	1.01	0.03	7.08	13.10	24.50	21.50	2.0	6.70	-360.1	
1211	0.25	1.26	0.03	7.08	12.17	25.19	21.32	2.0	7.05	-353.8	
1216	0.25	1.51	0.03	7.08	12.18	25.19	21.36	2.1	5.62	-372.9	
1221	0.25	1.76	0.03	7.08	11.49	25.02	21.37	1.4	6.26	-379.9	
1226	0.25	2.01	0.03	7.08	11.43	24.59	21.40	1.4	5.64	-402.2	
1231	0.25	2.26	0.03	7.08	11.08	24.71	21.40	1.3	5.47	-372.9	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Michael Epps	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1233**	SAMPLING ENDED AT: **1309**
PUMP OR TUBING DEPTH IN WELL (feet): **47.55**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No**	TUBING Y **No (replaced)**	DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION					
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
MW-357B	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-357B	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-357B	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-357B	1	PE	125mL	--	--	--	9056A_28D Chloride & Sulfate	APP	
MW-357B	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-357B	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-357B	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-357B	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-357B	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings:-**pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-358B**	SAMPLE ID: **MW-358B**	DATE: **9/4/2013**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc): **38.6 to 40.1**	STATIC DEPTH TO WATER (feet btoc): **n/a**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 37 feet) + 0.13 gallons = **0.24 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **40.1**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **40.1**	PURGING INITIATED AT: **1050**	PURGING ENDED AT: **1130**	TOTAL VOLUME PURGED (gallons): **~2**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1100	0.24	0.24	0.02	6.82	10.05	23.54	33.72	1.3	4.56	-329.0	
1105	0.36	0.6	0.04	6.82	12.58	22.71	34.09	1.1	6.42	-414.0	
1110	0.2	0.9	0.02	6.81	12.55	22.65	34.37	1.0	8.85	-430.7	
1115	0.5	1.4	0.05	6.81	12.47	22.60	34.55	1.0	8.16	-443.0	
1120	0.2	1.8	0.02	6.81	12.43	22.58	34.63	1.1	8.48	-455.7	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Ken Stuart	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1130**	SAMPLING ENDED AT: **1140**
PUMP OR TUBING DEPTH IN WELL (feet): **40.1**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No**	TUBING Y **No (replaced)**	DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION					
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
MW-358B	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-358B	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-358B	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-358B	1	PE	125mL	--	--	--	9056A_28D Chloride & Sulfate	APP	
MW-358B	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-358B	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-358B	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-358B	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-358B	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters. Purge water is brown, sulfur-like odor.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings:-**pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-501A**	SAMPLE ID: **MW-501A**	DATE: **8/29/2013**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc) **28.7 to 33.7**	STATIC DEPTH TO WATER (feet btoc): **4.57**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 44 feet) + 0.13 gallons = **0.22 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **31.2**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **31.2**	PURGING INITIATED AT: **1342**	PURGING ENDED AT: **1516**	TOTAL VOLUME PURGED (gallons): **4.5**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1346	0.22	0.22	0.02	4.62	6.72	27.24	0.771	24.5	n/a	-192.5	
1351	0.28	0.5	0.03	4.62	6.47	25.42	0.744	2.6	777	-180.0	
1356	0.25	0.75	0.03	4.62	6.55	25.27	0.756	4.0	160	-171.6	
1401	0.25	1.0	0.03	4.64	6.60	25.42	0.768	1.4	108	-159.8	
1406	0.25	1.25	0.03	4.63	6.62	25.36	0.777	1.0	129	-152.8	
1411	0.25	1.5	0.03	4.63	6.62	25.23	0.781	1.0	151	-152.7	
1416	0.25	1.75	0.03	4.63	6.64	25.35	0.786	0.7	95.8	-154.5	
1421	0.25	2.0	0.03	4.63	6.65	25.12	0.789	0.4	51.1	-154.2	
1426	0.25	2.25	0.03	4.63	6.66	25.21	0.792	0.3	24.4	-153.6	
1431	0.25	2.5	0.03	4.63	6.67	25.06	0.794	0.3	42.3	-155.5	
1436	0.25	2.75	0.03	4.63	6.68	25.20	0.797	0.0	17.8	-155.0	
1441	0.25	3.0	0.03	4.63	6.69	25.26	0.797	0.4	14.4	-156.6	
1446	0.25	3.25	0.03	4.63	6.71	25.02	0.798	0.4	25.5	-159.9	
1451	0.25	3.5	0.03	4.62	6.68	25.54	0.791	0.6	745	-158.6	
1456	0.25	3.75	0.03	4.62	6.70	25.38	0.799	0.4	25.8	-162.5	
1501	0.25	4.0	0.03	4.62	6.72	25.51	0.805	0.4	26.9	-165.3	
1506	0.25	4.25	0.03	4.62	6.71	25.55	0.805	0.4	17.2	-157.1	
1511	0.25	1.5	0.03	4.61	6.68	25.59	0.805	0.3	12.8	-150.4	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Tanya Chuprikova/Matt Scheauer	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1520**	SAMPLING ENDED AT: **1540**
PUMP OR TUBING DEPTH IN WELL (feet): **31.2**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No** TUBING Y **No (replaced)**		DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION					
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
MW-501A	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-501A	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-501A	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-501A	1	PE	125mL	--	--	--	9056A_28D Chloride & Sulfate	APP	
MW-501A	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-501A	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-501A	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-501A	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-501A	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings:-**pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-501B**	SAMPLE ID: **MW-501B**	DATE: **8/29/2013**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc) **40 to 45**	STATIC DEPTH TO WATER (feet btoc): **4.71**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 44 feet) + 0.13 gallons = **0.24 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **43**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **43**	PURGING INITIATED AT: **1437**	PURGING ENDED AT: **1545**	TOTAL VOLUME PURGED (gallons): ~**4.75**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1438	0.24	0.24	0.03	4.85	13.66	27.13	6.152	40.5	17.4	-71.3	
1443	0.26	0.50	0.03	4.82	9.77	25.16	6.092	10.3	17.7	-27.2	
1448	0.25	0.75	0.03	4.81	8.50	24.39	6.118	6.9	20.1	-24.2	
1453	0.45	1.2	0.05	4.82	12.30	25.12	6.488	3.5	25.7	-57.3	
1458	0.55	1.75	0.05	4.81	12.00	25.35	7.672	2.9	25.8	-81.2	
1503	0.50	2.25	0.05	4.81	10.54	25.48	8.540	2.9	24.0	-67.7	
1508	0.50	2.75	0.05	4.81	12.19	25.41	8.882	2.9	23.5	-95.5	
1513	0.25	3.00	0.03	4.81	10.14	25.31	9.15	2.5	22.7	-94.2	
1518	0.25	3.25	0.03	4.81	7.48	25.39	9.336	2.3	23.0	-91.5	
--Skipped readings to call lab--											
1530	0.5	3.75	0.05	4.81	4.20	25.21	9.610	2.2	22.1	-88.7	
1535	0.25	4.0	0.03	4.81	4.63	25.16	9.675	1.7	22.3	-87.5	
1540	0.25	4.25	0.03	4.81	7.69	25.05	9.797	1.7	22.2	-90.9	
1545	0.5	4.5	0.05	4.81	7.71	24.97	9.799	1.5	22.1	-97.9	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Tanya Chuprikova	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1547**	SAMPLING ENDED AT: **n/a**
PUMP OR TUBING DEPTH IN WELL (feet): **43**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No** TUBING Y **No (replaced)**		DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
MW-501B	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-501B	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-501B	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-501B	1	PE	125mL	--	--	--	9056A_28D Chloride & Sulfate	APP	
MW-501B	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-501B	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-501B	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-501B	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-501B	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters. Purge water is brown, sulfur-like odor. 7470 Mercury (field filtered) sample collected due to high turbidity (above 50 NTU).

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings:-**pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-502A**	SAMPLE ID: **MW-502A**	DATE: **8/29/2013**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc): **24.5 to 29.5**	STATIC DEPTH TO WATER (feet btoc): **4.09**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 44 feet) + 0.13 gallons = **0.21 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **27**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **27**	PURGING INITIATED AT: **1341**	PURGING ENDED AT: **1445**	TOTAL VOLUME PURGED (gallons): **~3.0**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1345	0.21	0.21	0.02	4.19	7.49	32.10	3.023	0.18	56.8	-226.4	
1350	0.2	0.51	0.02	4.19	5.64	30.53	2.705	0.06	59.0	-246.9	
1355	0.25	0.76	0.03	4.19	9.49	28.69	2.562	0.06	58.3	-261.0	
1400	0.25	1.01	0.03	4.19	9.53	29.94	2.566	0.04	59.9	-261.3	
1405	0.2	1.21	0.02	4.19	9.56	29.74	2.577	0.04	59.8	-277.8	
1410	0.2	1.41	0.02	4.19	9.57	30.00	2.601	0.03	60.0	-284.7	
1415	0.25	1.66	0.03	4.19	9.58	28.94	2.606	0.03	59.7	-296.3	
1420	0.15	1.81	0.03	4.19	9.61	30.25	2.609	0.03	62.9	-298.5	
1425	0.25	2.06	0.02	4.19	9.62	30.83	2.596	0.03	61.0	-297.4	
1430	0.15	2.21	0.02	4.19	9.61	30.73	2.576	0.02	60.9	-309.0	
1435	0.25	2.46	0.03	4.19	9.62	30.24	2.546	0.01	59.7	-315.9	
1440	0.2	2.66	0.02	4.19	9.62	30.26	2.542	0.01	60.1	-317.8	
1445	0.25	2.91	0.03	4.19	9.62	30.62	2.525	0.01	62.4	-321.0	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Michael Epps	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1447**	SAMPLING ENDED AT: **n/a**
PUMP OR TUBING DEPTH IN WELL (feet): **27**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No** TUBING Y **No (replaced)**		DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
MW-502A	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-502A	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-502A	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-502A	1	PE	125mL	--	--	--	9056A_28D Chloride & Sulfate	APP	
MW-502A	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-502A	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-502A	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-502A	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-502A	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters. 7470 Mercury (field filtered) sample collected due to high turbidity (above 50 NTU).

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings:-**pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-502B**	SAMPLE ID: **MW-502B**	DATE: **8/30/2013**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc): **36.4 to 41.4**	STATIC DEPTH TO WATER (feet btoc): **4.03**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 53 feet) + 0.13 gallons = **0.24 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **38.9**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **38.9**	PURGING INITIATED AT: **0903**	PURGING ENDED AT: **0936**	TOTAL VOLUME PURGED (gallons): **~1.85**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
0906	0.24	0.24	0.02	4.11	5.55	25.70	2.900	39.2	35.2	11.4	
0911	0.2	0.54	0.02	4.11	11.10	25.11	3.715	2.3	40.8	-101.6	
0916	0.25	0.79	0.03	4.11	11.13	24.96	3.729	2.0	41.0	-116.9	
0921	0.35	1.14	0.04	4.11	11.13	24.87	3.742	1.2	39.6	-134.1	
0926	0.25	1.39	0.03	4.11	11.14	24.92	3.750	1.3	40.3	-153.6	
0931	0.2	1.59	0.02	4.11	11.13	24.99	3.750	1.1	41.7	-164.8	
0936	0.25	1.84	0.03	4.11	11.13	25.08	3.751	1.1	39.1	-171.9	1.02

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Michael Epps	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **0938**	SAMPLING ENDED AT: **1009**
PUMP OR TUBING DEPTH IN WELL (feet): **38.9**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No**	TUBING Y **No (replaced)**	DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION					
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
MW-502B	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-502B	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-502B	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-502B	1	PE	125mL	--	--	--	9056A_28D Chloride & Sulfate	APP	
MW-502B	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-502B	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-502B	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-502B	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-502B	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings:-**pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-503B**	SAMPLE ID: **MW-503B**	DATE: **9/03/2013**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc): **42.1 to 47.1**	STATIC DEPTH TO WATER (feet btoc): **5.42**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 53 feet) + 0.13 gallons = **0.25 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **44.6**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **44.6**	PURGING INITIATED AT: **0847**	PURGING ENDED AT: **0948**	TOTAL VOLUME PURGED (gallons): **5.5**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
0907	0.25	0.25	0.03	6.08	5.91	25.09	4.430	5.1	11.4	11.3	
0912	0.5	0.75	0.05	6.47	5.36	23.00	4.117	1.9	10.7	36.5	
0917	0.5	1.25	0.05	6.3	5.18	23.08	4.160	1.5	5.26	42.0	
0922	0.75	2.0	0.08	6.29	5.03	23.08	4.398	1.4	4.72	45.2	
0927	0.75	2.75	0.08	6.29	4.98	23.09	4.466	1.4	3.24	45.5	
0932	0.75	3.5	0.08	6.29	4.98	23.04	4.609	1.3	3.55	43.7	
0937	0.75	4.25	0.08	6.29	4.96	23.12	4.770	1.2	3.26	42.6	
0942	0.75	5.0	0.08	6.29	4.95	23.12	4.850	1.2	2.98	42.9	
0947	0.5	5.5	0.05	6.29	4.96	23.14	4.923	1.2	3.24	41.8	1.00

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Matt Scheuer	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **0952**	SAMPLING ENDED AT: **1007**
PUMP OR TUBING DEPTH IN WELL (feet): **44.6**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No**	TUBING Y **No (replaced)**	DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION					
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
MW-503B	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-503B	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-502B	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-503B	1	PE	125mL	--	--	--	9056A_28D Chloride & Sulfate	APP	
MW-503B	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-503B	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-503B	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-503B	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-503B	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings:-**pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-504A**	SAMPLE ID: **MW-504A**	DATE: **8/29/2013**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc) **28.8 to 33.8**	STATIC DEPTH TO WATER (feet btoc): **4.65**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 44 feet) + 0.13 gallons = **0.22 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **31.3**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **31.3**	PURGING INITIATED AT: **1005**	PURGING ENDED AT: **1113**	TOTAL VOLUME PURGED (gallons): **4.75**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1008	0.22	0.22	0.02	4.92	7.92	26.46	6.071	17.1	11.1	-107.71	
1013	0.33	0.5	0.03	4.92	7.50	26.05	6.303	1.1	11.3	-159.9	
1018	0.25	0.75	0.03	4.91	7.32	25.95	6.302	1.0	12.2	-194.3	
1023	0.5	1.25	0.05	4.91	7.29	25.94	6.288	3.7	13.2	-211.4	
1028	0.5	1.75	0.05	4.91	7.39	25.98	6.286	2.2	13.4	-224.4	
1033	0.5	2.25	0.05	4.91	7.49	25.96	6.309	1.1	13.0	-231.1	
1038	0.25	2.5	0.03	4.92	7.64	25.91	6.322	0.5	13.1	-238.6	
1043	0.5	3.0	0.05	4.94	7.72	25.72	6.332	0.5	13.1	-241.1	
1048	0.5	3.5	0.05	4.94	7.80	25.64	6.349	0.3	13.6	-247.0	
1053	0.25	3.75	0.03	4.94	8.11	25.87	6.376	0.3	15.7	-250.4	
1058	0.25	4.0	0.03	4.90	8.11	25.99	6.398	0.4	15.8	-255.4	
1103	0.25	4.25	0.03	4.91	8.08	26.13	6.449	0.2	16.8	-260.7	
1108	0.25	4.5	0.03	4.85	8.04	26.31	6.495	0.1	15.5	-262.3	
1113	0.25	4.75	0.03	4.86	8.02	26.37	6.542	0.1	16.2	-264.6	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Tanya Chuprikova/Matt Scheauer	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1118**	SAMPLING ENDED AT: **1134**

PUMP OR TUBING DEPTH IN WELL (feet): **31.3**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**

FIELD DECONTAMINATION: PUMP Y **No** TUBING Y **No (replaced)** DUPLICATE: **No**

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
MW-504A	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-504A	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-504A	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-504A	1	PE	125mL	--	--	--	9056A_28D Chloride & Sulfate	APP	
MW-504A	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-504A	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-504A	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-504A	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-504A	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings: **pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-504B**	SAMPLE ID: **MW-504B**	DATE: **8/29/2013**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc): **38.8 to 43.8**	STATIC DEPTH TO WATER (feet btoc): **4.8**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 44 feet) + 0.13 gallons = **0.24 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **41.3**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **41.3**	PURGING INITIATED AT: **0848**	PURGING ENDED AT: **0921**	TOTAL VOLUME PURGED (gallons): **2.0**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
0851	0.24	0.24	0.02	4.86	11.10	25.66	9.960	7.0	19.7	-117.6	
0856	0.26	0.50	0.03	4.9	11.41	25.98	11.04	1.8	20.5	-238.3	
0901	0.25	0.75	0.03	4.85	11.22	26.07	11.16	1.5	19.4	-279.0	
0906	0.25	1.0	0.03	4.85	11.10	26.35	11.25	1.6	19.9	-300.6	
0911	0.25	1.25	0.03	4.85	11.21	26.50	11.41	1.9	18.6	-326.8	
0916	0.25	1.5	0.03	4.87	11.17	26.52	11.53	2.2	19.5	-339.6	
0921	0.25	2.0	0.03	4.87	11.20	26.66	11.62	2.3	19.5	-346.7	1.02

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Tanya Chuprikova/Matt Scheauer	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **0927**	SAMPLING ENDED AT: **0950**
PUMP OR TUBING DEPTH IN WELL (feet): **41.3**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No**	TUBING Y **No (replaced)**	DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION					
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
MW-504B	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-504B	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-504B	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-504B	1	PE	125mL	--	--	--	9056A_28D Chloride & Sulfate	APP	
MW-504B	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-504B	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-504B	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-504B	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-504B	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings:-**pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-505A**	SAMPLE ID: **MW-505A**	DATE: **8/29/2013**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc): **28.1 to 33.1**	STATIC DEPTH TO WATER (feet btoc): **4.28**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 44 feet) + 0.13 gallons = **0.22 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **30.6**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **30.6**	PURGING INITIATED AT: **0858**	PURGING ENDED AT: **1002**	TOTAL VOLUME PURGED (gallons): **~2.00**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
0902	0.22	0.22	0.02	4.33	8.80	27.01	5.299	27.6	8.80	-44.9	
0907	0.15	0.37	0.02	4.33	9.15	28.87	5.737	1.9	8.89	-150.9	
0912	0.2	0.57	0.02	4.33	9.22	26.88	6.090	1.0	8.51	-206.3	
0917	0.15	0.72	0.02	4.33	9.23	27.20	6.148	1.0	8.47	-214.7	
0922	0.2	0.92	0.02	4.33	9.20	27.16	6.302	0.7	12.9	-250.9	
0927	0.2	1.12	0.02	4.33	9.18	27.25	6.341	0.7	13.1	-257.7	
0932	0.1	1.22	0.01	4.33	9.17	27.31	6.535	0.7	14.7	-269.5	
0937	0.15	1.37	0.02	4.33	9.14	27.66	6.392	0.6	14.5	-283.7	
0942	0.25	1.62	0.03	4.33	9.13	27.68	6.412	0.5	15.6	-291.2	
0947	0.1	1.72	0.01	4.33	9.11	27.81	6.416	0.5	15.3	-299.2	
0952	0.1	1.82	0.01	4.33	9.10	28.05	6.411	0.4	16.9	-288.4	
0957	0.1	1.92	0.01	4.33	9.08	28.39	6.417	0.6	16.6	-292.7	
1002	0.1	2.02	0.01	4.33	9.08	28.54	6.429	0.4	16.8	-302.1	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Michael Epps	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1004**	SAMPLING ENDED AT: **1038**
PUMP OR TUBING DEPTH IN WELL (feet): **30.6**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No** TUBING Y **No (replaced)**		DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
MW-505A	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-505A	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-505A	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-505A	1	PE	125mL	--	--	--	9056A_28D Chloride & Sulfate	APP	
MW-505A	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-505A	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-505A	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-505A	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-505A	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings:-**pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-505B**	SAMPLE ID: **MW-505B**	DATE: **8/29/2013**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc): **38.6 to 43.6**	STATIC DEPTH TO WATER (feet btoc): **4.87**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 44 feet) + 0.13 gallons = **0.24 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **41.1**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **41.1**	PURGING INITIATED AT: **1048**	PURGING ENDED AT: **1122**	TOTAL VOLUME PURGED (gallons): **1.54**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1052	0.24	0.24	0.02	5.18	5.97	28.12	13.40	37.2	28.2	-267.8	
1057	0.30	0.59	0.03	5.18	9.92	27.66	17.63	1.3	31.40	-346.8	
1102	0.2	0.79	0.02	5.18	10.02	27.70	17.76	0.7	27.9	-374.8	
1107	0.15	0.94	0.02	5.18	10.02	27.81	17.77	0.7	26.7	-377.8	
1112	0.24	1.19	0.02	5.18	10.03	27.86	17.80	0.6	29.2	-399.9	
1117	0.2	1.39	0.02	5.18	10.04	27.85	17.78	0.6	27.8	-408.4	
1122	0.15	1.54	0.02	5.18	10.04	27.71	17.76	0.6	28.5	-410.3	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Michael Epps	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1124**	SAMPLING ENDED AT: **1159**
PUMP OR TUBING DEPTH IN WELL (feet): **41.1**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No** TUBING Y **No (replaced)**		DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
MW-505B	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-505B	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-505B	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-505B	1	PE	125mL	--	--	--	9056A_28D Chloride & Sulfate	APP	
MW-505B	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-505B	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-505B	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-505B	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-505B	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings:-**pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-507B**	SAMPLE ID: **MW-507B**	DATE: **9/4/2013**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc): **46.3 to 51.3**	STATIC DEPTH TO WATER (feet btoc): **n/a**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 53 feet) + 0.13 gallons = **0.27 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **51.3**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **51.3**	PURGING INITIATED AT: **0907**	PURGING ENDED AT: **1002**	TOTAL VOLUME PURGED (gallons): **2.5**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
			--First 7 readings would not read through flow cell--								
0942	1.6	1.6	--	9.88	11.32	26.15	43.24	1.4	2.08	-195.2	
0947	0.2	1.8	0.02	9.88	11.35	25.94	43.28	2.1	2.00	-239.5	
0952	0.2	2.0	0.02	9.87	11.34	25.82	43.26	1.3	1.32	-276.0	
0957	0.2	2.2	0.02	9.88	11.34	25.78	43.35	1.2	1.71	-297.7	
1002	0.5	2.5	0.05	9.88	11.33	25.93	43.37	1.0	1.40	-311.7	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Ken Stuart	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1002**	SAMPLING ENDED AT: **n/a**
PUMP OR TUBING DEPTH IN WELL (feet): **51.3**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No**	TUBING Y **No (replaced)**	DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
MW-507B	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-507B	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-507B	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-507B	1	PE	125mL	--	--	--	9056A_28D Chloride & Sulfate	APP	
MW-507B	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-507B	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-507B	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-507B	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-507B	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters. Purge water is brown, sulfur-like odor.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings:-**pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-508B**	SAMPLE ID: **MW-508B**	DATE: **9/3/2013**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc): **46.2 to 51.2**	STATIC DEPTH TO WATER (feet btoc): **6.35**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 58 feet) + 0.13 gallons = **0.28 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **48.7**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **48.7**	PURGING INITIATED AT: **1053**	PURGING ENDED AT: **1201**	TOTAL VOLUME PURGED (gallons): **~3.5**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1056	0.26	0.26	0.03	7.2	4.29	24.19	43.99	22.6	3.81	-240.0	
1101	0.25	0.51	0.03	7.1	4.91	25.27	52.05	0.4	5.43	-339.2	
1106	0.25	0.76	0.03	7.08	6.09	25.7	52.20	0.1	5.16	-368.3	
1111	0.25	1.01	0.03	7.0	6.28	25.74	52.33	0.2	4.84	-392.0	
1116	0.25	1.26	0.03	7.1	6.35	25.14	52.42	0.6	4.58	-405.6	
1121	0.25	1.51	0.03	7.14	6.49	25.12	52.32	0.5	4.47	-408.9	
1126	0.25	1.76	0.03	7.1	6.55	25.21	52.29	0.5	4.61	-404.3	
1131	0.25	2.01	0.03	7.08	6.63	25.43	52.23	0.4	4.33	-403.0	
1136	0.25	2.26	0.03	7.05	6.69	25.48	52.23	0.2	4.42	-442.4	
1141	0.25	2.51	0.03	7.1	6.73	25.14	52.22	0.4	5.0	-442.0	
1146	0.25	2.76	0.03	7.18	6.82	25.29	52.06	0.4	5.54	-420.4	
1151	0.25	3.01	0.03	7.15	6.89	25.25	52.07	0.4	5.13	-424.3	
1156	0.25	3.26	0.03	7.11	6.94	25.43	52.00	0.4	5.01	-427.8	
1201	0.25	3.51	0.03	7.14	6.98	25.43	52.04	0.4	5.06	-439.8	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Tanya Chuprikova	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1447**	SAMPLING ENDED AT: **n/a**

PUMP OR TUBING DEPTH IN WELL (feet): **48.7**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**

FIELD DECONTAMINATION: PUMP Y **No** TUBING Y **No (replaced)** DUPLICATE: **No**

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
MW-508B	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-508B	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-508B	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-508B	1	PE	125mL	--	--	--	9056A_28D Chloride & Sulfate	APP	
MW-508B	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-508B	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-508B	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-508B	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-508B	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings: **pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-510B**	SAMPLE ID: **MW-510B**	DATE: **9/3/2013**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc): **40 to 45**	STATIC DEPTH TO WATER (feet btoc): **n/a**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 37 feet) + 0.13 gallons = **0.25 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **43**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **43**	PURGING INITIATED AT: **1108**	PURGING ENDED AT: **1129**	TOTAL VOLUME PURGED (gallons): **~2**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1109	0.25	0.25	0.03	5.70	10.31	24.63	26.15	3.9	10.7	-288.7	
1114	0.65	0.90	0.07	5.72	10.72	24.92	27.43	1.7	8.81	-358.6	
1119	0.35	1.25	0.04	5.69	10.91	24.85	28.00	1.5	5.31	-395.7	
1124	0.5	1.75	0.05	5.67	11.11	24.94	28.60	1.4	5.77	-420.5	
1129	0.2	1.95	0.02	5.69	11.33	24.75	29.33	1.4	4.81	-435.3	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Ken Stuart	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1130**	SAMPLING ENDED AT: **1150**
PUMP OR TUBING DEPTH IN WELL (feet): **43**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No**	TUBING Y **No (replaced)**	DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION					
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
MW-510B	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-510B	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-510B	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-510B	1	PE	125mL	--	--	--	9056A_28D Chloride & Sulfate	APP	
MW-510B	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-510B	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-510B	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-510B	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-510B	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings: **pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-511A**	SAMPLE ID: **MW-511A**	DATE: **9/4/2013**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc): **31.6 to 36.6**	STATIC DEPTH TO WATER (feet btoc): **5.1**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 53 feet) + 0.13 gallons = **0.22 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **34.1**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **34.1**	PURGING INITIATED AT: **0900**	PURGING ENDED AT: **0950**	TOTAL VOLUME PURGED (gallons): **2.75**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
0905	0.5	0.5	0.05	5.38	9.53	24.17	2.267	0.5	538	-258.1	
0910	0.25	0.75	0.03	5.37	9.59	24.37	2.290	0.6	170	-260.8	
0915	0.25	1.0	0.03	5.36	9.60	24.49	2.308	0.6	97.7	-261.9	
0920	0.25	1.25	0.03	5.36	9.61	24.58	2.350	0.6	69.7	-264.5	
0925	0.25	1.5	0.03	5.36	9.60	24.72	2.377	0.6	59.1	-263.3	
0930	0.25	1.75	0.03	5.37	9.60	24.81	2.393	0.6	53.5	-267.1	
0935	0.25	2.0	0.03	5.36	9.60	24.84	2.413	0.6	52.43	-269.0	
0940	0.25	2.25	0.03	5.38	9.57	24.80	2.437	0.6	45.4	-269.5	
0945	0.25	2.5	0.03	5.37	9.59	25.10	2.458	0.6	43.5	-272.5	
0950	0.25	2.75	0.03	5.37	9.57	25.10	2.468	0.6	43.1	-272.5	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Tanya Chuprikova	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **0955**	SAMPLING ENDED AT: **1030**
PUMP OR TUBING DEPTH IN WELL (feet): **34.1**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No**	TUBING Y **No (replaced)**	DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
MW-511A	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-511A	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-511A	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-511A	1	PE	125mL	--	--	--	9056A_28D Chloride & Sulfate	APP	
MW-511A	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-511A	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-511A	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-511A	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-511A	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters. 7410 Mercury (field filtered) sample collected due to high turbidity.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings:-**pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-511B**	SAMPLE ID: **MW-511B**	DATE: **9/3/2013**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc): **43.7 to 48.7**	STATIC DEPTH TO WATER (feet btoc): **5.44**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 53 feet) + 0.13 gallons = **0.25 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **46.2**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **46.2**	PURGING INITIATED AT: **0940**	PURGING ENDED AT: **932**	TOTAL VOLUME PURGED (gallons): **~1.85**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
0853	0.25	0.25	0.03	5.73	12.16	23.92	17.82	2.4	9.67	-73.4	
0858				Readings skipped due to training							
0903											
0908	0.75	1.0	--	5.75	12.29	23.77	19.56	2.0	10.0	-187.4	
0913	0.25	1.25	0.03	5.74	12.27	23.81	21.07	1.9	9.43	-215.8	
0918	0.15	1.4	0.02	5.74	12.25	23.89	21.67	2.0	8.12	-227.5	
0923	0.4	1.80	0.04	5.75	12.20	23.88	21.08	1.6	8.05	-220.3	1.02

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Tanya Chuprikova/Matt Scheuer	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **0932**	SAMPLING ENDED AT: **1000**
PUMP OR TUBING DEPTH IN WELL (feet): **46.2**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No** TUBING Y **No (replaced)**		DUPLICATE: **Yes**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION					
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
MW-511B	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-511B	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-511B	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-511B	1	PE	125mL	--	--	--	9056A_28D Chloride & Sulfate	APP	
MW-511B	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-511B	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-511B	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-511B	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-511B	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings:-**pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-512A**	SAMPLE ID: **MW-512A**	DATE: **8/27/2013**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc) **31.4 to 36.4**	STATIC DEPTH TO WATER (feet btoc): **4.48**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 44 feet) + 0.13 gallons = **0.22 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **33.9**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **33.9**	PURGING INITIATED AT: **1122**	PURGING ENDED AT: **1238**	TOTAL VOLUME PURGED (gallons): **~4.0**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1128	0.22	0.22	0.02	4.75	9.92	25.79	2.113	17.8	67.8	7.5	
1133	0.25	0.47	0.03	4.76	9.83	24.87	2.092	2.4	70.9	-7.3	
1138	0.15	0.62	0.02	4.75	9.84	24.97	2.077	2.4	74.9	-22.1	
1143	0.4	1.02	0.04	4.75	9.86	24.41	2.070	2.0	75.0	-23.7	
1148	0.35	1.37	0.04	4.75	9.87	24.21	2.072	1.9	69.4	-21.9	
1153	0.35	1.72	0.04	4.75	9.91	24.63	2.071	1.8	75.0	-22.7	
1158	0.25	1.97	0.03	4.75	9.92	24.40	2.082	1.6	75.5	-19.3	
1203	0.25	2.22	0.03	4.75	9.88	24.29	2.078	1.5	73.8	-17.9	
1208	0.25	2.47	0.03	4.75	9.91	24.25	2.095	1.4	72.5	-28.7	
1213	0.25	2.72	0.03	4.75	9.88	23.67	2.097	1.4	74.5	-58.4	
1218	0.25	2.97	0.03	4.75	9.90	23.71	2.101	1.8	74.5	-30.9	
1223	0.25	3.22	0.03	4.75	9.90	23.57	2.107	1.6	74.0	-52.5	
1228	0.25	3.47	0.03	4.75	9.92	23.53	2.118	1.2	75.5	-81.8	
1233	0.25	3.72	0.03	4.75	9.94	23.90	2.128	0.8	75.0	-88.0	
1238	0.25	3.97	0.03	4.75	9.95	24.12	2.133	1.4	70.0	-66.5	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Michael Epps	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1240**	SAMPLING ENDED AT: **1306**
PUMP OR TUBING DEPTH IN WELL (feet): **33.9**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No** TUBING Y **No (replaced)**		DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION					
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
MW-512A	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-512A	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-512A	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-512A	1	PE	125mL	--	--	--	9056A_28D Chloride & Sulfate	APP	
MW-512A	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-512A	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-512A	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-512A	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-512A	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters. 7470 Mercury (field filtered) sample collected due to high turbidity (above 50 NTU).

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings: **pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-512B**	SAMPLE ID: **MW-512B**	DATE: **8/27/2013**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc) **46.8 to 51.8**	STATIC DEPTH TO WATER (feet btoc): **4.90**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 44 feet) + 0.13 gallons = **0.27 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **49.3**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **49.3**	PURGING INITIATED AT: **1129**	PURGING ENDED AT: **1201**	TOTAL VOLUME PURGED (gallons): **~2.0**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1131	0.27	0.27	0.03	5.5	11.98	26.51	4.521	40.3	3.73	136.0	
1136	0.25	0.52	0.03	5.47	11.93	27.41	4.517	4.517	1.09	174.6	
1141	0.25	0.77	0.03	5.25	11.98	27.36	6.124	6.124	4.19	49.3	
1146	0.25	1.02	0.03	5.45	11.74	25.88	14.30	14.30	15.5	-76.9	
1151	0.25	1.27	0.03	5.8	11.77	26.11	13.99	13.99	13.3	-151.2	
1156	0.25	1.52	0.03	5.6	11.72	27.27	14.86	14.86	15.3	-212.2	
1201	0.25	1.77	0.03	5.6	11.73	26.94	15.43	15.43	16.6	-252.2	1.025

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Tanya Chuprikova	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1205**	SAMPLING ENDED AT: **1239**
PUMP OR TUBING DEPTH IN WELL (feet): **49.3**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No** TUBING Y **No (replaced)**		DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
MW-512B	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-512B	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-512B	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-512B	1	PE	125mL	--	--	--	9056A_28D Chloride & Sulfate	APP	
MW-512B	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-512B	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-512B	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-512B	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-512B	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings: **pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-513A**	SAMPLE ID: **MW-513A**	DATE: **8/27/2013**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc): **32 to 37**	STATIC DEPTH TO WATER (feet btoc): **5.52**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 43 feet) + 0.13 gallons = **0.22 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **34.5**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **34.5**	PURGING INITIATED AT: **0900**	PURGING ENDED AT: **0938**	TOTAL VOLUME PURGED (gallons): **2.32**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
0903	0.22	0.22	0.02	5.60	7.17	23.10	2.729	16.0	26.9	-15.5	
0908	0.4	0.62	0.04	5.60	7.15	22.57	2.797	2.7	28.9	-67.4	
0913	0.2	0.72	0.02	5.60	7.15	22.63	2.850	3.0	27.9	-70.9	
0918	0.3	1.12	0.03	5.60	7.18	22.70	3.021	4.7	28.1	-88.8	
0923	0.3	1.42	0.03	5.60	7.18	22.71	3.040	3.0	28.0	-78.4	
0928	0.3	1.72	0.03	5.60	7.18	22.64	3.077	2.7	29.6	-97.9	
0933	0.3	2.02	0.03	5.60	7.18	22.73	3.128	2.4	30.0	-104.3	
0938	0.3	2.32	0.03	5.60	7.18	22.71	3.148	2.4	30.1	-106.9	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Michael Epps	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **0943**	SAMPLING ENDED AT: **1016**
PUMP OR TUBING DEPTH IN WELL (feet): **34.5**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No**	TUBING Y **No (replaced)**	DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
MW-513A	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-513A	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-513A	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-513A	1	PE	125mL	--	--	--	9056A_28D Chloride & Sulfate	APP	
MW-513A	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-513A	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-513A	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-513A	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-513A	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings:-**pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-513B**	SAMPLE ID: **MW-513B**	DATE: **8/27/2013**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH(ft btoc): **41.2 to 46.2**	STATIC DEPTH TO WATER (ft btoc): **5.7**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= s (0.0026 gallons/foot X 50 feet) + 0.13 gallons = **0.25 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (ft btoc): **43.7**	FINAL PUMP OR TUBING DEPTH IN WELL (ft btoc): **43.7**	PURGING INITIATED AT: **0859**	PURGING ENDED AT: **0936**	TOTAL VOLUME PURGED (gallons): **~1.75**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
0902	0.25	0.25	0.03	6.11	11.31	24.55	7.607	1,6	25.1	-91.5	
0907	0.25	0.5	0.03	6.05	11.30	24.53	7.579	0.8	25.5	-148.2	
0912	0.25	0.75	0.03	6.1	11.31	24.50	7.601	0.8	26.6	-180.3	
0917	0.25	1.00	0.03	6.07	11.33	24.44	7.620	0.7	29.5	-220.7	
0922	0.25	1.25	0.03	6.03	11.34	24.51	7.612	0.8	30.7	-250.0	
0927	0.25	1.5	0.03	6.03	11.35	24.48	7.631	0.5	32.1	-272.2	
0932	0.25	1.75	0.03	6.03	11.34	24.65	7.668	0.5	33.8	-295.5	1.01

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Maria Johnson	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **0939**	SAMPLING ENDED AT: **1015**
PUMP OR TUBING DEPTH IN WELL (feet): **43.7**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: Yes **SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No** TUBING Yes **No (replaced)**		DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION					
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
MW-513B	1	PE	250mL	HNO3	--	--	6010B TAL Metals/ 7470A Hg	APP	
MW-513B	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-513B	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-513B	1	PE	125mL	--	--	--	9056A_28D Chloride & Sulfate	APP	
MW-513B	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-513B	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-513B	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-513B	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-513B	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Purge water clear brown, sulfur-like odor.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings: **pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-514A**	SAMPLE ID: **MW-514A**	DATE: **9/5/2013**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH(ft btoc): **30.7 to 35.7**	STATIC DEPTH TO WATER (ft btoc): **4.3**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= s (0.0026 gallons/foot X 47 feet) + 0.13 gallons = **0.22 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (ft btoc): **33.2**	FINAL PUMP OR TUBING DEPTH IN WELL (ft btoc): **33.2**	PURGING INITIATED AT: **1350**	PURGING ENDED AT: **1430**	TOTAL VOLUME PURGED (gallons): **2.22**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1355	0.22	0.22	0.02	5.53	11.61	26.80	4.026	18.8	12.9	-18.2	
1400	0.25	0.47	0.03	5.5	11.50	25.37	4.057	3.0	11.9	9.6	
1405	--skipped readings to call lab--										
1410	0.5	0.97	0.05	5.5	11.54	25.47	4.094	3.0	12.4	29.7	
1415	0.25	1.22	0.03	5.5	11.55	25.54	4.067	1.1	12.8	26.4	
1420	0.45	1.67	0.05	5.55	11.55	25.48	4.074	0.5	12.8	17.4	
1425	0.30	1.97	0.03	5.55	11.55	25.40	4.077	0.4	12.1	-5.2	
1430	0.25	2.22	0.03	5.5	11.56	25.61	4.077	0.3	13.4	-29.2	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Tanya Chuprikova	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1435**	SAMPLING ENDED AT: **1454**
PUMP OR TUBING DEPTH IN WELL (feet): **33.2**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: Yes **SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No** TUBING Yes **No (replaced)**		DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION					
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
MW-514A	1	PE	250mL	HNO3	--	--	6010B TAL Metals/ 7470A Hg	APP	
MW-514A	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-514A	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-514A	1	PE	125mL	--	--	--	9056A_28D Chloride & Sulfate	APP	
MW-514A	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-514A	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-514A	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-514A	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-514A	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Purge water clear brown, sulfur-like odor.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings: **pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-514B**	SAMPLE ID: **MW-514B**	DATE: **8/28/2013**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH(ft btoc): **41.5 to 46.5**	STATIC DEPTH TO WATER (ft btoc): **5.28**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= s (0.0026 gallons/foot X 47 feet) + 0.13 gallons = **0.25 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (ft btoc): **46.5**	FINAL PUMP OR TUBING DEPTH IN WELL (ft btoc): **46.5**	PURGING INITIATED AT: **1348**	PURGING ENDED AT: **1414**	TOTAL VOLUME PURGED (gallons): **1.5**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1351	0.25	0.25	0.03	5.4	7.24	25.38	8.133	19.1	16.5	-50.0	
1356	0.45	0.7	0.05	5.38	10.32	25.19	7.319	2.4	39.8	-84.1	
1401	0.25	0.95	0.03	5.5	10.33	25.41	7.486	1.2	35.6	-90.7	
1406	0.3	1.25	0.03	5.35	10.35	25.20	7.480	0.9	34.1	-94.9	
1411	0.25	1.5	0.03	5.35	10.37	25.73	7.573	0.8	32.9	-96.4	1.00

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Maria Johnson	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1415**	SAMPLING ENDED AT: **1435**
PUMP OR TUBING DEPTH IN WELL (feet): **46.5**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: Yes **SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No** TUBING Yes **No (replaced)**		DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION					
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
MW-514B	1	PE	250mL	HNO3	--	--	6010B TAL Metals/ 7470A Hg	APP	
MW-514B	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-514B	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-514B	1	PE	125mL	--	--	--	9056A_28D Chloride & Sulfate	APP	
MW-514B	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-514B	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-514B	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-514B	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-514B	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Purge water clear brown, sulfur-like odor.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings: **pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-515B**	SAMPLE ID: **MW-515B**	DATE: **9/3/2013**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc): **46.5 to 51.5**	STATIC DEPTH TO WATER (feet btoc): **6.8**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 44 feet) + 0.13 gallons = **0.27 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **49**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **49**	PURGING INITIATED AT: **1432**	PURGING ENDED AT: **1510**	TOTAL VOLUME PURGED (gallons): **3.75**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1434	0.27	0.27	0.03	7.24	11.24	25.94	17.15	5.6	5.63	-227.9	
1439	0.48	0.75	0.05	7.24	11.63	25.45	17.91	0.0	6.57	-247.7	
1444	0.5	1.25	0.05	7.24	11.51	25.45	18.03	-0.1	6.66	-280.8	
1449	0.5	1.75	0.05	7.21	11.40	25.46	18.46	0.1	6.82	-238.9	
1454	0.5	2.25	0.05	7.21	11.33	25.38	18.52	0.0	6.61	-262.2	
1449	0.5	2.75	0.05	7.21	11.28	25.45	18.66	0.0	6.98	-263.0	
1504	0.5	3.25	0.05	7.21	11.26	25.55	18.71	0.0	6.65	-259.9	
1509	0.5	3.75	0.05	7.21	11.24	25.18	18.77	0.0	6.73	-257.6	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Matt Scheauer	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1515**	SAMPLING ENDED AT: **1537**
PUMP OR TUBING DEPTH IN WELL (feet): **49**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No**	TUBING Y **No (replaced)**	DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION					
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
MW-515B	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-515B	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-515B	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-515B	1	PE	125mL	--	--	--	9056A_28D Chloride & Sulfate	APP	
MW-515B	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-515B	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-515B	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-515B	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-515B	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings:-**pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-516A**	SAMPLE ID: **MW-516A**	DATE: **8/28/2013**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc): **32.4 to 37.4**	STATIC DEPTH TO WATER (feet btoc): **4.75**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 42 feet) + 0.13 gallons = **0.23 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **34.9**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **34.9**	PURGING INITIATED AT: **1056**	PURGING ENDED AT: **1118**	TOTAL VOLUME PURGED (gallons): **1.6**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1058	0.23	0.23	0.2	5.0	7.70	27.50	10.85	4.0	6.38	-239..7	
1103	0.27	0.50	0.3	5.0	8.63	24.05	10.35	3.5	5.96	-257.1	
1108	0.25	0.75	0.3	5.0	8.94	23.75	10.41	3.0	5.58	-257.9	
1113	0.65	1.4	0.06	5.0	8.95	23.65	10.47	2.6	5.38	-221.0	
1118	0.2	1.6	0.02	5.0	8.95	23.65	10.47	2.2	6.22	-206.1	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Maria Johnson	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1120**	SAMPLING ENDED AT: **1139**
PUMP OR TUBING DEPTH IN WELL (feet): **34.9**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No**	TUBING Y **No (replaced)**	DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION					
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
MW-516A	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-516A	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-516A	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-516A	1	PE	125mL	--	--	--	9056A_28D Chloride & Sulfate	APP	
MW-516A	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-516A	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-516A	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-516A	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-516A	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters. Purge water is brown, sulfur-like odor.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings:-**pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-516B**	SAMPLE ID: **MW-516B**	DATE: **8/28/2013**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc): **48.2 to 53.2**	STATIC DEPTH TO WATER (feet btoc): **6.5**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 54 feet) + 0.13 gallons = **0.27 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **50.7**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **50.7**	PURGING INITIATED AT: **0853**	PURGING ENDED AT: **0915**	TOTAL VOLUME PURGED (gallons): **1.65**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
0855	0.27	0.27	.03	6.02	7.67	23.64	39.80	9.8	10.3	-96.0	
0900	0.28	0.55	.03	6.07	7.81	23.72	44.94	2.9	4.91	-182.4	
0905	0.45	1.0	.05	6.05	7.73	23.75	41.07	1.9	3.53	-244.2	
0910	0.45	1.45	.05	6.05	7.74	23.78	40.25	1.7	3.37	-279.3	
0915	0.40	1.65	.04	6.05	7.74	23.79	40.23	1.6	3.44	-264.6	1.02

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Maria Johnson	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **0918**	SAMPLING ENDED AT: **0932**
PUMP OR TUBING DEPTH IN WELL (feet): **50.7**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No**	TUBING Y **No (replaced)**	DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION					
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
MW-516B	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-516B	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-516B	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-516B	1	PE	125mL	--	--	--	9056A_28D Chloride & Sulfate	APP	
MW-516B	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-516B	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-516B	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-516B	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-516B	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings:-**pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-517A**	SAMPLE ID: **MW-517A**	DATE: **9/5/2013**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH(ft btoc): **47.4 to 52.4**	STATIC DEPTH TO WATER (ft btoc): **6.48**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= s (0.0026 gallons/foot X 47 feet) + 0.13 gallons = **0.27 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (ft btoc): **50**	FINAL PUMP OR TUBING DEPTH IN WELL (ft btoc): **50**	PURGING INITIATED AT: **1058**	PURGING ENDED AT: **1121**	TOTAL VOLUME PURGED (gallons): **1.25**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1100	0.27	0.27	0.03	6.56	9.51	24.96	7.135	8.3	12.0	-122.3	
1105	0.23	0.5	0.02	6.57	9.45	24.38	7.361	0.2	10.8	-133.8	
1110	0.25	0.75	0.03	6.57	9.37	24.22	7.398	0.2	11.0	-133.8	
1115	0.25	1.00	0.03	6.57	9.33	24.18	7.436	0.3	10.4	-137.2	
1120	0.25	1.25	0.03	6.57	9.31	24.19	7.445	0.3	10.5	-145.4	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Matt Scheuer	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1127**	SAMPLING ENDED AT: **1147**
PUMP OR TUBING DEPTH IN WELL (feet): **50**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: Yes **SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No** TUBING Yes **No (replaced)**		DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
MW-517A	1	PE	250mL	HNO3	--	--	6010B TAL Metals/ 7470A Hg	APP	
MW-517A	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-517A	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-517A	1	PE	125mL	--	--	--	9056A_28D Chloride & Sulfate	APP	
MW-517A	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-517A	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-517A	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-517A	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-517A	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Purge water clear brown, sulfur-like odor.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings: **pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-517B**	SAMPLE ID: **MW-517B**	DATE: **8/26/2013**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH(ft btoc): **47.4 to 52.4**	STATIC DEPTH TO WATER (ft btoc): **6.63**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= s (0.0026 gallons/foot X 53 feet) + 0.13 gallons = **0.27 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (ft btoc): **49.9**	FINAL PUMP OR TUBING DEPTH IN WELL (ft btoc): **49.9**	PURGING INITIATED AT: **1514**	PURGING ENDED AT: **1548**	TOTAL VOLUME PURGED (gallons): **2.0**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1518	.27	.27	.03	6.89	9.77	27.50	18.23	1.15	7.01	-152.8	
1523	.18	0.45	.02	6.89	9.66	25.58	22.28	0.36	7.07	-246.4	
1528	.35	0.8	.04	6.89	9.69	25.38	22.40	0.11	6.63	-277.1	
1533	.4	1.2	.04	6.89	9.67	25.48	22.49	0.12	6.79	-296.8	
1538	.3	1.5	.03	6.89	9.75	25.60	22.58	0.07	7.38	-313.2	
1543	.25	1.75	.03	6.89	9.79	25.23	22.67	0.05	7.46	-325.8	
1548	.25	2.0	.03	6.89	9.81	25.07	22.68	0.04	7.46	-341.5	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Maria Johnson	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1555**	SAMPLING ENDED AT: **1616**
PUMP OR TUBING DEPTH IN WELL (feet): **49.9**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: Yes **SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No** TUBING Yes **No (replaced)**		DUPLICATE: **Yes**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
MW-517B	1	PE	250mL	HNO3	--	--	6010B TAL Metals/ 7470A Hg	APP	
MW-517B	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-517B	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-517B	1	PE	125mL	--	--	--	9056A_28D Chloride & Sulfate	APP	
MW-517B	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-517B	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-517B	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-517B	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-517B	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Purge water clear brown, sulfur-like odor.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings: **pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-518A**	SAMPLE ID: **MW-518A**	DATE: **8/28/2013**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc) **32.1 to 37.1**	STATIC DEPTH TO WATER (feet btoc): **5.47**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 44 feet) + 0.13 gallons = **0.23 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **34.6**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **34.6**	PURGING INITIATED AT: **0850**	PURGING ENDED AT: **1001**	TOTAL VOLUME PURGED (gallons): **~3.75**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
0901	0.23	0.23	0.02	6.25	11.29	22.10	9.866	6.3	8.61	-173.5	
0906	0.25	0.48	0.03	6.20	9.41	22.10	9.709	3.7	8.15	-248.8	
0911	0.35	0.83	0.04	6.65	8.93	22.58	9.971	3.3	7.45	-244.5	
0916	0.40	1.23	0.04	6.05	8.77	22.81	10.29	3.3	6.8	-271.4	
0921	0.25	1.48	0.03	6.15	8.40	22.35	10.45	3.3	6.99	-307.9	
0926	0.35	1.83	0.04	6.15	8.00	22.28	10.53	3.2	5.88	-299.9	
0931	0.40	2.23	0.04	6.2	7.67	21.84	10.58	2.9	6.11	-277.0	
0936	0.25	2.48	0.03	6.05	7.64	22.52	10.67	2.9	6.78	-304.7	
0941	0.25	2.73	0.03	6.25	7.43	22.24	10.78	2.8	6.31	-346.4	
0946	0.25	2.98	0.03	6.21	7.28	22.33	10.79	2.8	7.22	-359.5	
0951	0.25	3.23	0.03	6.0	7.32	22.73	10.83	2.7	7.37	-326.1	
0956	0.25	3.48	0.03	6.0	7.34	23.04	10.89	2.5	6.31	-324.7	
1001	0.25	3.73	0.03	6.0	7.40	23.15	10.92	2.4	5.97	-318.7	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Tanya Chuprikova	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1000**	SAMPLING ENDED AT: **1040**
PUMP OR TUBING DEPTH IN WELL (feet): **36**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No** TUBING Y **No (replaced)**		DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
MW-518A	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-518A	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-518A	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-518A	1	PE	125mL	--	--	--	9056A_28D Chloride & Sulfate	APP	
MW-518A	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-518A	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-518A	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-518A	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-518A	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings:-**pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-518B**	SAMPLE ID: **MW-518B**	DATE: **8/28/2013**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc): **45.3 to 50.3**	STATIC DEPTH TO WATER (feet btoc): **6.36**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 44 feet) + 0.13 gallons = **0.26 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **47.8**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **47.8**	PURGING INITIATED AT: **0859**	PURGING ENDED AT: **0933**	TOTAL VOLUME PURGED (gallons): ~**1.6**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
903	0.26	0.26	0.03	6.68	10.80	24.93	21.19	13.2	5.13	-229.2	
908	0.26	0.52	0.03	6.68	10.86	24.99	23.14	2.6	6.51	-310.7	
913	0.29	0.81	0.03	6.68	10.87	24.90	23.33	2.4	5.81	-342.0	
918	0.20	1.01	0.03	6.68	10.87	24.82	23.36	3.8	5.61	-354.9	
923	0.25	1.26	0.03	6.68	10.86	23.34	23.35	1.9	n/a	-368.3	
928	0.20	1.46	0.02	6.68	10.87	23.66	23.46	1.6	n/a	-381.7	
933	0.15	1.61	0.01	6.68	10.87	24.55	23.33	1.8	n/a	-388.7	1.030

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Michael Epps	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **0935**	SAMPLING ENDED AT: **1013**
PUMP OR TUBING DEPTH IN WELL (feet): **47.8**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No**	TUBING Y **No (replaced)**	DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
MW-518B-	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-518B-	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-518B-	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-518B-	1	PE	125mL	--	--	--	9056A_28D Chloride & Sulfate	APP	
MW-518B-	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-518B-	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-518B-	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-518B-	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-518B-	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings:-**pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-519A**	SAMPLE ID: **MW-519A**	DATE: **8/27/2013**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc): **32.5 to 37.5**	STATIC DEPTH TO WATER (feet btoc): **6.0**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 37 feet) + 0.13 gallons = **0.22 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **35**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **35**	PURGING INITIATED AT: **1531**	PURGING ENDED AT: **1554**	TOTAL VOLUME PURGED (gallons): **1.7**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1535	0.22	0.22	0.02	5.9	6.26	25.48	8.958	20.8	10.1	-34.3	
1539	0.48	0.7	0.05	5.95	6.36	25.46	9.028	6.2	8.48	-55.9	
1544	0.3	1.0	0.03	5.95	6.35	25.08	9.061	4.1	5.97	-66.0	
1549	0.45	1.45	0.05	6.0	6.36	25.01	9.063	3.3	4.39	-73.0	
1554	0.25	1.7	0.03	6.0	6.36	25.27	9.069	2.8	6.63	-80.0	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Maria Johnson	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1555**	SAMPLING ENDED AT: **n/a**
PUMP OR TUBING DEPTH IN WELL (feet): **35**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No**	TUBING Y **No (replaced)**	DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION					
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
MW-519A	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-519A	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-519A	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-519A	1	PE	125mL	--	--	--	9056A_28D Chloride & Sulfate	APP	
MW-519B-	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-519A	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-519A	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-519A	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-519A	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings:-**pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-519B**	SAMPLE ID: **MW-519B**	DATE: **8/27/2013**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc): **47.4 to 52.4**	STATIC DEPTH TO WATER (feet btoc): **7.0**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 53 feet) + 0.13 gallons = **0.27 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **49.9**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **49.9**	PURGING INITIATED AT: **1408**	PURGING ENDED AT: **1453**	TOTAL VOLUME PURGED (gallons): **1.7**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1412	0.27	0.27	0.03	9.00	6.82	30.58	56.04	2.4	n/a	-119.1	
1417	0.5	0.5	0.04	9.93	6.84	27.55	56.07	4.9	70.2	-171.8	
1422	0.2	0.7	0.02	9.90	7.21	28.33	56.29	1.8	41.3	-185.5	
1427	0.2	0.9	0.02	9.80	7.24	28.71	57.95	1.0	22.4	-193.5	
1432	0.2	1.1	0.02	9.85	7.24	28.80	58.81	0.9	10.8	-199.1	
1437	0.35	1.45	0.04	9.85	7.29	28.45	58.80	0.6	11.1	-210.0	
1442	0.3	1.75	0.03	9.85	7.30	28.33	58.80	0.6	4.54	-217.9	
1447	.25	2.0	0.02	9.85	7.35	26.96	60.25	0.5	3.51	-225.5	
1452	.25	2.25	0.02	9.85	7.35	26.67	60.36	0.6	3.40	-226.2	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Maria Johnson	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1453**	SAMPLING ENDED AT: **1511**
PUMP OR TUBING DEPTH IN WELL (feet): **49.9**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No** TUBING Y **No (replaced)**		DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION					
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
MW-519B-	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-519B-	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-519B-	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-519B-	1	PE	125mL	--	--	--	9056A_28D Chloride & Sulfate	APP	
MW-519B-	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-519B-	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-519B-	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-519B-	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-519B-	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters. Purge water is brown, sulfur-like odor.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings:-**pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

Post-Sparge Purge Logs

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **EW1**	SAMPLE ID: **EW1**	DATE: **2/27/2014**

PURGING DATA

WELL DIAMETER (inches): **n/a**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc): **44 to 49**	STATIC DEPTH TO WATER (feet btoc): **n/a**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 45 feet) + 0.13 gallons = **0.25 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **41.7**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **41.7**	PURGING INITIATED AT: **1507**	PURGING ENDED AT: **1534**	TOTAL VOLUME PURGED (gallons): **1.25**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1512	0.25	0.25	200	n/a	6.28	20.25	9.023	13.5	9.05	-50.7	
1517	0.25	0.50	200	n/a	6.28	20.22	9.482	5.1	8.40	-64.9	
1522	0.25	0.75	200	n/a	6.28	20.24	9.437	4.5	7.35	-67.2	
1527	0.25	1.00	200	n/a	6.27	20.10	9.272	3.9	6.90	-68.5	
1532	0.25	1.25	200	n/a	6.27	20.04	9.218	3.6	5.30	-69.2	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Matt Scheuer	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1540**	SAMPLING ENDED AT: **1611**
PUMP OR TUBING DEPTH IN WELL (feet): **41.7**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No**	TUBING Y **No (replaced)**	DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
EW-1	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
EW-1	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
EW-1	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
EW-1	1	PE	125mL	--	--	--	9251 Chloride & 9038 Sulfate	APP	
EW-1	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
EW-1	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
EW-1	1	PE	500mL	--	--	--	2540C TDS	APP	
EW-1	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
EW-1	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Depth of water cannot be recorded with recovery wells.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings:-**pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **EW-2**	SAMPLE ID: **EW-2**	DATE: **2/27/2014**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH(ft btoc): **32 to 56**	STATIC DEPTH TO WATER (ft btoc): **n/a**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= s (0.0026 gallons/foot X 45 feet) + 0.13 gallons = **0.25 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (ft btoc): **42**	FINAL PUMP OR TUBING DEPTH IN WELL (ft btoc): **42**	PURGING INITIATED AT: **1313**	PURGING ENDED AT: **1351**	TOTAL VOLUME PURGED (gallons): **~2**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1319	0.24	0.24	200	n/a	6.70	20.42	9.412	11.1	11.1	-61.9	
1324	0.24	0.48	200	n/a	6.72	20.44	9.535	2.9	9.94	-75.5	
1329	0.24	0.72	200	n/a	6.67	20.36	9.374	2.1	9.18	-45.1	
1334	0.24	0.96	200	n/a	6.61	20.23	9.196	1.8	9.24	-54.2	
1339	0.24	1.20	200	n/a	6.63	20.29	8.994	1.6	9.83	-74.0	
1344	0.24	1.44	200	n/a	6.58	20.21	8.906	1.5	9.87	-69.5	
1349	0.24	1.68	200	n/a	6.57	20.12	8.874	1.6	9.82	-69.4	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Matt Scheuer	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1355**	SAMPLING ENDED AT: **1422**
PUMP OR TUBING DEPTH IN WELL (feet): **42**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: Yes **SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No**	TUBING Yes **No (replaced)**	DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION					
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
EW-2	1	PE	250mL	HNO3	--	--	6010B TAL Metals/ 7470A Hg	APP	
EW-2	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
EW-2	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
EW-2	1	PE	125mL	--	--	--	9051 Chloride & 9038 Sulfate	APP	
EW-2	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
EW-2	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
EW-2	1	PE	500mL	--	--	--	2540C TDS	APP	
EW-2	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
EW-2	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Depth of water cannot be recorded with recovery wells.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings:-**pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **EW-3**	SAMPLE ID: **EW-3**	DATE: **2/27/2014**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH(ft btoc): **39.2 to 42.2**	STATIC DEPTH TO WATER (ft btoc): **n/a**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= s (0.0026 gallons/foot X 25 feet) + 0.13 gallons = **0.20 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (ft btoc): **21.6**	FINAL PUMP OR TUBING DEPTH IN WELL (ft btoc): **21.6**	PURGING INITIATED AT: **1000**	PURGING ENDED AT: **1118**	TOTAL VOLUME PURGED (gallons): **~3.5**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1003	0.20	0.20	200	n/a	9.40	18.42	22.22	10.1	18.5	-142.2	
1008	0.20	0.40	200	n/a	8.20	18.42	22.30	7.7	14.4	-168.8	
1013	0.20	0.60	200	n/a	5.90	19.34	22.15	5.9	17.7	-135.6	
1018	0.20	0.80	200	n/a	5.10	20.33	22.19	5.0	16.2	-179.7	
1023	0.20	1.0	200	n/a	9.88	20.31	22.25	4.5	14.0	-195.7	
1028	0.20	1.2	200	n/a	9.87	20.26	22.25	4.2	14.7	-177.7	
1033	0.20	1.4	200	n/a	9.86	20.28	22.24	3.8	14.3	-149.0	
1038	0.20	1.6	200	n/a	9.87	20.18	22.25	3.0	13.6	-191.2	
1043	0.20	1.8	200	n/a	9.85	20.31	22.22	2.9	14.4	-128.5	
1048	0.20	2.0	200	n/a	9.85	20.42	22.21	2.3	15.7	-84.2	
1053	0.20	2.2	200	n/a	9.85	20.60	22.23	2.1	16.1	-84.4	
1058	0.20	2.4	200	n/a	9.85	20.34	22.26	2.0	17.2	-171.7	
1103	0.20	2.6	200	n/a	9.86	20.42	22.22	1.8	18.2	-198.9	
1108	0.20	2.8	200	n/a	9.84	20.37	22.23	1.7	17.4	-63.2	
1113	0.20	3.0	200	n/a	9.85	20.28	22.23	1.5	17.6	-103.2	
1118	0.20	3.2	200	n/a	9.84	20.25	22.24	1.5	19.0	-132.7	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Matt Scheuer	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1522**	SAMPLING ENDED AT: **1539**
PUMP OR TUBING DEPTH IN WELL (feet): **21.6**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: Yes **SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	

FIELD DECONTAMINATION: PUMP Y **No** TUBING Yes **No (replaced)** DUPLICATE: **No**

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
EW-3	1	PE	250mL	HNO3	--	--	6010B TAL Metals/ 7470A Hg Mercury	APP	
EW-3	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
EW-3	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
EW-3	1	PE	125mL	--	--	--	9251 Chloride & 9038 Sulfate	APP	
EW-3	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
EW-3	2	PE	250mL	NaOH, Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
EW-3	1	PE	500mL	--	--	--	2540C TDS	APP	
EW-3	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
EW-3	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Depth of water cannot be recorded with recovery wells.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings:-**pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **EW-4**	SAMPLE ID: **EW-4**	DATE: **2/4/2013**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH(ft btoc): **38.2 to 43.2**	STATIC DEPTH TO WATER (ft btoc): **n/a**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= s (0.0026 gallons/foot X 38 feet) + 0.13 gallons = **0.23 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (ft btoc): **35.17**	FINAL PUMP OR TUBING DEPTH IN WELL (ft btoc): **35.17**	PURGING INITIATED AT: **1142**	PURGING ENDED AT:**1349**	TOTAL VOLUME PURGED (gallons): **~6**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1148	0.23	0.23	200	n/a	8.73	18.55	8.661	1.8	30.3	-104.6	
1153	0.23	0.46	200	n/a	8.72	19.09	8.671	1.4	29.1	-241.7	
1158	0.23	0.69	200	n/a	8.71	19.12	8.660	1.1	26.6	-245.5	
1203	0.23	0.92	200	n/a	8.66	19.13	8.631	0.9	26.1	-280.6	
1208	0.23	1.15	200	n/a	8.54	19.19	8.557	0.7	26.2	-266.4	
1213	0.23	1.38	200	n/a	8.47	19.30	8.484	0.8	25.5	-263.3	
1218	0.23	1.61	200	n/a	8.34	19.30	8.441	0.7	25.2	-302.3	
1223	0.23	1.84	200	n/a	8.06	19.24	8.333	0.8	25.2	-286.4	
1228	0.23	2.07	200	n/a	7.86	19.29	8.294	0.8	24.3	-268.8	
1233	0.23	2.30	200	n/a	7.65	19.37	8.234	1.0	24.0	-285.5	
1238	0.23	2.53	200	n/a	7.52	19.40	8.192	0.9	23.6	-287.3	
1243	0.23	2.76	200	n/a	7.39	19.43	8.147	0.7	24.0	-280.7	
1248	0.23	2.99	200	n/a	7.26	19.24	8.100	0.7	24.2	-294.2	
1253	0.23	3.22	200	n/a	7.22	19.22	8.050	0.8	23.0	-287.5	
1258	0.23	3.45	200	n/a	7.15	19.20	7.975	0.8	22.2	-306.5	
1303	0.23	3.68	200	n/a	7.11	19.25	7.943	0.8	22.5	-296.5	
1308	0.23	3.91	200	n/a	7.09	19.31	7.925	0.9	21.5	-316.3	
1313	0.23	4.14	200	n/a	7.07	19.18	7.887	0.9	21.6	-297.7	
1318	0.23	4.37	200	n/a	7.06	19.22	7.875	0.9	22.3	-297.3	
1323	0.23	4.60	200	n/a	7.04	19.16	7.807	0.8	21.8	-290.3	
1328	0.23	4.83	200	n/a	7.02	19.15	7.786	1.0	21.8	-327.4	
1333	0.23	5.06	200	n/a	7.01	19.17	7.756	0.9	20.8	-335.8	
1338	0.23	5.29	200	n/a	7.01	19.20	7.740	1.0	21.4	-308.3	
1343	0.23	5.52	200	n/a	7.00	19.26	7.714	0.9	21.5	-316.3	
1348	0.23	5.75	200	n/a	7.01	19.32	7.725	0.9	20.7	-337.3	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Matt Scheuer	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1352**	SAMPLING ENDED AT: **1428**
PUMP OR TUBING DEPTH IN WELL (feet): **35.17**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: Yes **SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	

FIELD DECONTAMINATION: PUMP Y **No** TUBING Yes **No (replaced)** DUPLICATE: **No**

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION					
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
EW-4	1	PE	250mL	HNO3	--	--	6010B TAL Metals/ 7470A Hg Mercury	APP	
EW-4	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
EW-4	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
EW-4	1	PE	125mL	--	--	--	9251 Chloride & 9038 Sulfate	APP	
EW-4	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
EW-4	2	PE	250mL	NaOH	--	--	SM4500 Sulfide	APP	**Field-Filtered**
EW-4	1	PE	500mL	--	--	--	2540C TDS	APP	
EW-4	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
EW-4	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Depth of water cannot be recorded with recovery wells.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings:-**pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **EW-5**	SAMPLE ID: **EW-5**	DATE: **3/5/2014**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH(ft btoc): **46.1 to 51.1**	STATIC DEPTH TO WATER (ft btoc): **n/a**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= s (0.0026 gallons/foot X 44 feet) + 0.13 gallons = **0.24 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (ft btoc): **41.02**	FINAL PUMP OR TUBING DEPTH IN WELL (ft btoc): **41.02**	PURGING INITIATED AT: **0842**	PURGING ENDED AT: **0923**	TOTAL VOLUME PURGED (gallons): **2.0**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
0845	0.24	0.24	200	n/a	10.74	18.31	35.05	11.2	183	-449.4	
0850	0.24	0.48	200	n/a	10.76	18.27	35.55	6.2	122	-509.4	
0855	0.24	0.72	200	n/a	10.76	18.53	35.31	4.9	42.8	-445.7	
0900	0.24	0.96	200	n/a	10.75	18.64	35.32	4.0	18.7	-497.8	
0905	0.24	1.20	200	n/a	10.74	18.70	35.32	3.4	12.4	-513.6	
0910	0.24	1.44	200	n/a	10.74	18.60	35.37	3.2	9.18	-472.0	
0915	0.24	1.68	200	n/a	10.74	18.52	35.45	3.0	9.06	-520.2	
0920	0.24	1.92	200	n/a	10.74	18.52	35.45	2.7	9.04	-477.7	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Matt Scheuer	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **0929**	SAMPLING ENDED AT: **0955**
PUMP OR TUBING DEPTH IN WELL (feet): **41.02**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: Yes **SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No**	TUBING Yes **No (replaced)**	DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
EW-5	1	PE	250mL	HNO3	--	--	6010B TAL Metals/ 7470A Hg	APP	
EW-5	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
EW-5	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
EW-5	1	PE	125mL	--	--	--	9251 Chloride & 9038Sulfate	APP	
EW-5	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
EW-5	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
EW-5	1	PE	500mL	--	--	--	2540C TDS	APP	
EW-5	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
EW-5	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Depth of water cannot be recorded with recovery wells.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings:-**pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **EW-6**	SAMPLE ID: **EW-6**	DATE: **2/28/2014**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH(ft btoc): **46.2 to 51.2**	STATIC DEPTH TO WATER (ft btoc): **n/a**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= s (0.0026 gallons/foot X 35 feet) + 0.13 gallons = **0.22 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (ft btoc): **31.75**	FINAL PUMP OR TUBING DEPTH IN WELL (ft btoc): **31.75**	PURGING INITIATED AT: **0931**	PURGING ENDED AT: **1000**	TOTAL VOLUME PURGED (gallons): **~1.5**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
0937	0.22	0.22	200	n/a	7.42	19.54	57.21	13.5	3.47	-94.3	
0942	0.22	0.44	200	n/a	7.43	20.12	57.23	6.7	3.34	-94.2	
0947	0.22	0.66	200	n/a	7.42	20.16	57.31	4.7	3.75	-96.0	
0952	0.22	0.88	200	n/a	7.42	20.44	57.36	3.2	3.60	-104.8	
0957	0.22	1.10	200	n/a	7.41	20.50	57.25	2.8	3.40	-136.6	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Matt Scheuer	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1005**	SAMPLING ENDED AT: **1025**
PUMP OR TUBING DEPTH IN WELL (feet): **31.75**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: Yes **SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No** TUBING Yes **No (replaced)**		DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
EW-6	1	PE	250mL	HNO3	--	--	6010B TAL Metals/ 7470A Hg	APP	
EW-6	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
EW-6	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
EW-6	1	PE	125mL	--	--	--	9251 Chloride & 9038 Sulfate	APP	
EW-6	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
EW-6	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
EW-6	1	PE	500mL	--	--	--	2540C TDS	APP	
EW-6	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
EW-6	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Depth of water cannot be recorded with recovery wells.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings:-**pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **EW-8**	SAMPLE ID: **EW-8**	DATE: **3/3/2014**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH(ft btoc): **46.6 to 51.6**	STATIC DEPTH TO WATER (ft btoc): **n/a**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= s (0.0026 gallons/foot X 46 feet) + 0.13 gallons = **0.25 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (ft btoc): **43.13**	FINAL PUMP OR TUBING DEPTH IN WELL (ft btoc): **43.13**	PURGING INITIATED AT: **1345**	PURGING ENDED AT: **1525**	TOTAL VOLUME PURGED (gallons): **4.75**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1353	0.25	0.25	200	n/a	9.11	21.94	9.225	1.4	15.4	-219.2	
1357	0.25	0.50	200	n/a	9.11	21.84	9.222	1.4	14.5	-242.0	
1403	0.25	0.75	200	n/a	9.10	22.00	9.209	1.3	14.3	-227.9	
1408	0.25	1.00	200	n/a	9.10	22.06	9.202	1.2	14.4	-219.5	
1413	0.25	1.25	200	n/a	9.10	22.25	9.181	1.3	13.9	-221.9	
1418	0.25	1.50	200	n/a	9.10	22.25	9.177	1.2	13.9	-225.4	
1423	0.25	1.75	200	n/a	9.11	22.02	9.182	1.2	13.1	-242.7	
1428	0.25	2.00	200	n/a	9.10	21.99	9.175	1.1	12.9	-261.9	
1433	0.25	2.25	200	n/a	9.10	22.15	9.182	1.0	12.9	-259.2	
1438	0.25	2.50	200	n/a	9.10	22.25	9.206	0.9	12.9	-270.7	
1443	0.25	2.75	200	n/a	9.09	22.11	9.264	1.0	12.6	-318.7	
1448	0.25	3.00	200	n/a	9.09	22.04	9.281	1.0	12.1	-326.0	
1453	0.25	3.25	200	n/a	9.10	22.07	9.325	0.7	11.1	-334.7	
1458	0.25	3.50	200	n/a	9.09	22.30	9.350	0.8	10.7	-296.7	
1503	0.25	3.75	200	n/a	9.10	22.23	9.420	0.8	10.5	-335.7	
1508	0.25	4.00	200	n/a	9.09	21.88	9.480	0.7	10.3	-361.5	
1513	0.25	4.25	200	n/a	9.09	21.76	9.503	0.7	9.88	-356.7	
1518	0.25	4.50	200	n/a	9.09	21.82	9.512	0.7	9.71	-286.4	
1523	0.25	4.75	200	n/a	9.09	22.00	9.549	0.6	9.69	-265.2	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Matt Scheuer	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1527**	SAMPLING ENDED AT: **1549**
PUMP OR TUBING DEPTH IN WELL (feet): **43.13**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: Yes **SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No** TUBING Yes **No (replaced)**		DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
EW-8	1	PE	250mL	HNO3	--	--	6010B TAL Metals/ 7470A Hg Mercury	APP	
EW-8	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
EW-8	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
EW-8	1	PE	125mL	--	--	--	9251 Chloride & 9038 Sulfate	APP	
EW-8	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
EW-8	2	PE	250mL	NaOH	--	--	SM4500 Sulfide	APP	**Field-Filtered**
EW-8	1	PE	500mL	--	--	--	2540C TDS	APP	
EW-8	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
EW-8	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Depth of water cannot be recorded with recovery wells.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings:-**pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **EW-9**	SAMPLE ID: **EW-9**	DATE: **2/04/2014**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH(ft btoc): **47 to 52**	STATIC DEPTH TO WATER (ft btoc): **n/a**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= s (0.0026 gallons/foot X 47 feet) + 0.13 gallons = **0.25 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (ft btoc): **44.1**	FINAL PUMP OR TUBING DEPTH IN WELL (ft btoc): **44.1**	PURGING INITIATED AT: **1045**	PURGING ENDED AT: **1111**	TOTAL VOLUME PURGED (gallons): **1.50**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
0942	0.25	0.25	200	n/a	7.08	18.68	5.723	3.6	8.66	-177.6	
0947	0.25	0.50	200	n/a	7.06	18.57	5.353	2.5	9.04	-198.2	
0952	0.25	0.75	200	n/a	7.06	18.58	5.277	1.8	28.7	-214.7	
0957	0.25	1.00	200	n/a	7.05	18.68	5.370	1.2	36.5	-239.7	
1002	0.25	1.25	200	n/a	7.03	18.78	5.328	0.9	23.0	-248.7	
1007	0.25	1.50	200	n/a	6.98	19.12	5.414	0.6	20.2	-254.4	
1012	0.25	1.75	200	n/a	6.89	19.06	6.006	0.8	11.7	-266.1	
1017	0.25	2.00	200	n/a	6.85	19.01	6.273	0.8	12.4	-265.9	
1022	0.25	2.25	200	n/a	6.75	19.00	6.934	0.9	9.3	-265.6	
1027	0.25	2.50	200	n/a	6.74	19.05	7.051	0.9	8.71	-266.2	
1032	0.25	2.75	200	n/a	6.73	19.13	7.260	1.1	8.7	-268.5	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Matt Scheuer	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1035**	SAMPLING ENDED AT: **1057**
PUMP OR TUBING DEPTH IN WELL (feet): **44.1**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: Yes **SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No** TUBING Yes **No (replaced)**		DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
EW-9	1	PE	250mL	HNO3	--	--	6010B TAL Metals/ 7470A Hg	APP	
EW-9	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
EW-9	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
EW-9	1	PE	125mL	--	--	--	9251 Chloride & 9038 Sulfate	APP	
EW-9	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
EW-9	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
EW-9	1	PE	500mL	--	--	--	2540C TDS	APP	
EW-9	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
EW-9	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Depth of water cannot be recorded with recovery wells.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings: **pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **EW-10**	SAMPLE ID: **EW-10**	DATE: **3/03/2014**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH(ft btoc): **45.3 to 50.3**	STATIC DEPTH TO WATER (ft btoc): **n/a**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= s (0.0026 gallons/foot X 45 feet) + 0.13 gallons = **0.25 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (ft btoc): **42.25**	FINAL PUMP OR TUBING DEPTH IN WELL (ft btoc): **42.25**	PURGING INITIATED AT: **1250**	PURGING ENDED AT:**1314**	TOTAL VOLUME PURGED (gallons): **4.75**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1018	0.25	0.25	200	n/a	7.33	20.84	11.58	7.7	12.2	-121.9	
1023	0.25	0.50	200	n/a	7.35	20.81	11.59	3.1	11.1	-131.7	
1228	0.25	0.75	200	n/a	7.37	20.84	11.55	2.0	11.4	-139.5	
1033	0.25	1.00	200	n/a	7.38	20.88	11.52	1.6	11.2	-156.8	
1038	0.25	1.25	200	n/a	7.38	20.89	11.51	1.5	11.5	-164.9	
1043	0.25	1.50	200	n/a	7.38	20.88	11.51	1.3	12.0	-177.1	
1048	0.25	1.75	200	n/a	7.37	20.97	11.50	1.3	11.6	-168.6	
1053	0.25	2.00	200	n/a	7.37	20.99	11.51	1.2	10.4	-181.8	
1058	0.25	2.25	200	n/a	7.37	20.94	11.51	1.2	10.6	-195.7	
1103	0.25	2.50	200	n/a	7.37	20.94	11.51	1.2	10.4	-192.2	
1108	0.25	2.75	200	n/a	7.37	20.96	11.51	1.1	10.9	-207.3	
1113	0.25	3.00	200	n/a	7.36	21.02	11.52	1.1	10.9	-213.8	
1118	0.25	3.25	200	n/a	7.36	21.10	11.53	0.9	10.6	-216.8	
1123	0.25	3.50	200	n/a	7.36	21.15	11.54	1.1	10.6	-216.9	
1128	0.25	3.75	200	n/a	7.36	21.17	11.55	1.1	10.1	-223.3	
1133	0.25	4.00	200	n/a	7.35	21.21	11.55	1.1	9.98	-227.4	
1138	0.25	4.25	200	n/a	7.35	21.20	11.56	1.1	10.1	-230.0	
1143	0.25	4.50	200	n/a	7.34	21.24	11.56	1.1	10.1	-234.8	
1148	0.25	4.75	200	n/a	7.34	21.28	11.56	1.0	9.95	-238.5	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Matt Scheuer	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1152**	SAMPLING ENDED AT: **1215**
PUMP OR TUBING DEPTH IN WELL (feet): **42.25**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: Yes **SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No**	TUBING Yes **No (replaced)**	DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
EW-10	1	PE	250mL	HNO3	--	--	6010B TAL Metals/ 7470A Hg	APP	
EW-10	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
EW-10	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
EW-10	1	PE	125mL	--	--	--	9251 Chloride & 9038 Sulfate	APP	
EW-10	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
EW-10	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
EW-10	1	PE	500mL	--	--	--	2540C TDS	APP	
EW-10	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
EW-10	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Depth of water cannot be recorded with recovery wells.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings: **pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **EW-11**	SAMPLE ID: **EW-11**	DATE: **2/28/2014**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH(ft btoc): 45.5 to 50.5	STATIC DEPTH TO WATER (ft btoc): **n/a**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= s (0.0026 gallons/foot X 46 feet) + 0.13 gallons = **0.25 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (ft btoc): **42.6**	FINAL PUMP OR TUBING DEPTH IN WELL (ft btoc): **42.6**	PURGING INITIATED AT: **1135**	PURGING ENDED AT:**1200**	TOTAL VOLUME PURGED (gallons): **1.25**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1138	0.25	0.25	200	n/a	6.55	20.70	35.85	7.6	8.76	-44.7	
1143	0.25	0.50	200	n/a	6.52	21.02	35.66	2.8	4.28	-76.4	
1148	0.25	0.75	200	n/a	6.51	21.13	35.49	2.9	1.71	-89.7	
1153	0.25	1.00	200	n/a	6.50	21.16	35.39	2.6	1.32	-93.9	
1158	0.25	1.25	200	n/a	6.49	21.25	35.44	2.7	1.29	-96.9	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Matt Scheuer	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1212**	SAMPLING ENDED AT: **1242**
PUMP OR TUBING DEPTH IN WELL (feet): **42.6**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: Yes **SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No** TUBING Yes **No (replaced)**		DUPLICATE: **Yes**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
EW-11	1	PE	250mL	HNO3	--	--	6010B TAL Metals/ 7470A Hg	APP	
EW-11	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
EW-11	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
EW-11	1	PE	125mL	--	--	--	9251 Chloride & 9038 Sulfate	APP	
EW-11	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
EW-11	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
EW-11	1	PE	500mL	--	--	--	2540C TDS	APP	
EW-11	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
EW-11	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Depth of water cannot be recorded with recovery wells.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings:-**pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-1A**	SAMPLE ID: **MW-1A**	DATE: **2/24/2014**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH(ft btoc): **19 to 24.4**	STATIC DEPTH TO WATER (ft btoc): **8.14**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= s (0.0026 gallons/foot X 25 feet) + 0.13 gallons = **0.20 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (ft btoc): **20.5**	FINAL PUMP OR TUBING DEPTH IN WELL (ft btoc): **20.5**	PURGING INITIATED AT: **1521**	PURGING ENDED AT: **1552**	TOTAL VOLUME PURGED (gallons): **2.75**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1526	0.25	0.25	350	8.38	6.27	20.79	16.60	6.3	4.91	-147.7	
1531	0.50	0.75	350	8.38	6.27	20.66	16.70	2.9	3.17	-156.3	
1536	0.50	1.25	350	8.40	6.27	20.66	16.71	2.2	2.74	-166.2	
1541	0.5	1.75	350	8.42	6.27	20.67	16.74	1.8	2.56	-166.7	
1546	0.5	2.25	350	8.43	6.27	20.65	16.75	1.7	2.18	-165.7	
1551	0.5	2.75	350	8.43	6.27	20.59	16.82	1.6	2.24	-170.3	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Matt Veter	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1555**	SAMPLING ENDED AT: **1610**
PUMP OR TUBING DEPTH IN WELL (feet): **20.5**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: Yes **SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No** TUBING Yes **No (replaced)**		DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
MW-1A	1	PE	250mL	HNO3	--	--	6010B TAL Metals/ 7470A Hg	APP	
MW-1A	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-1A	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-1A	1	PE	125mL	--	--	--	9251 Chloride & 9038 Sulfate	APP	
MW-1A	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-1A	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-1A	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-1A	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-1A	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Purge water brown, sulfur-like odor.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings:-**pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-1B**	SAMPLE ID: **MW-1B**	DATE: **2/24/2014**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc) **34.5 to 39.5**	STATIC DEPTH TO WATER (feet btoc): **8.3**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 40 feet) + 0.13 gallons = **0.23 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **35.5**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **35.5**	PURGING INITIATED AT: **1526**	PURGING ENDED AT: **1556**	TOTAL VOLUME PURGED (gallons): **3.5**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1530	0.1	0.1	200	8.56	6.78	21.95	7.091	163.4	18.9	-45.1	
1535	0.5	0.6	250	8.5	6.12	21.78	6.588	25.6	17.4	-73.4	
1540	0.9	1.5	300	8.5	6.07	21.64	6.524	19.4	13.2	-72.0	
1545		--skipped due to training--									
1550	1.0	2.5	300	8.5	6.05	22.03	6.095	14.3	13.5	-60.7	
1555	1.0	3.5	300	8.5	6.03	21.52	6.311	13.1	15.2	-65	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Tanya Chuprikova	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1600**	SAMPLING ENDED AT: **n/a**
PUMP OR TUBING DEPTH IN WELL (feet): **35.5**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No** TUBING Y **No (replaced)**		DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION					
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
MW-1B	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-1B	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-1B	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-1B	1	PE	125mL	--	--	--	9251 Chloride & 9038 Sulfate	APP	
MW-1B	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-1B	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-1B	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-1B	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-1B	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings: **pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-1C**	SAMPLE ID: **MW-1C**	DATE: **2/24/2014**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc): **48 to 53**	STATIC DEPTH TO WATER (feet btoc): **9.67**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 55 feet) + 0.13 gallons = **0.26 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **50.5**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **50.5**	PURGING INITIATED AT: **1343**	PURGING ENDED AT: **1410**	TOTAL VOLUME PURGED (gallons): 2.0

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1345	0.2	0.2	150	9.82	7.09	22.40	47.99	28.2	3.64	-138.9	
1350	0.2	0.4	150	9.83	6.66	22.09	49.93	10.7	10.7	-161.2	
1355	0.6	1.0	200	9.85	6.65	21.92	50.77	7.9	7.9	-171.8	
1400	0.4	1.0	200	9.83	6.59	21.96	51.04	6.0	6.0	-170.6	
1405	0.5	1.5	200	9.85	6.55	21.90	51.12	5.2	5.2	-194.2	
1410	0.5	2.0	200	9.85	6.64	21.91	51.14	4.8	4.8	-197.6	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Tanya Chuprikova	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1412**	SAMPLING ENDED AT: **1447**
PUMP OR TUBING DEPTH IN WELL (feet): **50.5**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No**	TUBING Y **No (replaced)**	DUPLICATE: **Yes**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
MW-1C	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-1C	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-1C	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-1C	1	PE	125mL	--	--	--	9251 Chloride & 9038 Sulfate	APP	
MW-1C	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-1C	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-1C	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-1C	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-1C	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings: **pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-2A**	SAMPLE ID: **MW-2A**	DATE: **3/5/2014**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc): **18 to 23**	STATIC DEPTH TO WATER (feet btoc): **n/a**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 26 feet) + 0.13 gallons = **0.20 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **21.5**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **21.5**	PURGING INITIATED AT: **0848**	PURGING ENDED AT: **0919**	TOTAL VOLUME PURGED (gallons): **1.6**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
0854	0.2	0.2	230	8.25	7.17	14.16	7.617	27.9	7.58	-164.6	
0859	0.2	0.4	230	8.24	7.18	14.81	7.705	17.3	6.99	-188.5	
0904	0.3	0.7	230	8.24	7.19	14.82	7.743	13.2	n/a	-199.3	
0909	0.3	1.0	230	8.24	7.20	14.91	7.766	9.4	7.14	-210.2	
0914	0.3	1.3	230	8.24	7.21	15.21	7.806	8.0	7.64	-215.6	
0919	0.3	1.6	230	8.24	7.21	14.85	7.828	6.7	7.54	-218.6	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Ken Stuart	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **0919**	SAMPLING ENDED AT: **0945**
PUMP OR TUBING DEPTH IN WELL (feet): **21.5**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No** TUBING Y **No (replaced)**		DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
MW-2A-	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-2A-	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-2A-	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-2A-	1	PE	125mL	--	--	--	9251 Chloride & 9038 Sulfate	APP	
MW-2A-	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-2A-	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-2A-	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-2A-	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-2A-	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings:-**pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-2B**	SAMPLE ID: **MW-2B**	DATE: **3/04/2014**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc): **34.5 to 39.5**	STATIC DEPTH TO WATER (feet btoc): **7.94**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 44 feet) + 0.13 gallons = **0.23 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **35.5**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **35.5**	PURGING INITIATED AT: **1537**	PURGING ENDED AT: **1644**	TOTAL VOLUME PURGED (gallons): **~6.5**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1544	0.3	0.3	350	8.04	6.25	19.04	6.281	11.7	11.2	-44.1	
1549	0.45	0.75	275	8.01	6.17	18.81	6.227	9.2	6.56	-45.0	
1554	0.5	1.25	275	8.01	6.15	18.41	6.216	8.8	6.42	-40.8	
1559	0.5	1.75	275	8.03	6.16	18.35	6.197	8.1	7.61	-41.4	
1604	0.5	2.25	275	8.03	6.16	18.49	6.200	7.4	4.90	-42.5	
1609	0.5	2.75	275	8.03	6.16	18.54	6.189	7.0	5.75	-42.0	
1614	0.5	3.25	275	8.03	6.17	18.54	6.190	6.4	6.26	-42.3	
1619	0.5	3.75	275	8.03	6.16	18.39	6.179	6.4	5.37	-42.3	
1624	0.5	4.25	275	8.03	6.16	18.57	6.184	5.7	4.66	-42.9	
1629	0.5	4.75	275	8.03	6.16	18.73	6.187	5.9	4.37	-43.5	
1634	0.5	5.25	275	8.03	6.17	18.42	6.184	5.1	4.47	-41.8	
1639	0.5	5.75	275	8.03	6.17	18.61	6.181	5.3	4.95	-43.0	
1644	0.5	6.25	275	8.03	6.17	18.55	6.171	5.1	4.19	-42.7	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Ken Stuart	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1644**	SAMPLING ENDED AT: **1700**
PUMP OR TUBING DEPTH IN WELL (feet): **35.5**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No** TUBING Y **No (replaced)**		DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
MW-2B	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-2B-	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-2B-	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-2B-	1	PE	125mL	--	--	--	9251 Chloride & 9038 Sulfate	APP	
MW-2B-	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-2B-	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-2B-	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-2B-	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-2B-	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings:-**pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-2C**	SAMPLE ID: **MW-2C**	DATE: **2/24/2014**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc) **48.75 to 53.75**	STATIC DEPTH TO WATER (feet btoc): **9.08**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 56 feet) + 0.13 gallons = **0.27 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **51**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **51**	PURGING INITIATED AT: **1342**	PURGING ENDED AT: **1403**	TOTAL VOLUME PURGED (gallons): **~1.0**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1346	0.1	0.1	120	10.35	6.53	23.04	50.53	5.1	54.2	-43.3	
1351	0.25	0.26	120	10.35	6.52	22.52	50.66	2.2	21.5	-132.3	
1356	0.20	0.46	120	10.35	6.49	22.62	50.95	2.0	21.7	-135.9	
1402	0.20	0.66	120	10.35	6.49	23.02	51.34	1.8	19.9	-138.0	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Rick Butler	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1405**	SAMPLING ENDED AT: **1438**
PUMP OR TUBING DEPTH IN WELL (feet): **51**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No**	TUBING Y **No (replaced)**	DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION					
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
MW-2C	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-2C	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-2C	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-2C	1	PE	125mL	--	--	--	9251 Chloride & 9038 Sulfate	APP	
MW-2C	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-2C	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-2C	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-2C	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-2C	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings:-**pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-3A**	SAMPLE ID: **MW-3A**	DATE: **3/5/2014**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc): **18 to 23**	STATIC DEPTH TO WATER (feet btoc): **8.00**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 26 feet) + 0.13 gallons = **0.20 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **21.5**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **21.5**	PURGING INITIATED AT: **1018**	PURGING ENDED AT: **1108**	TOTAL VOLUME PURGED (gallons): **1.5**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1023	0.2	0.2	210	9.86	6.61	15.24	38.87	20.0	8.60	-191.3	
1028	0.1	0.3	110	9.99	6.61	15.12	39.19	11.4	14.1	-214.8	
1033	0.15	0.45	110	9.96	6.61	14.57	39.20	9.2	13.2	-220.8	
1038	0.15	0.6	110	9.98	6.60	14.20	39.18	7.8	16.3	-223.8	
1043	0.15	0.75	110	10.00	6.60	14.31	39.15	6.7	13.5	-227.6	
1048	0.15	0.9	110	10.04	6.60	14.07	39.03	6.1	12.9	-229.0	
1053	0.15	1.05	110	10.05	6.59	13.98	38.93	5.7	10.1	-230.0	
1058	0.15	1.2	110	10.07	6.59	14.15	38.71	5.1	9.65	-232.7	
1103	0.15	1.35	110	10.10	6.59	14.24	38.44	4.8	9.71	-234.2	
1108	0.15	1.5	110	10.09	6.58	14.19	38.16	4.3	8.34	-234.4	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Ken Stuart	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT:**1108**	SAMPLING ENDED AT: **1150**
PUMP OR TUBING DEPTH IN WELL (feet): **21.5**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No** TUBING Y **No (replaced)**		DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION					
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
MW-3A-	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-3A-	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-3A-	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-3A-	1	PE	125mL	--	--	--	9251 Chloride & 9038 Sulfate	APP	
MW-3A-	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-3A-	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-3A-	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-3A-	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-3A-	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings:-**pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-105A**	SAMPLE ID: **MW-105A**	DATE: **3/5/2014**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc): **10.7 to 20.7**	STATIC DEPTH TO WATER (feet btoc): **7.41**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 21 feet) + 0.13 gallons = **0.18 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **15.5**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **15.5**	PURGING INITIATED AT: **0940**	PURGING ENDED AT: **1010**	TOTAL VOLUME PURGED (gallons): **~2.0**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
0945	0.2	0.2	170	7.46	6.03	16.63	0.483	n/a	5.87	-38.2	
0950	0.3	0.5	170	7.46	6.08	16.83	0.465	26.3	4.35	-33.8	
0955	0.3	0.8	170	7.46	5.95	16.69	0.457	12.2	3.60	-25.5	
1000	0.3	1.1	170	7.46	5.97	17.00	0.455	8.3	3.60	-34.3	
1005	0.3	1.4	170	7.46	5.99	17.11	0.454	7.1	4.52	-34.5	
1010	0.3	1.7	170	7.46	5.99	17.21	0.455	5.8	4.30	-43.9	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Tanya Chuprikova	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1015**	SAMPLING ENDED AT: **~1050**
PUMP OR TUBING DEPTH IN WELL (feet): **15.5**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No** TUBING Y **No (replaced)**		DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
MW-105A-	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-105A-	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-105A-	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-105A-	1	PE	125mL	--	--	--	9251 Chloride & 9038 Sulfate	APP	
MW-105A-	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-105A-	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-105A-	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-105A-	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-105A-	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings: **pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-105B**	SAMPLE ID: **MW-105B**	DATE: **3/5/2014**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc): **26.5 to 31.5**	STATIC DEPTH TO WATER (feet btoc): **7.53**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 44 feet) + 0.13 gallons = **0.21 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **30.7**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **30.7**	PURGING INITIATED AT: **0816**	PURGING ENDED AT: **0855**	TOTAL VOLUME PURGED (gallons): **~2.0**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
0820	0.2	0.2	150	7.61	6.62	17.01	1.090	42.3	7.73	-42.9	
0825	0.2	0.4	150	7.61	6.56	16.82	1.199	23.3	4.76	-67.4	
0830	0.2	0.6	150	7.61	6.53	17.48	1.173	13.6	3.95	-66.3	
0835	0.2	0.8	150	7.61	6.42	17.48	1.159	11.9	4.03	-60.4	
0840	0.2	1.0	150	7.61	6.45	17.66	1.160	10.4	3.94	-59.3	
0845	0.3	1.3	150	7.61	6.42	17.71	1.163	9.4	3.84	-53.7	
0850	0.2	1.5	150	7.61	6.42	17.79	1.167	8.8	3.37	-50.5	
0855	0.3	1.8	150	7.61	6.39	17.87	1.168	8.1	3.17	-50.6	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Tanya Chuprikova	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **0900**	SAMPLING ENDED AT: **0940**
PUMP OR TUBING DEPTH IN WELL (feet): **27.65**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No** TUBING Y **No (replaced)**		DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION					
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
MW-105B-	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-105B-	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-105B-	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-105B-	1	PE	125mL	--	--	--	9251 Chloride & 9038 Sulfate	APP	
MW-105B-	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-105B-	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-105B-	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-105B-	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-105B-	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings: **pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-105C**	SAMPLE ID: **MW-105C**	DATE: **3/4/2014**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc): **n/a**	STATIC DEPTH TO WATER (feet btoc): **7.62**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 49 feet) + 0.13 gallons = **0.26 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **44.8**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **44.8**	PURGING INITIATED AT: **0907**	PURGING ENDED AT: **0942**	TOTAL VOLUME PURGED (gallons): **~2.5**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
0912	0.2	0.2	200	7.98	7.51	19.89	5.796	41.1	27.8	67.9	
0917	0.4	0.6	200	n/a	6.71	20.42	6.558	27.2	35.3	-51.1	
0922	0.4	1.0	200	7.95	6.62	20.42	6.703	13.4	5.55	-66.8	
0927	0.4	1.4	200	7.98	6.64	20.42	6.814	10.7	2.28	-64.3	
0932	0.4	1.8	200	7.98	6.65	20.25	6.922	9.2	2.24	-54.4	
0937	0.4	2.2	200	7.98	6.67	20.40	6.993	8.0	2.71	-46.9	
0942	0.4	2.2	200	7.98	6.68	20.54	7.080	7.2	5.14	-48.4	1.01

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Tanya Chuprikova	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **0945**	SAMPLING ENDED AT: **0955**
PUMP OR TUBING DEPTH IN WELL (feet): **44.8**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No**	TUBING Y **No (replaced)**	DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
MW-105C-	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-105C-	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-105C-	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-105C-	1	PE	125mL	--	--	--	9251 Chloride & 9038 Sulfate	APP	
MW-105C-	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-105C-	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-105C-	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-105C-	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-105C-	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings:-**pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-112C**	SAMPLE ID: **MW-112C**	DATE: **2/28/2014**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc): **49.6 to 51.6**	STATIC DEPTH TO WATER (feet btoc): **n/a**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 51 feet) + 0.13 gallons = **0.27 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **49.6**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **49.6**	PURGING INITIATED AT: **1025**	PURGING ENDED AT: **1110**	TOTAL VOLUME PURGED (gallons): **~2**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1037	0.5	0.5	200	6.42	11.23	18.07	39.69	n/a	10.9	-435.7	
1042	0.25	0.75	200	6.43	11.37	18.20	39.65	14.6	10.9	-473.2	
1047	0.25	1.0	200	6.44	11.37	18.15	39.58	8.3	11.1	-484.8	
1052	0.25	1.25	200	6.45	11.36	18.17	39.14	5.9	12.1	-488.2	
1057	0.25	1.5	200	6.46	11.35	18.35	39.22	4.8	12.9	-491.5	
1102	0.25	1.75	200	6.47	11.32	18.36	39.00	4.2	13.6	-494.0	
1107	0.25	2.0	200	6.48	11.29	18.50	38.75	3.7	14.1	-497.3	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Matt Vetter	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1110**	SAMPLING ENDED AT: **1132**
PUMP OR TUBING DEPTH IN WELL (feet): **49.6**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No**	TUBING Y **No (replaced)**	DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION					
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
MW-112C-	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-112C-	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-112C-	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-112C-	1	PE	125mL	--	--	--	9251 Chloride & 9038 Sulfate	APP	
MW-112C-	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-112C-	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-112C-	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-112C-	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-112C-	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings: **pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-113C**	SAMPLE ID: **MW-113C**	DATE: **3/4/2014**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc): **45.2 to 50.2**	STATIC DEPTH TO WATER (feet btoc): **n/a**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 49 feet) + 0.13 gallons = **0.26 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **45**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **45**	PURGING INITIATED AT: **0903**	PURGING ENDED AT: **0943**	TOTAL VOLUME PURGED (gallons): **3.35**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
0908	0.25	0.25	250	8.75	9.09	18.71	51.06	9.1	23.6	-180.5	
0913	0.75	1.00	210	9.07	9.11	18.83	51.68	5.3	17.3	-222.8	
0918	0.5	1.50	210	8.89	9.10	18.54	51.70	4.6	13.9	-229.6	
0923	0.5	2.00	210	8.76	9.10	18.28	51.70	3.5	10.5	-167.2	
0928	0.5	2.5	210	8.69	9.09	18.28	51.65	3.2	7.51	-166.8	
0933	0.25	2.75	210	8.62	9.09	18.24	51.64	2.4	6.30	-237.3	
0938	0.35	3.10	210	8.59	9.08	18.29	51.63	2.5	6.08	-246.0	
0943	0.25	3.35	210	8.57	9.08	18.30	51.62	2.5	5.46	-247.1	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Ken Stuart	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **0943**	SAMPLING ENDED AT: **1032**
PUMP OR TUBING DEPTH IN WELL (feet): **45**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No**	TUBING Y **No (replaced)**	DUPLICATE: **Yes**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
MW-113C-	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-113C-	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-113C-	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-113C-	1	PE	125mL	--	--	--	9251 Chloride & 9038 Sulfate	APP	
MW-113C-	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-113C-	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-113C-	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-113C-	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-113C-	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings:-**pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-115A**	SAMPLE ID: **MW-115A**	DATE: **3/4/2014**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc): **17.5 to 22.5**	STATIC DEPTH TO WATER (feet btoc): **7.9**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 25 feet) + 0.13 gallons = **0.20 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **20**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **20**	PURGING INITIATED AT: **1219**	PURGING ENDED AT: **1252**	TOTAL VOLUME PURGED (gallons): **~2.0**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1222	0.2	0.2	170	8.26	8.53	16.83	5.877	134.0	6.71	-146.7	
1227	0.3	0.5	170	8.3	7.88	17.53	5.357	22.9	7.24	-184.9	
1232	0.2	0.7	150	8.23	7.55	17.49	5.067	10.7	6.30	-200.4	
1237	0.3	1.0	170	8.28	7.44	17.70	4.914	7.4	6.48	-222.9	
1242	0.3	1.3	170	8.28	7.40	17.83	4.851	5.5	6.70	-197.3	
1247	0.3	1.6	170	8.3	7.38	17.90	4.843	4.5	7.50	-213.7	
1252	0.4	2.0	170	8.3	7.36	17.64	4.828	4.1	7.34	-200.6	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Tanya Chuprikova	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1300**	SAMPLING ENDED AT: **1307**
PUMP OR TUBING DEPTH IN WELL (feet): **20**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No**	TUBING Y **No (replaced)**	DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION					
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
MW-115A-	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-115A-	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-115A-	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-115A-	1	PE	125mL	--	--	--	9251 Chloride & 9038 Sulfate	APP	
MW-115A-	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-115A-	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-115A-	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-115A-	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-115A-	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings:-**pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-115B**	SAMPLE ID: **MW-115B**	DATE: **3/4/2014**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH(ft btoc): **33.2 to 35.2**	STATIC DEPTH TO WATER (ft btoc): **7.45**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= s (0.0026 gallons/foot X 40 feet) + 0.13 gallons = **0.23 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (ft btoc): **34.7**	FINAL PUMP OR TUBING DEPTH IN WELL (ft btoc): **34.7**	PURGING INITIATED AT: **1343**	PURGING ENDED AT: **1413**	TOTAL VOLUME PURGED (gallons): **~2.0**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1348	0.2	0.2	200	7.53	6.74	18.22	4.365	27.7	8.49	-107.5	
1353	0.4	0.6	200	7.51	6.25	18.45	4.816	14.7	5.45	-123.2	
1358	0.4	1.0	180	7.51	6.16	18.09	4.840	7.4	6.51	-141.3	
1403	0.3	1.3	180	7.51	6.12	18.09	4.823	6.0	4.69	-146.1	
1408	0.3	1.6	180	7.52	6.11	18.29	4.793	5.3	4.01	-153.4	
1413	0.3	2.0	180	7.52	6.08	18.17	4.779	5.2	3.83	-150.7	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Tanya Chuprikova	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1415**	SAMPLING ENDED AT: **n/a**
PUMP OR TUBING DEPTH IN WELL (feet): **34.7**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: Yes **SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No** TUBING Yes **No (replaced)**		DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
MW-115B	1	PE	250mL	HNO3	--	--	6010B TAL Metals/ 7470A Hg	APP	
MW-115B	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-115B	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-115B	1	PE	125mL	--	--	--	9251 Chloride & 9038 Sulfate	APP	
MW-115B	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-115B	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-115B	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-115B	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-115B	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings: **pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-115C**	SAMPLE ID: **MW-115C**	DATE: **2/24/2014**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc): **44.9 to 46.9**	STATIC DEPTH TO WATER (feet btoc): **8.51**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 50 feet) + 0.13 gallons = **0.26 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **45**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **45**	PURGING INITIATED AT: **1504**	PURGING ENDED AT: **1522**	TOTAL VOLUME PURGED (gallons): **~1.0**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1506	0.2	0.2	120	9.91	6.75	21.83	48.56	7.9	25.4	-141.4	
1511	0.25	0.27	120	9.91	6.65	21.84	49.02	3.6	18.6	-141.7	
1516	0.23	0.50	120	9.92	6.69	21.75	48.92	2.5	20.0	-139.8	
1521	0.23	0.73	120	9.91	6.68	21.78	48.69	1.8	20.4	-146.2	1.045

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Rick Butler	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1525**	SAMPLING ENDED AT: **1542**
PUMP OR TUBING DEPTH IN WELL (feet): **45**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No**	TUBING Y **No (replaced)**	DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
MW-115C-	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-115C-	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-115C-	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-115C-	1	PE	125mL	--	--	--	9251 Chloride & 9038 Sulfate	APP	
MW-115C-	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-115C-	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-115C-	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-115C-	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-115C-	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings:-**pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-352A**	SAMPLE ID: **MW-352A**	DATE: **2/27/2014**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc): **35.6 to 36.8**	STATIC DEPTH TO WATER (feet btoc): **9.50**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 41 feet) + 0.13 gallons = **0.24 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **36**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **36**	PURGING INITIATED AT: **1228**	PURGING ENDED AT: **1335**	TOTAL VOLUME PURGED (gallons): **3.25**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1235	0.25	0.25	250	9.55	6.74	19.86	5.555	12.6	805	-84.4	
1240	0.25	0.5	250	9.60	6.75	20.34	5.714	11.2	580	-114.9	
1245	0.25	0.75	250	9.60	6.63	20.92	5.318	9.5	101	-187.7	
1250	0.25	1.0	250	9.60	6.61	20.96	5.374	7.9	44.8	-187.1	
1255	0.25	1.25	250	9.60	6.59	21.03	5.586	7.0	28.1	-172.3	
1300	0.25	1.5	250	9.60	6.59	21.10	5.631	6.1	26.0	-150.2	
1305	0.25	1.75	250	9.60	6.59	21.13	5.709	5.8	22.3	-132.2	
1310	0.25	2.0	250	9.60	6.59	21.20	5.731	5.3	17.7	-125.2	
1315	0.25	2.25	250	9.60	6.59	21.17	5.742	5.1	29.0	-129.0	
1320	0.25	2.50	250	9.60	6.59	21.17	5.741	4.8	22.6	-132.3	
1325	0.25	2.75	250	9.60	6.59	21.22	5.737	4.7	22.1	-131.9	
1330	0.25	3.0	250	9.60	6.59	21.22	5.725	4.2	16.1	-130.5	
1335	0.25	3.25	250	9.60	6.58	21.75	5.720	4.2	16.8	-128.3	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Matt Vetter	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1338**	SAMPLING ENDED AT: **1400**
PUMP OR TUBING DEPTH IN WELL (feet): **36**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No** TUBING Y **No (replaced)**		DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
MW-352A-	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-352A-	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-352A-	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-352A-	1	PE	125mL	--	--	--	9251 Chloride & 9038 Sulfate	APP	
MW-352A-	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-352A-	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-352A-	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-352A-	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-352A-	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings:-**pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-352B**	SAMPLE ID: **MW-352B**	DATE: **2/27/2014**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc): **48.5 to 53.5**	STATIC DEPTH TO WATER (feet btoc): **10.03**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 60.5 feet) + 0.13 gallons = **0.28 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **52.5**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **52.5**	PURGING INITIATED AT: **1044**	PURGING ENDED AT: **1113**	TOTAL VOLUME PURGED (gallons): **1.75**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1053	0.5	0.5	230	10.54	12.82	18.95	38.72	8.6	6.88	-280.0	
1058	0.25	0.75	230	10.54	12.87	19.01	40.82	5.8	4.58	-302.2	
1103	0.25	1.00	230	10.54	12.87	19.55	41.67	5.6	4.44	-316.6	
1108	0.25	1.25	230	10.54	12.88	19.66	42.00	5.8	3.64	-326.3	
1113	0.25	1.75	230	10.54	12.89	19.47	42.16	5.6	3.33	-329.6	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Matt Vetter	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1115**	SAMPLING ENDED AT: **1135**
PUMP OR TUBING DEPTH IN WELL (feet): **52.5**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No**	TUBING Y **No (replaced)**	DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION					
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
MW-352B-	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-352B-	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-352B-	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-352B-	1	PE	125mL	--	--	--	9251 Chloride & 9038 Sulfate	APP	
MW-352B-	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-352B-	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-352B-	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-352B-	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-352B-	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings:-**pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-353B**	SAMPLE ID: **MW-353B**	DATE: **3/4/2014**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc): **43.5 to 44.5**	STATIC DEPTH TO WATER (feet btoc): **7.12**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 48 feet) + 0.13 gallons = **0.25 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **43**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **43**	PURGING INITIATED AT: **1021**	PURGING ENDED AT: **1049**	TOTAL VOLUME PURGED (gallons): **~ 2.5**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1023	0.2	0.2	180	7.25	8.98	19.45	34.07	33.9	7.67	-330.3	
1028	0.4	0.6	200	7.3	9.61	19.52	37.88	10.0	7.54	-389.1	
1033	0.4	1.0	200	7.3	9.67	19.65	37.59	6.5	6.82	-409.2	
1038	0.4	1.4	200	7.3	9.69	19.77	37.45	4.8	7.76	-402.2	
1043	0.4	1.8	200	7.3	9.70	19.77	37.44	4.1	7.72	-377.0	
1048	0.4	2.2	200	7.3	9.70	19.75	37.44	3.4	7.72	-436.2	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Tanya Chuprikova	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1050**	SAMPLING ENDED AT: **1120**
PUMP OR TUBING DEPTH IN WELL (feet): **43**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No**	TUBING Y **No (replaced)**	DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION					
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
MW-353B-	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-353B-	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-353B-	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-353B-	1	PE	125mL	--	--	--	9251 Chloride & 9038 Sulfate	APP	
MW-353B-	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-353B-	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-353B-	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-353B-	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-353B-	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings: **pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-357A**	SAMPLE ID: **MW-357A**	DATE: **3/3/2014**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc) **41.3 to 42.8**	STATIC DEPTH TO WATER (feet btoc): **6.84**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 47 feet) + 0.13 gallons = **0.25 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **41.5**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **41.5**	PURGING INITIATED AT: **1151**	PURGING ENDED AT: **1528**	TOTAL VOLUME PURGED (gallons):

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1156	0.2	0.2	125	9.98	6.45	22.30	11.53	20.7	12.6	-177.1	
1201	0.2	0.4	125	11.29	6.45	22.47	11.52	20.9	11.7	-194.9	
1206	0.3	0.7	125	11.77	6.45	22.55	11.51	21.0	12.2	-199.3	
1211	0.3	1.0	125	12.70	6.48	22.58	11.53	20.9	13.0	-210.9	
Drawdown exceeds 3 feet. Start Contingent Purge Method, purge to 1 foot above the top of the saturated screen interval (about 5 well volumes = 25.7 gallons). Do not want to purge the well dry so sample was collected although parameters were not stable. 1 Well Volume = (Total Depth – Water Level) * 0.16 5.14 gallons = 39 feet – 6.84 x 0.16 5.14 gallons x 5 = 25.7 gallons											
1528	n/a	n/a	180	17.4	6.54	22.93	11.29	12.2	18.8	-40.5	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Ken Stuart	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1530**	SAMPLING ENDED AT: **n/a**
PUMP OR TUBING DEPTH IN WELL (feet): **41.5**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No** TUBING Y **No (replaced)**		DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION					
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
MW-357A-	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-357A-	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-357A-	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-357A-	1	PE	125mL	--	--	--	9251 Chloride & 9038 Sulfate	APP	
MW-357A-	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-357A-	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-357A-	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-357A-	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-357A-	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level could not stabilize and pump purged as low as it can go.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings:**-pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-357B**	SAMPLE ID: **MW-357B**	DATE: **3/03/2014**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc): **48.7 to 50.7**	STATIC DEPTH TO WATER (feet btoc): **6.15**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 50 feet) + 0.13 gallons = **0.26 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **50**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **50**	PURGING INITIATED AT: **1401**	PURGING ENDED AT: **1533**	TOTAL VOLUME PURGED (gallons): **2.5**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1406	n/a	n/a	275	8.99	8.62	22.05	1.775	14.0	7.71	-171.6	
1413	n/a	n/a	275	11.15	6.98	21.78	0.572	8.4	n/a	-122.9	
1418	n/a	n/a	125	11.53	7.08	22.00	1.085	7.6	3.88	-109.2	
1423	n/a	n/a	125	11.76	7.35	22.01	1.793	7.1	2.35	-139.2	
1428	n/a	n/a	125	11.85	7.53	22.04	2.316	6.7	2.37	-152.4	
1433	n/a	n/a	125	11.97	7.83	21.94	3.081	5.7	1.88	-167.9	
1438	n/a	n/a	125	12.02	8.16	22.06	4.183	4.3	1.99	-180.9	
1443	n/a	n/a	125	12.06	8.27	22.07	4.697	3.6	2.25	-188.3	
1448	n/a	n/a	125	12.20	8.42	22.13	5.963	2.9	2.51	-202.7	
1453	n/a	n/a	125	12.22	8.52	22.11	5.956	2.8	2.73	-214.7	
1458	n/a	n/a	125	12.23	8.61	22.08	6.338	2.6	3.28	-223.5	
1503	n/a	n/a	125	12.28	8.68	22.16	6.839	2.5	3.75	-236.8	
1508	n/a	n/a	125	12.32	8.72	22.19	7.287	2.3	3.68	-247.6	
1513	n/a	n/a	125	12.31	8.76	22.19	7.524	2.3	4.09	-253.6	
1518	n/a	n/a	125	12.31	8.79	22.04	7.778	2.3	n/a	-262.0	
1523	n/a	n/a	125	12.29	8.80	21.98	8.042	2.3	4.32	-268.7	
1528	n/a	n/a	125	12.20	8.81	22.07	8.240	2.3	4.01	-273.1	
1533	n/a	n/a	125	12.11	8.82	22.14	8.439	2.2	4.04	-275.4	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Ken Stuart	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1533**	SAMPLING ENDED AT: **n/a**

PUMP OR TUBING DEPTH IN WELL (feet): **50**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**

FIELD DECONTAMINATION: PUMP Y **No** TUBING Y **No (replaced)** DUPLICATE: **Yes**

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
MW-357B-	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-357B-	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-357B-	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-357B-	1	PE	125mL	--	--	--	9251 Chloride & 9038 Sulfate	APP	
MW-357B-	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-357B-	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-357B-	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-357B-	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-357B-	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings: **pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-358B**	SAMPLE ID: **MW-358B**	DATE: **2/28/2014**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc): **39.5 to 41.5**	STATIC DEPTH TO WATER (feet btoc): **5.93**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 45.7 feet) + 0.13 gallons = **0.25 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **40.7**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **40.7**	PURGING INITIATED AT: **0854**	PURGING ENDED AT: **0934**	TOTAL VOLUME PURGED (gallons): **~2**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
0905	0.3	0.3	200	6.15	11.20	17.40	31.24	11.6	109	-406.2	
0910	0.25	0.55	200	6.16	11.21	17.51	31.42	8.4	45	-440.4	
0915	0.25	0.8	200	6.18	11.15	17.44	31.56	6.9	37.6	-434.6	
0920	0.25	1.05	200	6.21	11.12	17.54	31.63	6.1	14.7	-438.9	
0925	0.25	1.3	200	6.23	11.10	17.30	31.66	5.5	7.93	-441.9	
0930	0.25	1.55	200	6.27	11.07	17.31	31.71	5.1	7.56	-443.3	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Matt Vetter	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **0934**	SAMPLING ENDED AT: **0958**
PUMP OR TUBING DEPTH IN WELL (feet): **40.7**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No**	TUBING Y **No (replaced)**	DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION					
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
MW-358B-	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-358B-	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-358B-	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-358B-	1	PE	125mL	--	--	--	9251 Chloride & 9038 Sulfate	APP	
MW-358B-	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-358B-	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-358B-	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-358B-	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-358B-	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings:-**pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-501A**	SAMPLE ID: **MW-501A**	DATE: **2/27/2014**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc) **28.1 to 33.1**	STATIC DEPTH TO WATER (feet btoc): **7.03**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 35 feet) + 0.13 gallons = **0.23 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **30**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **30**	PURGING INITIATED AT: **0936**	PURGING ENDED AT: **1007**	TOTAL VOLUME PURGED (gallons): **1.75**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
0943	0.5	0.5	230	7.11	5.84	18.72	0.821	21.3	4.47	-20.7	
0948	0.25	0.75	230	7.11	5.77	19.31	0.831	13.6	8.96	-32.6	
0953	0.25	1.0	230	7.11	5.75	19.51	0.837	10.4	3.0	-38.9	
0958	0.25	1.25	230	7.11	5.73	19.52	0.844	8.9	3.51	-40.0	
1003	0.25	1.5	230	7.11	5.71	19.33	0.845	8.1	5.05	-43.8	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Matt Vetter	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1007**	SAMPLING ENDED AT: **1021**
PUMP OR TUBING DEPTH IN WELL (feet): **30**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No**	TUBING Y **No (replaced)**	DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION					
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
MW-501A-	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-501A-	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-501A-	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-501A-	1	PE	125mL	--	--	--	9251Chloride & 9038 Sulfate	APP	
MW-501A-	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-501A-	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-501A-	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-501A-	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-501A-	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings:-**pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-501B**	SAMPLE ID: **MW-501B**	DATE: **2/27/2014**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc) **40 to 45**	STATIC DEPTH TO WATER (feet btoc): **4.71**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 55 feet) + 0.13 gallons = **0.25 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **40**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **40**	PURGING INITIATED AT: **0810**	PURGING ENDED AT: **0845**	TOTAL VOLUME PURGED (gallons): **1.5**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
815	0.25	0.25	200	9.15	6.68	17.94	21.02	21.1	14.8	-180.0	
820	0.25	0.5	150	9.78	6.69	18.28	21.08	13.1	14.1	-188.3	
825	0.25	0.75	150	10.15	6.69	18.20	21.21	10.2	13.4	-192.6	
830	0.25	0.9	100	10.02	6.75	17.12	22.19	8.7	10.9	188.0	
835	0.25	1.1	120	9.95	6.77	16.90	22.34	8.5	12.0	-184.3	
840	0.25	1.3	130	10.0	6.79	16.96	22.30	8.0	98.2	-183.7	
845	0.25	1.5	130	10.1	6.81	17.33	21.25	7.2	14.5	-185.1	1.02

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Matt Vetter	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **0905**	SAMPLING ENDED AT: **0927**
PUMP OR TUBING DEPTH IN WELL (feet): **40**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No**	TUBING Y **No (replaced)**	DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
MW-501B-	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-501B-	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-501B-	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-501B-	1	PE	125mL	--	--	--	9251 Chloride & 9038 Sulfate	APP	
MW-501B-	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-501B-	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-501B-	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-501B-	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-501B-	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings:-**pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-502A**	SAMPLE ID: **MW-502A**	DATE: **2/27/2014**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc): **27.4 to 32.4**	STATIC DEPTH TO WATER (feet btoc): **6.1**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 34 feet) + 0.13 gallons = **0.22 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **29**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **29**	PURGING INITIATED AT: **1005**	PURGING ENDED AT: **1040**	TOTAL VOLUME PURGED (gallons): **~3.0**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1008	0.2	0.2	200	6.32	6.41	17.67	6.987	59.0	26.5	-120.9	
1013	0.4	0.6	200	6.3	6.45	20.23	7.171	27.8	18.7	-168.6	
1018	0.5	1.1	200	6.3	6.45	20.25	7.182	18.9	19.0	-173.6	
1023	0.5	1.6	200	6.3	6.44	20.22	7.151	14.5	14.3	-179.3	
1028	0.5	2.1	200	6.3	6.44	20.09	7.095	12.5	11.4	-187.2	
1033	0.5	2.6	200	6.3	6.44	20.12	7.021	11.0	11.5	-189.9	
1038	0.5	3.1	200	6.3	6.44	20.52	6.954	9.9	10.3	-190.1	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Tanya Chuprikova	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1040**	SAMPLING ENDED AT: **1050**
PUMP OR TUBING DEPTH IN WELL (feet): **29**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No** TUBING Y **No (replaced)**		DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
MW-502A-	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-502A-	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-502A-	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-502A-	1	PE	125mL	--	--	--	9251 Chloride & 9038 Sulfate	APP	
MW-502A-	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-502A-	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-502A-	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-502A-	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-502A-	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings:-**pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-502B**	SAMPLE ID: **MW-502B**	DATE: **2/27/2014**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc): **38.7 to 43.7**	STATIC DEPTH TO WATER (feet btoc): **6.03**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 45 feet) + 0.13 gallons = **0.25 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **40**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **40**	PURGING INITIATED AT: **0827**	PURGING ENDED AT: **0853**	TOTAL VOLUME PURGED (gallons): **~1.5**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
0830	0.2	0.2	150	6.25	6.29	17.77	4.930	70.4	10.8	8.3	
0835	0.2	0.4	150	6.23	6.45	18.71	7.011	13.6	3.14	-48.1	
0840	0.35	0.75	180	6.25	6.45	19.09	7.263	7.2	1.36	-49.9	
0845	0.35	1.1	180	6.25	6.45	19.37	7.321	5.8	1.18	-56.2	
0850	0.40	1.5	180	6.25	6.45	19.32	7.406	5.0	1.14	-58.4	1.023

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Tanya Chuprikova	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **0855**	SAMPLING ENDED AT: **~930**
PUMP OR TUBING DEPTH IN WELL (feet): **40**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No**	TUBING Y **No (replaced)**	DUPLICATE: **Yes**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
MW-502B-	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-502B-	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-502B-	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-502B-	1	PE	125mL	--	--	--	9251 Chloride & 9038 Sulfate	APP	
MW-502B-	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-502B-	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-502B-	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-502B-	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-502B-	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings:-**pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-503B**	SAMPLE ID: **MW-503B**	DATE: **3/03/2014**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc): **38.8 to 43.8**	STATIC DEPTH TO WATER (feet btoc): **7.06**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 47 feet) + 0.13 gallons = **0.25 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **41.7**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **41.7**	PURGING INITIATED AT: **1349**	PURGING ENDED AT: **1418**	TOTAL VOLUME PURGED (gallons): **~2.0**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1353	0.2	0.2	200	7.5	6.24	22.62	2.772	26.5	11.1	6.0	
1358	0.2	0.4	180	7.45	5.90	22.49	2.667	10.3	5.11	11.0	
1403	0.3	0.7	200	7.63	5.66	22.29	2.645	6.2	3.39	9.4	
1408	0.3	1.0	180	7.5	5.59	22.45	2.777	4.7	4.04	4.3	
1413	0.3	1.3	180	7.5	5.51	22.33	2.889	4.2	3.04	8.9	
1418	0.3	1.6	180	7.5	5.51	22.48	2.955	3.7	2.25	9.8	1.01

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Tanya Chuprikova	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1420**	SAMPLING ENDED AT: ~**1450**
PUMP OR TUBING DEPTH IN WELL (feet): **41.7**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No** TUBING Y **No (replaced)**		DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION					
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
MW-503B-	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-503B-	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-503B-	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-503B-	1	PE	125mL	--	--	--	9251 Chloride & 9038 Sulfate	APP	
MW-503B-	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-503B-	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-503B-	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-503B-	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-503B-	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings:-**pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-504A**	SAMPLE ID: **MW-504A**	DATE: **2/25/2014**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc) **31.6 to 36.6**	STATIC DEPTH TO WATER (feet btoc): **n/a**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 40 feet) + 0.13 gallons = **0.24 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **34**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **34**	PURGING INITIATED AT: **1002**	PURGING ENDED AT: **1021**	TOTAL VOLUME PURGED (gallons): **2.25**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1005	0.25	0.25	220	7.32	6.16	22.49	6.891	3.2	27.7	-156.8	
1010	0.5	0.75	220	7.4	6.15	22.85	6.809	1.1	27.3	-193.2	
1015	0.5	1.25	220	7.3	6.15	22.91	6.751	1.1	29.6	-202.1	
1020	1.0	2.25	220	7.3	6.15	22.85	6.708	1.1	29.3	-203.0	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Tanya Chuprikova	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1025**	SAMPLING ENDED AT: **1050**
PUMP OR TUBING DEPTH IN WELL (feet): **34**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No**	TUBING Y **No (replaced)**	DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
MW-504A	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-504A	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-504A	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-504A	1	PE	125mL	--	--	--	9251 Chloride & 9038 Sulfate	APP	
MW-504A	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-504A	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-504A	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-504A	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-504A	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings:-**pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-504B**	SAMPLE ID: **MW-504B**	DATE: **2/25/2014**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc): **31 to 46**	STATIC DEPTH TO WATER (feet btoc): **7.06**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 48 feet) + 0.13 gallons = **0.25 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **43.5**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **43.5**	PURGING INITIATED AT: **0901**	PURGING ENDED AT: **0923**	TOTAL VOLUME PURGED (gallons): **~2.0**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
0903	0.1	0.1	120	7.18	6.55	22.44	16.60	24.0	13.0	-68.9	
0908	0.2	0.3	120	7.18	6.58	22.19	16.54	3.9	5.81	-152.6	
0913	0.5	0.5	120	7.18	6.53	22.35	15.61	2.2	3.68	-152.6	
0918	0.55	1.2	120	7.19	6.52	22.47	15.57	1.9	3.73	-149.0	
0923	0.55	1.75	120	7.19	6.49	22.46	15.34	1.8	3.43	-174.4	1.02

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Tanya Chuprikova	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **0925**	SAMPLING ENDED AT: **0940**
PUMP OR TUBING DEPTH IN WELL (feet): **43.5**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No**	TUBING Y **No (replaced)**	DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION					
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
MW-504B-	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-504B-	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-504B-	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-504B-	1	PE	125mL	--	--	--	9251 Chloride & 9038 Sulfate	APP	
MW-504B-	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-504B-	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-504B-	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-504B-	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-504B-	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings:-**pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-505A**	SAMPLE ID: **MW-505A**	DATE: **2/25/2014**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc): **32.8 to 37.8**	STATIC DEPTH TO WATER (feet btoc): **7.01**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 40 feet) + 0.13 gallons = **0.26 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **35**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **35**	PURGING INITIATED AT: **0835**	PURGING ENDED AT: **0910**	TOTAL VOLUME PURGED (gallons): **~3.25**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
845	0.5	0.5	400	7.1	6.23	22.91	8.054	4.1	25.4	-156.0	
850	0.5	1.0	400	7.12	6.21	23.24	7.24	2.8	22.3	-152.2	
855	0.75	1.75	400	7.12	6.18	23.26	7.13	2.2	19.5	-152.0	
900	0.75	2.5	400	7.11	6.17	23.01	7.12	1.9	20.4	-155.1	
905	0.75	3.25	400	7.11	6.17	23.08	7.08	2.0	21.5	-156.5	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Matt Vetter	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **0910**	SAMPLING ENDED AT: **0925**
PUMP OR TUBING DEPTH IN WELL (feet): **35**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No** TUBING Y **No (replaced)**		DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
MW-505A	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-505A	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-505A	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-505A	1	PE	125mL	--	--	--	9251 Chloride & 9038 Sulfate	APP	
MW-505A	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-505A	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-505A	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-505A	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-505A	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings: **pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-505B**	SAMPLE ID: **MW-505B**	DATE: **2/25/2014**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc): **40.3 to 45.3**	STATIC DEPTH TO WATER (feet btoc): **9.1**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 48 feet) + 0.13 gallons = **0.25 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **43**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **43**	PURGING INITIATED AT: **0951**	PURGING ENDED AT: **1100**	TOTAL VOLUME PURGED (gallons): **1.00**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1040	0.5	0.5	200	9.60	6.81	23.65	34.93	16.2	22.5	-175.6	
1045	0.25	0.75	200	9.73	6.81	23.70	35.40	12.7	10.7	-177	
1050	0.25	1.0	200	9.75	6.80	23.71	33.19	11.2	9.06	-175	
1055	0.25	1.25	200	9.88	6.77	23.85	32.19	10.2	7.71	-174.9	
1100	0.25	1.5	200	9.97	6.76	23.83	31.69	9.1	7.58	-176.9	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Matt Vetter	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1105**	SAMPLING ENDED AT: **1122**
PUMP OR TUBING DEPTH IN WELL (feet): **43**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No** TUBING Y **No (replaced)**		DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
MW-505B-	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-505B-	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-505B-	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-505B-	1	PE	125mL	--	--	--	9251 Chloride & 9038 Sulfate	APP	
MW-505B-	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-505B-	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-505B-	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-505B-	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-505B-	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings: **pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-507B**	SAMPLE ID: **MW-507B**	DATE: **2/28/2014**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc): **49.1 to 54.1**	STATIC DEPTH TO WATER (feet btoc): **n/a**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 56 feet) + 0.13 gallons = **0.27 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **51.5**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **51.5**	PURGING INITIATED AT: **1210**	PURGING ENDED AT:**1240**	TOTAL VOLUME PURGED (gallons): **1.5**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1220	0.5	0.5	200	9.58	10.05	20.36	37.70	10.4	1.97	-297.3	
1225	0.25	0.75	200	9.62	10.08	20.49	38.27	7.2	1.38	-317.1	
1230	0.25	1.0	200	9.62	10.08	20.54	38.38	5.5	1.68	-326.2	
1235	0.25	1.25	200	9.62	10.08	20.69	38.20	4.4	1.65	-330.3	
1240	0.25	1.5	200	9.62	10.07	20.65	37.95	3.7	1.36	-334.8	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Matt Vetter	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1243**	SAMPLING ENDED AT: **1310**
PUMP OR TUBING DEPTH IN WELL (feet): **51.5**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No**	TUBING Y **No (replaced)**	DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
MW-507B-	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-507B-	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-507B-	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-507B-	1	PE	125mL	--	--	--	9251 Chloride & 9038 Sulfate	APP	
MW-507B-	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-507B-	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-507B-	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-507B-	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-507B-	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings:-**pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-508B**	SAMPLE ID: **MW-508B**	DATE: **2/28/2014**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc): **49.7 to 54.7**	STATIC DEPTH TO WATER (feet btoc): **8.61**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 58 feet) + 0.13 gallons = **0.28 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **53.2**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **53.2**	PURGING INITIATED AT: **0923**	PURGING ENDED AT: **1001**	TOTAL VOLUME PURGED (gallons): **~2.5**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
0925	0.25	0.25	180	9.54	9.79	20.02	51.14	6.6	23.1	-389.0	
0930	0.3	0.55	180	9.45	9.87	20.20	51.62	4.0	7.67	-431.4	
0935	0.3	0.85	180	9.42	9.88	20.24	51.78	2.9	5.02	-446.4	
0940	0.3	1.15	180	9.42	9.87	20.34	51.73	2.5	5.53	-454.5	
0945	0.3	1.45	180	9.42	9.84	20.42	51.63	2.0	14.4	-457.7	
0950	0.3	1.75	180	9.41	9.84	20.31	51.70	1.7	8.23	-462.3	
0955	0.3	2.05	180	9.41	9.85	20.45	51.64	1.7	5.50	-465.1	
1000	0.3	2.35	180	9.41	9.86	20.42	51.58	1.4	4.11	-467.9	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Tanya Chuprikova	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1005**	SAMPLING ENDED AT: **1040**
PUMP OR TUBING DEPTH IN WELL (feet): **53.2**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No** TUBING Y **No (replaced)**		DUPLICATE: **Yes**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
MW-508B-	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-508B-	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-508B-	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-508B-	1	PE	125mL	--	--	--	9251 Chloride & 9038 Sulfate	APP	
MW-508B-	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-508B-	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-508B-	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-508B-	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-508B-	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings:-**pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-510B**	SAMPLE ID: **MW-510B**	DATE: **2/27/2014**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc): **40 to 45**	STATIC DEPTH TO WATER (feet btoc): **n/a**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 495 feet) + 0.13 gallons = **0.27 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **44.5**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **44.5**	PURGING INITIATED AT: **1440**	PURGING ENDED AT: **1542**	TOTAL VOLUME PURGED (gallons): **~2**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1441	0.5	0.5	250	7.55	10.85	19.61	26.73	8.3	9.23	-396.1	
1446	0.25	0.75	250	7.54	10.74	19.76	26.32	6.3	6.81	-406.1	
1451	0.25	1.0	250	7.54	10.52	19.86	25.67	4.7	5.99	-407.2	
1456	-- Equipment malfunction. Restart with new pump. --										
1505											
1515											
1522	0.5	1.5	250	7.71	10.46	20.14	25.74	6.2	5.77	-406.1	
1527	0.25	1.75	250	7.72	10.30	20.44	25.24	4.8	4.81	-402.2	
1532	0.25	2.0	250	7.72	10.20	20.39	25.09	3.8	4.16	-430.1	
1537	0.25	2.25	250	7.73	10.20	20.53	25.22	3.2	4.22	-436.7	
1542	0.25	2.5	250	7.75	10.20	20.65	25.35	3.0	4.22	-442.2	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Matt Vetter	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1545**	SAMPLING ENDED AT: **1606**
PUMP OR TUBING DEPTH IN WELL (feet): **44.5**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No** TUBING Y **No (replaced)**		DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
MW-510B-	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-510B-	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-510B-	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-510B-	1	PE	125mL	--	--	--	9251 Chloride & 9038 Sulfate	APP	
MW-510B-	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-510B-	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-510B-	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-510B-	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-510B-	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters. Purge water brown, sulfur-like odor.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings:-**pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-511A**	SAMPLE ID: **MW-511A**	DATE: **3/4/2014**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc): **31.6 to 36.6**	STATIC DEPTH TO WATER (feet btoc): **7.10**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 37 feet) + 0.13 gallons = **0.22 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **32.5**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **32.5**	PURGING INITIATED AT: **1112**	PURGING ENDED AT: **1308**	TOTAL VOLUME PURGED (gallons): **5.35**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1116	0.25	0.25	210	7.26	6.58	17.99	4.564	34.2	28.7	-60.7	
1121	0.15	0.40	210	7.26	6.46	17.93	4.717	23.5	21.3	-63.3	
1126	0.20	0.60	210	7.26	6.41	17.99	4.830	18.4	22.1	-61.5	
1131	0.40	0.80	210	7.26	6.36	17.99	4.909	16.9	17.0	-58.7	
1138	0.20	1.25	210	7.26	6.37	18.13	5.060	15.9	17.3	-57.5	
1143	0.20	1.45	210	7.26	6.36	17.77	5.144	16.1	15.6	-55.0	
1148	0.20	1.65	210	7.26	6.36	17.81	5.244	15.3	14.9	-54.0	
1153	0.20	1.85	210	7.26	6.35	17.74	5.299	15.3	12.3	-53.3	
1158	0.20	2.05	210	7.26	6.35	18.03	5.376	14.9	13.3	-52.8	
1203	0.20	2.25	210	7.26	6.36	18.15	5.419	15.1	11.1	-52.9	
1208	0.20	2.45	210	7.26	6.37	17.87	5.466	14.7	10.7	-51.6	
1213	0.20	2.65	210	7.26	6.35	17.64	5.504	14.6	10.4	-50.2	
1218	0.20	2.85	210	7.26	6.36	17.78	5.543	14.4	10.4	-50.2	
1223	0.25	3.10	210	7.26	6.37	17.98	5.574	14.1	10.5	-50.7	
1228	0.25	3.35	210	7.26	6.36	17.52	5.590	16.1	10.4	-50.8	
1233	0.25	3.60	210	7.26	6.35	17.68	5.643	14.3	10.3	-48.7	
1238	0.25	3.85	210	7.26	6.37	17.94	5.673	14.2	10.6	-49.6	
1243	0.25	4.10	210	7.26	6.35	18.08	5.698	13.5	10.4	-49.1	
1248	0.25	4.35	210	7.26	6.34	17.58	5.715	13.3	10.2	-47.6	
1253	0.25	4.60	210	7.26	6.34	17.80	5.721	13.5	9.72	-42.6	
1258	0.25	4.85	210	7.26	6.36	17.94	5.736	13.0	10.0	-48.5	
1303	0.25	5.10	210	7.26	6.35	18.09	5.752	13.1	10.1	-48.8	
1308	0.25	5.35	210	7.26	6.36	18.22	5.763	13.0	10.1	-49.0	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Ken Stuart	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1308**	SAMPLING ENDED AT: **1335**
PUMP OR TUBING DEPTH IN WELL (feet): **32.5**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No** TUBING Y **No (replaced)**		DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION					
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
MW-511A	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-511A	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-511A	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-511A	1	PE	125mL	--	--	--	9251 Chloride & 9038 Sulfate	APP	
MW-511A	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-511A	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-511A	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-511A	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-511A	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings: **pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-511B**	SAMPLE ID: **MW-511B**	DATE: **3/4/2014**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc): **43.7 to 48.7**	STATIC DEPTH TO WATER (feet btoc): **5.44**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 49 feet) + 0.13 gallons = **0.26 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **44.5**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **44.5**	PURGING INITIATED AT: **1424**	PURGING ENDED AT: **1459**	TOTAL VOLUME PURGED (gallons): **~1.5**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1429	0.25	0.25	210	7.52	9.86	17.79	25.42	8.6	7.02	-142.2	
1434	0.20	0.45	210	7.53	9.68	18.14	26.82	7.2	5.21	-166.4	
1439	0.20	0.65	210	7.52	9.79	18.16	27.56	6.9	3.54	-177.4	
1444	0.25	0.85	210	7.53	9.81	18.38	27.88	6.5	3.10	-185.3	
1449	0.25	1.10	210	7.53	9.82	18.40	27.98	5.7	2.87	-188.4	
1454	0.25	1.35	210	7.53	9.82	18.64	27.97	5.5	3.13	-191.7	
1459	0.25	1.60	210	7.53	9.81	18.84	27.96	5.5	2.75	-192.3	1.02

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Ken Stuart	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1459**	SAMPLING ENDED AT: **1525**
PUMP OR TUBING DEPTH IN WELL (feet): **44.5**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No**	TUBING Y **No (replaced)**	DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
MW-511B-	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-511B-	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-511B-	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-511B-	1	PE	125mL	--	--	--	9251 Chloride & 9038 Sulfate	APP	
MW-511B-	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-511B-	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-511B-	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-511B-	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-511B-	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings:-**pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-512A**	SAMPLE ID: **MW-512A**	DATE: **2/27/2014**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc) **33.2 to 38.2**	STATIC DEPTH TO WATER (feet btoc): **6.63**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 40 feet) + 0.13 gallons = **0.24 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **36**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **36**	PURGING INITIATED AT: **1417**	PURGING ENDED AT: **1625**	TOTAL VOLUME PURGED (gallons): **~7.0**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1425	0.2	0.2	150	6.95	8.79	19.61	3.372	32.1	416	-172.7	
1430	0.3	0.5	150	6.95	7.66	20.46	3.205	9.9	338	-222.7	
1435	0.3	0.8	150	6.95	7.5	20.58	3.190	7.3	153	-242.7	
1440	0.4	1.0	180	6.95	7.71	20.54	3.167	6.1	203	-255.9	
1445	0.4	1.4	150	6.93	7.73	20.56	3.136	4.8	105	-259.3	
1450	0.3	1.7	150	6.93	7.82	20.64	3.111	3.8	77.8	-274.6	
1455	0.4	2.1	150	6.92	7.84	20.50	3.070	3.5	65.9	-271.9	
1500	0.5	2.6	150	6.92	8.04	20.74	3.010	3.0	61.9	-283.7	
1505	0.2	2.8	120	6.82	8.11	20.51	2.992	2.5	59.9	-294.5	
1510	0.2	3.1	120	6.81	8.10	20.25	2.979	2.2	64.4	-301.1	
1515	0.2	3.3	120	6.81	8.10	20.24	2.980	2.1	69.4	-306.8	
1520	0.2	3.5	100	6.79	8.17	20.00	2.981	2.0	66.7	-313.5	
1525	0.2	3.7	100	6.77	8.28	19.79	2.976	2.7	60.9	-317.7	
1530	0.2	3.9	100	6.77	8.37	19.61	2.976	1.7	67.9	-319.4	
1535	0.2	4.1	100	6.78	8.29	19.70	2.971	1.5	65.8	-322.8	
1540	0.2	4.3	100	6.77	8.25	19.72	2.971	1.5	60.3	-324.5	
1545	0.2	4.5	100	6.77	8.23	19.69	2.975	1.4	53.6	-319.4	
1550	0.2	4.7	100	6.77	8.23	19.70	2.977	1.3	54.0	-324.7	
1555	0.2	4.9	100	6.77	8.35	19.65	2.984	1.4	61.9	-327.7	
1600	0.2	5.1	100	6.77	8.37	19.60	2.983	1.3	56.4	-332.7	
1605	0.2	5.5	120	6.8	8.53	19.76	2.984	1.2	63.4	-333.7	
1610	0.2	5.7	120	6.8	8.52	19.69	2.992	1.1	55.5	-335.8	
1615	0.3	6.0	120	6.8	8.56	19.67	2..993	1.2	66.1	-265.0	
1620	0.3	6.3	120	6.8	8.58	19.91	2.995	1.2	76.4	-265.8	
1625	0.3	6.6	120	6.8	8.59	20.00	3.005	1.2	69.9	-277.1	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Tanya Chuprikova	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1625**	SAMPLING ENDED AT: **1650**
PUMP OR TUBING DEPTH IN WELL (feet): **36**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No** TUBING Y **No (replaced)**		DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION					
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
MW-512B-	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-512B-	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-512B-	1	PE	125mL	--	--	--	9251 Chloride & 9038 Sulfate	APP	
MW-	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-512B-	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters. 7470 Mercury (field filtered) sample collected due to high turbidity (above 50 NTU).

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings: **pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-512B**	SAMPLE ID: **MW-512B**	DATE: **2/27/2014**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc) **49 to 54**	STATIC DEPTH TO WATER (feet btoc): **7.61**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 55 feet) + 0.13 gallons = **0.27 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **49**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **49**	PURGING INITIATED AT: **1250**	PURGING ENDED AT: **1331**	TOTAL VOLUME PURGED (gallons): **2.5**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1300	0.25	0.25	180	9.3	6.97	18.66	26.25	28.1	22.2	-158.9	
1305	0.25	0.5	180	10.0	6.95	20.33	26.45	13.0	14.6	-188.1	
1310	0.25	0.75	120	10.27	6.95	19.55	26.72	11.4	11.7	-208.6	
1315	1.0	1.75	200	10.27	6.94	19.33	26.50	11.0	9.39	-212.0	
1320	0.25	2.0	140	10.4	6.94	19.58	26.33	10.6	14.3	-218.4	
1325	0.25	2.25	120	10.35	6.94	19.43	26.14	10.5	8.13	-213.2	
1330	0.25	2.5	120	10.3	6.93	19.41	25.63	10.0	8.23	-210.2	1.01

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Tanya Chuprikova	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1335**	SAMPLING ENDED AT: **n/a**
PUMP OR TUBING DEPTH IN WELL (feet): **49**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No** TUBING Y **No (replaced)**		DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
MW-512B-	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-512B-	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-512B-	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-512B-	1	PE	125mL	--	--	--	9251 Chloride & 9038 Sulfate	APP	
MW-512B-	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-512B-	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-512B-	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-512B-	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-512B-	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings:-**pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-513A**	SAMPLE ID: **MW-513A**	DATE: **2/25/2014**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc): **34.5 to 39.5**	STATIC DEPTH TO WATER (feet btoc): **7.95**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 43 feet) + 0.13 gallons = **0.24 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **38.5**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **38.5**	PURGING INITIATED AT: **0949**	PURGING ENDED AT: **1018**	TOTAL VOLUME PURGED (gallons): **1.0**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
0954	0.1	0.1	300	8.05	6.23	20.54	4.635	14.0	30.0	-100.8	
1000	0.25	0.26	200	8.05	6.03	20.86	4.402	7.0	30.9	-114.3	
1006	0.25	0.47	220	8.05	6.00	20.89	4.386	5.7	31.8	-120.1	
1012	0.25	0.72	225	8.05	5.99	20.98	4.391	4.6	32.6	-123.0	
1015	0.25	0.97	225	8.05	5.99	21.06	4.401	4.2	31.2	-127.5	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Rick Butler	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1020**	SAMPLING ENDED AT: **1050**
PUMP OR TUBING DEPTH IN WELL (feet): **38.5**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No**	TUBING Y **No (replaced)**	DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION					
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
MW-513A-	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-513A-	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-513A-	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-513A-	1	PE	125mL	--	--	--	9251 Chloride & 9038 Sulfate	APP	
MW-513A-	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-513A-	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-513A-	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-513A-	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-513A-	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings:-**pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-513B**	SAMPLE ID: **MW-513B**	DATE: **2/25/2014**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH(ft btoc): **43.8 to 48.8**	STATIC DEPTH TO WATER (ft btoc): **7.53**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= s (0.0026 gallons/foot X 50 feet) + 0.13 gallons = **0.26 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (ft btoc): **45.8**	FINAL PUMP OR TUBING DEPTH IN WELL (ft btoc): **45.8**	PURGING INITIATED AT: **0827**	PURGING ENDED AT: **0900**	TOTAL VOLUME PURGED (gallons): **~1.0**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
0834	0.1	0.1	100	9.48	6.52	20.40	13.46	13.2	38.3	-158.2	
0841	0.26	0.27	300	9.48	6.44	20.58	12.91	7.2	36.5	-204.7	
0847	0.26	0.53	300	9.48	6.47	20.63	11.86	6.3	21.3	-197.7	
0852	0.26	0.79	300	9.48	6.50	20.59	11.05	6.5	15.7	-200.5	
0857	0.26	1.05	300	9.48	6.51	20.65	10.63	6.53	15.1	-185.0	1.02

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Rick Butler	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **0905**	SAMPLING ENDED AT: **0941**
PUMP OR TUBING DEPTH IN WELL (feet): **45.8**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: Yes **SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	

FIELD DECONTAMINATION: PUMP Y **No** TUBING Yes **No (replaced)** DUPLICATE: **No**

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
MW-513B	1	PE	250mL	HNO3	--	--	6010B TAL Metals/ 7470A Hg	APP	
MW-513B	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-513B	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-513B	1	PE	125mL	--	--	--	9251 Chloride & 9038 Sulfate	APP	
MW-513B	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-513B	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-513B	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-513B	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-513B	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings: **pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-514A**	SAMPLE ID: **MW-514A**	DATE: **2/28/2014**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH(ft btoc): **34.8 to 39.8**	STATIC DEPTH TO WATER (ft btoc): **8.84**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= s (0.0026 gallons/foot X 42 feet) + 0.13 gallons = **0.24 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (ft btoc): **37.3**	FINAL PUMP OR TUBING DEPTH IN WELL (ft btoc): **36**	PURGING INITIATED AT: **1237**	PURGING ENDED AT: **1310**	TOTAL VOLUME PURGED (gallons): **2.00**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1240	0.2	0.2	180	9.25	6.83	20.68	6.031	n/a	5.27	-68.3	
1245	0.3	0.5	180	9.25	6.79	21.39	6.011	23.6	3.98	-78.6	
1250	0.3	0.8	180	9.25	6.83	21.49	5.974	15.4	3.73	-86.5	
1255	0.3	1.1	180	9.25	6.84	21.50	5.942	12.2	4.05	-92.6	
1300	0.3	1.4	180	9.25	6.85	21.44	5.919	10.8	3.92	-97.6	
1305	0.3	1.7	180	9.25	6.86	21.50	5.910	9.8	4.56	-87.6	
1310	0.3	2.0	180	9.25	6.86	21.49	5.903	9.2	4.63	-81.2	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Tanya Chuprikova	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1315**	SAMPLING ENDED AT: **11324**
PUMP OR TUBING DEPTH IN WELL (feet): **36**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: Yes **SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No** TUBING Yes **No (replaced)**		DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
MW-514A	1	PE	250mL	HNO3	--	--	6010B TAL Metals/ 7470A Hg	APP	
MW-514A	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-514A	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-514A	1	PE	125mL	--	--	--	9251 Chloride & 9038 Sulfate	APP	
MW-514A	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-514A	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-514A	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-514A	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-514A	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings:-**pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-514B**	SAMPLE ID: **MW-514B**	DATE: **2/28/2014**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH(ft btoc): **44 to 49**	STATIC DEPTH TO WATER (ft btoc): **8.91**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= s (0.0026 gallons/foot X 52 feet) + 0.13 gallons = **0.27 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (ft btoc): **47**	FINAL PUMP OR TUBING DEPTH IN WELL (ft btoc): **47**	PURGING INITIATED AT: **1118**	PURGING ENDED AT: **1142**	TOTAL VOLUME PURGED (gallons): **1.5**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1122	0.2	0.2	200	9.4	6.73	19.86	6.031	20.9	16.7	-143.2	
1127	0.2	0.4	180	9.36	6.32	20.56	5.000	11.3	6.95	-118.5	
1132	0.35	0.75	200	9.52	6.28	21.38	5.056	10.3	4,86	-114.2	
1137	0.35	1.20	200	9.52	6.28	21.39	5.362	9.5	3.88	-119.8	
1142	0.35	1.55	200	9.52	6.31	21.52	5.911	8.9	4.39	-120.6	1.01

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Tanya Chuprikova	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1145**	SAMPLING ENDED AT: **1200**
PUMP OR TUBING DEPTH IN WELL (feet): **47**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: Yes **SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No** TUBING Yes **No (replaced)**		DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
MW-514B	1	PE	250mL	HNO3	--	--	6010B TAL Metals/ 7470A Hg	APP	
MW-514B	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-514B	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-514B	1	PE	125mL	--	--	--	9251 Chloride & 9038 Sulfate	APP	
MW-514B	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-514B	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-514B	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-514B	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-514B	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings: **pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-515B**	SAMPLE ID: **MW-515B**	DATE: **2/25/2014**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc): **49.2 to 54.2**	STATIC DEPTH TO WATER (feet btoc): **9.0**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 57 feet) + 0.13 gallons = **0.28 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **52**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **52**	PURGING INITIATED AT: **1418**	PURGING ENDED AT: **1445**	TOTAL VOLUME PURGED (gallons): **2.25**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1424	0.25	0.25	230	9.2	8.75	22.90	15.72	4.6	11.4	-316.2	
1429	0.5	0.75	230	9.21	8.59	22.84	15.71	2.5	9.0	-335.4	
1434	0.5	1.25	230	9.21	8.70	22.75	15.74	1.7	1.7	-360.8	
1439	0.5	1.75	230	9.21	8.73	22.83	15.74	1.5	1.5	-376.0	
1444	0.5	2.25	230	9.24	8.80	22.76	15.33	1.1	1.1	-390.0	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Tanya Chuprikova	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1445**	SAMPLING ENDED AT: **n/a**
PUMP OR TUBING DEPTH IN WELL (feet): **52**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No**	TUBING Y **No (replaced)**	DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION					
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
MW-515B-	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-515B-	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-515B-	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-515B-	1	PE	125mL	--	--	--	9251 Chloride & 9038 Sulfate	APP	
MW-515B-	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-515B-	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-515B-	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-515B-	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-515B-	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters. Purge water brown, sulfur-like odor.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings: **pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-516A**	SAMPLE ID: **MW-516A**	DATE: **2/25/2014**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc): **34.6 to 39.6**	STATIC DEPTH TO WATER (feet btoc): **7.03**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 45 feet) + 0.13 gallons = **0.23 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **37**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **37**	PURGING INITIATED AT: **n/a**	PURGING ENDED AT: **1505**	TOTAL VOLUME PURGED (gallons): **3.75**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1440	0.75	0.75	300	7.13	6.25	22.36	9.641	10.0	12.6	-125.7	
1445	0.5	1.25	300	7.15	6.21	22.22	9.731	11.1	14.3	-126	
1450	0.5	1.75	300	7.17	6.19	22.17	9.703	11.2	11.9	-125.6	
1455	0.5	2.25	300	7.17	6.19	22.20	9.816	11.6	16.7	-126.3	
1500	0.5	2.75	300	7.17	6.16	22.18	9.808	11.8	13.6	-126.7	
1505	0.5	3.25	300	7.18	6.15	22.19	9.815	11.8	12.2	-127.1	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Matt Vetter	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1510**	SAMPLING ENDED AT: **1525**
PUMP OR TUBING DEPTH IN WELL (feet): **37**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No**	TUBING Y **No (replaced)**	DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
MW-516A-	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-516A-	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-516A-	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-516A-	1	PE	125mL	--	--	--	9251 Chloride & 9038 Sulfate	APP	
MW-516A-	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-516A-	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-516A-	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-516A-	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-516A-	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings: **pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-516B**	SAMPLE ID: **MW-516B**	DATE: **2/25/2014**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc): **50.6 to 55.6**	STATIC DEPTH TO WATER (feet btoc): **7.78**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 42 feet) + 0.13 gallons = **0.28 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **52.7**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **52.7**	PURGING INITIATED AT: **1308**	PURGING ENDED AT: **1346**	TOTAL VOLUME PURGED (gallons): **2.0**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1316	0.5	0.5	250	8.30	11.50	22.28	36.52	9.4	5.4	-260.3	
1321	0.25	0.75	250	8.31	11.50	21.91	36.38	7.2	4.04	-288.8	
1326	0.25	1.0	250	8.32	11.49	22.20	36.64	5.7	3.67	-309.4	
1331	0.25	1.25	250	8.35	11.47	22.30	36.77	4.3	3.86	-322.7	
1336	0.25	1.5	250	8.36	11.46	22.34	37.28	3.8	3.40	-331.8	
1341	0.25	1.75	250	8.37	11.48	22.39	37.24	3.3	3.50	-337.2	1.02

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Matt Vetter	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1348**	SAMPLING ENDED AT: **1405**
PUMP OR TUBING DEPTH IN WELL (feet): **52.7**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No**	TUBING Y **No (replaced)**	DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION					
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
MW-516B-	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-516B-	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-516B-	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-516B-	1	PE	125mL	--	--	--	9251 Chloride & 9038 Sulfate	APP	
MW-516B-	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-516B-	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-516B-	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-516B-	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-516B-	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings: **pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-517A**	SAMPLE ID: **MW-517A**	DATE: **2/25/2014**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH(ft btoc): **30 - 35**	STATIC DEPTH TO WATER (ft btoc): **8.25**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= s (0.0026 gallons/foot X 38 feet) + 0.13 gallons = **0.23 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (ft btoc): **33**	FINAL PUMP OR TUBING DEPTH IN WELL (ft btoc): **33**	PURGING INITIATED AT: **1402**	PURGING ENDED AT: **1420**	TOTAL VOLUME PURGED (gallons): **~1.0**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1406	0.1	0.1	250	8.29	6.29	22.02	9.489	12.2	12.1	-75.4	
1410	0.25	0.26	250	8.29	6.08	21.82	9.373	4.9	7.08	-94.2	
1415	0.25	0.51	250	8.29	6.05	21.81	9.277	3.6	9.19	-72.5	
1420	0.25	0.75	250	8.29	6.06	21.81	9.277	3.4	8.5	-71.5	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Rick Butler	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1425**	SAMPLING ENDED AT: **1445**
PUMP OR TUBING DEPTH IN WELL (feet): **33**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: Yes **SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No** TUBING Yes **No (replaced)**		DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION					
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
MW-517A	1	PE	250mL	HNO3	--	--	6010B TAL Metals/ 7470A Hg	APP	
MW-517A	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-517A	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-517A	1	PE	125mL	--	--	--	9251 Chloride & 9038 Sulfate	APP	
MW-517A	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-517A	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-517A	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-517A	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-517A	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Purge water clear brown, sulfur-like odor.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings: **pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-517B**	SAMPLE ID: **MW-517B**	DATE: **2/25/2014**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH(ft btoc): **49.7 to 54.7**	STATIC DEPTH TO WATER (ft btoc): **9.47**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= s (0.0026 gallons/foot X 58 feet) + 0.13 gallons = **0.28 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (ft btoc): **53**	FINAL PUMP OR TUBING DEPTH IN WELL (ft btoc): **53**	PURGING INITIATED AT: **1304**	PURGING ENDED AT: **1335**	TOTAL VOLUME PURGED (gallons): ~**1.25**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1309	0.1	0.1	250	10.15	6.48	22.31	30.56	12.9	53.0	-82.1	
1315	0.25	0.26	250	10.25	6.46	22.01	30.64	6.1	57.7	-89.3	
1320	0.25	0.51	250	10.25	6.47	22.43	30.64	4.6	45.9	-96.0	
1325	0.25	0.76	250	10.25	6.49	22.17	30.61	4.2	46.2	-96.0	
1330	0.25	1.01	250	10.25	6.47	22.14	30.58	4.2	46.8	-96.9	
1335	0.25	1.26	250	10.25	6.48	22.16	30.57	4.2	47.8	-96.0	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Rick Butler	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1340**	SAMPLING ENDED AT: **1400**
PUMP OR TUBING DEPTH IN WELL (feet): **53**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: Yes **SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No** TUBING Yes **No (replaced)**		DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION					
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
MW-517B	1	PE	250mL	HNO3	--	--	6010B TAL Metals/ 7470A Hg	APP	
MW-517B	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-517B	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-517B	1	PE	125mL	--	--	--	9251 Chloride & 9038 Sulfate	APP	
MW-517B	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-517B	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-517B	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-517B	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-517B	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Purge water clear brown, sulfur-like odor.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings: **pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-518A**	SAMPLE ID: **MW-518A**	DATE: **3/3/2014**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc) **35.1 to 40.1**	STATIC DEPTH TO WATER (feet btoc): **7.67**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 41 feet) + 0.13 gallons = **0.24 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **36**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **36**	PURGING INITIATED AT: **1128**	PURGING ENDED AT: **1206**	TOTAL VOLUME PURGED (gallons): **~3.75**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1131	0.2	0.2	200	8.61	8.76	21.49	7.583	15.4	12.5	-98.6	
1136	0.3	0.5	200	8.75	8.81	21.43	7.368	5.4	10.2	-95.4	
1141	0.3	0.8	170	8.48	8.84	21.36	7.656	3.7	8.96	-171.4	
1146	0.2	1.0	180	8.51	7.66	21.44	7.845	3.4	7.92	-171.3	
1151	0.3	1.3	180	8.5	7.29	21.48	8.038	3.0	7.57	-172.9	
1156	0.3	1.6	180	8.46	7.16	21.52	8.181	2.4	7.08	-176.3	
1201	0.4	2.0	200	8.46	7.12	21.57	8.276	1.8	6.83	-172.8	
1206	0.4	2.4	200	8.46	7.09	21.61	8.370	1.8	6.54	-166.9	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Tanya Chuprikova	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1210**	SAMPLING ENDED AT: **1228**
PUMP OR TUBING DEPTH IN WELL (feet): **36**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No** TUBING Y **No (replaced)**		DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
MW-518A-	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-518A-	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-518A-	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-518A-	1	PE	125mL	--	--	--	9251 Chloride & 9038 Sulfate	APP	
MW-518A-	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-518A-	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-518A-	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-518A-	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-518A-	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings:-**pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-518B**	SAMPLE ID: **MW-518B**	DATE: **3/03/2014**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc): **48.2 to 53.2**	STATIC DEPTH TO WATER (feet btoc): **8.25**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 55 feet) + 0.13 gallons = **0.27 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **50**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **50**	PURGING INITIATED AT: **0931**	PURGING ENDED AT: **0956**	TOTAL VOLUME PURGED (gallons): ~**1.6**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
0936	0.2	0.2	180	7.15	6.54	19.76	13.49	103.4	9.14	-74.7	
0941	0.3	0.5	180	7.15	6.43	20.09	14.09	14.6	5.68	-75.3	
0946	0.4	0.7	180	7.18	6.40	20.37	14.30	8.1	4.27	-76.9	
0951	0.4	1.2	180	7.18	6.41	20.41	14.38	6.8	4.76	-80.2	
0956	0.4	1.6	180	7.18	6.39	20.50	14.38	6.7	4.72	-82.9	1.02

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Tanya Chuprikova	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1000**	SAMPLING ENDED AT: ~**1030**
PUMP OR TUBING DEPTH IN WELL (feet): **50**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No** TUBING Y **No (replaced)**		DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION					
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
MW-518B-	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-518B-	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-518B-	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-518B-	1	PE	125mL	--	--	--	9251 Chloride & 9038 Sulfate	APP	
MW-518B-	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-518B-	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-518B-	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-518B-	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-518B-	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings:-**pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-519A**	SAMPLE ID: **MW-519A**	DATE: **2/24/2014**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc): **34.75 – 39.75**	STATIC DEPTH TO WATER (feet btoc): **8.37**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 37 feet) + 0.13 gallons = **0.23 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **35**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **35**	PURGING INITIATED AT: **1340**	PURGING ENDED AT: **1410**	TOTAL VOLUME PURGED (gallons): **4.0**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
1342	0.25	0.25	400	8.45	5.94	21.88	7.441	4.7	9.11	-97.2	
1347	0.75	1.0	400	8.45	5.92	21.81	7.442	2.6	5.94	-109	
1352	1.25	2.0	400	8.45	5.93	21.79	7.496	2.6	5.18	-117	
1357	0.75	2.75	400	8.45	5.94	21.78	7.513	2.7	4.72	-119.5	
1402	0.75	3.5	400	8.45	5.94	21.78	7.506	2.8	4.12	-122.5	
1405	0.75	4.0	400	8.45	5.94	21.75	7.546	2.7	3.94	-123.7	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Matt Vetter	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1410**	SAMPLING ENDED AT: **1433**
PUMP OR TUBING DEPTH IN WELL (feet): **35**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No**	TUBING Y **No (replaced)**	DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
MW-519A-	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-519A-	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-519A-	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-519A-	1	PE	125mL	--	--	--	9251 Chloride & 9038 Sulfate	APP	
MW-519A-	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-519A-	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-519A-	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-519A-	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-519A-	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings:-**pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

GROUNDWATER SAMPLING LOG

SITE NAME: **LCP Chemical Site**	SITE LOCATION: **Brunswick, GA**	
WELL NO: **MW-519B**	SAMPLE ID: **MW-519B**	DATE: **2/24/2014**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **1/4**	WELL SCREEN INTERVAL DEPTH (feet btoc): **48 to 53**	STATIC DEPTH TO WATER (feet btoc): **10.15**	PURGE PUMP TYPE OR BAILER: **PP**

Tubing–in-Screen Interval Purge: 1 EQUIPMENT VOL. = (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
= (0.0026 gallons/foot X 55 feet) + 0.13 gallons = **0.27 gallons**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **50**	FINAL PUMP OR TUBING DEPTH IN WELL (feet btoc): **50**	PURGING INITIATED AT: **950**	PURGING ENDED AT: **1015**	TOTAL VOLUME PURGED (gallons): **2.0**

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet btoc)	pH (standard units)	TEMP. (^{O}C)	SP COND. (mS/cm)	DISSOLVED OXYGEN (% saturation)	TURBIDITY (NTUs)	ORP (mV)	SP Gravity (sg)
955	0.25	0.25	220	11.86	6.52	21.47	51.23	6.5	7.15	-170.4	
1000	0.25	0.5	220	12.68	6.53	21.41	52.88	6.8	5.7	-188.7	
1005	0.25	1.0	220	12.7	6.54	21.3	53.48	7.1	3.81	-191.8	
1010	0.25	1.5	220	12.7	6.54	21.2	53.15	7.1	3.74	-195.6	
1015	0.25	1.75	220	12.77	6.54	21.29	53.42	7.3	2.64	-190.3	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
BTOC = Below top of casing – feet below top of casing which includes above grade riser

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Tanya Chuprikova	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1020**	SAMPLING ENDED AT: ~**1150**
PUMP OR TUBING DEPTH IN WELL (feet): **50**	TUBING MATERIAL CODE: **Teflon-lined PE**	FIELD-FILTERED: **Yes/SM 4500 Sulfide** FILTER SIZE: **0.45 µm** Filtration Equipment Type: **In-line filter**	
FIELD DECONTAMINATION: PUMP Y **No**	TUBING Y **No (replaced)**	DUPLICATE: **No**	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION					
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	Additional Comments
MW-519B-	1	PE	250mL	HNO3	--	--	6010B TAL Metals/7470A Hg	APP	
MW-519B-	1	PE	125mL	--	--		3500 FE/ 9040B pH	APP	
MW-519B-	1	PE	250mL	--	--	--	6010B Dissolved Silica	APP	
MW-519B-	1	PE	125mL	--	--	--	9251 Chloride & 9038 Sulfate	APP	
MW-519B-	1	AG	125mL	--	--	--	SM 5310 DOC	APP	
MW-519B-	2	PE	250mL	NaOH Zinc Acetate	--	--	SM4500 Sulfide	APP	**Field-Filtered**
MW-519B-	1	PE	500mL	--	--	--	2540C TDS	APP	
MW-519B-	1	PE	250mL	--	--	--	2320B Alkalinity	APP	
MW-519B-	1	AG	125mL	HCl	--	--	SM5310 TOC	APP	

REMARKS: Per SOP, parameters stable prior to sample collection. Water level stabilized prior to collecting parameters. Purge water brown, sulfur-like odor.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: Stabilization Criteria for Range of Variation of Last Three Consecutive Readings: **pH:** ± 0.1 unit **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 10% saturation; optionally, ± 0.2 mg/L **Turbidity:** all readings ≤ 10 NTU; or ± 10%

Appendix E:

Sparging Flow Rates and Masses

SW-2 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
SW-2 Event 1	11/25/2013	9:10	11/25/2013 9:10	57	29			56	0.0				
	11/25/2013	9:12	11/25/2013 9:12	59	32	33	<2	56	0.0		0.0	0.00	0.00
	11/25/2013	9:24	11/25/2013 9:24		31	31.5	3.5	58	7.1		42.7	4.88	4.88
	11/25/2013	9:25	11/25/2013 9:25		32	33	5	58	10.3		8.7	0.99	5.88
	11/25/2013	10:25	11/25/2013 10:25		31	32	8	64	16.2		793.0	90.72	96.60
	11/25/2013	10:28	11/25/2013 10:28		33	34	10.5	64	21.7		56.8	6.49	103.09
	11/25/2013	11:23	11/25/2013 11:23		33	33.5	12	62	23.8		1250.3	143.04	246.13
	11/25/2013	12:08	11/25/2013 12:08		33	33.5	12	65	24.7		1092.1	124.94	371.07
	11/25/2013	12:45	11/25/2013 12:45		33	33	13	65	26.8		953.9	109.13	480.20
	11/25/2013	13:53	11/25/2013 13:53		33	33	14	64	28.9		1894.3	216.71	696.91
	11/25/2013	14:17	11/25/2013 14:17							Valve shut	693.7	79.36	776.27
	11/25/2013	14:18	11/25/2013 14:18			28							776.27
SW-2 Event 2	12/5/2013	8:30	12/5/2013 8:30										776.27
	12/5/2013	8:31	12/5/2013 8:31	56	29	28	<2	68	0.0				776.27
	12/5/2013	8:34	12/5/2013 8:34	56	32	32	3	68	6.1		9.2	1.05	777.31
	12/5/2013	8:46	12/5/2013 8:46	55	32	32	5	69	10.2		97.6	11.16	788.48
	12/5/2013	9:32	12/5/2013 9:32	53	32	32	8.5	76	17.2		628.4	71.88	860.36
	12/5/2013	10:24	12/5/2013 10:24	52	32	31.5	9.5	79	19.1		943.3	107.91	968.27
	12/5/2013	10:37	12/5/2013 10:37	51	32	31	11	81	22.1		267.9	30.65	998.93
	12/5/2013	11:38	12/5/2013 11:38	51	34	32.5	13.5	81	27.7		1519.0	173.77	1172.69
	12/5/2013	13:00	12/5/2013 13:00	54	34	32	14	81	28.7		2313.8	264.69	1437.39
	12/5/2013	13:01	12/5/2013 13:01							Valve shut	28.7	3.29	1440.68
	12/5/2013	13:02	12/5/2013 13:02			26							1440.68
SW-2 Event 3	12/10/2013	13:17	12/10/2013 13:17	53	34	34	<2	81	0.0				1440.68
	12/10/2013	13:43	12/10/2013 13:43	53	32	33	6.2	76	12.5		162.7	18.61	1459.29
	12/10/2013	14:09	12/10/2013 14:09	53	32	32	6.5	72	13.2		333.9	38.20	1497.49
	12/10/2013	15:04	12/10/2013 15:04	52	32	32	8	74	16.2		807.2	92.34	1589.83
	12/10/2013	15:49	12/10/2013 15:49	50	32	31	9	72	18.2		774.4	88.59	1678.43
	12/10/2013	16:26	12/10/2013 16:26	50	32	31	10	76	20.2		710.8	81.32	1759.75
	12/10/2013	17:10	12/10/2013 17:10	50	32	30	11	68	22.4		936.4	107.13	1866.87
	12/10/2013	22:37	12/10/2013 22:37	55	31	29	15	59	30.5		8637.9	988.17	2855.04
	12/10/2013	22:38	12/10/2013 22:38	55	35	32	20	59	42.4		36.4	4.17	2859.21
	12/11/2013	7:49	12/11/2013 7:49	51	34	30	22.5	60	47.1	Valve shut	24658.5	2820.93	5680.14
SW-2 Event 4	12/19/2013	12:09	12/19/2013 12:09	44	32	32	<2	69	0.0				5680.14
	12/19/2013	12:21	12/19/2013 12:21	44	30	30	6	72	11.9		71.4	8.16	5688.31
	12/19/2013	13:24	12/19/2013 13:24	50	30	29	7	74	13.8		810.8	92.75	5781.06
	12/19/2013	13:34	12/19/2013 13:34	50	32	31	12	74	24.3		190.6	21.80	5802.86
	12/19/2013	13:35	12/19/2013 13:35	49	34	32.5	14	74	28.9		26.6	3.04	5805.90
	12/19/2013	15:52	12/19/2013 15:52	45	34	32	17	68	35.3		4401.4	503.52	6309.42
	12/19/2013	16:38	12/19/2013 16:38	45	34	31	17.5	64	36.5		1652.4	189.03	6498.45
	12/19/2013	16:39	12/19/2013 16:39							Valve shut	36.5	4.18	6502.63
	12/19/2013	16:40	12/19/2013 16:40			26							6502.63
SW-2 Event 5	1/22/2014	8:15	1/22/2014 8:15	56	27	27	<2	42	0.0		0.0	0.00	6502.63
	1/22/2014	8:16	1/22/2014 8:16	56	31	33	<2	42	0.0		0.0	0.00	6502.63
	1/22/2014	8:18	1/22/2014 8:18	56	31	32	3.5	42	7.2		7.2	0.83	6503.45
	1/22/2014	8:49	1/22/2014 8:49	54	30.5	31	6	47	12.3		302.1	34.56	6538.01
	1/22/2014	8:50	1/22/2014 8:50	54	32	32	8	47	16.6		14.4	1.65	6539.67
	1/22/2014	9:48	1/22/2014 9:48	50	32	32	9	52	18.6		1021.6	116.87	6656.53
	1/22/2014	10:55	1/22/2014 10:55	47	32	32	11.2	57	23.0		1394.9	159.58	6816.11
	1/22/2014	12:00	1/22/2014 12:00	45	31.5	31	12.5	59	25.5		1578.0	180.52	6996.64
	1/22/2014	12:46	1/22/2014 12:46	49	31	30.5	13.8	60	28.0		1230.6	140.79	7137.42
	1/22/2014	13:59	1/22/2014 13:59	47	30.5	30	14.5	61	29.2		2087.9	238.86	7376.28
	1/22/2014	14:00	1/22/2014 14:00	47	32	31	18	61	36.9		33.0	3.78	7380.06

SW-2 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	1/22/2014	15:07	1/22/2014 15:07	53	32	31	19.7	62	40.3		2585.8	295.82	7675.88
	1/22/2014	16:00	1/22/2014 16:00	53	32	31	19.8	61	40.6		2143.2	245.19	7921.07
	1/22/2014	16:30	1/22/2014 16:30	52	32	30.5	19.9	58	40.9		1221.7	139.77	8060.84
	1/22/2014	16:31	1/22/2014 16:31			25				Valve shut	40.9	4.68	8065.51
Note: a red value, i.e. 75 °F, indicates that value was interpolated from field data											Total CO_2 Mass (lbs):		8065.51

SW-3 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
SW-3 Event 1	11/20/2013	10:00	11/20/2013 10:00	55	27			66	0.0				
	11/20/2013	10:02	11/20/2013 10:02		31	32	<2	66	0.0		0.0	0.00	0.00
	11/20/2013	11:07	11/20/2013 11:07		29	29	5	66	9.9		320.3	36.64	36.64
	11/20/2013	11:09	11/20/2013 11:09		32	31.5	8	66	16.3		26.2	2.99	39.63
	11/20/2013	13:12	11/20/2013 13:12		32	31.5	8.5	66	17.3		2068.5	236.63	276.26
	11/20/2013	14:58	11/20/2013 14:58		32	31.5	9	65	18.4		1891.6	216.40	492.66
	11/20/2013	15:04	11/20/2013 15:04							Valve shut	110.2	12.60	505.27
	11/20/2013	15:05	11/20/2013 15:05		24	24							505.27
SW-3 Event 2	12/5/2013	13:07	12/5/2013 13:07	55	32	31.5	<2	82	0.0				505.27
	12/5/2013	14:26	12/5/2013 14:26	54	31	30.5	4.5	86	8.9		351.5	40.21	545.48
	12/5/2013	14:27	12/5/2013 14:27	54	33	32	8	86	16.2		12.5	1.43	546.91
	12/5/2013	15:32	12/5/2013 15:32	50	33	32	9	80	18.3		1120.0	128.13	675.04
	12/5/2013	16:42	12/5/2013 16:42	50	32	31.5	10.5	73	21.3		1384.3	158.36	833.40
	12/5/2013	17:26	12/5/2013 17:26	55	32	31.5	11	70	22.3		959.0	109.71	943.11
	12/5/2013	17:27	12/5/2013 17:27							Valve shut	22.3	2.56	945.67
	12/5/2013	17:28	12/5/2013 17:28										945.67
SW-3 Event 3	12/11/2013	9:10	12/11/2013 9:10	55	34	33	<2	66	0.0				945.67
	12/11/2013	9:43	12/11/2013 9:43	52.5	32	31	3	68	6.1		100.7	11.52	957.19
	12/11/2013	10:16	12/11/2013 10:16	50	32	31	4	68	8.1		235.0	26.88	984.07
	12/11/2013	10:56	12/11/2013 10:56	50	32	31	5.5	70	11.2		386.1	44.17	1028.24
	12/11/2013	11:40	12/11/2013 11:40	50	32.5	31	8.5	70	17.4		627.4	71.78	1100.01
	12/11/2013	11:41	12/11/2013 11:41	50	35	32	11	70	23.1		20.2	2.31	1102.33
	12/11/2013	12:34	12/11/2013 12:34	50	34	32	11	68	22.9		1216.7	139.19	1241.51
	12/11/2013	13:15	12/11/2013 13:15	50	34	32	11	66	22.9		938.2	107.33	1348.84
	12/11/2013	13:21	12/11/2013 13:21							Valve shut	137.4	15.72	1364.56
	12/11/2013	13:22	12/11/2013 13:22			25							1364.56
SW-3 Event 4	12/17/2013	8:47	12/17/2013 8:47	46	36	30	<2	62	0.0		0.0	0.00	1364.56
	12/17/2013	9:52	12/17/2013 9:52	45	35	23	<2	66	0.0		0.0	0.00	1364.56
	12/17/2013	9:53	12/17/2013 9:53	45	36	23	<2	66	0.0		0.0	0.00	1364.56
	12/17/2013	10:58	12/17/2013 10:58	42	39	23	<2	72	0.0		0.0	0.00	1364.56
	12/17/2013	11:02	12/17/2013 11:02	42	39	23	<2	72	0.0		0.0	0.00	1364.56
	12/17/2013	13:45	12/17/2013 13:45	45	40	34	21	74	46.0		3751.1	429.12	1793.68
	12/17/2013	14:52	12/17/2013 14:52	45	40	36	17	70	37.4		2794.9	319.74	2113.42
	12/17/2013	14:53	12/17/2013 14:53	45	36	33	8	70	16.9		27.2	3.11	2116.53
	12/17/2013	15:45	12/17/2013 15:45	45	32.5	31	14	68	28.6		1184.9	135.55	2252.08
	12/17/2013	22:20	12/17/2013 22:20	46	32	30	18	60	36.9		12945.4	1480.95	3733.03
	12/18/2013	8:44	12/18/2013 8:44	45	32	28	20.5	62	42.0		24605.4	2814.86	6547.89
	12/18/2013	8:45	12/18/2013 8:45							Valve shut	42.0	4.80	6552.69
SW-3 Event 5	12/19/2013	15:50	12/19/2013 15:50	45	32.5	32	<2	74	0.0				6552.69
	12/19/2013	16:28	12/19/2013 16:28	40	32.5	31	7	70	14.3		271.5	31.06	6583.75
	12/19/2013	17:07	12/19/2013 17:07	52	32	29.5	5.5	65	11.2		497.5	56.91	6640.66
	12/19/2013	17:14	12/19/2013 17:14	31	33	30.5	8	65	16.5		97.0	11.10	6651.76
	12/19/2013	22:18	12/19/2013 22:18	50	34	29	13	58	27.3		6655.5	761.39	7413.15
	12/20/2013	7:33	12/20/2013 7:33	48	32	27	16.3	56	33.6		16884.5	1931.59	9344.74
	12/20/2013	7:34	12/20/2013 7:34			22				Valve shut	33.6	3.84	9348.58
SW-3 Event 6	1/14/2014	12:06	1/14/2014 12:06	43	30	26	<2	65	0.0		0.0	0.00	9348.58
	1/14/2014	12:08	1/14/2014 12:08	43	37	34	5	65	10.7		10.7	1.23	9349.81
	1/14/2014	13:08	1/14/2014 13:08	45	37	33.5	8	65	17.2		838.0	95.87	9445.67
	1/14/2014	15:53	1/14/2014 15:53	46	36	32	11	65	23.4		3348.8	383.10	9828.77
	1/14/2014	16:24	1/14/2014 16:24	46	36	32	11.2	65	23.8		732.0	83.75	9912.52
	1/14/2014	16:25	1/14/2014 16:25	49	36	32	11.2	65	23.8		23.8	2.73	9915.24
	1/14/2014	16:43	1/14/2014 16:43			25				Valve shut	428.9	49.07	9964.31

SW-3 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)	Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
Note: a red value, i.e. 75 °F, indicates that value was interpolated from field data										Total CO_2 Mass (lbs):		9964.31

SW-4 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
SW-4 Event 1	11/22/2013	12:52	11/22/2013 12:52						0.0				
	11/22/2013	12:53	11/22/2013 12:53	56	34	34	<2	84	0.0		0.0	0.00	0.00
	11/22/2013	13:34	11/22/2013 13:34	55	34	33	4	88	8.2		167.2	19.12	19.12
	11/22/2013	14:00	11/22/2013 14:00	54	35	34.5	8	87	16.5		320.4	36.65	55.78
	11/22/2013	14:31	11/22/2013 14:31	52	35	34.5	9	80	18.7		545.2	62.37	118.14
	11/22/2013	15:01	11/22/2013 15:01	50	35	34.5	10	77	20.8		592.4	67.77	185.91
	11/22/2013	15:46	11/22/2013 15:46	50	35	34	11	80	22.8		982.0	112.34	298.25
	11/22/2013	16:42	11/22/2013 16:42	50	35	34	12	76	25.0		1339.2	153.21	451.46
	11/22/2013	17:14	11/22/2013 17:14	50	35	34	12	72	25.1		801.6	91.70	543.16
	11/22/2013	17:15	11/22/2013 17:15							Valve shut	25.1	2.87	546.03
	11/22/2013	17:16	11/22/2013 17:16										546.03
SW-4 Event 2	12/5/2013	12:22	12/5/2013 12:22	52	34	33	<2	84	0.0				546.03
	12/5/2013	14:19	12/5/2013 14:19	52	32	31	3	87	6.0		350.6	40.10	586.14
	12/5/2013	14:20	12/5/2013 14:20	52	36	34	6	87	12.5		9.2	1.06	587.19
	12/5/2013	15:24	12/5/2013 15:24	49	36	34	6.5	83	13.6		834.7	95.48	682.68
	12/5/2013	16:37	12/5/2013 16:37	49	35	34	8	78	16.6		1103.1	126.20	808.88
	12/5/2013	17:42	12/5/2013 17:42	55	35	34	10	72	20.9		1220.4	139.61	948.49
	12/5/2013	21:55	12/5/2013 21:55	55	34	31	15	69	31.1		6585.3	753.36	1701.85
	12/5/2013	22:06	12/5/2013 22:06	54	36	33	19	69	40.3		392.7	44.93	1746.77
	12/6/2013	6:58	12/6/2013 6:58	54	36	31	23	67	48.8		23699.5	2711.22	4457.99
	12/6/2013	9:34	12/6/2013 9:34	44	35	31	23	76	47.9		7546.7	863.34	5321.33
	12/6/2013	9:36	12/6/2013 9:36	42	37	32	26	76	55.3		103.2	11.80	5333.14
	12/6/2013	10:39	12/6/2013 10:39	40	37	32	24.5	80	51.9		3374.9	386.09	5719.23
	12/6/2013	11:34	12/6/2013 11:34	40	37	32	24.5	82	51.8		2850.4	326.09	6045.32
	12/6/2013	11:50	12/6/2013 11:50	45	40	33	28	82	60.9		901.3	103.11	6148.43
	12/6/2013	14:31	12/6/2013 14:31	45	40	33	28	80	61.0		9813.2	1122.63	7271.06
	12/6/2013	15:29	12/6/2013 15:29	45	39	32	28	77	60.6		3527.2	403.51	7674.57
	12/6/2013	17:25	12/6/2013 17:25	45	42	33	32	70	71.7		7674.9	878.00	8552.57
	12/6/2013	17:26	12/6/2013 17:26							Valve shut	71.7	8.20	8560.77
SW-4 Event 3	12/19/2013	12:20	12/19/2013 12:20	44	44	12	10	72.0	18.5				8560.77
	12/19/2013	12:27	12/19/2013 12:27	45	35	34	6.5	74.0	11.0		103.1	11.79	8572.56
	12/19/2013	13:22	12/19/2013 13:22	50	35	33.5	9	74.0	15.2		721.2	82.51	8655.07
	12/19/2013	15:47	12/19/2013 15:47	45	34	32	13	68.0	21.9		2691.7	307.93	8963.01
	12/19/2013	16:37	12/19/2013 16:37	43	34	31	13.5	64.0	22.8		1118.2	127.93	9090.93
	12/19/2013	16:38	12/19/2013 16:38							Valve shut	22.8	2.61	9093.55
	12/19/2013	16:39	12/19/2013 16:39			27							9093.55
SW-4 Event 4	1/16/2014	12:32	1/16/2014 12:32	46	33	31.5	<2	64.0	0.0		0.0	0.00	9093.55
	1/16/2014	12:33	1/16/2014 12:33	46	35	32.5	5	64.0	8.5		4.3	0.49	9094.03
	1/16/2014	14:37	1/16/2014 14:37	50	33	31.5	9	64.0	15.1		1463.5	167.42	9261.46
	1/16/2014	15:39	1/16/2014 15:39	52	32	31.5	10	64.0	16.6		980.1	112.13	9373.58
	1/16/2014	16:51	1/16/2014 16:51	58	32	34.5	11.9	57.0	19.8		1310.2	149.89	9523.47
	1/16/2014	16:52	1/16/2014 16:52							Valve shut	19.8	2.27	9525.74
Note: a red value, i.e. 75 °F, indicates that value was interpolated from field data											Total CO_2 Mass (lbs):		9525.74

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
SW-5 Event 1	11/22/2013	8:35	11/22/2013 8:35						0.0				
	11/22/2013	8:36	11/22/2013 8:36	55	28	28	<2	70	0.0		0.0	0.00	0.00
	11/22/2013	8:40	11/22/2013 8:40	55	32	30	3.5	70	7.1		14.2	1.63	1.63
	11/22/2013	8:46	11/22/2013 8:46	55	30	30	6.8	70	13.5		61.8	7.07	8.70
	11/22/2013	9:04	11/22/2013 9:04	55	30	29	10	74	19.8		299.6	34.27	42.97
	11/22/2013	9:06	11/22/2013 9:06	55	30	30	11.5	74	22.7		42.5	4.87	47.83
	11/22/2013	10:00	11/22/2013 10:00	53	30	30	12.0	76	23.7		1253.9	143.44	191.28
	11/22/2013	10:34	11/22/2013 10:34	53	30	30	11.75	77	23.2		796.7	91.15	282.43
	11/22/2013	11:04	11/22/2013 11:04	51	31	30	11.75	77	23.4		699.2	79.99	362.41
	11/22/2013	11:34	11/22/2013 11:34	53	31	30	12	77	23.9		710.6	81.29	443.71
	11/22/2013	11:56	11/22/2013 11:56	53	35	33.5	16	81	33.2		628.2	71.87	515.57
	11/22/2013	12:40	11/22/2013 12:40	52	35	33.5	16	81	33.2		1459.7	166.99	682.56
	11/22/2013	12:42	11/22/2013 12:42							Valve shut	66.3	7.59	690.15
	11/22/2013	12:44	11/22/2013 12:44										690.15
SW-5 Event 2	12/12/2013	11:50	12/12/2013 11:50	40	34	32	<2	70	0.0				690.15
	12/12/2013	13:04	12/12/2013 13:04	45	32	29	9	70	18.3		676.1	77.35	767.50
	12/12/2013	16:08	12/12/2013 16:08	45	32	28	11.5	70	23.3		3829.4	438.08	1205.58
	12/12/2013	16:14	12/12/2013 16:14							Valve shut	140.1	16.03	1221.60
	12/12/2013	16:15	12/12/2013 16:15			20							1221.60
SW-5 Event 3	12/13/2013	8:54	12/13/2013 8:54	51	34	35.2	<2	60	0.0				1221.60
	12/13/2013	8:55	12/13/2013 8:55		28	20	<2	60	0.0			0.00	1221.60
	12/13/2013	8:56	12/13/2013 8:56	51	30	32.6	<2	60	0.0			0.00	1221.60
	12/13/2013	8:59	12/13/2013 8:59	51	30	32.6	<2	60	0.0			0.00	1221.60
	12/13/2013	9:24	12/13/2013 9:24	50	30	31	5.8	62	11.6		145.1	16.60	1238.20
	12/13/2013	9:27	12/13/2013 9:27	50	32	32.8	8	62	16.4		42.0	4.80	1243.01
	12/13/2013	10:27	12/13/2013 10:27	45	32	32.4	10	66	20.4		1102.7	126.15	1369.15
	12/13/2013	12:10	12/13/2013 12:10	45	32	30.8	11.5	70	23.3		2252.3	257.66	1626.81
	12/13/2013	12:11	12/13/2013 12:11	42	33	32.4	14	70	28.7		26.0	2.98	1629.79
	12/13/2013	14:19	12/13/2013 14:19	40	33	32.4	15	68	30.8		3813.1	436.21	2066.01
	12/13/2013	15:18	12/13/2013 15:18	50	32	32	16	68	32.6		1870.2	213.95	2279.96
	12/13/2013	15:19	12/13/2013 15:19							Valve shut	32.6	3.72	2283.68
	12/13/2013	15:20	12/13/2013 15:20			23.6							2283.68
SW-5 Event 4	12/19/2013	9:00	12/19/2013 9:00	45	32	33.6	<2	54	0.0				2283.68
	12/19/2013	9:26	12/19/2013 9:26	42	28	28	13.8	62	27.0		350.8	40.13	2323.82
	12/19/2013	9:28	12/19/2013 9:28	42	29	30	14.5	62	28.7		55.7	6.37	2330.19
	12/19/2013	10:05	12/19/2013 10:05	40	29	28	15.5	66	30.5		1095.9	125.37	2455.56
	12/19/2013	11:28	12/19/2013 11:28	40	29	27.2	16	70	31.4		2571.3	294.16	2749.72
	12/19/2013	12:54	12/19/2013 12:54	45	28	27.2	17	72	32.9		2766.2	316.46	3066.17
	12/19/2013	13:00	12/19/2013 13:00							Valve shut	197.5	22.60	3088.77
	12/19/2013	13:01	12/19/2013 13:01			20							3088.77
SW-5 Event 5	1/7/2014	12:48	1/7/2014 12:48										3088.77
	1/7/2014	12:49	1/7/2014 12:49	50	33	34.4	3	50	6.3		6.3	0.72	3089.49
	1/7/2014	13:57	1/7/2014 13:57	52	31	31.8	9.5	52	19.4		874.0	99.98	3189.47
	1/7/2014	13:59	1/7/2014 13:59	52	33	33.2	12	52	25.1		44.5	5.09	3194.56
	1/7/2014	15:18	1/7/2014 15:18	50	33	32.8	13	52	27.2		2063.4	236.06	3430.62
	1/7/2014	16:26	1/7/2014 16:26	47	32	32.6	14	50	29.0		1909.6	218.45	3649.07
	1/7/2014	17:11	1/7/2014 17:11	52	32	32.6	14.5	47	30.1		1330.3	152.19	3801.26
	1/7/2014	17:12	1/7/2014 17:12							Valve shut	30.1	3.45	3804.71
	1/7/2014	17:13	1/7/2014 17:13			24.8							3804.71
SW-5 Event 6	1/9/2014	8:37	1/9/2014 8:37						0.0		0.0	0.00	3804.71
	1/9/2014	8:38	1/9/2014 8:38	53	36	33	<2	53	0.0		0.0	0.00	3804.71
	1/9/2014	8:42	1/9/2014 8:42	53	34	30	7	53	14.8		29.5	3.38	3808.09
	1/9/2014	8:44	1/9/2014 8:44	51	36	30.5	14.5	53	31.2		46.0	5.26	3813.35

SW-5 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	1/9/2014	8:45	1/9/2014 8:45	50	39	33.5	20.5	53	45.5		38.3	4.39	3817.73
	1/9/2014	8:57	1/9/2014 8:57	50	40	35	17	54	38.0		500.8	57.29	3875.02
	1/9/2014	9:40	1/9/2014 9:40	49	40	34	18	54	40.2		1682.5	192.48	4067.51
	1/9/2014	10:15	1/9/2014 10:15	47	40	33.5	19.5	57	43.5		1465.0	167.60	4235.10
	1/9/2014	10:58	1/9/2014 10:58	40	38	31.5	19.5	60	42.5		1848.8	211.50	4446.60
	1/9/2014	10:59	1/9/2014 10:59	40	39	32.5	20.5	60	45.1		43.8	5.01	4451.61
	1/9/2014	12:48	1/9/2014 12:48	38	36	31	20.5	60	43.8		4848.5	554.66	5006.28
	1/9/2014	12:49	1/9/2014 12:49							Valve shut	43.8	5.01	5011.29
	1/9/2014	12:50	1/9/2014 12:50			23.5							5011.29
SW-5 Event 7	1/16/2014	12:09	1/16/2014 12:09	43	26	22	<2	60	0.0		0.0	0.00	5011.29
	1/16/2014	12:10	1/16/2014 12:10	43	33	30	6	60	12.4		6.2	0.71	5012.00
	1/16/2014	12:11	1/16/2014 12:11	43	35	30	15	60	31.7		22.1	2.53	5014.53
	1/16/2014	12:13	1/16/2014 12:13	43	37.5	33	18	60	39.1		70.8	8.10	5022.63
	1/16/2014	13:05	1/16/2014 13:05	45	39	33.5	16	60	35.2		1931.4	220.96	5243.59
	1/16/2014	14:41	1/16/2014 14:41	46	39	33	17.2	61	37.8		3506.6	401.15	5644.74
	1/16/2014	15:45	1/16/2014 15:45	48	39	33	18.1	61	39.8		2484.4	284.21	5928.95
	1/16/2014	16:10	1/16/2014 16:10	49	39	33	18.5	61	40.7		1006.2	115.11	6044.06
	1/16/2014	16:11	1/16/2014 16:11			25				Valve shut	40.7	4.65	6048.72
SW-5 Event 8	1/17/2014	12:06	1/17/2014 12:06	45	30	27.5	5	68	9.9				6048.72
	1/17/2014	12:07	1/17/2014 12:07	45	35	31.8	6	68	12.6		11.3	1.29	6050.01
	1/17/2014	12:49	1/17/2014 12:49	42	34	30.5	8.5	68	17.7		635.5	72.70	6122.71
	1/17/2014	12:52	1/17/2014 12:52	42	37	33.2	13.2	68	28.3		68.9	7.88	6130.60
	1/17/2014	14:02	1/17/2014 14:02	42	37	33	14.8	67	31.7		2100.5	240.30	6370.90
	1/17/2014	14:37	1/17/2014 14:37	45	37	32.5	15	67	32.2		1118.3	127.93	6498.83
	1/17/2014	16:05	1/17/2014 16:05	53	37	32	16	66	34.3		2926.5	334.79	6833.62
	1/17/2014	16:07	1/17/2014 16:07							Valve shut	68.7	7.86	6841.48
	1/17/2014	16:08	1/17/2014 16:08			25							6841.48
SW-5 Event 9	1/22/2014	12:41	1/22/2014 12:41	48	34	32.3	<2	57	0.0				6841.48
	1/22/2014	12:53	1/22/2014 12:53	47	32	27	11	57	22.6		135.7	15.53	6857.01
	1/22/2014	12:54	1/22/2014 12:54	47	37	30.5	20.5	57	44.4		33.5	3.83	6860.84
	1/22/2014	13:09	1/22/2014 13:09	45	37	30.5	20.8	58	45.0		670.6	76.71	6937.56
	1/22/2014	13:53	1/22/2014 13:53	45	36	29.5	22	59	47.1		2026.0	231.78	7169.33
	1/22/2014	14:59	1/22/2014 14:59	51	35.5	28.5	23.7	59	50.5		3219.2	368.28	7537.61
	1/22/2014	15:20	1/22/2014 15:20	50	38	30.5	27.9	59	60.9		1169.4	133.78	7671.39
	1/22/2014	15:52	1/22/2014 15:52	49	38	30.5	28	59	61.1		1952.3	223.34	7894.73
	1/22/2014	16:51	1/22/2014 16:51	55	38	30.2	29	57	63.4		3674.1	420.32	8315.05
	1/22/2014	16:52	1/22/2014 16:52							Valve shut	63.4	7.26	8322.31
	1/22/2014	16:53	1/22/2014 16:53			22							8322.31
Note: a red value, i.e. 75 °F, indicates that value was interpolated from field data										Total CO_2 Mass (lbs):			8322.31

SW-6 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
SW-6 Event 1	11/20/2013	9:08	11/20/2013 9:08	55	27			64	0.0				
	11/20/2013	9:11	11/20/2013 9:11		30	30	<2	64	0.0		0.0	0.00	0.00
	11/20/2013	9:23	11/20/2013 9:23		30	30	<2	64	0.0		0.0	0.00	0.00
	11/20/2013	10:13	11/20/2013 10:13		29	29	<2	66	0.0		0.0	0.00	0.00
	11/20/2013	10:15	11/20/2013 10:15		36	35	5	66	10.6		10.6	1.22	1.22
	11/20/2013	11:00	11/20/2013 11:00		35	34	7	66	14.7		570.5	65.26	66.48
	11/20/2013	12:47	11/20/2013 12:47		35	34	8.0	66	16.8		1688.4	193.15	259.63
	11/20/2013	14:42	11/20/2013 14:42		35	33.5	9.5	65	20.0		2118.2	242.32	501.95
	11/20/2013	15:21	11/20/2013 15:21		35	33	10	65	21.1		800.8	91.61	593.56
	11/20/2013	15:22	11/20/2013 15:22			24				Valve shut	21.1	2.41	595.97
SW-6 Event 2	12/10/2013	8:51	12/10/2013 8:51		35	33.5	<2	72	0.0				595.97
	12/10/2013	8:55	12/10/2013 8:55		35	33.5	<2	73	0.0				595.97
	12/10/2013	9:29	12/10/2013 9:29	50	34	32	<2	72	0.0				595.97
	12/10/2013	10:02	12/10/2013 10:02	50	34	31	4	73	8.3		136.5	15.61	611.59
	12/10/2013	10:50	12/10/2013 10:50	47.5	34	31	4.5	75	9.3		421.4	48.21	659.80
	12/10/2013	10:56	12/10/2013 10:56	46	34	32	5.5	74	11.4		62.0	7.09	666.89
	12/10/2013	11:42	12/10/2013 11:42	45	34	32	6	74	12.4		546.5	62.52	729.40
	12/10/2013	12:36	12/10/2013 12:36	51	35	31.5	6.5	78	13.5		699.6	80.04	809.44
	12/10/2013	13:03	12/10/2013 13:03	50	34	32	7	76	14.4		377.3	43.17	852.61
	12/10/2013	13:04	12/10/2013 13:04							Valve shut	14.4	1.65	854.26
	12/10/2013	13:05	12/10/2013 13:05			22.5							854.26
SW-6 Event 3	12/12/2013	15:19	12/12/2013 15:19	45	36	33	<2	68	0.0				854.26
	12/12/2013	16:38	12/12/2013 16:38	45	35	32.5	2	66	4.2		166.2	19.01	873.27
	12/12/2013	17:39	12/12/2013 17:39	55	35	32.5	4	60	8.5		386.6	44.22	917.49
	12/12/2013	22:27	12/12/2013 22:27	52	34	31	8	52	16.9		3651.8	417.77	1335.26
	12/13/2013	9:28	12/13/2013 9:28		32	30	12	62	24.6		13699.8	1567.26	2902.52
	12/13/2013	10:30	12/13/2013 10:30	45	32	30	12	66	24.5		1519.6	173.84	3076.36
	12/13/2013	12:12	12/13/2013 12:12	45	32	29	12	70	24.4		2490.1	284.87	3361.23
	12/13/2013	14:20	12/13/2013 14:20	40	32	29	12	68	24.4		3121.8	357.13	3718.36
	12/13/2013	14:24	12/13/2013 14:24							Valve shut	97.7	11.17	3729.53
	12/13/2013	14:25	12/13/2013 14:25			22							3729.53
SW-6 Event 4	12/20/2013	7:40	12/20/2013 7:40	50	30	32.4	<2	56	0.0				3729.53
	12/20/2013	7:49	12/20/2013 7:49	48	30	31.2	<2	56	0.0				3729.53
	12/20/2013	7:52	12/20/2013 7:52	48	33	32	4.3	56	8.9		13.4	1.54	3731.07
	12/20/2013	8:12	12/20/2013 8:12	45	32	31.6	6	60	12.3		212.5	24.31	3755.38
	12/20/2013	9:50	12/20/2013 9:50	40	33	32	6.5	68	13.4		1257.8	143.90	3899.28
	12/20/2013	10:37	12/20/2013 10:37	39	32	32	7	72	14.2		647.5	74.07	3973.35
	12/20/2013	11:30	12/20/2013 11:30	39	32	31.6	7.5	74	15.2		777.9	88.99	4062.34
	12/20/2013	11:47	12/20/2013 11:47	42	31	31	8	74	16.0		265.0	30.31	4092.65
	12/20/2013	11:48	12/20/2013 11:48							Valve shut	16.0	1.83	4094.48
	12/20/2013	11:49	12/20/2013 11:49										4094.48
SW-6 Event 5	1/9/2014	8:39	1/9/2014 8:39										4094.48
	1/9/2014	8:40	1/9/2014 8:40	52	34	35.2	<2	53	0.0				4094.48
	1/9/2014	8:47	1/9/2014 8:47	50	33	34	3	53	6.3		21.9	2.51	4096.99
	1/9/2014	8:59	1/9/2014 8:59	50	32.5	33.6	4	54	8.3		87.4	9.99	4106.98
	1/9/2014	9:42	1/9/2014 9:42	49	32.5	33.6	4.5	54	9.3		379.1	43.36	4150.34
	1/9/2014	10:16	1/9/2014 10:16	47	32.5	33.4	5	57	10.3		334.4	38.26	4188.60
	1/9/2014	11:00	1/9/2014 11:00	40	32	32.8	5	60	10.3		453.0	51.83	4240.43
	1/9/2014	12:55	1/9/2014 12:55	45	32	32.4	6	60	12.3		1297.0	148.38	4388.81
	1/9/2014	12:56	1/9/2014 12:56	45	35	35.2	10	60	21.2		16.7	1.91	4390.72
	1/9/2014	14:15	1/9/2014 14:15	37	34	34.4	10	60	20.9		1663.4	190.30	4581.02
	1/9/2014	15:55	1/9/2014 15:55	42	35	34.6	12	58	25.4		2319.8	265.39	4846.41
	1/9/2014	17:24	1/9/2014 17:24	55	34	34	12.5	58	26.2		2300.0	263.12	5109.53

SW-6 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	1/9/2014	17:25	1/9/2014 17:25							Valve shut	26.2	3.00	5112.53
	1/9/2014	17:26	1/9/2014 17:26			26.4							5112.53
SW-6 Event 6	1/10/2014	16:16	1/10/2014 16:16										5112.53
	1/10/2014	16:18	1/10/2014 16:18	46	37	34	2	68	4.3		8.6	0.98	5113.51
	1/10/2014	16:36	1/10/2014 16:36	45	35	32	8.5	70	17.8		198.9	22.75	5136.27
	1/10/2014	16:37	1/10/2014 16:37	45	37	33.5	12	70	25.7		21.7	2.49	5138.75
	1/10/2014	17:52	1/10/2014 17:52	45	37	33	12.5	65	26.9		1969.3	225.29	5364.04
	1/10/2014	17:53	1/10/2014 17:53	45	38	33.5	14	65	30.4		28.6	3.27	5367.32
	1/10/2014	21:45	1/10/2014 21:45	44	37	32.5	16	63	34.4		7519.5	860.23	6227.55
	1/10/2014	21:47	1/10/2014 21:47	44	38	34	20	63	43.5		77.9	8.91	6236.46
	1/11/2014	7:59	1/11/2014 7:59	40	37	30	24	64	51.6		29100.7	3329.12	9565.58
	1/11/2014	8:00	1/11/2014 8:00							Valve shut	51.6	5.91	9571.49
	1/11/2014	8:01	1/11/2014 8:01										9571.49
SW-6 Event 7	1/29/2014	8:00	1/29/2014 8:00	51	40	34	12.5	40	28.4				9571.49
	1/29/2014	9:00	1/29/2014 9:00	51	40	34	12.5	40	28.4		1701.5	194.65	9766.14
	1/29/2014	9:30	1/29/2014 9:30	48	39	34	16.5	40	37.1		981.6	112.29	9878.43
	1/29/2014	10:30	1/29/2014 10:30	49	38	34	18	40	40.1		2314.4	264.77	10143.20
	1/29/2014	11:50	1/29/2014 11:50	49	38	34	18	40	40.1		3205.3	366.68	10509.88
	1/29/2014	13:00	1/29/2014 13:00	48	38	34	18	40	40.1		2804.6	320.85	10830.73
	1/29/2014	14:00	1/29/2014 14:00	46	38	34	18	40	40.1		2404.0	275.01	11105.75
	1/29/2014	15:00	1/29/2014 15:00	47	38	34.5	18	40	40.1		2404.0	275.01	11380.76
	1/29/2014	16:30	1/29/2014 16:30	50	39	34.5	18	40	40.5	Valve shut	3623.3	414.51	11795.27
	1/29/2014	16:31	1/29/2014 16:31			24							11795.27
SW-6 Event 8	2/4/2014	9:40	2/4/2014 9:40	55	35	33	<2	60	0.0				11795.27
	2/4/2014	9:44	2/4/2014 9:44	55	35	33	2.5	60	5.3		10.6	1.21	11796.48
	2/4/2014	10:00	2/4/2014 10:00	53	34	32	5.8	60	12.1		139.5	15.96	11812.44
	2/4/2014	10:05	2/4/2014 10:05	53	35	31	8.3	60	17.6		74.3	8.50	11820.94
	2/4/2014	11:42	2/4/2014 11:42	50	35	32	10	64	21.1		1874.4	214.43	12035.37
	2/4/2014	11:44	2/4/2014 11:44	50	36	32	12	64	25.6		46.6	5.34	12040.71
	2/4/2014	12:39	2/4/2014 12:39	49	35	32	11.9	64	25.1		1392.6	159.32	12200.03
	2/4/2014	13:22	2/4/2014 13:22	49	35	32	11.9	64	25.1		1078.7	123.40	12323.43
	2/4/2014	14:15	2/4/2014 14:15	48	38	32	12	62	26.1		1356.8	155.22	12478.65
	2/4/2014	14:16	2/4/2014 14:16			25				Valve shut	26.1	2.99	12481.64
SW-6 Event 9	2/6/2014	8:07	2/6/2014 8:07	54	33	33.4	<2	50	0.0				12481.64
	2/6/2014	8:12	2/6/2014 8:12	52	33	33	4	50	8.4		20.9	2.40	12484.03
	2/6/2014	8:41	2/6/2014 8:41	50	31	32	7	54	14.3		328.5	37.59	12521.62
	2/6/2014	8:44	2/6/2014 8:44	50	32	32.8	8	54	16.5		46.2	5.28	12526.90
	2/6/2014	10:36	2/6/2014 10:36	48	32	32.2	9.2	60	18.9		1980.7	226.59	12753.49
	2/6/2014	10:40	2/6/2014 10:40			27				Valve shut	75.5	8.63	12762.12
SW-6 Event 10	2/10/2014	8:57	2/10/2014 8:57	54	33	33	<2	53	0.0				12762.12
	2/10/2014	9:53	2/10/2014 9:53	47	30	30	9	53	18.2		508.9	58.22	12820.35
	2/10/2014	9:54	2/10/2014 9:54	49	33	32	11	65	22.7		20.4	2.34	12822.68
	2/10/2014	11:40	2/10/2014 11:40	47	32	31	12.8	75	25.9		2573.2	294.37	13117.05
	2/10/2014	11:42	2/10/2014 11:42	47	34	32.5	15.8	75	32.6		58.5	6.69	13123.74
	2/10/2014	13:20	2/10/2014 13:20	46	34	32.5	15.5	77	31.9		3162.6	361.80	13485.54
	2/10/2014	14:55	2/10/2014 14:55	45	34	32	16	78	32.9		3080.8	352.44	13837.99
	2/10/2014	16:41	2/10/2014 16:41	45	34	32	17.2	71	35.6		3634.1	415.74	14253.73
	2/10/2014	17:39	2/10/2014 17:39	49	33.5	32	17.8	65	36.9		2103.9	240.68	14494.41
	2/10/2014	17:42	2/10/2014 17:42							Valve shut	110.7	12.67	14507.08
SW-6 Event 11	2/11/2014	8:08	2/11/2014 8:08	54	33	32.2	<2	54	0.0				14507.08
	2/11/2014	10:03	2/11/2014 10:03	52	30	29.5	9.5	60	19.1		1095.5	125.33	14632.40
	2/11/2014	10:04	2/11/2014 10:04	52	33	32	13.5	60	28.0		23.5	2.69	14635.09
	2/11/2014	10:35	2/11/2014 10:35	51	33	32	13.5	66	27.8		864.9	98.94	14734.04

SW-6 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	2/11/2014	11:53	2/11/2014 11:53	50	33	32	13.5	62	27.9		2174.0	248.70	14982.74
	2/11/2014	12:48	2/11/2014 12:48	45	33	32	13.9	63	28.7		1557.9	178.23	15160.97
	2/11/2014	14:08	2/11/2014 14:08	45	33	32	14.2	60	29.4		2326.4	266.14	15427.10
	2/11/2014	17:00	2/11/2014 17:00	45	33	32	15.5	55	32.3		5308.2	607.26	16034.36
	2/11/2014	17:22	2/11/2014 17:22	52	33	32	15.5	54	32.3		710.7	81.31	16115.67
	2/11/2014	17:23	2/11/2014 17:23			26				Valve shut	32.3	3.70	16119.36
Note: a red value, i											Total CO_2 Mass (lbs):		16119.36

SW-7 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
SW-7 Event 1	11/23/2013	8:19	11/23/2013 8:19	49	28			70	0.0				
	11/23/2013	8:21	11/23/2013 8:21	54	31	31	<2	70	0.0		0.0	0.00	0.00
	11/23/2013	8:35	11/23/2013 8:35		30	30	<2	72.5	0.0		0.0	0.00	0.00
	11/23/2013	8:37	11/23/2013 8:37		34	33.5	4.5	75	9.3		9.3	1.06	1.06
	11/23/2013	9:24	11/23/2013 9:24		34	33	6	80	12.3		507.9	58.10	59.17
	11/23/2013	10:24	11/23/2013 10:24		33	33	6.5	84	13.2		764.6	87.47	146.63
	11/23/2013	10:25	11/23/2013 10:25		36	35	8.5	84	17.8		15.5	1.77	148.40
	11/23/2013	11:27	11/23/2013 11:27		35	35	8.0	83	16.6		1063.5	121.67	270.07
	11/23/2013	11:30	11/23/2013 11:30		37	36.5	10	83	21.1		56.5	6.46	276.53
	11/23/2013	12:40	11/23/2013 12:40	50	37	36.5	10	82	21.1		1477.9	169.07	445.60
	11/23/2013	12:47	11/23/2013 12:47							Valve shut	147.9	16.92	462.53
	11/23/2013	12:48	11/23/2013 12:48										462.53
SW-7 Event 2	12/6/2013	12:42	12/6/2013 12:42	51	35	33.5	<2	85	0.0				462.53
	12/6/2013	13:40	12/6/2013 13:40	47	34	33	<2	83	0.0				462.53
	12/6/2013	14:38	12/6/2013 14:38	46	33	32.5	3	80	6.1		176.8	20.23	482.76
	12/6/2013	15:58	12/6/2013 15:58	45	33	32	4	73	8.2		571.3	65.36	548.12
	12/6/2013	16:27	12/6/2013 16:27	45	33	32	4	72	8.2		237.5	27.17	575.29
	12/6/2013	16:48	12/6/2013 16:48	45	33	32	4	71	8.2		172.1	19.69	594.98
	12/6/2013	16:49	12/6/2013 16:49							Valve shut	8.2	0.94	595.92
	12/6/2013	16:50	12/6/2013 16:50			25							595.92
SW-7 Event 3	12/11/2013	13:53	12/11/2013 13:53	50	31	31	<2	69	0.0				595.92
	12/11/2013	13:55	12/11/2013 13:55	50	32	32	<2	69	0.0				595.92
	12/11/2013	14:22	12/11/2013 14:22	50	32.5	32	<2	68	0.0				595.92
	12/11/2013	14:24	12/11/2013 14:24	50	32.5	33	<2	68	0.0				595.92
	12/11/2013	15:16	12/11/2013 15:16	50	34	33	<2	68	0.0				595.92
	12/11/2013	16:36	12/11/2013 16:36	45	32.5	32	4	65	8.2		328.2	37.55	633.47
	12/11/2013	17:26	12/11/2013 17:26	45	32.5	32	5	64	10.3		461.8	52.83	686.30
	12/11/2013	22:15	12/11/2013 22:15	51	32	31	8	62	16.4		3849.4	440.37	1126.68
	12/12/2013	8:05	12/12/2013 8:05	50	32	30	12	58	24.7		12103.3	1384.62	2511.29
	12/12/2013	9:02	12/12/2013 9:02							Valve shut	1405.4	160.78	2672.07
	12/12/2013	9:03	12/12/2013 9:03										2672.07
SW-7 Event 4	12/18/2013	8:03	12/18/2013 8:03	58	33	34	<2	48	0.0				2672.07
	12/18/2013	9:04	12/18/2013 9:04	45	30	31	7	62	14.0		427.3	48.89	2720.96
	12/18/2013	9:10	12/18/2013 9:10	48	32	33	10	62	20.5		103.4	11.83	2732.79
	12/18/2013	9:54	12/18/2013 9:54	44	34	33	10	64	20.9		909.2	104.02	2836.81
	12/18/2013	10:05	12/18/2013 10:05							Valve shut	229.5	26.26	2863.06
SW-7 Event 5	12/19/2013	8:45	12/19/2013 8:45	54	32	33	<2	45	0.0				2863.06
	12/19/2013	8:49	12/19/2013 8:49	50	29	30	7	58	13.9		27.8	3.18	2866.24
	12/19/2013	8:51	12/19/2013 8:51	49	33	33	10	58	20.8		34.7	3.97	2870.21
	12/19/2013	9:16	12/19/2013 9:16	45	34	33	11	64	23.0		546.5	62.52	2932.73
	12/19/2013	9:49	12/19/2013 9:49	45	32	32	11	68	22.4		747.9	85.56	3018.29
	12/19/2013	11:37	12/19/2013 11:37	44	33	34	11	72	22.5		2425.2	277.44	3295.73
	12/19/2013	12:42	12/19/2013 12:42	48	33	32	11.5	72	23.6		1497.9	171.36	3467.09
	12/19/2013	12:43	12/19/2013 12:43							Valve shut	23.6	2.69	3469.78
	12/19/2013	12:44	12/19/2013 12:44										3469.78
SW-7 Event 6	1/9/2014	8:18	1/9/2014 8:18	53	34	33.5	<2	56	0.0				3469.78
	1/9/2014	8:24	1/9/2014 8:24	53	33.5	33	4	56	8.4		25.1	2.87	3472.65
	1/9/2014	8:53	1/9/2014 8:53	52	33	32.5	6.5	56	13.5		317.5	36.32	3508.97
	1/9/2014	9:33	1/9/2014 9:33	52	33	32.5	7	56	14.6		561.9	64.28	3573.26
	1/9/2014	10:06	1/9/2014 10:06	52	33	31.5	7.5	59	15.6		497.1	56.87	3630.13
	1/9/2014	10:07	1/9/2014 10:07	50	34	33	11	59	23.1		19.3	2.21	3632.34
	1/9/2014	11:07	1/9/2014 11:07	42	34	33	11	61	23.0		1382.5	158.16	3790.50
	1/9/2014	12:32	1/9/2014 12:32	41	33.5	32	11.5	62	23.9		1994.7	228.20	4018.70

SW-7 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	1/9/2014	12:33	1/9/2014 12:33	41	35	33	14	62	29.6		26.7	3.06	4021.76
	1/9/2014	14:20	1/9/2014 14:20	39	33.5	32.5	14.5	60	30.2		3198.6	365.92	4387.68
	1/9/2014	16:03	1/9/2014 16:03	45	37	34	16	60	34.6		3335.4	381.57	4769.25
	1/9/2014	17:08	1/9/2014 17:08	49	38	34	17	60	37.1		2327.7	266.29	5035.54
	1/9/2014	17:09	1/9/2014 17:09							Valve shut	37.1	4.24	5039.78
	1/9/2014	17:10	1/9/2014 17:10			27							5039.78
SW-7 Event 7	1/10/2014	17:24	1/10/2014 17:24										5039.78
	1/10/2014	17:25	1/10/2014 17:25	46	32.5	34	<2	66	0.0				5039.78
	1/10/2014	17:39	1/10/2014 17:39	46	31	31.5	5	66	10.1		70.6	8.07	5047.85
	1/10/2014	17:40	1/10/2014 17:40	46	34	33.5	8	66	16.7		13.4	1.53	5049.38
	1/10/2014	21:55	1/10/2014 21:55	46	33	32.5	10	64	20.6		4756.2	544.11	5593.49
	1/10/2014	21:57	1/10/2014 21:57	45	33.5	33	11.5	64	23.9		44.5	5.09	5598.58
	1/11/2014	8:24	1/11/2014 8:24	45	32.5	32	15	64	30.8		17139.3	1960.74	7559.32
	1/11/2014	8:25	1/11/2014 8:25							Valve shut	30.8	3.52	7562.85
	1/11/2014	8:26	1/11/2014 8:26			26							7562.85
SW-7 Event 8	1/21/2014	13:06	1/21/2014 13:06	49	31.5	31.5	<2	70	0.0				7562.85
	1/21/2014	13:07	1/21/2014 13:07	49	33	32	3.5	70	7.2		3.6	0.41	7563.26
	1/21/2014	14:15	1/21/2014 14:15	50	31.5	30	11	68	22.3		1001.0	114.51	7677.77
	1/21/2014	14:17	1/21/2014 14:17	49	33.5	31.8	15.2	68	31.4		53.7	6.14	7683.91
	1/21/2014	16:00	1/21/2014 16:00	50	33.5	31.5	15.2	66	31.5		3239.8	370.63	8054.54
	1/21/2014	17:09	1/21/2014 17:09	53	33	31	15.5	64	32.0		2190.3	250.56	8305.10
	1/21/2014	17:10	1/21/2014 17:10			26				Valve shut	32.0	3.66	8308.77
Note: a red value, i.e. 75 °F, indicates that value was interpolated from field data											Total CO_2 Mass (lbs):		8308.77

SW-8 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
SW-8 Event 1	11/22/2013	8:26	11/22/2013 8:26						0.0				
	11/22/2013	8:27	11/22/2013 8:27	57.5	30	30	<2	70	0.0		0.0	0.00	0.00
	11/22/2013	8:28	11/22/2013 8:28		32		<2	70	0.0		0.0	0.00	0.00
	11/22/2013	8:56	11/22/2013 8:56		35	35	4	72	8.4		117.1	13.40	13.40
	11/22/2013	8:58	11/22/2013 8:58	57.5	34	33	3.5	74	7.2		15.6	1.78	15.18
	11/22/2013	10:08	11/22/2013 10:08	53	34	33.2	4	76	8.2		541.8	61.98	77.16
	11/22/2013	10:42	11/22/2013 10:42	55	34	33.5	4.0	77	8.2		280.3	32.07	109.23
	11/22/2013	11:11	11/22/2013 11:11	55	34	33.5	4.50	76	9.3		254.0	29.06	138.29
	11/22/2013	11:42	11/22/2013 11:42	55	34	33.5	4.5	78	9.3		287.4	32.88	171.17
	11/22/2013	12:05	11/22/2013 12:05	55	35	35	6.6	82	13.7		263.7	30.17	201.34
	11/22/2013	13:10	11/22/2013 13:10	60	35	35	6.5	80	13.5		882.7	100.99	302.32
	11/22/2013	13:42	11/22/2013 13:42	56	35	35	7	82	14.5		447.8	51.23	353.55
	11/22/2013	14:04	11/22/2013 14:04	55	35	35	8	81	16.6		342.0	39.12	392.67
	11/22/2013	14:35	11/22/2013 14:35	53	35	35	8	76	16.7		515.4	58.97	451.64
	11/22/2013	15:05	11/22/2013 15:05	51	35	35	8	74	16.7		500.5	57.26	508.90
	11/22/2013	15:49	11/22/2013 15:49	50	35	35	8	76	16.7		734.1	83.98	592.88
	11/22/2013	16:44	11/22/2013 16:44	50	35	35	8	71	16.7		918.9	105.13	698.00
	11/22/2013	17:18	11/22/2013 17:18	55	35	35	8	70	16.8		569.7	65.18	763.18
	11/22/2013	17:20	11/22/2013 17:20							Valve shut	33.5	3.84	767.02
	11/22/2013	17:21	11/22/2013 17:21			26							767.02
SW-8 Event 2	12/6/2013	8:32	12/6/2013 8:32	54	33	32	<2	73	0.0				767.02
	12/6/2013	9:06	12/6/2013 9:06	48	32	31.5	<2	75	0.0				767.02
	12/6/2013	9:07	12/6/2013 9:07	47	35	33.5	3	75	6.3		3.1	0.36	767.37
	12/6/2013	10:25	12/6/2013 10:25	42	35	34	3	78	6.2		487.3	55.75	823.12
	12/6/2013	11:20	12/6/2013 11:20	41	35	34	3	80	6.2		342.8	39.21	862.33
	12/6/2013	12:31	12/6/2013 12:31	50	35	34	4	82	8.3		515.2	58.94	921.27
	12/6/2013	12:32	12/6/2013 12:32							Valve shut	8.3	0.95	922.21
	12/6/2013	12:33	12/6/2013 12:33			26							922.21
SW-8 Event 3	12/12/2013	13:27	12/12/2013 13:27	50	33	33	<2	72	0.0				922.21
	12/12/2013	14:44	12/12/2013 14:44	46	32	32	<2	70	0.0				922.21
	12/12/2013	14:45	12/12/2013 14:45	45	32.5	32.5	3.5	70	7.1		3.6	0.41	922.62
	12/12/2013	15:26	12/12/2013 15:26	44	32	32.5	4	70	8.1		313.0	35.80	958.43
	12/12/2013	16:33	12/12/2013 16:33	45	32.5	32.5	5.5	70	11.2		648.2	74.15	1032.58
	12/12/2013	17:27	12/12/2013 17:27	57	32.5	32	6	60	12.4		637.1	72.89	1105.47
	12/12/2013	22:18	12/12/2013 22:18	55	32	31	11	54	22.7		5101.7	583.63	1689.10
	12/13/2013	9:39	12/13/2013 9:39	50	31		15	64	30.3		18044.6	2064.30	3753.40
	12/13/2013	10:34	12/13/2013 10:34	47.5	31	29.5	15	67	30.2		1664.1	190.38	3943.78
	12/13/2013	10:35	12/13/2013 10:35	47.5	32	30	17	67	34.6		32.4	3.71	3947.48
	12/13/2013	12:32	12/13/2013 12:32	45	32	30	16.5	70	33.5		3985.1	455.89	4403.37
	12/13/2013	15:09	12/13/2013 15:09	50	32	30	17	68	34.6		5344.8	611.44	5014.82
	12/13/2013	15:10	12/13/2013 15:10							Valve shut	34.6	3.96	5018.78
	12/13/2013	15:11	12/13/2013 15:11			25							5018.78
SW-8 Event 4	12/18/2013	12:43	12/18/2013 12:43	50	32	31	<2	75	0.0		0.0	0.00	5018.78
	12/18/2013	13:08	12/18/2013 13:08	55	32	30.5	3	76	6.1		75.7	8.66	5027.44
	12/18/2013	13:09	12/18/2013 13:09	55	32.5	32.5	6	76	12.2		9.1	1.04	5028.48
	12/18/2013	14:12	12/18/2013 14:12	49	32.5	32.5	6	70	12.2		769.4	88.02	5116.50
	12/18/2013	15:59	12/18/2013 15:59	40	32.5	31	9.5	64	19.5		1699.0	194.36	5310.86
	12/18/2013	16:57	12/18/2013 16:57	45	32	31	11	60	22.6		1219.9	139.55	5450.42
	12/18/2013	17:17	12/18/2013 17:17	42	34	33	14	60	29.3		518.8	59.35	5509.77
	12/18/2013	17:58	12/18/2013 17:58	50	35	33	14	55	29.8		1211.7	138.62	5648.39
	12/18/2013	17:59	12/18/2013 17:59							Valve shut	29.8	3.41	5651.80
	12/18/2013	18:00	12/18/2013 18:00			26							5651.80
SW-8 Event 5	1/11/2013	8:40	1/11/2013 8:40										5651.80

SW-8 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	1/11/2013	8:42	1/11/2013 8:42	45	34	35	<2	66	0.0				5651.80
	1/11/2013	8:54	1/11/2013 8:54	45	34	34	3	66	6.2		37.5	4.29	5656.08
	1/11/2013	10:50	1/11/2013 10:50	41	33.5	34	5.5	70	11.3		1020.5	116.75	5772.83
	1/11/2013	11:12	1/11/2013 11:12	41	33	34	6.5	70	13.3		271.6	31.07	5803.90
	1/11/2013	11:37	1/11/2013 11:37	48	33	34	8	72	16.4		371.6	42.51	5846.41
	1/11/2013	11:38	1/11/2013 11:38							Valve shut	16.4	1.87	5848.28
	1/11/2013	11:39	1/11/2013 11:39			28							5848.28
SW-8 Event 6	1/13/2014	12:01	1/13/2014 12:01						0.0		0.0	0.00	5848.28
	1/13/2014	12:02	1/13/2014 12:02	50	34	33	3	72	6.2		3.1	0.36	5848.64
	1/13/2014	12:12	1/13/2014 12:12	50	33	32	7	72	14.3		102.7	11.75	5860.39
	1/13/2014	12:13	1/13/2014 12:13	50	35	34	10	72	20.9		17.6	2.02	5862.41
	1/13/2014	12:40	1/13/2014 12:40	49	35	34	10.5	70	22.0		579.4	66.28	5928.69
	1/13/2014	13:53	1/13/2014 13:53	44	35	34	11.5	68	24.1		1684.5	192.71	6121.40
	1/13/2014	14:42	1/13/2014 14:42	42	35	33.5	11.5	68	24.1		1183.2	135.36	6256.76
	1/13/2014	16:01	1/13/2014 16:01	41	34	33	12	66	25.0		1940.8	222.03	6478.79
	1/13/2014	17:02	1/13/2014 17:02	42	34	33.5	13.5	64	28.2		1621.2	185.47	6664.26
	1/13/2014	21:39	1/13/2014 21:39	52	34	32	16	62	33.4		8533.8	976.26	7640.52
	1/13/2014	21:42	1/13/2014 21:42	52	35	33	18.5	62	39.1		108.8	12.45	7652.97
	1/14/2014	8:30	1/14/2014 8:30	47	35	32	22	64	46.4		27687.5	3167.45	10820.41
	1/14/2014	8:31	1/14/2014 8:31							Valve shut	46.4	5.31	10825.72
	1/14/2014	8:32	1/14/2014 8:32			25							10825.72
SW-8 Event 7	1/15/2014	9:15	1/15/2014 9:15	52	31	31	4.8	62	9.7		0.0	0.00	10825.72
	1/15/2014	9:17	1/15/2014 9:17	52	32.5	31.5	9.5	62	19.5		29.3	3.35	10829.07
	1/15/2014	9:31	1/15/2014 9:31	46	31	30	14	64	28.3		334.8	38.30	10867.37
	1/15/2014	10:17	1/15/2014 10:17	43	31	30	15	66	30.2		1346.0	153.99	11021.35
	1/15/2014	11:24	1/15/2014 11:24	41	30	29.8	15	69	29.8		2012.0	230.17	11251.52
	1/15/2014	12:38	1/15/2014 12:38	45	33	30	15	67	30.9		2245.6	256.90	11508.42
	1/15/2014	12:40	1/15/2014 12:40			25				Valve shut	61.8	7.06	11515.49
SW-8 Event 8	1/17/2014	7:35	1/17/2014 7:35	55	32	32	6	40	12.6				11515.49
	1/17/2014	7:37	1/17/2014 7:37	55	32	32	8.2	40	17.2		29.7	3.40	11518.88
	1/17/2014	8:53	1/17/2014 8:53	50	30	30.5	11	60	22.1		1490.4	170.50	11689.39
	1/17/2014	8:54	1/17/2014 8:54	50	32	31.5	14	60	28.7		25.4	2.90	11692.29
	1/17/2014	10:30	1/17/2014 10:30	47	32	31.5	15.2	66	31.0		2865.2	327.78	12020.07
	1/17/2014	11:38	1/17/2014 11:38	45	32	30	16	67	32.6		2161.2	247.25	12267.32
	1/17/2014	11:40	1/17/2014 11:40	45	33	31.5	19	67	39.1		71.7	8.20	12275.52
	1/17/2014	12:36	1/17/2014 12:36	46	33	31.5	18.5	68	38.0		2160.3	247.14	12522.66
	1/17/2014	13:02	1/17/2014 13:02	45	33	31	18.5	68	38.0		989.1	113.16	12635.82
	1/17/2014	14:14	1/17/2014 14:14	45	33	31	19	68	39.1		2776.1	317.59	12953.41
	1/17/2014	15:35	1/17/2014 15:35	50	33	31	20.5	66	42.2		3293.1	376.73	13330.14
	1/17/2014	15:36	1/17/2014 15:36							Valve shut	42.2	4.83	13334.97
	1/17/2014	15:37	1/17/2014 15:37			25							13334.97
Note: a red value, i.e. 75 °F, indicates that value was interpolated from field data										Total CO_2 Mass (lbs):			13334.97

SW-9 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
SW-9 Event 1	11/25/2013	9:08	11/25/2013 9:08	57	29			56	0.0				
	11/25/2013	9:10	11/25/2013 9:10	59	33	32.3	<2	56	0.0		0.0	0.00	0.00
	11/25/2013	9:22	11/25/2013 9:22		33	31.5	<2	58	0.0		0.0	0.00	0.00
	11/25/2013	9:23	11/25/2013 9:23		35	33	2	58	4.2		2.1	0.24	0.24
	11/25/2013	10:26	11/25/2013 10:26		33	32	5.5	64	11.4		491.3	56.20	56.45
	11/25/2013	10:27	11/25/2013 10:27		35	34	7.5	63	15.8		13.6	1.55	58.00
	11/25/2013	11:24	11/25/2013 11:24		35	34	8	62	16.9		932.7	106.70	164.70
	11/25/2013	12:09	11/25/2013 12:09		35	34	9	65	19.0		806.7	92.28	256.98
	11/25/2013	12:46	11/25/2013 12:46		35	34	8	65	16.8		662.3	75.77	332.75
	11/25/2013	13:54	11/25/2013 13:54		35	34	9	64	19.0		1217.9	139.33	472.08
	11/25/2013	14:15	11/25/2013 14:15							Valve shut	398.4	45.58	517.66
	11/25/2013	14:16	11/25/2013 14:16			27							517.66
SW-9 Event 2	12/5/2013	8:26	12/5/2013 8:26										517.66
	12/5/2013	8:28	12/5/2013 8:28	56	29	28.5	<2	68.0	0.0				517.66
	12/5/2013	8:32	12/5/2013 8:32	56	33	32.5	<2	68	0.0				517.66
	12/5/2013	8:35	12/5/2013 8:35	56	37	32.5	<2	68	0.0				517.66
	12/5/2013	8:44	12/5/2013 8:44	55	34	32.5	<2	69.0	0.0				517.66
	12/5/2013	9:33	12/5/2013 9:33	53	34	33	2	76.0	4.1		101.0	11.56	529.22
	12/5/2013	10:25	12/5/2013 10:25	52	34	33	3	79	6.2		267.6	30.61	559.83
	12/5/2013	11:40	12/5/2013 11:40	51	34	32.5	4	81	8.2		539.1	61.68	621.51
	12/5/2013	11:42	12/5/2013 11:42	51	35	34	7	81	14.5		22.7	2.60	624.11
	12/5/2013	13:10	12/5/2013 13:10	55	35	34	7	82	14.5		1276.6	146.04	770.15
	12/5/2013	13:11	12/5/2013 13:11							Valve shut	14.5	1.66	771.81
	12/5/2013	13:12	12/5/2013 13:12										771.81
SW-9 Event 3	12/11/2013	9:03	12/11/2013 9:03	55	34	33	<2	66	0.0				771.81
	12/11/2013	9:41	12/11/2013 9:41	52	34	33	<2	68	0.0				771.81
	12/11/2013	10:14	12/11/2013 10:14	50	32	32	<2	68	0.0				771.81
	12/11/2013	10:55	12/11/2013 10:55	50	32	32	<2	70	0.0				771.81
	12/11/2013	11:38	12/11/2013 11:38	50	34	33	6.5	70	13.5		289.9	33.16	804.97
	12/11/2013	12:32	12/11/2013 12:32	50	34	33	7.5	68	15.6		784.8	89.79	894.75
	12/11/2013	13:12	12/11/2013 13:12	50	34	33	8	66	16.7		644.9	73.78	968.53
	12/11/2013	13:13	12/11/2013 13:13							Valve shut	16.7	1.91	970.43
	12/11/2013	13:14	12/11/2013 13:14			25							970.43
SW-9 Event 4	12/13/2013	8:20	12/13/2013 8:20	55	30	31	<2	60	0.0				970.43
	12/13/2013	8:21	12/13/2013 8:21	55	32	30	<2	60	0.0				970.43
	12/13/2013	9:07	12/13/2013 9:07	52	30	29	<2	62	0.0				970.43
	12/13/2013	9:08	12/13/2013 9:08	52	32	31.5	<2	62	0.0				970.43
	12/13/2013	9:09	12/13/2013 9:09	52	35	33	4	62	8.4		4.2	0.48	970.92
	12/13/2013	9:37	12/13/2013 9:37	50	35	34	3	64	6.3		206.8	23.66	994.58
	12/13/2013	10:32	12/13/2013 10:32	48	35	34	4	67	8.4		405.1	46.35	1040.92
	12/13/2013	12:30	12/13/2013 12:30	45	35	33	6	70	12.6		1237.9	141.61	1182.54
	12/13/2013	13:52	12/13/2013 13:52	45	35	33	8	70	16.8		1202.9	137.61	1320.15
	12/13/2013	15:10	12/13/2013 15:10	50	35	32.5	9.5	68	19.9		1431.8	163.80	1483.95
	12/13/2013	15:11	12/13/2013 15:11							Valve shut	19.9	2.28	1486.23
	12/13/2013	15:12	12/13/2013 15:12			26							1486.23
SW-9 Event 5	12/16/2013	8:32	12/16/2013 8:32			35			0.0		0.0	0.00	1486.23
	12/16/2013	8:32	12/16/2013 8:32	50	32	32	<2	50	0.0		0.0	0.00	1486.23
	12/16/2013	8:36	12/16/2013 8:36			39			0.0		0.0	0.00	1486.23
	12/16/2013	9:07	12/16/2013 9:07	50	32	31	3.5	50	7.2		112.4	12.86	1499.09
	12/16/2013	10:12	12/16/2013 10:12	45	32	31	4	58	8.2		502.7	57.51	1556.60
	12/16/2013	10:13	12/16/2013 10:13	47.5	32	31	4	64	8.2		8.2	0.94	1557.53
	12/16/2013	11:14	12/16/2013 11:14	47.5	34	33	6	64	12.5		631.0	72.19	1629.72
	12/16/2013	13:18	12/16/2013 13:18	42.5	34	33	6.5	70	13.5		1612.0	184.41	1814.13

SW-9 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	12/16/2013	13:19	12/16/2013 13:19	55	34	32	10	70	20.7		17.1	1.96	1816.09
	12/16/2013	13:20	12/16/2013 13:20			25			0.0	Valve Shut	10.4	1.19	1817.28
	12/16/2013	14:48	12/16/2013 14:48	45	32	39	16.5	74	33.4	Restart	1468.4	167.98	1985.26
	12/16/2013	15:28	12/16/2013 15:28	45	32	31	13	68	26.4		1196.4	136.87	2122.12
	12/16/2013	16:24	12/16/2013 16:24	45	34	31	12	62	25.1		1443.0	165.07	2287.20
	12/16/2013	16:25	12/16/2013 16:25	44	34	32	14	62	29.3		27.2	3.11	2290.31
	12/16/2013	22:22	12/16/2013 22:22	47	37	30.5	17.5	58	37.9		11983.4	1370.91	3661.21
	12/17/2013	8:34	12/17/2013 8:34	45	36	30	20	62	42.7		24645.9	2819.49	6480.70
	12/17/2013	8:35	12/17/2013 8:35							Valve shut	42.7	4.88	6485.58
	12/17/2013	8:36	12/17/2013 8:36			25							6485.58
SW-9 Event 6	1/21/2014	12:51	1/21/2014 12:51	49	26	25.5	<2	71	0.0		0.0	0.00	6485.58
	1/21/2014	12:52	1/21/2014 12:52	49	32.5	32.2	<2	71	0.0		0.0	0.00	6485.58
	1/21/2014	14:12	1/21/2014 14:12	52	31	32	4.2	72	8.4		336.7	38.52	6524.10
	1/21/2014	15:53	1/21/2014 15:53	55	30	30.5	6.8	68	13.5		1108.4	126.80	6650.90
	1/21/2014	15:54	1/21/2014 15:54	55	32	31.5	12	68	24.4		19.0	2.17	6653.07
	1/21/2014	16:58	1/21/2014 16:58	57	32.5	31.5	11.6	64	23.8		1543.5	176.57	6829.64
	1/21/2014	17:00	1/21/2014 17:00							Valve shut	47.6	5.45	6835.09
SW-9 Event 7	1/23/2014	13:07	1/23/2014 13:07	52	30	27	<2	58	0.0				6835.09
	1/23/2014	13:08	1/23/2014 13:08	52	35	32	<2	58	0.0		0.0	0.00	6835.09
	1/23/2014	13:12	1/23/2014 13:12	52	33	30.5	5	58	10.4		20.8	2.38	6837.47
	1/23/2014	13:12	1/23/2014 13:12	52	34.5	32	6.5	58	13.7		0.0	0.00	6837.47
	1/23/2014	14:24	1/23/2014 14:24	53	34	30	8.8	57	18.5		1159.3	132.63	6970.10
	1/23/2014	14:26	1/23/2014 14:26	53	35	32.2	12	57	25.5		44.0	5.03	6975.13
	1/23/2014	15:59	1/23/2014 15:59	53	35	32	13	57	27.6		2467.9	282.33	7257.45
	1/23/2014	17:08	1/23/2014 17:08	59	35	31	14.3	54	30.4		2002.6	229.10	7486.56
	1/23/2014	17:09	1/23/2014 17:09			27				Valve shut	30.4	3.48	7490.04
SW-9 Event 8	1/27/2014	12:35	1/27/2014 12:35										7490.04
	1/27/2014	12:37	1/27/2014 12:37	56	35	33	5	86	10.3		20.6	2.36	7492.40
	1/27/2014	13:05	1/27/2014 13:05	50	34.5	31.5	9.5	75	19.7		420.4	48.09	7540.49
	1/27/2014	13:06	1/27/2014 13:06	49	36	33	12.5	74	26.4		23.0	2.64	7543.13
	1/27/2014	13:19	1/27/2014 13:19	49	36	33	12.5	72	26.4		343.0	39.24	7582.37
	1/27/2014	14:54	1/27/2014 14:54	48	36	33	13	68	27.6		2564.3	293.35	7875.72
	1/27/2014	15:52	1/27/2014 15:52	47	36	32.5	14	67	29.7		1661.7	190.10	8065.82
	1/27/2014	16:38	1/27/2014 16:38	52	36	32.5	14	65	29.8		1368.7	156.58	8222.40
	1/27/2014	16:39	1/27/2014 16:39							Valve shut	29.8	3.41	8225.80
	1/27/2014	16:40	1/27/2014 16:40			25							8225.80
Note: a red value, i.e. 75 °F, indicates that value was interpolated from field data										Total CO_2 Mass (lbs):			8225.80

SW-10 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
SW-10 Event 1	11/21/2013	9:29	11/21/2013 9:29	55	28			66	0.0				
	11/21/2013	9:30	11/21/2013 9:30		33	34	<2	66	0.0		0.0	0.00	0.00
	11/21/2013	10:20	11/21/2013 10:20		31	32	4	66	8.1		201.6	23.06	23.06
	11/21/2013	10:21	11/21/2013 10:21		34	34	6	68	12.5		10.3	1.17	24.24
	11/21/2013	10:57	11/21/2013 10:57		34	34	6.5	70	13.5		467.1	53.44	77.68
	11/21/2013	11:59	11/21/2013 11:59		34	34	7	72	14.5		867.1	99.20	176.88
	11/21/2013	13:23	11/21/2013 13:23	45	33	33.5	7	74	14.3		1209.6	138.38	315.26
	11/21/2013	13:40	11/21/2013 13:40		33.5	34	8	74	16.4		261.4	29.90	345.16
	11/21/2013	13:41	11/21/2013 13:41							Valve shut	16.4	1.88	347.05
	11/21/2013	13:42	11/21/2013 13:42			28							347.05
SW-10 Event 2	11/26/2013	8:02	11/26/2013 8:02	52	25			68					347.05
	11/26/2013	8:05	11/26/2013 8:05	55	33	33	<2	68	0.0				347.05
	11/26/2013	8:25	11/26/2013 8:25	55	33	32	<2	68	0.0				347.05
	11/26/2013	8:27	11/26/2013 8:27	55	35	31	4	68	8.4		8.4	0.96	348.01
	11/26/2013	9:10	11/26/2013 9:10	55	34	34	4	68	8.3		359.3	41.10	389.11
	11/26/2013	11:10	11/26/2013 11:10	54	33	34	8	68	16.5		1485.8	169.98	559.09
	11/26/2013	12:35	11/26/2013 12:35	58	34	34	10	68	20.8		1582.4	181.03	740.12
	11/26/2013	12:36	11/26/2013 12:36							Valve shut	20.8	2.38	742.49
	11/26/2013	12:38	11/26/2013 12:38			26							742.49
SW-10 Event 3	12/12/2013	9:20	12/12/2013 9:20	50	30	29	<2	62	0.0				742.49
	12/12/2013	9:21	12/12/2013 9:21	50	35	32.5	<2	62	0.0				742.49
	12/12/2013	9:59	12/12/2013 9:59	49	32	32	<2	66	0.0				742.49
	12/12/2013	10:00	12/12/2013 10:00	49	35	33	4	66	8.4		4.2	0.48	742.98
	12/12/2013	10:36	12/12/2013 10:36	47	35	33.5	4	67	8.4		302.8	34.64	777.62
	12/12/2013	11:33	12/12/2013 11:33	45	35	33.5	6	68	12.6		598.7	68.49	846.11
	12/12/2013	13:28	12/12/2013 13:28	45	32	32	9	70	18.3		1775.2	203.08	1049.18
	12/12/2013	13:29	12/12/2013 13:29							Valve shut	18.3	2.09	1051.27
	12/12/2013	13:30	12/12/2013 13:30			19							1051.27
SW-10 Event 4	12/16/2013	8:34	12/16/2013 8:34	50	34	33	<2	50.0	0.0		0.0	0.00	1051.27
	12/16/2013	8:34	12/16/2013 8:34	50	33	32	<2	50.0	0.0		0.0	0.00	1051.27
	12/16/2013	9:06	12/16/2013 9:06	45	32	31.5	3.5	58.0	7.2		115.1	13.16	1064.44
	12/16/2013	9:08	12/16/2013 9:08	45	34	33	6	58.0	12.6		19.8	2.26	1066.70
	12/16/2013	10:11	12/16/2013 10:11	48	34	33	6	64.0	12.5		791.0	90.49	1157.19
	12/16/2013	11:12	12/16/2013 11:12	43	34	33	8	70.0	16.6		887.9	101.58	1258.77
	12/16/2013	13:20	12/16/2013 13:20	55	32	31.5	11	70.0	22.3		2491.4	285.01	1543.78
	12/16/2013	13:21	12/16/2013 13:21						0.0	Valve shut	11.2	1.28	1545.06
	12/16/2013	13:22	12/16/2013 13:22			25			0.0		0.0	0.00	1545.06
	12/16/2013	14:46	12/16/2013 14:46	45	30	28	20	74.0	39.6	Restart	1661.6	190.09	1735.15
	12/16/2013	15:30	12/16/2013 15:30	45	30	31	14	68.0	27.9		1483.2	169.68	1904.83
	12/16/2013	16:26	12/16/2013 16:26	45	32	31	14	62.0	28.7		1582.2	181.00	2085.83
	12/16/2013	22:20	12/16/2013 22:20	47	32	30	18	58.0	37.0		11617.4	1329.03	3414.86
	12/17/2013	8:35	12/17/2013 8:35	45	32	28	20	62.0	40.9		23958.6	2740.86	6155.72
	12/17/2013	8:36	12/17/2013 8:36							Valve shut	40.9	4.68	6160.41
	12/17/2013	8:37	12/17/2013 8:37			24							6160.41
SW-10 Event 5	1/20/2014	10:54	1/20/2014 10:54	46	26	26	<2	66.0	0.0		0.0	0.00	6160.41
	1/20/2014	10:57	1/20/2014 10:57	46	32.5	30.2	4	66.0	8.2		12.3	1.41	6161.81
	1/20/2014	11:01	1/20/2014 11:01	46	34.5	31.2	5.5	66.0	11.5		39.4	4.51	6166.32
	1/20/2014	11:30	1/20/2014 11:30	45	34.5	31.5	5.5	68.0	11.5		333.5	38.16	6204.48
	1/20/2014	12:51	1/20/2014 12:51	49	34	31	7.2	69.0	14.9		1070.7	122.49	6326.97
	1/20/2014	13:54	1/20/2014 13:54	50	34	31	9.2	68.0	19.1		1073.1	122.77	6449.73
	1/20/2014	15:10	1/20/2014 15:10	49	33.5	30.5	10	68.0	20.7	Valve shut	1512.1	172.99	6622.72
	1/20/2014	15:11	1/20/2014 15:11			27							6622.72
SW-10 Event 6	1/21/2014	8:11	1/21/2014 8:11	55	30	28	<2	54.0	0.0		0.0	0.00	6622.72

SW-10 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	1/21/2014	8:12	1/21/2014 8:12	55	33	31	3.8	54.0	7.9		4.0	0.45	6623.17
	1/21/2014	8:13	1/21/2014 8:13	55	34	31.5	7	54.0	14.8		11.3	1.30	6624.47
	1/21/2014	8:19	1/21/2014 8:19	54	33	31.5	9	56.0	18.7		100.4	11.49	6635.96
	1/21/2014	8:54	1/21/2014 8:54	50	33	31.5	10	60.0	20.7		690.5	78.99	6714.96
	1/21/2014	8:58	1/21/2014 8:58	50	34	31.5	12	60.0	25.1		91.7	10.49	6725.45
	1/21/2014	9:59	1/21/2014 9:59	40	34	31.5	10.5	64.0	21.9		1434.9	164.15	6889.60
	1/21/2014	11:20	1/21/2014 11:20	39	34	31	11	68.0	22.9		1813.1	207.42	7097.01
	1/21/2014	12:44	1/21/2014 12:44	45	34	30.5	12.5	68.0	26.0		2051.2	234.65	7331.67
	1/21/2014	12:45	1/21/2014 12:45			27				Valve shut	26.0	2.97	7334.64
SW-10 Event 7	1/23/2014	8:22	1/23/2014 8:22	53	33	31	<2	41.0	0.0		0.0	0.00	7334.64
	1/23/2014	9:03	1/23/2014 9:03	52	30.5	29.5	6.3	50.0	12.8		263.1	30.10	7364.74
	1/23/2014	9:04	1/23/2014 9:04	52	33.5	31	11	50.0	23.2		18.0	2.06	7366.80
	1/23/2014	9:49	1/23/2014 9:49	48	33.5	30.5	10	52.0	21.0		993.6	113.67	7480.47
	1/23/2014	9:50	1/23/2014 9:50	48	35	32	12	52.0	25.6		23.3	2.67	7483.13
	1/23/2014	10:54	1/23/2014 10:54	45	35	32	12.8	54.0	27.3		1691.5	193.51	7676.65
	1/23/2014	11:47	1/23/2014 11:47	44	35	31.5	13.5	54.0	28.7		1484.1	169.78	7846.42
	1/23/2014	13:04	1/23/2014 13:04	50	35	31.5	15.5	58.0	32.9		2372.3	271.39	8117.81
	1/23/2014	13:05	1/23/2014 13:05			26				Valve shut	32.9	3.76	8121.57
Note: a red value, i.e. 75 °F, indicates that value was interpolated from field data											Total CO_2 Mass (lbs):		8121.57

SW-11 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
SW-11 Event 1	11/22/2013	8:29	11/22/2013 8:29						0.0				
	11/22/2013	8:30	11/22/2013 8:30	55	24	24	<2	70	0.0		0.0	0.00	0.00
	11/22/2013	8:44	11/22/2013 8:44	55	30	30	<2	70	0.0		0.0	0.00	0.00
	11/22/2013	8:48	11/22/2013 8:48	55	32	33	<2	70	0.0		0.0	0.00	0.00
	11/22/2013	9:08	11/22/2013 9:08	55	32	33	<2	74	0.0		0.0	0.00	0.00
	11/22/2013	9:09	11/22/2013 9:09	55	34	34	3.8	74	7.9		3.9	0.45	0.45
	11/22/2013	10:02	11/22/2013 10:02	53	32.5	34	6.0	76	12.2		530.7	60.72	61.17
	11/22/2013	10:37	11/22/2013 10:37	53	34	34	6.0	77	12.4		429.4	49.12	110.29
	11/22/2013	11:06	11/22/2013 11:06	52	34	33	7	77	14.4		388.3	44.42	154.71
	11/22/2013	11:36	11/22/2013 11:36	53	34	33.5	7	77	14.4		432.6	49.49	204.20
	11/22/2013	11:59	11/22/2013 11:59	52	35	35	10	81	20.7		404.3	46.25	250.45
	11/22/2013	12:43	11/22/2013 12:43	52	35	35	10	81	20.7		912.3	104.37	354.82
	11/22/2013	12:44	11/22/2013 12:44							Valve shut	20.7	2.37	357.19
	11/22/2013	12:45	11/22/2013 12:45										357.19
SW-11 Event 2	11/26/2013	7:55	11/26/2013 7:55	54	28			68					357.19
	11/26/2013	7:58	11/26/2013 7:58	55	32	33	<2	68	0.0		0.0	0.00	357.19
	11/26/2013	8:22	11/26/2013 8:22	55	31	31	4	68	8.0		96.6	11.05	368.24
	11/26/2013	9:07	11/26/2013 9:07	55	32	32	5	68	10.2		410.0	46.90	415.14
	11/26/2013	11:03	11/26/2013 11:03	54	31	31	7	68	14.1		1406.9	160.95	576.09
	11/26/2013	12:30	11/26/2013 12:30	58	31	32	8	68	16.1		1312.9	150.20	726.29
	11/26/2013	12:32	11/26/2013 12:32							Valve shut	32.2	3.68	729.97
	11/26/2013	12:33	11/26/2013 12:33			24							729.97
SW-11 Event 3	12/5/2013	8:09	12/5/2013 8:09	55	35	32.5	7	66	14.7				729.97
	12/5/2013	8:43	12/5/2013 8:43	53	36	34.5	13	69	27.5		718.7	82.22	812.19
	12/5/2013	9:19	12/5/2013 9:19	51	36	34	14	72	29.6		1028.3	117.64	929.83
	12/5/2013	10:19	12/5/2013 10:19	50	36	33.5	14	78	29.4		1769.6	202.44	1132.27
	12/5/2013	11:34	12/5/2013 11:34	50	36	33.5	14.5	80	30.4		2242.7	256.57	1388.84
	12/5/2013	12:18	12/5/2013 12:18	50	36	33	15	82	31.4		1359.3	155.50	1544.34
	12/5/2013	12:19	12/5/2013 12:19							Valve shut	31.4	3.59	1547.93
	12/5/2013	12:20	12/5/2013 12:20			23							1547.93
SW-11 Event 4	12/18/2013	8:33	12/18/2013 8:33	48	33	36	<2	56.0	0.0				1547.93
	12/18/2013	9:34	12/18/2013 9:34	45	31	32	3	62.0	6.1		185.2	21.19	1569.12
	12/18/2013	9:35	12/18/2013 9:35	45	33	34.5	7.5	62.0	15.5		10.8	1.23	1570.35
	12/18/2013	9:38	12/18/2013 9:38						0.0	Valve shut	23.3	2.66	1573.01
	12/18/2013	13:59	12/18/2013 13:59	50	36	35.6	<2	75.0	0.0	Restart	0.0	0.00	1573.01
	12/18/2013	14:00	12/18/2013 14:00	50	34	34	<2	75.0	0.0		0.0	0.00	1573.01
	12/18/2013	14:45	12/18/2013 14:45	48	29	29.8	<2	72.0	0.0		0.0	0.00	1573.01
	12/18/2013	14:47	12/18/2013 14:47	48	34	34.4	5	72.0	10.4		10.4	1.18	1574.20
	12/18/2013	15:31	12/18/2013 15:31	40	34	34	6	70.0	12.4		501.5	57.37	1631.57
	12/18/2013	16:52	12/18/2013 16:52	45	33	33.6	9	65.0	18.6		1255.8	143.66	1775.23
	12/18/2013	17:50	12/18/2013 17:50	45	33	33.4	10.5	56.0	21.9		1172.0	134.08	1909.31
	12/18/2013	17:55	12/18/2013 17:55							Valve shut	109.3	12.50	1921.81
	12/18/2013	17:56	12/18/2013 17:56			26							1921.81
SW-11 Event 4	1/8/2014	8:17	1/8/2014 8:17					40.0					1921.81
	1/8/2014	8:18	1/8/2014 8:18	57	38	34.5	<2	40.0	0.0		0.0	0.00	1921.81
	1/8/2014	8:34	1/8/2014 8:34	50	36	34	3	45.0	6.5		52.1	5.96	1927.77
	1/8/2014	8:52	1/8/2014 8:52	50	36	33.5	3.5	48.0	7.6		126.8	14.51	1942.27
	1/8/2014	8:53	1/8/2014 8:53	50	37	35	6	48.0	13.1		10.3	1.18	1943.46
	1/8/2014	9:50	1/8/2014 9:50	47	37	35	7	50.0	15.3		809.0	92.55	2036.01
	1/8/2014	10:41	1/8/2014 10:41	46	36	34.5	8.5	54.0	18.3		855.6	97.88	2133.89
	1/8/2014	11:20	1/8/2014 11:20	45	36	34	9.5	56.0	20.4		754.2	86.28	2220.17
	1/8/2014	12:54	1/8/2014 12:54	49	36	33.5	12	56.0	25.8		2169.2	248.16	2468.34
	1/8/2014	12:55	1/8/2014 12:55	49	38	35	16	56.0	35.0		30.4	3.48	2471.81

SW-11 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	1/8/2014	13:02	1/8/2014 13:02	55	38	35	16	56.0	35.0		245.2	28.05	2499.87
	1/8/2014	14:00	1/8/2014 14:00	52	38	35	16	56.0	35.0		2031.8	232.44	2732.30
	1/8/2014	15:09	1/8/2014 15:09	51	38	34.5	18	58.0	39.3		2565.4	293.49	3025.79
	1/8/2014	16:30	1/8/2014 16:30	50	38	34	18	54.0	39.5		3192.2	365.19	3390.98
	1/8/2014	16:52	1/8/2014 16:52	53	38	34	19	53.0	41.7		893.4	102.20	3493.18
	1/8/2014	16:53	1/8/2014 16:53							Valve shut	41.7	4.77	3497.95
	1/8/2014	16:54	1/8/2014 16:54			26							3497.95
SW-11 Event 5	1/10/2014	11:10	1/10/2014 11:10	45	32.5	32.5	<2	72.0	0.0				3497.95
	1/10/2014	11:13	1/10/2014 11:13	45	34	33.5	<2	72.0	0.0		0	0.00	3497.95
	1/10/2014	12:50	1/10/2014 12:50	45	32	32	4.5	72.0	9.1		442.3	50.60	3548.55
	1/10/2014	12:54	1/10/2014 12:54	45	35	33.5	8	72.0	16.7		51.7	5.91	3554.46
	1/10/2014	14:35	1/10/2014 14:35	50	35	33	8.5	70.0	17.8		1744.5	199.57	3754.04
	1/10/2014	16:32	1/10/2014 16:32	48	35	33	11	70.0	23.1		2390.6	273.48	4027.52
	1/10/2014	17:55	1/10/2014 17:55	48	35	33	12.2	66.0	25.7		2021.9	231.30	4258.82
	1/10/2014	22:10	1/10/2014 22:10	45	34	31	14.5	64.0	30.3		7129.9	815.66	5074.48
	1/10/2014	22:14	1/10/2014 22:14							Valve shut	121.0	13.84	5088.32
	1/10/2014	22:16	1/10/2014 22:16			26							5088.32
SW-11 Event 6	1/13/2014	8:05	1/13/2014 8:05						0.0		0.0	0.00	5088.32
	1/13/2014	8:07	1/13/2014 8:07	53	39	36	3	50	6.7		6.7	0.76	5089.09
	1/13/2014	8:22	1/13/2014 8:22	50	39	34	10	52	22.2		216.5	24.77	5113.86
	1/13/2014	10:09	1/13/2014 10:09	47	39	34	10	67	21.9		2357.1	269.65	5383.51
	1/13/2014	11:18	1/13/2014 11:18	46	39	34	10	70	21.8		1506.3	172.32	5555.82
	1/13/2014	12:10	1/13/2014 12:10	50	39	34	10.5	72	22.8		1160.6	132.78	5688.60
	1/13/2014	12:39	1/13/2014 12:39	49	39	34	10.5	70	22.9		663.1	75.86	5764.45
	1/13/2014	13:50	1/13/2014 13:50	45	37	33	12	68	25.7		1725.1	197.35	5961.81
	1/13/2014	13:51	1/13/2014 13:51	45	39	34	15	68	32.8		29.2	3.34	5965.15
	1/13/2014	14:41	1/13/2014 14:41	42	39	34	15	68	32.8		1638.0	187.39	6152.54
	1/13/2014	15:59	1/13/2014 15:59	41	39	33	15	66	32.8		2557.9	292.62	6445.17
	1/13/2014	16:00	1/13/2014 16:00	41	39	34	16	66	35.0		33.9	3.88	6449.05
	1/13/2014	17:00	1/13/2014 17:00	46	41	35	20	64	44.7		2390.8	273.51	6722.56
	1/13/2014	17:01	1/13/2014 17:01							Valve shut	44.7	5.11	6727.67
	1/13/2014	17:02	1/13/2014 17:02			27							6727.67
SW-11 Event 6	1/15/2014	9:09	1/15/2014 9:09	52	34	32	<2	62	0.0		0.0	0.00	6727.67
	1/15/2014	9:12	1/15/2014 9:12	52	34	32	4	62	8.4		12.5	1.43	6729.10
	1/15/2014	9:13	1/15/2014 9:13	52	35	33	6	62	12.7		10.5	1.20	6730.31
	1/15/2014	9:18	1/15/2014 9:18	52	35	33	8	62	16.9		73.9	8.46	6738.76
	1/15/2014	9:32	1/15/2014 9:32	46	34	32	10.2	64	21.3		267.3	30.57	6769.34
	1/15/2014	9:33	1/15/2014 9:33	46	35	33	12.2	64	25.7		23.5	2.69	6772.03
	1/15/2014	10:18	1/15/2014 10:18	43	35	32.5	13	66	27.4		1194.1	136.60	6908.63
	1/15/2014	11:26	1/15/2014 11:26	41	35	32.5	13.5	69	28.3		1892.8	216.53	7125.16
	1/15/2014	12:35	1/15/2014 12:35	45	35	32.5	14.2	67	29.8		2006.7	229.56	7354.72
	1/15/2014	13:58	1/15/2014 13:58	50	35	32.5	15	66	31.6		2548.3	291.52	7646.25
	1/15/2014	15:40	1/15/2014 15:40	48	34	32	16	69	33.2		3303.6	377.93	8024.18
	1/15/2014	17:11	1/15/2014 17:11	57	34	31.5	17	62	35.5		3128.5	357.90	8382.08
	1/15/2014	17:13	1/15/2014 17:13							Valve shut	71.1	8.13	8390.21
	1/15/2014	17:16	1/15/2014 17:16			24							8390.21
SW-11 Event 7	1/17/2014	7:32	1/17/2014 7:32	55	35	30	<2	40	0.0				8390.21
	1/17/2014	7:33	1/17/2014 7:33	55	34	30	2	40	4.3		2.1	0.24	8390.46
	1/17/2014	7:34	1/17/2014 7:34	55	34	30	3.8	40	8.1		6.2	0.71	8391.17
	1/17/2014	7:36	1/17/2014 7:36	55	34	32.5	8	40	17.1		25.2	2.89	8394.05
	1/17/2014	8:50	1/17/2014 8:50	50	33	31	11.5	60	23.8		1514.8	173.30	8567.35
	1/17/2014	8:51	1/17/2014 8:51	50	34	32.5	14	60	29.3		26.6	3.04	8570.39
	1/17/2014	10:28	1/17/2014 10:28	47	34	32	13	66	27.1		2735.2	312.91	8883.30

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	1/17/2014	11:36	1/17/2014 11:36	45	34	32	13	67	27.0		1839.8	210.48	9093.78
	1/17/2014	12:28	1/17/2014 12:28	46	34	32	13.5	68	28.1		1432.6	163.89	9257.66
	1/17/2014	13:00	1/17/2014 13:00	45	34	32	13.8	68	28.7		907.8	103.85	9361.51
	1/17/2014	14:11	1/17/2014 14:11	45	34	32	14	68	29.1		2051.0	234.63	9596.14
	1/17/2014	15:30	1/17/2014 15:30	47	34	31.5	14.5	66	30.2		2341.9	267.91	9864.05
	1/17/2014	15:32	1/17/2014 15:32							Valve shut	60.4	6.91	9870.95
	1/17/2014	15:41	1/17/2014 15:41			26							9870.95
SW-11 Event 8	1/21/2014	8:15	1/21/2014 8:15	55	30	30	<2	54	0.0				9870.95
	1/21/2014	8:17	1/21/2014 8:17	55	33	33	4	54	8.3		8.3	0.95	9871.91
	1/21/2014	8:56	1/21/2014 8:56	50	31	31	10	60	20.3		558.1	63.85	9935.76
	1/21/2014	8:57	1/21/2014 8:57	50	33.5	33.5	13	60	27.1		23.7	2.71	9938.47
	1/21/2014	9:58	1/21/2014 9:58	40	33.3	33	12	64	24.9		1584.3	181.24	10119.71
	1/21/2014	11:19	1/21/2014 11:19	39	33	32.5	11.7	68	24.1		1981.0	226.63	10346.33
	1/21/2014	12:43	1/21/2014 12:43	46	33	32.5	13	69	26.7		2132.2	243.92	10590.26
	1/21/2014	12:45	1/21/2014 12:45			28				Valve shut	53.4	6.11	10596.37
SW-11 Event 9	1/28/2014	7:45	1/28/2014 7:45										10596.37
	1/28/2014	7:46	1/28/2014 7:46	55	35	34.5	3.5	58	7.4		7.4	0.85	10597.22
	1/28/2014	8:16	1/28/2014 8:16	55	33	33	10.5	58	21.8		438.5	50.16	10647.38
	1/28/2014	8:18	1/28/2014 8:18	55	35	34	13	58	27.6		49.4	5.65	10653.03
	1/28/2014	8:35	1/28/2014 8:35	55	35	34	13.5	58	28.6		477.7	54.65	10707.68
	1/28/2014	10:10	1/28/2014 10:10	54	35	34	13.5	58	28.6		2719.9	311.15	11018.83
	1/28/2014	11:05	1/28/2014 11:05	54	35	34	13.5	58	28.6		1574.7	180.14	11198.97
	1/28/2014	11:52	1/28/2014 11:52	52	35	34	15	54	31.9		1423.4	162.84	11361.81
	1/28/2014	13:07	1/28/2014 13:07	51	35	34	16	54	34.1		2475.4	283.18	11645.00
	1/28/2014	14:10	1/28/2014 14:10	51	34.5	33.5	17	54	36.0		2207.6	252.55	11897.55
	1/28/2014	15:02	1/28/2014 15:02	50	34.5	33.5	18	54	38.1		1927.8	220.54	12118.08
	1/28/2014	16:18	1/28/2014 16:18	50	34	33	18.5	52	39.1		2933.6	335.60	12453.68
	1/28/2014	16:19	1/28/2014 16:19							Valve shut	39.1	4.47	12458.15
	1/28/2014	16:20	1/28/2014 16:20			25							12458.15
SW-11 Event 10	1/29/2014	8:18	1/29/2014 8:18										12458.15
	1/29/2014	8:19	1/29/2014 8:19	53	35	35	7	42	15.1		15.1	1.73	12459.88
	1/29/2014	9:11	1/29/2014 9:11	50	32.5	32	15.5	44	32.5		1236.8	141.50	12601.37
	1/29/2014	9:12	1/29/2014 9:12	50	35	34	18	44	38.7		35.6	4.07	12605.45
	1/29/2014	10:28	1/29/2014 10:28	50	35	34	19.5	46	41.9		3062.3	350.33	12955.78
	1/29/2014	12:42	1/29/2014 12:42	50	35	34	20	46	42.9		5681.7	649.99	13605.76
	1/29/2014	14:00	1/29/2014 14:00	50	35	33.5	20	46	42.9		3349.1	383.14	13988.90
	1/29/2014	14:55	1/29/2014 14:55	50	35	33.5	20	45	43.0		2362.8	270.30	14259.21
	1/29/2014	16:25	1/29/2014 16:25	50	35	33.5	21	45	45.1		3965.1	453.61	14712.81
	1/29/2014	16:26	1/29/2014 16:26							Valve shut	45.1	5.16	14717.98
	1/29/2014	16:27	1/29/2014 16:27			25							14717.98
SW-11 Event 11	1/30/2014	7:40	1/30/2014 7:40										14717.98
	1/30/2014	7:42	1/30/2014 7:42	54	36.5	34	10	42	21.9		43.8	5.01	14722.98
	1/30/2014	7:49	1/30/2014 7:49	54	36	34	14	42	30.5		183.3	20.97	14743.96
	1/30/2014	9:04	1/30/2014 9:04	52	35	34	20	46	42.9		2753.5	315.00	15058.96
	1/30/2014	9:56	1/30/2014 9:56	50	35	34	20.5	48	43.9		2258.3	258.35	15317.31
	1/30/2014	11:00	1/30/2014 11:00	50	35	34	20.5	48	43.9		2810.9	321.57	15638.87
	1/30/2014	12:22	1/30/2014 12:22	50	34.5	33.5	21.5	50	45.7		3675.8	420.51	16059.38
	1/30/2014	13:35	1/30/2014 13:35	55	34.5	33.5	22	50	46.8		3377.3	386.36	16445.74
	1/30/2014	13:36	1/30/2014 13:36							Valve shut	46.8	5.35	16451.09
	1/30/2014	13:37	1/30/2014 13:37			25							16451.09
SW-11 Event 12	2/5/2014	7:32	2/5/2014 7:32	58	34	34	<2	62	0.0				16451.09
	2/5/2014	7:58	2/5/2014 7:58	56	32	32	9.2	62	18.8		244.8	28.00	16479.09
	2/5/2014	8:51	2/5/2014 8:51	51	32	32	10	66	20.4		1039.1	118.87	16597.97

SW-11 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	2/5/2014	9:17	2/5/2014 9:17		32	32	10.2	66	20.8		535.3	61.24	16659.20
	2/5/2014	10:32	2/5/2014 10:32	45	32	32	10.2	68	20.8		1557.8	178.22	16837.42
	2/5/2014	11:32	2/5/2014 11:32	45	31.5	31.5	10.2	70	20.6		1240.4	141.91	16979.33
	2/5/2014	12:43	2/5/2014 12:43	45	31.5	31.5	10.2	71	20.6		1461.7	167.22	17146.55
	2/5/2014	13:41	2/5/2014 13:41	45	31.5	31.5	10.3	73	20.7		1198.2	137.07	17283.62
	2/5/2014	14:52	2/5/2014 14:52	48	31.5	31.5	11.3	80	22.6		1538.5	176.00	17459.62
	2/5/2014	15:45	2/5/2014 15:45	48	31.5	31.5	12	74	24.1		1238.5	141.69	17601.31
	2/5/2014	16:03	2/5/2014 16:03	48	31.5	31.5	12	76	24.1		434.1	49.66	17650.97
	2/5/2014	16:04	2/5/2014 16:04			27				Valve shut	24.1	2.76	17653.72
SW-11 Event 13	2/7/2014	8:34	2/7/2014 8:34	51	30	30	<2	56	0.0				17653.72
	2/7/2014	8:36	2/7/2014 8:36	49	33.5	33	3	56	6.3		6.3	0.72	17654.44
	2/7/2014	8:40	2/7/2014 8:40	49	32.5	33	7	57	14.5		41.5	4.75	17659.19
	2/7/2014	9:29	2/7/2014 9:29	46	31.5	31.5	10.5	57	21.5		880.9	100.77	17759.96
	2/7/2014	9:31	2/7/2014 9:31	46	33.5	32.2	13.6	57	28.4		49.9	5.71	17765.67
	2/7/2014	11:43	2/7/2014 11:43	44	33.5	32.5	13.7	60	28.5		3760.2	430.17	18195.83
	2/7/2014	13:15	2/7/2014 13:15	44	33.5	32.5	13.7	61	28.5		2625.1	300.31	18496.15
	2/7/2014	14:32	2/7/2014 14:32	49	33.5	32.5	14.2	61	29.6		2236.1	255.81	18751.95
	2/7/2014	15:45	2/7/2014 15:45	50	33.5	32.5	15	60	31.3		2219.8	253.95	19005.90
	2/7/2014	16:23	2/7/2014 16:23	50	33	32	15.9	59	33.0		1220.7	139.65	19145.55
	2/7/2014	16:34	2/7/2014 16:34	57	33	32	16.5	58	34.3		369.9	42.32	19187.87
	2/7/2014	16:35	2/7/2014 16:35			27				Valve shut	34.3	3.92	19191.79
SW-11 Event 14	2/10/2014	9:15	2/10/2014 9:15	54	29	31	<2	60	0.0		0.0	0.00	19191.79
	2/10/2014	9:18	2/10/2014 9:18	53	33	33.5	3.8	60	7.9		11.8	1.35	19193.14
	2/10/2014	10:02	2/10/2014 10:02	48	32	32	12	66	24.5		711.4	81.39	19274.52
	2/10/2014	10:03	2/10/2014 10:03	47	33.5	32.5	14.5	66	30.0		27.2	3.12	19277.64
	2/10/2014	11:52	2/10/2014 11:52	48	33.5	32.5	14.2	70	29.3		3233.7	369.93	19647.57
	2/10/2014	13:32	2/10/2014 13:32	48	33.5	32.5	14.2	71	29.3		2928.4	335.01	19982.58
	2/10/2014	15:04	2/10/2014 15:04	45	33.5	32.5	14.2	71	29.3		2692.8	308.06	20290.64
	2/10/2014	16:54	2/10/2014 16:54	45	33.5	32.5	14.5	67	30.0		3260.1	372.96	20663.60
	2/10/2014	17:46	2/10/2014 17:46	48	33.5	32.5	15.5	63	32.2		1617.4	185.03	20848.63
	2/10/2014	17:47	2/10/2014 17:47			26				Valve shut	32.2	3.68	20852.32
SW-11 Event 15	2/11/2014	8:30	2/11/2014 8:30	51	30.5	31.5	3.5	56	7.1				20852.32
	2/11/2014	8:35	2/11/2014 8:35	48	33.5	33.2	9	56	18.8		64.8	7.41	20859.73
	2/11/2014	9:06	2/11/2014 9:06	49	32.5	32	13.8	59	28.5		733.3	83.89	20943.62
	2/11/2014	9:10	2/11/2014 9:10			22				Valve shut	113.9	13.03	20956.65
Note: a red value, i.e. 75 °F, indicates that value was interpolated from field data											Total CO_2 Mass (lbs):		20956.65

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
SW-12 Event 1	11/25/2013	8:53	11/25/2013 8:53	55	28			52	0.0				
	11/25/2013	8:54	11/25/2013 8:54		34	33	<2	52	0.0		0.0	0.00	0.00
	11/25/2013	9:14	11/25/2013 9:14		33	30	4	54	8.3		83.4	9.54	9.54
	11/25/2013	9:15	11/25/2013 9:15		35	32.5	6	54	12.8		10.6	1.21	10.75
	11/25/2013	9:16	11/25/2013 9:16		36	34	7	54	15.1		13.9	1.59	12.34
	11/25/2013	10:24	11/25/2013 10:24		35	33	11	62	23.2		1301.9	148.94	161.29
	11/25/2013	11:30	11/25/2013 11:30		36	33	12	62	25.6		1611.7	184.38	345.67
	11/25/2013	12:38	11/25/2013 12:38		36	32	12	64	25.6		1739.4	198.99	544.66
	11/25/2013	13:58	11/25/2013 13:58	50	36	31	12	64	25.6		2044.4	233.88	778.54
	11/25/2013	14:10	11/25/2013 14:10							Valve shut	306.7	35.08	813.62
	11/25/2013	14:11	11/25/2013 14:11			23							813.62
SW-12 Event 2	12/4/2013	8:05	12/4/2013 8:05					63					813.62
	12/4/2013	8:07	12/4/2013 8:07	54	36	33.5	<2	63	0.0				813.62
	12/4/2013	8:37	12/4/2013 8:37	47	34	31.5	6	68	12.5		187.0	21.40	835.01
	12/4/2013	8:39	12/4/2013 8:39	47	36	33	7.5	68	15.9		28.4	3.25	838.26
	12/4/2013	9:09	12/4/2013 9:09	46	35	33	8.5	70	17.8		505.8	57.87	896.13
	12/4/2013	9:59	12/4/2013 9:59	46	35	32	10	70	21.0		969.2	110.88	1007.01
	12/4/2013	11:00	12/4/2013 11:00	45	37	33.5	14	74	29.8		1548.6	177.16	1184.16
	12/4/2013	12:06	12/4/2013 12:06	45	36	33	15	76	31.6		2025.7	231.74	1415.90
	12/4/2013	12:07	12/4/2013 12:07							Valve shut	31.6	3.61	1419.51
	12/4/2013	12:08	12/4/2013 12:08			24							1419.51
SW-12 Event 3	12/17/2013	8:29	12/17/2013 8:29	45	28	32	<2	50	0.0		0.0	0.00	1419.51
	12/17/2013	9:58	12/17/2013 9:58	42	28	27.4	<2	66	0.0		0.0	0.00	1419.51
	12/17/2013	9:59	12/17/2013 9:59	42	31	32	6	66.0	12.1		6.0	0.69	1420.21
	12/17/2013	11:05	12/17/2013 11:05	39	30	32	7	68.0	13.9		858.8	98.25	1518.45
	12/17/2013	11:06	12/17/2013 11:06	39	32	33.6	10	68	20.3		17.1	1.96	1520.41
	12/17/2013	12:38	12/17/2013 12:38	47	32	33	12.5	72	25.3		2101.0	240.36	1760.77
	12/17/2013	12:39	12/17/2013 12:39							Valve shut	25.3	2.90	1763.67
	12/17/2013	12:40	12/17/2013 12:40			23							1763.67
SW-12 Event 4	1/6/2014	13:04	1/6/2014 13:04										1763.67
	1/6/2014	13:06	1/6/2014 13:06	56	32	32.4	<2	60	0.0		0.0	0.00	1763.67
	1/6/2014	13:26	1/6/2014 13:26	55	30.5	31.6	<2	60	0.0		0.0	0.00	1763.67
	1/6/2014	13:28	1/6/2014 13:28	55	33.5	34.4	4.5	60	9.4		9.4	1.07	1764.74
	1/6/2014	13:58	1/6/2014 13:58	55	33.5	34.4	5	58	10.4		297.3	34.01	1798.75
	1/6/2014	15:06	1/6/2014 15:06	55	33	34	7.5	58	15.6		884.6	101.19	1899.94
	1/6/2014	16:04	1/6/2014 16:04	54	33	33.6	9	55	18.7		995.5	113.88	2013.82
	1/6/2014	17:04	1/6/2014 17:04	54	33	33.2	10.5	52	21.9		1220.7	139.65	2153.47
	1/6/2014	17:18	1/6/2014 17:18	55	33	33.2	11	52	23.0		314.5	35.98	2189.45
	1/6/2014	17:19	1/6/2014 17:19							Valve shut	23.0	2.63	2192.07
	1/6/2014	17:20	1/6/2014 17:20										2192.07
SW-12 Event 5	1/7/2014	7:34	1/7/2014 7:34					27					2192.07
	1/7/2014	7:36	1/7/2014 7:36	19	19	21.2	<2	27	0.0				2192.07
	1/7/2014	7:51	1/7/2014 7:51	15	17	19.2	<2	27	0.0		0.0	0.00	2192.07
	1/7/2014	9:04	1/7/2014 9:04	55	35	36.4	7.5	42	16.2		590.2	67.51	2259.59
	1/7/2014	9:05	1/7/2014 9:05	55	33.5	34.8	6	42	12.7		14.5	1.65	2261.24
	1/7/2014	10:23	1/7/2014 10:23	50	33.5	34.4	7.5	47	15.8		1114.2	127.47	2388.71
	1/7/2014	11:23	1/7/2014 11:23	48	33	34	9.5	50	19.9		1071.8	122.62	2511.33
	1/7/2014	12:42	1/7/2014 12:42	49	32.5	33.6	10.5	50	21.9		1649.5	188.70	2700.03
	1/7/2014	12:43	1/7/2014 12:43							Valve shut	21.9	2.50	2702.53
	1/7/2014	12:44	1/7/2014 12:44			27.6							2702.53
SW-12 Event 6	1/9/2014	12:51	1/9/2014 12:51						0.0		0.0	0.00	2702.53
	1/9/2014	12:52	1/9/2014 12:52	45	38	34.5	<2	60	0.0		0.0	0.00	2702.53
	1/9/2014	12:58	1/9/2014 12:58	43	36	33	2	60	4.3		12.8	1.47	2704.00

SW-12 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	1/9/2014	12:59	1/9/2014 12:59	43	38	34.5	4	60	8.7		6.5	0.74	2704.74
	1/9/2014	14:16	1/9/2014 14:16	37	36	33.5	6.5	60	13.9		870.9	99.63	2804.37
	1/9/2014	15:56	1/9/2014 15:56	42	36	32.5	10	58	21.4		1766.1	202.04	3006.40
	1/9/2014	15:57	1/9/2014 15:57	40	38	34	13.5	58	29.5		25.5	2.91	3009.32
	1/9/2014	17:29	1/9/2014 17:29	56	38	34	16	58	35.0		2965.0	339.20	3348.52
	1/9/2014	17:30	1/9/2014 17:30							Valve shut	35.0	4.00	3352.51
	1/9/2014	17:31	1/9/2014 17:31			24							3352.51
SW-12 Event 7	1/13/2014	8:07	1/13/2014 8:07	50	30	27.5	<2	46	0.0		0.0	0.00	3352.51
	1/13/2014	8:08	1/13/2014 8:08	50	35	32	<2	46	0.0		0.0	0.00	3352.51
	1/13/2014	8:09	1/13/2014 8:09	50	36	33.5	<2	46	0.0		0.0	0.00	3352.51
	1/13/2014	8:12	1/13/2014 8:12	50	36	33.5	3.5	46	7.6		11.4	1.30	3353.82
	1/13/2014	8:26	1/13/2014 8:26	47	36	32.5	6	46	13.0		144.2	16.50	3370.32
	1/13/2014	8:27	1/13/2014 8:27	47	37.5	33.2	6.5	46	14.3		13.7	1.56	3371.88
	1/13/2014	8:47	1/13/2014 8:47	46	36	33	7	54	15.1		293.7	33.59	3405.47
	1/13/2014	9:55	1/13/2014 9:55	45	36	32.5	9	62	19.2		1164.9	133.26	3538.74
	1/13/2014	9:56	1/13/2014 9:56	45	37	32.8	10	62	21.6		20.4	2.33	3541.07
	1/13/2014	11:08	1/13/2014 11:08	43	36	32.5	11	69	23.3		1615.0	184.75	3725.82
	1/13/2014	12:16	1/13/2014 12:16	45	36	32	12	70	25.4		1656.2	189.47	3915.30
	1/13/2014	12:17	1/13/2014 12:17			25				Valve shut	25.4	2.91	3918.20
SW-12 Event 8	1/14/2014	7:45	1/14/2014 7:45	49	34	30.5	<2	62	0.0		0.0	0.00	3918.20
	1/14/2014	7:47	1/14/2014 7:47	49	35	32.5	<2	62	0.0		0.0	0.00	3918.20
	1/14/2014	7:55	1/14/2014 7:55	50	35	32.5	4	62	8.4		33.8	3.87	3922.07
	1/14/2014	8:42	1/14/2014 8:42	46	35	31	6.8	62	14.4		536.1	61.33	3983.40
	1/14/2014	8:45	1/14/2014 8:45	46	37	33	10	62	21.6		53.9	6.16	3989.56
	1/14/2014	10:07	1/14/2014 10:07	44	37	32.5	11.2	63	24.1		1872.2	214.18	4203.74
	1/14/2014	11:30	1/14/2014 11:30	38	36	31.5	12.5	63	26.6		2106.5	240.98	4444.73
	1/14/2014	11:53	1/14/2014 11:53	38	36	31	12.8	63	27.3	Valve shut	620.2	70.95	4515.68
	1/14/2014	11:55	1/14/2014 11:55			25							4515.68
SW-12 Event 9	1/15/2014	8:15	1/15/2014 8:15	54	37	30	<2	46	0.0		0.0	0.00	4515.68
	1/15/2014	8:16	1/15/2014 8:16	54	37	33	<2	46	0.0		0.0	0.00	4515.68
	1/15/2014	8:22	1/15/2014 8:22	54	37	33	4.2	46	9.2		27.6	3.16	4518.84
	1/15/2014	8:25	1/15/2014 8:25	54	37	33	5	46	11.0		30.2	3.46	4522.29
	1/15/2014	9:02	1/15/2014 9:02	50	35	31	7.2	58	15.3		485.1	55.50	4577.79
	1/15/2014	9:03	1/15/2014 9:03	50	37.5	33.8	1.1	58	2.4		8.8	1.01	4578.80
	1/15/2014	9:40	1/15/2014 9:40	42	37.5	33.8	11.5	64	24.9		504.1	57.67	4636.47
	1/15/2014	10:52	1/15/2014 10:52	40	37	33	12.5	68	26.8		1858.8	212.65	4849.12
	1/15/2014	11:22	1/15/2014 11:22	39	37	33	13	68	27.8		819.4	93.74	4942.86
	1/15/2014	12:14	1/15/2014 12:14	43	37	33	14	67	30.0		1504.7	172.13	5114.99
	1/15/2014	12:15	1/15/2014 12:15			25				Valve shut	30.0	3.43	5118.43
SW-12 Event 10	1/16/2014	7:58	1/16/2014 7:58	55	32	28.5	<2	40	0.0		0.0	0.00	5118.43
	1/16/2014	8:00	1/16/2014 8:00	55	37	34	2	40	4.4		4.4	0.50	5118.93
	1/16/2014	8:04	1/16/2014 8:04	55	37	34	3	40	6.6		22.0	2.52	5121.45
	1/16/2014	8:58	1/16/2014 8:58	47	35	31	7.8	54	16.6		627.0	71.73	5193.18
	1/16/2014	8:59	1/16/2014 8:59	47	37	33	11.5	54	25.0		20.8	2.38	5195.56
	1/16/2014	10:24	1/16/2014 10:24	42	37	33	12	57	26.0		2166.5	247.85	5443.41
	1/16/2014	11:18	1/16/2014 11:18	40	37	32	13.2	58	28.6		1472.9	168.50	5611.91
	1/16/2014	12:05	1/16/2014 12:05	44	37	32	14	59	30.3		1382.4	158.14	5770.05
	1/16/2014	12:06	1/16/2014 12:06			25				Valve shut	30.3	3.46	5773.52
SW-12 Event 11	1/17/2014	7:24	1/17/2014 7:24	55	36	33.5	<2	37	0.0		0.0	0.00	5773.52
	1/17/2014	7:27	1/17/2014 7:27	55	36	33.5	4	37	8.8		13.1	1.50	5775.02
	1/17/2014	8:21	1/17/2014 8:21	51	35	30	7.5	54	16.0		667.6	76.38	5851.40
	1/17/2014	8:22	1/17/2014 8:22	51	37	33.2	11	54	23.9		19.9	2.28	5853.68
	1/17/2014	10:15	1/17/2014 10:15	45	37	33	12.5	59	27.0		2876.9	329.12	6182.79

SW-12 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	1/17/2014	11:19	1/17/2014 11:19	45	37	32.5	14	65	30.1		1827.2	209.04	6391.83
	1/17/2014	12:04	1/17/2014 12:04	44	37		14.8	66	31.8		1391.6	159.20	6551.03
	1/17/2014	12:05	1/17/2014 12:05							Valve shut	31.8	3.63	6554.67
SW-12 Event 12	1/20/2014	8:43	1/20/2014 8:43	50	27	25	<2	49	0.0		0.0	0.00	6554.67
	1/20/2014	8:44	1/20/2014 8:44	50	37.5	34	<2	49	0.0		0.0	0.00	6554.67
	1/20/2014	8:47	1/20/2014 8:47	50	37.5	33	4	49	8.8		13.2	1.51	6556.17
	1/20/2014	9:15	1/20/2014 9:15	49	36	32.5	7	58	15.0		332.8	38.08	6594.25
	1/20/2014	9:16	1/20/2014 9:16	49	37.5	33	9.5	58	20.7		17.8	2.04	6596.29
	1/20/2014	10:28	1/20/2014 10:28	47	37.5	33	9.8	64	21.2		1506.2	172.31	6768.60
	1/20/2014	11:24	1/20/2014 11:24	44	37	33	11	67	23.6		1253.6	143.41	6912.00
	1/20/2014	13:01	1/20/2014 13:01	48	36	32	12	69	25.4		2377.3	271.97	7183.97
	1/20/2014	13:02	1/20/2014 13:02							Valve shut	25.4	2.91	7186.88
	1/20/2014	13:04	1/20/2014 13:04			27							7186.88
SW-12 Event 13	1/21/2014	8:00	1/21/2014 8:00	55	32.5	30	<2	50	0.0		0.0	0.00	7186.88
	1/21/2014	8:01	1/21/2014 8:01	55	37.5	34.2	<2	50	0.0		0.0	0.00	7186.88
	1/21/2014	8:03	1/21/2014 8:03	55	37	33.33	3	50	6.5		6.5	0.75	7187.63
	1/21/2014	8:06	1/21/2014 8:06	55	37	33.3	4	52	8.7		22.9	2.62	7190.24
	1/21/2014	8:47	1/21/2014 8:47	50	35	31.5	8.8	56	18.7		561.9	64.28	7254.52
	1/21/2014	8:48	1/21/2014 8:48	50	37.5	33.5	13.2	56	28.8		23.7	2.71	7257.24
	1/21/2014	9:53	1/21/2014 9:53	39	37.5	33	12.2	62	26.4		1793.4	205.17	7462.40
	1/21/2014	11:15	1/21/2014 11:15	38	37	32.5	12.2	66	26.2		2157.0	246.76	7709.16
	1/21/2014	12:18	1/21/2014 12:18	39	37	33	13.8	67	29.6		1757.1	201.01	7910.17
	1/21/2014	12:19	1/21/2014 12:19			26				Valve shut	29.6	3.39	7913.56
SW-12 Event 14	1/22/2014	8:33	1/22/2014 8:33	53	35	32	<2	40	0.0		0.0	0.00	7913.56
	1/22/2014	8:34	1/22/2014 8:34	53	37	33.8	<2	40	0.0		0.0	0.00	7913.56
	1/22/2014	9:02	1/22/2014 9:02	51	36	31	8	46	17.4		242.9	27.79	7941.35
	1/22/2014	9:03	1/22/2014 9:03	51	37.5	33	11	46	24.2		20.8	2.38	7943.72
	1/22/2014	9:54	1/22/2014 9:54	46	37	32	11.2	50	24.4		1240.5	141.91	8085.63
	1/22/2014	9:55	1/22/2014 9:55	46	38	33.2	14	50	30.8		27.6	3.16	8088.80
	1/22/2014	11:02	1/22/2014 11:02	44	37.5	33	14	55	30.5		2056.0	235.21	8324.01
	1/22/2014	12:08	1/22/2014 12:08		37	32.5	14.8	56	32.1		2066.6	236.41	8560.42
	1/22/2014	12:36	1/22/2014 12:36		37.5	32.5	14.8	57	32.2	Valve shut	900.2	102.99	8663.41
Note: a red value, i.e. 75 °F, indicates that value was interpolated from field data											Total CO_2 Mass (lbs):		8663.41

SW-13 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
SW-13 Event 1	11/21/2013	9:12	11/21/2013 9:12	57	28			64	0.0				
	11/21/2013	9:14	11/21/2013 9:14	59	32	34.5	<2	64	0.0		0.0	0.00	0.00
	11/21/2013	9:20	11/21/2013 9:20		31	31.5	4	65.5	8.1		24.2	2.77	2.77
	11/21/2013	9:21	11/21/2013 9:21		35	35	6	65.5	12.6		10.3	1.18	3.95
	11/21/2013	9:41	11/21/2013 9:41		35	34.5	9	67	18.9		315.5	36.09	40.04
	11/21/2013	10:14	11/21/2013 10:14		34	34	11	68	22.9		689.3	78.86	118.90
	11/21/2013	10:47	11/21/2013 10:47	50	34	32.5	13.0	70	27.0		822.1	94.05	212.95
	11/21/2013	10:48	11/21/2013 10:48		36	34	14.0	70	29.6		28.3	3.24	216.18
	11/21/2013	11:46	11/21/2013 11:46		36	33.5	15.5	70.0	32.8		1811.1	207.18	423.37
	11/21/2013	13:11	11/21/2013 13:11	45	35	33	16	72.0	33.5		2816.8	322.24	745.61
	11/21/2013	13:30	11/21/2013 13:30		35	33	16	72	33.5		635.8	72.74	818.35
	11/21/2013	13:31	11/21/2013 13:31							Valve shut	33.5	3.83	822.18
	11/21/2013	13:33	11/21/2013 13:33			21.5							822.18
SW-13 Event 2	12/10/2013	13:09	12/10/2013 13:09	50	30	34	5	76	9.9				822.18
	12/10/2013	14:02	12/10/2013 14:02	50	30	30.5	9	70	17.9		735.2	84.11	906.28
	12/10/2013	14:04	12/10/2013 14:04	50	35	32	11	70	23.1		40.9	4.68	910.97
	12/10/2013	14:32	12/10/2013 14:32	49	35	32	11.5	72	24.1		659.5	75.44	986.41
	12/10/2013	15:18	12/10/2013 15:18	47.5	35	31	13	72	27.2		1178.6	134.83	1121.24
	12/10/2013	15:43	12/10/2013 15:43	48	34	30.5	14	72	29.0		702.1	80.32	1201.56
	12/10/2013	16:22	12/10/2013 16:22	45	35	30	14.5	70	30.4		1157.7	132.44	1334.00
	12/10/2013	17:02	12/10/2013 17:02	45	35	30	15	68	31.5		1237.7	141.59	1475.59
	12/10/2013	17:03	12/10/2013 17:03							Valve shut	31.5	3.60	1479.19
	12/10/2013	17:04	12/10/2013 17:04										1479.19
SW-13 Event 3	12/19/2013	13:08	12/19/2013 13:08	50	34	34	3	73	6.2				1479.19
	12/19/2013	13:42	12/19/2013 13:42	45	32	32	11	74	22.2		483.7	55.33	1534.52
	12/19/2013	15:15	12/19/2013 15:15	40	31	32	14	71	28.1		2340.6	267.77	1802.29
	12/19/2013	16:27	12/19/2013 16:27	42	30	29.6	16	70	31.8		2155.0	246.53	2048.82
	12/19/2013	16:28	12/19/2013 16:28	40	34	32	20	70	41.5		36.6	4.19	2053.01
	12/19/2013	17:04	12/19/2013 17:04	50	35	33.2	20.5	66	43.1		1523.0	174.23	2227.24
	12/19/2013	17:06	12/19/2013 17:06							Valve shut	86.3	9.87	2237.11
	12/19/2013	17:07	12/19/2013 17:07										2237.11
SW-13 Event 4	1/8/2014	7:52	1/8/2014 7:52					34					2237.11
	1/8/2014	7:53	1/8/2014 7:53	42	31.5	33.4	3	34	6.3		0.0	0.00	2237.11
	1/8/2014	8:07	1/8/2014 8:07	59	32	33.4	4.5	36	9.5	System reset	110.2	12.61	2249.72
	1/8/2014	8:29	1/8/2014 8:29	52	32	33.2	8	42	16.7		287.8	32.93	2282.64
	1/8/2014	8:42	1/8/2014 8:42	49	32	33.2	9	42	18.8		230.8	26.40	2309.04
	1/8/2014	8:43	1/8/2014 8:43	49	33	34	10	42	21.1		20.0	2.28	2311.33
	1/8/2014	9:45	1/8/2014 9:45	46	33	33.2	11	50	23.0		1368.5	156.55	2467.88
	1/8/2014	10:36	1/8/2014 10:36	45	33	33.2	11	52	23.0		1173.4	134.24	2602.12
	1/8/2014	11:12	1/8/2014 11:12	45	33	32.8	12	56	25.0		863.3	98.76	2700.88
	1/8/2014	11:13	1/8/2014 11:13	45	34	33.6	14	56	29.4		27.2	3.11	2703.99
	1/8/2014	12:14	1/8/2014 12:14	43	33.5	33.2	14	58	29.2		1789.6	204.73	2908.72
	1/8/2014	12:15	1/8/2014 12:15							Valve shut	29.2	3.34	2912.07
	1/8/2014	12:16	1/8/2014 12:16			27.2							2912.07
SW-13 Event 5	1/11/2014	8:06	1/11/2014 8:06										2912.07
	1/11/2014	8:07	1/11/2014 8:07	49	36	33.5	<2	64	0.0		0.0	0.00	2912.07
	1/11/2014	8:12	1/11/2014 8:12	46	36	33	<2	64	0.0		0.0	0.00	2912.07
	1/11/2014	8:13	1/11/2014 8:13	46	38	34	3.5	64	7.6		3.8	0.43	2912.50
	1/11/2014	9:02	1/11/2014 9:02	42	36	33.5	6	66	12.8		498.7	57.05	2969.55
	1/11/2014	9:03	1/11/2014 9:03	42	38	34	8	66	17.3		15.0	1.72	2971.27
	1/11/2014	10:40	1/11/2014 10:40	39	36	33	10	69	21.2		1868.7	213.78	3185.05
	1/11/2014	10:41	1/11/2014 10:41	39	37	33.5	12	69	25.7		23.4	2.68	3187.73
	1/11/2014	11:37	1/11/2014 11:37	37	37	33	13	70	27.8		1497.4	171.30	3359.03

SW-13 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	1/11/2014	11:38	1/11/2014 11:38	37	37	33	14	70	29.9		28.9	3.30	3362.33
	1/11/2014	12:25	1/11/2014 12:25	46	40	34	20	70	44.0		1737.6	198.78	3561.11
	1/11/2014	12:26	1/11/2014 12:26							Valve shut	44.0	5.03	3566.15
	1/11/2014	12:27	1/11/2014 12:27			28							3566.15
SW-13 Event 6	1/13/2014	12:20	1/13/2014 12:20	48	31	28	<2	70	0.0		0.0	0.00	3566.15
	1/13/2014	12:21	1/13/2014 12:21	48	33	30.5	3.5	70	7.2		3.6	0.41	3566.56
	1/13/2014	12:22	1/13/2014 12:22	48	35	32.5	7	70	14.7		10.9	1.25	3567.81
	1/13/2014	12:24	1/13/2014 12:24	48	37.5	33	8.5	70	18.3		32.9	3.77	3571.57
	1/13/2014	14:26	1/13/2014 14:26	40	36	32.5	10	70	21.2		2405.4	275.17	3846.75
	1/13/2014	14:28	1/13/2014 14:28	40	37	33	12.2	70	26.1		47.3	5.41	3852.16
	1/13/2014	15:46	1/13/2014 15:46	38	37	32.8	12.2	66	26.2		2038.6	233.22	4085.37
	1/13/2014	16:44	1/13/2014 16:44	38	37	32.2	14	66	30.1		1630.9	186.58	4271.95
	1/13/2014	17:00	1/13/2014 17:00	42	37	32.2	15	66	32.2		498.0	56.97	4328.92
	1/13/2014	17:02	1/13/2014 17:02							valve shut	64.4	7.37	4336.29
	1/13/2014	17:04	1/13/2014 17:04			26							4336.29
SW-13 Event 7	1/14/2014	12:17	1/14/2014 12:17	43	27	29.2	<2	63	0.0				4336.29
	1/14/2014	12:19	1/14/2014 12:19	43	31	31	8	63	16.2		16.2	1.85	4338.14
	1/14/2014	12:21	1/14/2014 12:21	43	32	32.6	12	65	24.5		40.7	4.65	4342.79
	1/14/2014	13:03	1/14/2014 13:03	46	31	31.4	16	67	32.2		1190.9	136.24	4479.04
	1/14/2014	13:04	1/14/2014 13:04	46	33	31.4	18	67	37.1		34.6	3.96	4483.00
	1/14/2014	13:06	1/14/2014 13:06	46	34	32.5	20.2	67	42.0		79.1	9.05	4492.04
	1/14/2014	15:50	1/14/2014 15:50	45	36	33.4	18	70	38.1		6570.3	751.64	5243.69
	1/14/2014	16:22	1/14/2014 16:22	44	36	33.4	19	70	40.2		1253.2	143.37	5387.06
	1/14/2014	16:23	1/14/2014 16:23			27.6				Valve shut	40.2	4.60	5391.66
SW-13 Event 8	1/15/2014	12:18	1/15/2014 12:18	45	27.5	26	<2	69	0.0		0.0	0.00	5391.66
	1/15/2014	12:19	1/15/2014 12:19	45	34	30	8.5	69	17.6		8.8	1.01	5392.67
	1/15/2014	12:21	1/15/2014 12:21	45	36	32	12	69	25.4		43.1	4.93	5397.60
	1/15/2014	13:45	1/15/2014 13:45	47	35	30.5	15.2	64	32.0		2413.8	276.14	5673.74
	1/15/2014	13:46	1/15/2014 13:46	47	37.5	32	18.2	64	39.3		35.7	4.08	5677.82
	1/15/2014	15:34	1/15/2014 15:34	45	37.5	32	18.2	67	39.2		4242.1	485.29	6163.11
	1/15/2014	16:31	1/15/2014 16:31	48	37	31.2	19	65	40.8		2281.3	260.98	6424.09
	1/15/2014	16:32	1/15/2014 16:32							Valve shut	40.8	4.67	6428.76
	1/15/2014	16:33	1/15/2014 16:33			25							6428.76
SW-13 Event 9	1/16/2014	12:21	1/16/2014 12:21	45	28	29.6	<2	60	0.0		0.0	0.00	6428.76
	1/16/2014	12:22	1/16/2014 12:22	45	31	32.2	9.8	60	19.9		9.9	1.14	6429.90
	1/16/2014	12:24	1/16/2014 12:24	45	32	32.4	12	60	24.6		44.5	5.09	6434.98
	1/16/2014	12:25	1/16/2014 12:25	45	34	33.6	15	60	31.4		28.0	3.20	6438.19
	1/16/2014	13:07	1/16/2014 13:07	45	34	32.8	17	60	35.6		1407.7	161.04	6599.23
	1/16/2014	14:43	1/16/2014 14:43	46	34	32.8	17.5	61	36.6		3467.1	396.64	6995.87
	1/16/2014	15:47	1/16/2014 15:47	48	34	32.8	17	61	35.6		2310.3	264.30	7260.17
	1/16/2014	16:22	1/16/2014 16:22	43	34	32.8	17	61	35.6		1245.1	142.44	7402.61
	1/16/2014	16:23	1/16/2014 16:23			28				Valve shut	35.6	4.07	7406.68
SW-13 Event 10	1/17/2014	12:18	1/17/2014 12:18	45	26.5	27.6	6	70	11.4				7406.68
	1/17/2014	12:19	1/17/2014 12:19	45	32	32	12.2	70	24.8		18.1	2.07	7408.75
	1/17/2014	12:20	1/17/2014 12:20	45	33	32.6	15.7	70	32.2		28.5	3.26	7412.01
	1/17/2014	12:51	1/17/2014 12:51	43	33	32.2	16.5	68	33.9		1025.4	117.30	7529.31
	1/17/2014	12:53	1/17/2014 12:53	43	34.5	32.8	18	68	37.6		71.5	8.18	7537.49
	1/17/2014	14:07	1/17/2014 14:07	42	35	33.6	17	67	35.7		2713.3	310.40	7847.90
	1/17/2014	14:39	1/17/2014 14:39	45	36	33.8	17	67	36.1		1149.2	131.47	7979.37
	1/17/2014	16:09	1/17/2014 16:09	55	35	33.6	17.8	67	37.4		3307.8	378.42	8357.78
	1/17/2014	16:10	1/17/2014 16:10							Valve shut	37.4	4.28	8362.06
	1/17/2014	16:11	1/17/2014 16:11			29.2							8362.06

SW-13 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)	Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
Note: a red value, i.e. 75 °F, indicates that value was interpolated from field data										Total CO_2 Mass (lbs):		8362.06

SW-14 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
SW-14 Event 1	11/21/2013	9:15	11/21/2013 9:15	55	28			65	0.0				
	11/21/2013	9:19	11/21/2013 9:19		32	32	<2	64	0.0		0.0	0.00	0.00
	11/21/2013	9:37	11/21/2013 9:37		30	30	6.5	66	13.0		116.6	13.34	13.34
	11/21/2013	9:38	11/21/2013 9:38		34	33	10	67	20.8		16.9	1.93	15.27
	11/21/2013	10:07	11/21/2013 10:07		34	32	15	68	31.2		753.6	86.22	101.49
	11/21/2013	10:43	11/21/2013 10:43	50	32	31	16	70	32.5		1145.9	131.09	232.58
	11/21/2013	11:48	11/21/2013 11:48		34	30	17.0	71	35.2		2200.6	251.75	484.33
	11/21/2013	11:53	11/21/2013 11:53		39	33	21.0	71	45.7		202.4	23.15	507.48
	11/21/2013	13:06	11/21/2013 13:06	45	38	33	22	72	47.4		3399.4	388.89	896.38
	11/21/2013	13:29	11/21/2013 13:29		38	33	22	72	47.4		1090.3	124.73	1021.11
	11/21/2013	13:30	11/21/2013 13:30							Valve shut	47.4	5.42	1026.53
	11/21/2013	13:32	11/21/2013 13:32										1026.53
SW-14 Event 2	12/11/2013	9:19	12/11/2013 9:19	51	32.5	33	4.5	62	9.3				1026.53
	12/11/2013	9:48	12/11/2013 9:48	50	31	30.4	10	67	20.1		426.3	48.77	1075.30
	12/11/2013	9:50	12/11/2013 9:50	50	31	30.4	11.5	67	23.2		43.3	4.95	1080.25
	12/11/2013	10:25	12/11/2013 10:25	50	31	30	12	67	24.2		828.3	94.76	1175.01
	12/11/2013	11:01	12/11/2013 11:01	50	31	29.6	13.5	70	27.1		923.1	105.60	1280.61
	12/11/2013	11:32	12/11/2013 11:32	50	31	30	14	71	28.1		855.6	97.88	1378.49
	12/11/2013	11:33	12/11/2013 11:33	50	31	30.4	**16**	71	32.1		30.1	3.44	1381.93
	12/11/2013	12:17	12/11/2013 12:17	46	31	30.4	16	70	32.1		1413.1	161.66	1543.59
	12/11/2013	13:53	12/11/2013 13:53	45	36	30.4	16	66	34.0		3174.6	363.17	1906.76
	12/11/2013	13:54	12/11/2013 13:54							Valve shut	34.0	3.89	1910.65
	12/11/2013	13:55	12/11/2013 13:55										1910.65
SW-14 Event 3	12/19/2013	13:04	12/19/2013 13:04	50	34	31.5	<2	72	0.0				1910.65
	12/19/2013	13:40	12/19/2013 13:40	45	30	26	13.5	74	26.7		480.7	54.99	1965.64
	12/19/2013	13:41	12/19/2013 13:41	45	32.5	29	17	74	34.6		30.6	3.50	1969.15
	12/19/2013	13:43	12/19/2013 13:43	45	35	30	19.5	74	40.7		75.3	8.61	1977.76
	12/19/2013	15:17	12/19/2013 15:17	40	33	30.4	24.3	71	49.8		4254.9	486.76	2464.52
	12/19/2013	15:19	12/19/2013 15:19							Valve shut	99.6	11.40	2475.92
SW-14 Event 4	1/8/2014	12:18	1/8/2014 12:18					58.0					2475.92
	1/8/2014	12:19	1/8/2014 12:19	45	29.5	28	11	58.0	22.0		0.0	0.00	2475.92
	1/8/2014	12:21	1/8/2014 12:21	45	33	30	20	58.0	41.5		63.5	7.27	2483.18
	1/8/2014	12:36	1/8/2014 12:36	48	32.5	28.4	26	58.0	53.7		714.4	81.72	2564.91
	1/8/2014	12:37	1/8/2014 12:37	49	34	29.4	28	58.0	58.8		56.2	6.43	2571.34
	1/8/2014	13:18	1/8/2014 13:18	52	33	28	30	56.0	62.4		2484.7	284.25	2855.59
	1/8/2014	14:04	1/8/2014 14:04	50	32.5	27.2	31	55.0	64.2		2913.4	333.29	3188.88
	1/8/2014	15:20	1/8/2014 15:20	48	32.5	26.6	32	54.0	66.4		4963.1	567.78	3756.66
	1/8/2014	16:33	1/8/2014 16:33	46	32	26	32	53.0	66.1		4834.6	553.08	4309.74
	1/8/2014	16:44	1/8/2014 16:44	46	32	26	32	52.0	66.1		727.3	83.20	4392.94
	1/8/2014	16:45	1/8/2014 16:45							Valve shut	66.1	7.57	4400.51
	1/8/2014	16:46	1/8/2014 16:46			19.6							4400.51
SW-14 Event 5	1/11/2014	8:09	1/11/2014 8:09										4400.51
	1/11/2014	8:10	1/11/2014 8:10	48	31.5	30.4	14	64	28.4		28.4	3.25	4403.76
	1/11/2014	8:14	1/11/2014 8:14	45	32.5	30.4	21.5	64	44.2		145.2	16.61	4420.37
	1/11/2014	9:05	1/11/2014 9:05	42	31	27.6	24.5	66	49.4		2385.4	272.89	4693.26
	1/11/2014	9:06	1/11/2014 9:06	40	34	29.2	28	66	58.3		53.8	6.16	4699.42
	1/11/2014	10:42	1/11/2014 10:42	39	31.5	27	28	69	56.6		5515.3	630.95	5330.37
	1/11/2014	11:40	1/11/2014 11:40	37	31	26.2	28	70	56.2		3272.0	374.32	5704.68
	1/11/2014	12:28	1/11/2014 12:28	46	36	28.4	29	70	61.4		2822.9	322.94	6027.63
	1/11/2014	12:29	1/11/2014 12:29							Valve shut	61.4	7.02	6034.65
	1/11/2014	12:30	1/11/2014 12:30			19							6034.65
SW-14 Event 6	1/23/2014	7:58	1/23/2014 7:58	55	32.5	31	8	34	16.9				6034.65
	1/23/2014	8:02	1/23/2014 8:02	55	32.5	31	18.3	34	38.8		111.4	12.74	6047.39

SW-14 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	1/23/2014	8:17	1/23/2014 8:17	52	30	30	20.3	44	41.4		601.0	68.75	6116.14
	1/23/2014	8:55	1/23/2014 8:55	49	30	22.5	21.2	50	42.9		1602.1	183.29	6299.43
	1/23/2014	9:35	1/23/2014 9:35	46	29.5	22	21.2	50	42.7		1713.0	195.96	6495.39
	1/23/2014	9:36	1/23/2014 9:36	46	30	23.5	24.8	50	50.2		46.5	5.32	6500.71
	1/23/2014	10:05	1/23/2014 10:05	45	30	23	24.8	50	50.2		1456.9	166.67	6667.38
	1/23/2014	11:15	1/23/2014 11:15	42	30	22.5	25.8	52	52.2		3583.9	410.00	7077.38
	1/23/2014	12:03	1/23/2014 12:03	41	30	22.2	25.9	54	52.3		2506.0	286.68	7364.07
	1/23/2014	12:06	1/23/2014 12:06							Valve shut	156.8	17.93	7382.00
	1/23/2014	12:07	1/23/2014 12:07			17							7382.00
SW-14 Event 7	1/24/2014	7:52	1/24/2014 7:52	52	32	32.4	10	39	21.0				7382.00
	1/24/2014	7:53	1/24/2014 7:53	52	29	30.4	16	39	32.4		26.7	3.05	7385.05
	1/24/2014	7:54	1/24/2014 7:54	51	32	31.2	23.7	39	49.7		41.0	4.69	7389.75
	1/24/2014	7:57	1/24/2014 7:57	55	32	30	24.5	40	51.3		151.4	17.32	7407.06
	1/24/2014	8:12	1/24/2014 8:12	51	31	28.6	25.8	45	53.1		783.0	89.58	7496.64
	1/24/2014	8:33	1/24/2014 8:33	50	31	28.6	25.9	46	53.3		1117.3	127.82	7624.46
	1/24/2014	8:59	1/24/2014 8:59	50	31	28.4	25.9	46	53.3		1385.3	158.47	7782.93
	1/24/2014	9:44	1/24/2014 9:44	49	30.5	28	26	48	53.1		2393.0	273.76	8056.69
	1/24/2014	10:47	1/24/2014 10:47	49	30.2	27.4	26.5	51	53.8		3365.1	384.96	8441.66
	1/24/2014	11:49	1/24/2014 11:49	49	30.2	26	27	55	54.5		3357.1	384.05	8825.71
	1/24/2014	11:53	1/24/2014 11:53			20					218.2	24.96	8850.67
SW-14 Event 8	1/28/2014	11:27	1/28/2014 11:27										8850.67
	1/28/2014	11:28	1/28/2014 11:28	52	33	29	9.5	54	19.8		19.8	2.27	8852.93
	1/28/2014	11:30	1/28/2014 11:30	50	35	27.5	20	53	42.6		62.4	7.14	8860.08
	1/28/2014	11:45	1/28/2014 11:45	50	34	25	24	53	50.6		699.5	80.02	8940.10
	1/28/2014	11:46	1/28/2014 11:46	50	35	5	26.5	53	56.5		53.6	6.13	8946.22
	1/28/2014	13:20	1/28/2014 13:20	48	38	27	28	51	61.6		5550.8	635.01	9581.24
	1/28/2014	14:20	1/28/2014 14:20	48	38	26	28	51	61.6		3697.0	422.94	10004.18
	1/28/2014	15:45	1/28/2014 15:45	48	38	24.5	29.5	51	64.9		5377.7	615.21	10619.39
	1/28/2014	16:40	1/28/2014 16:40	51	37.5	24	30	51	65.7		3592.0	410.92	11030.31
	1/28/2014	16:42	1/28/2014 16:42			18				Valve shut	131.4	15.03	11045.34
SW-14 Event 9	2/4/2014	9:42	2/4/2014 9:42	55	32	33	<2	60	0.0				11045.34
	2/4/2014	10:01	2/4/2014 10:01	53	30.5	31.4	6	60	12.1		115.0	13.15	11058.49
	2/4/2014	10:05	2/4/2014 10:05	53	32	32.2	10	60	20.5		65.2	7.46	11065.95
	2/4/2014	11:43	2/4/2014 11:43	50	30	29	16.8	64	33.6		2649.2	303.06	11369.02
	2/4/2014	11:45	2/4/2014 11:45	50	32.5	30.6	19.9	64	40.9		74.4	8.51	11377.53
	2/4/2014	12:40	2/4/2014 12:40	50	32.5	30.4	20.8	64	42.7		2298.4	262.94	11640.47
	2/4/2014	12:44	2/4/2014 12:44	49	33.5	31.2	21.9	64	45.5		176.3	20.17	11660.64
	2/4/2014	13:23	2/4/2014 13:23	49	33.5	31.2	21.9	60	45.6		1776.2	203.20	11863.84
	2/4/2014	14:25	2/4/2014 14:25	48	33	30.8	22.5	60	46.6		2860.4	327.23	12191.08
	2/4/2014	14:47	2/4/2014 14:47	48	33	30.6	23	62	47.6		1036.4	118.56	12309.64
	2/4/2014	15:37	2/4/2014 15:37	47	33	30.2	23	62	47.6		2378.9	272.15	12581.79
	2/4/2014	16:32	2/4/2014 16:32	46	33	29.8	24	60	49.7		2676.4	306.19	12887.97
	2/4/2014	17:45	2/4/2014 17:45	53	32	29.4	25	60	51.3		3686.9	421.78	13309.75
	2/4/2014	17:47	2/4/2014 17:47			21				Valve shut	102.5	11.73	13321.48
SW-14 Event 10	2/6/2014	8:10	2/6/2014 8:10	54	33	31	<2	50	0.0				13321.48
	2/6/2014	8:40	2/6/2014 8:40	54	30	28	<2	54	0.0		0.0	0.00	13321.48
	2/6/2014	8:43	2/6/2014 8:43	50	33.5	30.5	15.5	54	32.5		48.7	5.58	13327.06
	2/6/2014	10:37	2/6/2014 10:37	47	31.5	27	23.2	60	47.3		4549.1	520.41	13847.47
	2/6/2014	11:09	2/6/2014 11:09	46	31	26.5	23.8	61	48.2		1528.6	174.87	14022.34
	2/6/2014	12:11	2/6/2014 12:11	45	30	25.5	25	62	50.0		3046.0	348.47	14370.81
	2/6/2014	14:11	2/6/2014 14:11	42	30	24.5	26	63	52.0		6121.5	700.30	15071.11
	2/6/2014	15:22	2/6/2014 15:22	43	30	24	26.3	60	52.7		3718.0	425.34	15496.45
	2/6/2014	16:37	2/6/2014 16:37	43	29.5	23.5	27	58	53.9		4000.9	457.71	15954.16

SW-14 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	2/6/2014	17:20	2/6/2014 17:20	47	29.5	23.5	27	58	53.9		2319.7	265.38	16219.53
	2/6/2014	17:21	2/6/2014 17:21			19				Valve shut	53.9	6.17	16225.71
Note: a red value, i.e. 75 °F, indicates that value was interpolated from field data											Total CO_2 Mass (lbs):		16225.71

SW-15 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
SW-15 Event 1	11/21/2013	10:27	11/21/2013 10:27	49	28			70	0.0				
	11/21/2013	10:29	11/21/2013 10:29		30.5	30.5	<2	70	0.0		0.0	0.00	0.00
	11/21/2013	10:30	11/21/2013 10:30		33	33	<2	70	0.0		0.0	0.00	0.00
	11/21/2013	10:50	11/21/2013 10:50		32	32	<2	73	0.0		0.0	0.00	0.00
	11/21/2013	10:51	11/21/2013 10:51		34	34	2	73	4.1		2.1	0.24	0.24
	11/21/2013	11:56	11/21/2013 11:56		34	33.5	3	76	6.2		335.5	38.38	38.61
	11/21/2013	13:21	11/21/2013 13:21		34	33.5	4.0	77	8.2		613.1	70.14	108.75
	11/21/2013	17:23	11/21/2013 17:23		34	32.5	6.0	77	12.4		2492.6	285.16	393.91
	11/21/2013	17:25	11/21/2013 17:25							Valve shut	24.7	2.83	396.74
	11/21/2013	17:26	11/21/2013 17:26										396.74
SW-15 Event 2	12/12/2013	9:05	12/12/2013 9:05	52.5	30	30	<2	62	0.0				396.74
	12/12/2013	9:52	12/12/2013 9:52	50	30	30	<2	67	0.0				396.74
	12/12/2013	9:53	12/12/2013 9:53	50	32	32	4	67	8.1		4.1	0.47	397.21
	12/12/2013	10:46	12/12/2013 10:46	49	32	32	5	68	10.2		485.4	55.53	452.74
	12/12/2013	11:40	12/12/2013 11:40	45	32	31	6.5	70	13.2		631.0	72.18	524.92
	12/12/2013	11:41	12/12/2013 11:41	45	32.5	32.5	9.5	70	19.4		16.3	1.86	526.79
	12/12/2013	13:08	12/12/2013 13:08	45	32.5	32.5	9.5	70	19.4		1687.2	193.02	719.81
	12/12/2013	13:09	12/12/2013 13:09							Valve shut	19.4	2.22	722.02
	12/12/2013	13:10	12/12/2013 13:10										722.02
SW-15 Event 3	12/13/2013	8:57	12/13/2013 8:57	50	30	31	<2	66	0.0				722.02
	12/13/2013	9:46	12/13/2013 9:46	48	32	31	<2	68	0.0				722.02
	12/13/2013	10:42	12/13/2013 10:42	48	30	30.5	<2	70	0.0				722.02
	12/13/2013	10:43	12/13/2013 10:43	45	32	32.5	5	70	10.2		5.1	0.58	722.60
	12/13/2013	12:39	12/13/2013 12:39	45	32	32	5	70	10.2		1177.6	134.72	857.33
	12/13/2013	13:45	12/13/2013 13:45	45	32	32	5	70	10.2		670.0	76.65	933.98
	12/13/2013	14:53	12/13/2013 14:53	45	32	32	5.5	70	11.2		724.9	82.92	1016.90
	12/13/2013	14:54	12/13/2013 14:54							Valve shut	11.2	1.28	1018.18
	12/13/2013	14:55	12/13/2013 14:55			26							1018.18
SW-15 Event 4	12/16/2013	8:41	12/16/2013 8:41	45	32	33	<2	50	0.0		0.0	0.00	1018.18
	12/16/2013	9:25	12/16/2013 9:25	48	30	32	3	58.0	6.0		132.6	15.17	1033.35
	12/16/2013	10:17	12/16/2013 10:17	48	30	31	4	56.0	8.1		366.1	41.89	1075.24
	12/16/2013	11:20	12/16/2013 11:20	45	29	31	5	70	9.8		562.9	64.40	1139.64
	12/16/2013	13:24	12/16/2013 13:24	50	28	30	6	68	11.7		1331.8	152.35	1291.99
	12/16/2013	13:25	12/16/2013 13:25							Valve shut	11.7	1.33	1293.32
	12/16/2013	13:26	12/16/2013 13:26			25							1293.32
	12/16/2013	14:51	12/16/2013 14:51	45	28	28	10	70	19.4	Start	1649.2	188.67	1482.00
	12/16/2013	15:20	12/16/2013 15:20	45	28	30	8	69	15.5		506.6	57.96	1539.95
	12/16/2013	15:24	12/16/2013 15:24	45	32	32	9	69	18.3		67.7	7.74	1547.69
	12/16/2013	16:13	12/16/2013 16:13	45	32	33	9	68	18.3		896.7	102.59	1650.28
	12/16/2013	22:16	12/16/2013 22:16	50	32	32.5	10	58	20.5		7052.4	806.80	2457.08
	12/17/2013	8:56	12/17/2013 8:56	45	31	31	12	64	24.2		14332.2	1639.60	4096.68
	12/17/2013	10:51	12/17/2013 10:51	41	32	30.5	12	68	24.4		2797.6	320.05	4416.73
	12/17/2013	13:39	12/17/2013 13:39	45	31	31	13.5	69	27.1		4330.2	495.38	4912.11
	12/17/2013	14:32	12/17/2013 14:32	45	31	31	13.5	70	27.1		1437.6	164.46	5076.57
	12/17/2013	15:56	12/17/2013 15:56	45	30	31	14	69	27.8		2307.5	263.97	5340.54
	12/17/2013	16:10	12/17/2013 16:10							Valve shut	389.6	44.57	5385.11
	12/17/2013	16:11	12/17/2013 16:11			25							5385.11
SW-15 Event 5	12/19/2013	12:46	12/19/2013 12:46	50	30	32	<2	71	0.0				5385.11
	12/19/2013	13:14	12/19/2013 13:14	50	30	31	6	72	11.9		166.5	19.05	5404.16
	12/19/2013	13:15	12/19/2013 13:15	49	32	33	8.5	72	17.2		14.6	1.67	5405.82
	12/19/2013	15:59	12/19/2013 15:59	45	32	32	10	71	20.3		3075.8	351.87	5757.69
	12/19/2013	16:56	12/19/2013 16:56	44	32	32	11	67	22.4		1216.5	139.17	5896.86
	12/19/2013	22:22	12/19/2013 22:22	50	40	31	12	60	26.7		7998.2	914.99	6811.85

SW-15 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	12/20/2013	7:38	12/20/2013 7:38	50	30	30	14	59	28.1		15226.9	1741.96	8553.81
	12/20/2013	8:38	12/20/2013 8:38	44	30	30	14	64	28.0		1682.1	192.43	8746.25
	12/20/2013	9:12	12/20/2013 9:12							Valve shut	950.8	108.78	8855.02
	12/20/2013	9:13	12/20/2013 9:13										8855.02

Note: a red value, i.e. 75 °F, indicates that value was interpolated from field data

Total CO_2 Mass (lbs): 8855.02

SW-16 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
SW-16 Event 1	11/23/2013	8:16	11/23/2013 8:16	50	28			70	0.0				
	11/23/2013	8:18	11/23/2013 8:18	54	30	33	<2	70	0.0		0.0	0.00	0.00
	11/23/2013	8:22	11/23/2013 8:22	54	31	33	<2	70	0.0		0.0	0.00	0.00
	11/23/2013	8:35	11/23/2013 8:35		31	32	<2	72.5	0.0		0.0	0.00	0.00
	11/23/2013	8:38	11/23/2013 8:38		33	35	<2	75	0.0		0.0	0.00	0.00
	11/23/2013	9:23	11/23/2013 9:23		33	34.5	3	80	6.1		137.2	15.70	15.70
	11/23/2013	10:21	11/23/2013 10:21		32	34	4.0	84	8.0		409.2	46.81	62.51
	11/23/2013	10:22	11/23/2013 10:22		34	36	6.0	84	12.3		10.1	1.16	63.67
	11/23/2013	11:26	11/23/2013 11:26		34	36	6	83	12.3		786.1	89.93	153.60
	11/23/2013	11:29	11/23/2013 11:29		36	37.5	6.5	83	13.6		38.8	4.44	158.04
	11/23/2013	12:38	11/23/2013 12:38	50	36	37.5	6.5	82	13.6		938.0	107.31	265.35
	11/23/2013	12:55	11/23/2013 12:55		36	37.5	6.5	82	13.6		231.2	26.45	291.80
	11/23/2013	12:57	11/23/2013 12:57							Valve shut	27.2	3.11	294.92
	11/23/2013	12:58	11/23/2013 12:58			31							294.92
SW-16 Event 2	11/25/2013	10:35	11/25/2013 10:35	48	24			66					294.92
	11/25/2013	10:40	11/25/2013 10:40	55	28	28.4	<2	68	0.0		0.0	0.00	294.92
	11/25/2013	10:43	11/25/2013 10:43	55	32	32.8	<2	68	0.0		0.0	0.00	294.92
	11/25/2013	11:03	11/25/2013 11:03		35	37.2	4	64	8.4		84.3	9.65	304.56
	11/25/2013	11:30	11/25/2013 11:30	54	35	37.2	3.5	63	7.4		213.5	24.43	328.99
	11/25/2013	12:12	11/25/2013 12:12		35	36.8	4	68	8.4		331.5	37.92	366.91
	11/25/2013	12:48	11/25/2013 12:48	54	35	36.4	5	67	10.5		340.3	38.94	405.85
	11/25/2013	13:56	11/25/2013 13:56	54	35	36	5.5	68	11.5		750.0	85.80	491.64
	11/25/2013	15:12	11/25/2013 15:12	54	36	36	6	67	12.7		922.9	105.58	597.23
	11/25/2013	16:02	11/25/2013 16:02		37	36	7.5	64	16.1		721.8	82.57	679.80
	11/25/2013	16:03	11/25/2013 16:03							Valve shut	16.1	1.85	681.64
	11/25/2013	16:04	11/25/2013 16:04			28.4							681.64
SW-16 Event 3	12/6/2013	8:42	12/6/2013 8:42	51	34	33.5	<2	76	0.0				681.64
	12/6/2013	9:20	12/6/2013 9:20	47	34	33	<2	82	0.0				681.64
	12/6/2013	9:21	12/6/2013 9:21	47	34	34.5	3	82	6.2		3.1	0.35	682.00
	12/6/2013	10:31	12/6/2013 10:31	45	34	34.5	3	84	6.1		430.1	49.21	731.20
	12/6/2013	11:25	12/6/2013 11:25	44	34	34.5	3	85	6.1		331.3	37.90	769.11
	12/6/2013	13:11	12/6/2013 13:11	49	34	34.5	4	82	8.2		759.7	86.91	856.01
	12/6/2013	13:12	12/6/2013 13:12							Valve shut	8.2	0.94	856.95
	12/6/2013	13:13	12/6/2013 13:13			28.5							856.95
SW-16 Event 4	12/11/2013	9:04	12/11/2013 9:04	52	32	31	<2	66	0.0				856.95
	12/11/2013	9:34	12/11/2013 9:34	52.5	31	31	<2	70	0.0				856.95
	12/11/2013	9:36	12/11/2013 9:36	52.5	32	32	<2	70	0.0				856.95
	12/11/2013	10:05	12/11/2013 10:05	51	32	32	<2	70	0.0				856.95
	12/11/2013	11:09	12/11/2013 11:09	51	32	32	<2	74	0.0				856.95
	12/11/2013	11:16	12/11/2013 11:16	50	32	32.5	3.5	74	7.1		24.8	2.83	859.79
	12/11/2013	11:17	12/11/2013 11:17	50	34	34	4	74	8.3		7.7	0.88	860.66
	12/11/2013	11:48	12/11/2013 11:48	50	34	34	4	72	8.3		256.4	29.34	890.00
	12/11/2013	12:37	12/11/2013 12:37	50	34	34	4.5	70	9.3		431.5	49.37	939.37
	12/11/2013	13:36	12/11/2013 13:36							Valve shut	550.7	63.00	1002.37
	12/11/2013	13:37	12/11/2013 13:37			28							1002.37
SW-16 Event 5	12/11/2013	17:36	12/11/2013 17:36		32	34	<2	62					1002.37
	12/11/2013	22:14	12/11/2013 22:14		32	34	<2	62	0.0				1002.37
	12/12/2013	8:06	12/12/2013 8:06		32	32.5	4	58	8.2		2432.7	278.31	1280.67
	12/12/2013	9:05	12/12/2013 9:05			25				Valve shut	484.9	55.47	1336.14
	12/12/2013	9:07	12/12/2013 9:07										1336.14
SW-16 Event 6	12/19/2013	9:14	12/19/2013 9:14	45	37	34	<2	64	0.0				1336.14
	12/19/2013	9:50	12/19/2013 9:50	45	34	32	4	68	8.3		149.6	17.12	1353.26
	12/19/2013	9:52	12/19/2013 9:52	41	34	34	7	68	14.5		22.9	2.62	1355.88

SW-16 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	12/19/2013	11:39	12/19/2013 11:39	44	34	32.5	7	72	14.5		1553.5	177.72	1533.60
	12/19/2013	11:40	12/19/2013 11:40	44	35	34.5	9.5	72	19.9		17.2	1.97	1535.56
	12/19/2013	13:12	12/19/2013 13:12	49	37.5	35.5	10	72	21.4		1900.4	217.41	1752.97
	12/19/2013	13:13	12/19/2013 13:13	49	35	34	5.5	72	11.5		16.5	1.88	1754.85
	12/19/2013	15:58	12/19/2013 15:58	45	34	33	9	71	18.6		2487.6	284.58	2039.43
	12/19/2013	16:55	12/19/2013 16:55	44	34	33	9	67	18.7		1065.1	121.84	2161.27
	12/19/2013	22:20	12/19/2013 22:20	50	34	32	12	60	25.1		7127.1	815.34	2976.61
	12/20/2013	7:37	12/20/2013 7:37	50	34	30	14	59	29.4		15176.3	1736.16	4712.78
	12/20/2013	7:38	12/20/2013 7:38							Valve shut	29.4	3.36	4716.14
	12/20/2013	7:39	12/20/2013 7:39			24							4716.14
SW-16 Event 7	1/7/2014	9:17	1/7/2014 9:17					40					4716.14
	1/7/2014	9:18	1/7/2014 9:18	55	31.5	32.5	<2	40	0.0				4716.14
	1/7/2014	9:25	1/7/2014 9:25	54	32.5	30	4.5	40	9.5		33.1	3.79	4719.93
	1/7/2014	9:57	1/7/2014 9:57	53	32	33	4	43	8.3		285.0	32.61	4752.54
	1/7/2014	10:45	1/7/2014 10:45	51	32	33	4	46	8.3		400.0	45.76	4798.29
	1/7/2014	11:46	1/7/2014 11:46	50	32	33	4	48	8.3		507.0	58.00	4856.29
	1/7/2014	13:19	1/7/2014 13:19	50	31.5	33	4	50	8.2		769.2	88.00	4944.29
	1/7/2014	14:09	1/7/2014 14:09	50	31.5	33	4.5	50	9.3		437.8	50.08	4994.37
	1/7/2014	15:23	1/7/2014 15:23	50	31.5	32.5	5	53	10.3		723.0	82.71	5077.08
	1/7/2014	15:24	1/7/2014 15:24	50	33.5	34	8	53	16.8		13.5	1.55	5078.62
	1/7/2014	16:42	1/7/2014 16:42	49	34	34	8	48	17.0		1316.3	150.59	5229.21
	1/7/2014	17:22	1/7/2014 17:22	50	34	34	8	45	17.0		679.6	77.74	5306.95
	1/7/2014	17:23	1/7/2014 17:23							Valve shut	17.0	1.95	5308.90
	1/7/2014	17:24	1/7/2014 17:24			29							5308.90
SW-16 Event 8	1/13/2014	12:04	1/13/2014 12:04						0.0		0.0	0.00	5308.90
	1/13/2014	12:05	1/13/2014 12:05	50	34.5	34	9	72	18.7		9.4	1.07	5309.97
	1/13/2014	12:15	1/13/2014 12:15	49	34	34	6	71	12.4		155.8	17.82	5327.79
	1/13/2014	12:44	1/13/2014 12:44	46	33	33	8	70	16.4		418.3	47.86	5375.65
	1/13/2014	12:45	1/13/2014 12:45	46	34.5	34.5	10	70	20.8		18.6	2.13	5377.78
	1/13/2014	13:48	1/13/2014 13:48	45	34	34.5	10	68	20.8		1311.4	150.02	5527.80
	1/13/2014	14:44	1/13/2014 14:44	44	34	34	10.5	68	21.8		1192.9	136.47	5664.27
	1/13/2014	16:03	1/13/2014 16:03	42	34	34	10.5	67	21.8		1724.7	197.31	5861.58
	1/13/2014	17:08	1/13/2014 17:08	51	35	34.5	11.5	66	24.2		1496.2	171.17	6032.74
	1/13/2014	21:45	1/13/2014 21:45	50	34.5	34	12	64	25.2		6836.7	782.12	6814.86
	1/14/2014	7:45	1/14/2014 7:45	50	33	32.5	15.5	63	32.0		17159.8	1963.08	8777.94
	1/14/2014	7:46	1/14/2014 7:46							Valve shut	32.0	3.66	8781.60
	1/14/2014	7:47	1/14/2014 7:47			28							8781.60
SW-16 Event 9	1/15/2014	9:22	1/15/2014 9:22	49	25	25	6	62	11.3		0.0	0.00	8781.60
	1/15/2014	9:23	1/15/2014 9:23	49	33	31	12	62	24.8		18.1	2.07	8783.67
	1/15/2014	9:29	1/15/2014 9:29	46	32	30	14	62	28.7		160.4	18.35	8802.02
	1/15/2014	9:30	1/15/2014 9:30	46	34	31.5	16.5	62	34.5		31.6	3.61	8805.64
	1/15/2014	10:12	1/15/2014 10:12	44	33	31	16.5	68	33.9		1436.9	164.38	8970.02
	1/15/2014	11:31	1/15/2014 11:31	42	33	30.5	17	68	35.0		2721.1	311.30	9281.32
	1/15/2014	11:32	1/15/2014 11:32	42	34.5	33.5	17.8	68	37.2		36.1	4.13	9285.44
	1/15/2014	12:42	1/15/2014 12:42	43	37	33.2	20.2	66	43.4		2819.0	322.50	9607.94
	1/15/2014	12:44	1/15/2014 12:44							Valve shut	86.7	9.92	9617.86
	1/15/2014	12:51	1/15/2014 12:51			24							9617.86
Note: a red value, i.e. 75 °F, indicates that value was interpolated from field data											Total CO_2 Mass (lbs):		9617.86

SW-17 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
SW-17 Event 1	11/20/2013	9:49	11/20/2013 9:49	55	28			66	0.0				
	11/20/2013	9:51	11/20/2013 9:51		32	32	<2	66	0.0		0.0	0.00	0.00
	11/20/2013	10:05	11/20/2013 10:05		30	30	3	66	6.0		41.9	4.79	4.79
	11/20/2013	10:06	11/20/2013 10:06		34	32.5	5	66	10.4		8.2	0.94	5.73
	11/20/2013	11:05	11/20/2013 11:05	55	33	32.5	7	66	14.4		732.6	83.81	89.54
	11/20/2013	11:10	11/20/2013 11:10		35	33.5	9	66	18.9		83.4	9.54	99.08
	11/20/2013	13:09	11/20/2013 13:09		34	33	10	66	20.8		2365.6	270.63	369.70
	11/20/2013	14:56	11/20/2013 14:56		34	33	10.5	65	21.9		2284.9	261.39	631.10
	11/20/2013	15:00	11/20/2013 15:00							Valve shut	87.5	10.01	641.11
	11/20/2013	15:01	11/20/2013 15:01		25	25							641.11
SW-17 Event 2	12/5/2013	14:02	12/5/2013 14:02	53	36	34	<2	88	0.0				641.11
	12/5/2013	14:29	12/5/2013 14:29	53	35	33.5	3	86.0	6.2		83.6	9.56	650.67
	12/5/2013	15:33	12/5/2013 15:33	50	34	33	5	80.0	10.3		526.8	60.26	710.93
	12/5/2013	15:35	12/5/2013 15:35	50	36	35	9	80.0	18.9		29.1	3.33	714.27
	12/5/2013	16:45	12/5/2013 16:45	50	36	35	10	73.0	21.1		1399.2	160.06	874.33
	12/5/2013	17:30	12/5/2013 17:30	56	36	33.5	12	70.0	25.4		1046.5	119.72	994.05
	12/5/2013	17:32	12/5/2013 17:32							Valve shut	50.8	5.81	999.86
	12/5/2013	17:33	12/5/2013 17:33			27.5							999.86
SW-17 Event 3	12/11/2013	13:30	12/11/2013 13:30	50	34	32	<2	67	0.0				999.86
	12/11/2013	14:01	12/11/2013 14:01	50	32	31	<2	67	0.0				999.86
	12/11/2013	14:03	12/11/2013 14:03	50	35	33.5	3.5	66	7.4		7.4	0.84	1000.70
	12/11/2013	14:30	12/11/2013 14:30	50	35	33.5	3.5	67	7.4		198.7	22.73	1023.44
	12/11/2013	15:09	12/11/2013 15:09	50	34	33.5	5	66	10.4		346.5	39.64	1063.07
	12/11/2013	15:35	12/11/2013 15:35	45	35	33	6	65	12.6		299.6	34.28	1097.35
	12/11/2013	16:32	12/11/2013 16:32	48	34	33	8	64	16.7		835.8	95.62	1192.97
	12/11/2013	17:08	12/11/2013 17:08	50	34	32	9.5	64	19.8		657.2	75.19	1268.16
	12/11/2013	17:57	12/11/2013 17:57	55	34	31.5	12	60	25.1		1101.5	126.01	1394.16
	12/11/2013	17:58	12/11/2013 17:58							Valve shut	25.1	2.88	1397.04
	12/11/2013	17:59	12/11/2013 17:59			26							1397.04
SW-17 Event 4	12/17/2013	8:50	12/17/2013 8:50	45	35	33	<2	65.0	0.0		0.0	0.00	1397.04
	12/17/2013	9:50	12/17/2013 9:50	45	34	33	4	66.0	8.3		249.9	28.59	1425.62
	12/17/2013	10:56	12/17/2013 10:56	42	35	32	7	72.0	14.6		758.0	86.72	1512.34
	12/17/2013	13:47	12/17/2013 13:47	45	35	29	13	74.0	27.1		3572.0	408.64	1920.98
	12/17/2013	13:48	12/17/2013 13:48	45	32.5	31	16	74.0	32.5		29.8	3.41	1924.39
	12/17/2013	14:54	12/17/2013 14:54	45	32.5	31	16	70.0	32.7		2151.5	246.14	2170.53
	12/17/2013	14:55	12/17/2013 14:55	45	35	31	19	70.0	39.8		36.2	4.15	2174.67
	12/17/2013	15:47	12/17/2013 15:47	45	35	31.5	19	68.0	39.9		2072.5	237.10	2411.77
	12/17/2013	22:22	12/17/2013 22:22	46	34	29	22	60.0	46.1		16981.0	1942.63	4354.40
	12/17/2013	22:24	12/17/2013 22:24	43	38	30.2	28	60.0	61.1		107.1	12.26	4366.66
	12/18/2013	8:45	12/18/2013 8:45	45	39	31	32	61.0	70.4		40810.8	4668.76	9035.42
	12/18/2013	8:49	12/18/2013 8:49							Valve shut	281.5	32.21	9067.62
	12/18/2013	8:50	12/18/2013 8:50			25							9067.62

Note: a red value, i.e. 75 °F, indicates that value was interpolated from field data

Total CO_2 Mass (lbs): 9067.62

SW-18 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
SW-18 Event 1	11/22/2013	13:14	11/22/2013 13:14			31.5		82	0.0				
	11/22/2013	13:15	11/22/2013 13:15	58	30	31.5	<2	82	0.0		0.0	0.00	0.00
	11/22/2013	13:18	11/22/2013 13:18	58	32	33.5	<2	82	0.0		0.0	0.00	0.00
	11/22/2013	13:44	11/22/2013 13:44	56	30	30	13	82	25.5		331.7	37.95	37.95
	11/22/2013	14:06	11/22/2013 14:06	55	30	29.5	14	80	27.5		583.6	66.76	104.71
	11/22/2013	14:37	11/22/2013 14:37	53	30	29	16	76	31.6		916.4	104.84	209.55
	11/22/2013	15:07	11/22/2013 15:07	51	34	32	22	74	45.5		1155.6	132.20	341.75
	11/22/2013	15:51	11/22/2013 15:51	50	34	32	23	76	47.4		2043.3	233.76	575.51
	11/22/2013	16:46	11/22/2013 16:46	50	34	31	24	71	49.7		2671.8	305.65	881.17
	11/22/2013	17:22	11/22/2013 17:22	56	34	31	24	70	49.8		1791.2	204.91	1086.07
	11/22/2013	17:23	11/22/2013 17:23							Valve shut	49.8	5.69	1091.77
	11/22/2013	17:24	11/22/2013 17:24			25							1091.77
SW-18 Event 2	12/6/2013	12:39	12/6/2013 12:39	49	34	32.5	5.5	84	11.3				1091.77
	12/6/2013	13:36	12/6/2013 13:36	49	34	30.5	13.5	83	27.7		1108.8	126.85	1218.61
	12/6/2013	13:38	12/6/2013 13:38	47	35	33	20	83	41.4		69.0	7.90	1226.51
	12/6/2013	14:37	12/6/2013 14:37	46	35	32.5	21.5	80	44.6		2537.3	290.26	1516.78
	12/6/2013	15:56	12/6/2013 15:56	45	36	31	23	74	48.5		3678.3	420.79	1937.57
	12/6/2013	15:57	12/6/2013 15:57	45	36	31.5	24	74	50.6		49.6	5.67	1943.24
	12/6/2013	16:25	12/6/2013 16:25	45	36	31	24	72	50.7		1418.4	162.27	2105.51
	12/6/2013	16:45	12/6/2013 16:45	45	36	31	24	71	50.8		1014.6	116.08	2221.58
	12/6/2013	16:47	12/6/2013 16:47							Valve shut	101.5	11.61	2233.20
	12/6/2013	16:48	12/6/2013 16:48			25							2233.20
SW-18 Event 3	12/12/2013	9:15	12/12/2013 9:15	50	35	33.5	14	62	29.6				2233.20
	12/12/2013	9:57	12/12/2013 9:57	50	34	28	22	66	45.8		1583.0	181.10	2414.29
	12/12/2013	9:58	12/12/2013 9:58	49	34	30	24	66	50.0		47.9	5.48	2419.77
	12/12/2013	10:02	12/12/2013 10:02	49	35	30	26	66	54.7		209.4	23.95	2443.72
	12/12/2013	10:35	12/12/2013 10:35	47	38	29.5	26.5	67	57.4		1849.4	211.57	2655.29
	12/12/2013	11:31	12/12/2013 11:31	45	35	29	27	68	56.7		3194.2	365.41	3020.71
	12/12/2013	11:32	12/12/2013 11:32	45	36	30	28	68	59.4		58.0	6.64	3027.35
	12/12/2013	13:17	12/12/2013 13:17	45	36	28	30	70	63.5		6452.3	738.14	3765.48
	12/12/2013	13:18	12/12/2013 13:18							Valve shut	63.5	7.27	3772.75
	12/12/2013	13:19	12/12/2013 13:19			20							3772.75
SW-18 Event 4	12/19/2013	8:10	12/19/2013 8:10	55	35	35	7	50	15.0				3772.75
	12/19/2013	8:37	12/19/2013 8:37	52	34	31	15.5	60	32.5		640.4	73.26	3846.01
	12/19/2013	8:44	12/19/2013 8:44	49	37.5	33	20.5	60	44.5		269.3	30.81	3876.82
	12/19/2013	8:45	12/19/2013 8:45	47.5	39	34	22	60	48.4		46.5	5.32	3882.14
	12/19/2013	9:32	12/19/2013 9:32	41	36	31	21.5	63	45.8		2215.2	253.42	4135.56
	12/19/2013	11:31	12/19/2013 11:31	40	35	29	22	67	46.2		5478.2	626.71	4762.27
	12/19/2013	12:06	12/19/2013 12:06	40	36	30	24.5	69	51.9		1717.7	196.51	4958.78
	12/19/2013	12:10	12/19/2013 12:10							Valve shut	207.7	23.76	4982.53
	12/19/2013	12:11	12/19/2013 12:11			22							4982.53
SW-18 Event 5	1/9/2014	10:41	1/9/2014 10:41						0.0				4982.53
	1/9/2014	10:42	1/9/2014 10:42	47	33	35	16.5	64	34.1		17.0	1.95	4984.48
	1/9/2014	10:50	1/9/2014 10:50	45	32	29	20	64	40.8		299.7	34.28	5018.76
	1/9/2014	10:51	1/9/2014 10:51	43	35	31	24.5	64	51.6		46.2	5.29	5024.05
	1/9/2014	11:12	1/9/2014 11:12	40	35	30	24	60	50.8		1075.7	123.06	5147.11
	1/9/2014	12:42	1/9/2014 12:42	39	34	27.5	24	60	50.3		4548.2	520.31	5667.42
	1/9/2014	14:25	1/9/2014 14:25	36	32	26	23.5	60	48.2		5070.8	580.10	6247.52
	1/9/2014	14:46	1/9/2014 14:46	36	32	26	24	60	49.2		1022.7	117.00	6364.52
	1/9/2014	14:47	1/9/2014 14:47							Valve shut	49.2	5.63	6370.15
	1/9/2014	14:48	1/9/2014 14:48			21							6370.15
SW-18 Event 6	1/13/2014	7:52	1/13/2014 7:52						0.0				6370.15
	1/13/2014	7:54	1/13/2014 7:54	53	30.5	35	16	48	32.7		32.7	3.74	6373.89

SW-18 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	1/13/2014	7:59	1/13/2014 7:59	50	30	33.5	18	50	36.5		172.8	19.77	6393.66
	1/13/2014	8:00	1/13/2014 8:00	50	33	29	22	50	46.1		41.3	4.72	6398.38
	1/13/2014	8:02	1/13/2014 8:02	49	36	31	26	52	56.0		102.1	11.68	6410.06
	1/13/2014	8:20	1/13/2014 8:20	45	35	30.5	28	56	59.5		1039.9	118.96	6529.02
	1/13/2014	10:15	1/13/2014 10:15	42	34	29	28	64	58.4		6780.5	775.68	7304.71
	1/13/2014	11:24	1/13/2014 11:24	40	33.5	29	26	64	54.0		3877.2	443.55	7748.26
	1/13/2014	11:57	1/13/2014 11:57	44	34	29	28	66	58.3		1852.4	211.92	7960.17
	1/13/2014	11:58	1/13/2014 11:58							Valve shut	58.3	6.67	7966.84
	1/13/2014	11:59	1/13/2014 11:59		22								7966.84

Note: a red value, i.e. 75 °F, indicates that value was interpolated from field data

Total CO_2 Mass (lbs): 7966.84

SW-19 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
SW-19 Event 1	11/22/2013	8:30	11/22/2013 8:30						0.0				
	11/22/2013	8:32	11/22/2013 8:32			25	<2	70	0.0		0.0	0.00	0.00
	11/22/2013	8:51	11/22/2013 8:51		22	25	<2	71	0.0		0.0	0.00	0.00
	11/22/2013	8:52	11/22/2013 8:52	56	28		3.5	72	6.8		3.4	0.39	0.39
	11/22/2013	10:05	11/22/2013 10:05	63		28.5	7.5	76	8.5		555.9	63.59	63.98
	11/22/2013	10:44	11/22/2013 10:44	55	28	28.5	8	77	15.4		465.5	53.25	117.23
	11/22/2013	11:14	11/22/2013 11:14	55	28	28.5	8.5	76	16.4		477.2	54.59	171.82
	11/22/2013	11:44	11/22/2013 11:44	55	28	28.5	9	79	17.3		505.6	57.84	229.67
	11/22/2013	12:07	11/22/2013 12:07	54	30	31	14.5	82	28.5		526.4	60.22	289.89
	11/22/2013	13:04	11/22/2013 13:04	59	35	30	16	80	33.2		1757.6	201.07	490.95
	11/22/2013	13:08	11/22/2013 13:08							Valve shut	132.8	15.20	506.15
	11/22/2013	13:09	11/22/2013 13:09			32							506.15
SW-19 Event 2	12/6/2013	8:28	12/6/2013 8:28	55	30	29	5	73	9.9				506.15
	12/6/2013	9:00	12/6/2013 9:00	49	29	27	14	75	27.4		596.0	68.19	574.34
	12/6/2013	9:02	12/6/2013 9:02	49	33	30.2	20	75	40.8		68.2	7.80	582.14
	12/6/2013	10:19	12/6/2013 10:19	43	32	27.5	23.5	78	47.3		3395.5	388.44	970.58
	12/6/2013	10:22	12/6/2013 10:22	42	34	29	27	78	55.6		154.4	17.66	988.24
	12/6/2013	11:19	12/6/2013 11:19	41	34	28	28	80	57.5		3222.8	368.69	1356.93
	12/6/2013	12:25	12/6/2013 12:25	45	35	28	31.5	80	65.4		4055.3	463.93	1820.86
	12/6/2013	12:26	12/6/2013 12:26							Valve shut	65.4	7.48	1828.34
	12/6/2013	12:27	12/6/2013 12:27			21							1828.34
SW-19 Event 3	12/11/2013	13:19	12/11/2013 13:19	49	30	28	<2	66	0.0				1828.34
	12/11/2013	13:57	12/11/2013 13:57	50	28	25	13.5	67	26.3		499.1	57.10	1885.44
	12/11/2013	13:58	12/11/2013 13:58	50	28	26	16	67	31.1		28.7	3.28	1888.72
	12/11/2013	14:32	12/11/2013 14:32	50	24	25	17	67	31.5		1064.3	121.76	2010.48
	12/11/2013	14:35	12/11/2013 14:35	50	34	26	20	67	41.6		109.6	12.54	2023.02
	12/11/2013	15:04	12/11/2013 15:04	50	30	26	21	66	41.9		1210.3	138.46	2161.49
	12/11/2013	15:05	12/11/2013 15:05	50	31	27	25	66	50.4		46.1	5.28	2166.76
	12/11/2013	15:26	12/11/2013 15:26	45	31	27	26	65	52.5		1080.2	123.57	2290.34
	12/11/2013	16:30	12/11/2013 16:30	48	31	26	27	64	54.5		3424.4	391.76	2682.09
	12/11/2013	17:06	12/11/2013 17:06	50	31	25	28.5	64	57.6		2018.1	230.87	2912.96
	12/11/2013	17:19	12/11/2013 17:19							Valve shut	748.5	85.62	2998.58
	12/11/2013	17:20	12/11/2013 17:20			21							2998.58
SW-19 Event 4	12/18/2013	8:54	12/18/2013 8:54	50	30	30	4	62	8.0				2998.58
	12/18/2013	9:42	12/18/2013 9:42			27				Valve shut	384.3	43.96	3042.55
	12/18/2013	9:43	12/18/2013 9:43			27							3042.55
	12/18/2013	14:00	12/18/2013 14:00	50	28	26	16	74	30.9	Restart			3042.55
	12/18/2013	14:01	12/18/2013 14:01	50	32	28	20.5	74	41.5		36.2	4.14	3046.69
	12/18/2013	15:57	12/18/2013 15:57	40	32	25	23	64	47.0		5129.4	586.80	3633.49
	12/18/2013	16:59	12/18/2013 16:59	45	32	24	24	60	49.2		2981.9	341.13	3974.62
	12/18/2013	17:19	12/18/2013 17:19	41	35	26	28	60	59.3		1084.8	124.10	4098.71
	12/18/2013	17:22	12/18/2013 17:22	41	35	26	29	60	61.4		181.0	20.70	4119.42
	12/18/2013	17:56	12/18/2013 17:56	50	40	29	33	58	73.5		2292.7	262.29	4381.70
	12/18/2013	17:57	12/18/2013 17:57							Valve shut	73.5	8.41	4390.11
	12/18/2013	17:58	12/18/2013 17:58			19							4390.11
SW-19 Event 5	1/9/2014	10:46	1/9/2014 10:46										4390.11
	1/9/2014	10:47	1/9/2014 10:47	45	34	30.5	6	64	12.5		12.5	1.43	4391.54
	1/9/2014	10:53	1/9/2014 10:53	43	34	28	12	64	25.0		112.7	12.89	4404.43
	1/9/2014	10:54	1/9/2014 10:54	42	35	30.5	18	64	37.9		31.5	3.60	4408.03
	1/9/2014	11:14	1/9/2014 11:14	40	35	29	20	60	42.3		802.8	91.84	4499.87
	1/9/2014	12:44	1/9/2014 12:44	39	35	36.5	22.5	60	47.6		4047.8	463.07	4962.94
	1/9/2014	14:27	1/9/2014 14:27	36	32	25	23	60	47.2		4881.4	558.43	5521.37
	1/9/2014	14:51	1/9/2014 14:51	40	35	26	26	60	55.0		1226.3	140.29	5661.66

SW-19 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	1/9/2014	14:52	1/9/2014 14:52							Valve shut	55.0	6.30	5667.96
	1/9/2014	14:53	1/9/2014 14:53			22							5667.96
SW-19 Event 6	1/14/2014	8:10	1/14/2014 8:10										5667.96
	1/14/2014	8:11	1/14/2014 8:11	46	27	29	10	60	19.4		19.4	2.21	5670.17
	1/14/2014	8:25	1/14/2014 8:25	44	27	27	14	60	27.1		325.3	37.21	5707.38
	1/14/2014	8:26	1/14/2014 8:26	44	30.5	29	20	60	40.3		33.7	3.86	5711.24
	1/14/2014	10:02	1/14/2014 10:02	44	29	26	24	62	47.5		4215.6	482.26	6193.50
	1/14/2014	10:04	1/14/2014 10:04	44	32.5	27.5	28	62	57.6		105.1	12.02	6205.53
	1/14/2014	11:02	1/14/2014 11:02	38	30.5	26	28	62	56.4		3305.2	378.11	6583.64
	1/14/2014	12:17	1/14/2014 12:17	38	30.5	26	29	62	58.4		4302.4	492.20	7075.84
	1/14/2014	12:18	1/14/2014 12:18							Valve shut	58.4	6.68	7082.52
	1/14/2014	12:19	1/14/2014 12:19			22							7082.52
SW-19 Event 7	1/20/2014	10:56	1/20/2014 10:56	46	28	30	12	64	23.4				7082.52
	1/20/2014	10:58	1/20/2014 10:58	46	30	28.5	18	64	36.0		59.4	6.79	7089.31
	1/20/2014	11:02	1/20/2014 11:02	46	30	28.5	19	64	38.0		147.8	16.91	7106.22
	1/20/2014	11:28	1/20/2014 11:28	45	29	26	21	68	41.3		1030.4	117.88	7224.10
	1/20/2014	12:52	1/20/2014 12:52	50	28.5	25	22.5	69	44.0		3581.1	409.68	7633.77
	1/20/2014	12:55	1/20/2014 12:55	50	29	25.2	23.8	69	46.8		136.1	15.57	7649.34
	1/20/2014	13:58	1/20/2014 13:58	50	29	25	24	68	47.2		2960.3	338.65	7988.00
	1/20/2014	15:08	1/20/2014 15:08	50	29	25	24	68	47.2		3304.6	378.04	8366.04
	1/20/2014	15:11	1/20/2014 15:11							Valve shut	141.6	16.20	8382.24
	1/20/2014	15:12	1/20/2014 15:12			21							8382.24
SW-19 Event 8	1/27/2014	12:40	1/27/2014 12:40										8382.24
	1/27/2014	12:42	1/27/2014 12:42	53	30	30	15	84	29.4		58.8	6.72	8388.96
	1/27/2014	13:02	1/27/2014 13:02	50	28	25	20	76	38.6		679.7	77.76	8466.72
	1/27/2014	13:03	1/27/2014 13:03	50	34	28	28	75	57.8		48.2	5.51	8472.23
	1/27/2014	13:18	1/27/2014 13:18	49	34	28	28	72	58.0		868.2	99.32	8571.55
	1/27/2014	14:53	1/27/2014 14:53	48	33	26	30	68	61.7		5683.5	650.20	9221.75
	1/27/2014	15:51	1/27/2014 15:51	47	32.5	25	30	67	61.4		3570.3	408.45	9630.20
	1/27/2014	16:42	1/27/2014 16:42	52	32	25	32	65	65.3		3231.3	369.66	9999.85
	1/27/2014	16:43	1/27/2014 16:43							Valve shut	65.3	7.47	10007.32
	1/27/2014	16:44	1/27/2014 16:44			20							10007.32
SW-19 Event 9	2/5/2014	8:57	2/5/2014 8:57	48	29	29.5	12	66	23.7				10007.32
	2/5/2014	9:00	2/5/2014 9:00		28		13	66	25.3		73.5	8.40	10015.73
	2/5/2014	9:15	2/5/2014 9:15	46	27	24.5	16	66	30.8		420.9	48.15	10063.87
	2/5/2014	9:18	2/5/2014 9:18		30	25	20	66	39.9		106.0	12.13	10076.00
	2/5/2014	10:30	2/5/2014 10:30		30	24	21.9	68	43.6		3004.1	343.67	10419.67
	2/5/2014	11:31	2/5/2014 11:31		29.5	23.5	22	70	43.4		2653.9	303.61	10723.28
	2/5/2014	12:45	2/5/2014 12:45	45	29.5	23.5	21	71	41.4		3140.0	359.21	11082.49
	2/5/2014	13:39	2/5/2014 13:39	45	29.5	23.5	21.2	74	41.7		2244.3	256.75	11339.24
	2/5/2014	13:42	2/5/2014 13:42			21				Valve shut	125.1	14.31	11353.55
SW-19 Event 10	2/7/2014	8:35	2/7/2014 8:35	51	24	23	4	56	7.5				11353.55
	2/7/2014	8:37	2/7/2014 8:37	49	29.5	26	11.2	56	22.4		29.9	3.42	11356.97
	2/7/2014	8:39	2/7/2014 8:39	49	30.5	26	15.8	57	32.0		54.4	6.22	11363.19
	2/7/2014	9:28	2/7/2014 9:28	46	30	25	18.2	57	36.6		1680.0	192.19	11555.38
	2/7/2014	9:33	2/7/2014 9:33	46	31.5	26.5	20.8	57	42.5		197.9	22.64	11578.02
	2/7/2014	11:45	2/7/2014 11:45	44	31.5	26	21.2	60	43.2		5661.6	647.69	12225.71
	2/7/2014	13:14	2/7/2014 13:14	44	31	25	21.8	61	44.2		3889.5	444.96	12670.67
	2/7/2014	14:31	2/7/2014 14:31	46	31	25.5	22.5	61	45.6		3455.7	395.33	13066.00
	2/7/2014	14:32	2/7/2014 14:32			21				Valve shut	45.6	5.22	13071.21
SW-19 Event 11	2/10/2014	9:16	2/10/2014 9:16		25	25.5	5	60	9.4				13071.21
	2/10/2014	9:19	2/10/2014 9:19	53	30	26	16	60	32.1		62.3	7.13	13078.34
	2/10/2014	10:00	2/10/2014 10:00	49	38	23	22.1	66	47.9		1639.8	187.59	13265.93

SW-19 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	2/10/2014	10:02	2/10/2014 10:02	48	30	23.5	25.5	66	50.8		98.7	11.30	13277.23
	2/10/2014	11:51	2/10/2014 11:51	48	30	23	26	70	51.6		5584.5	638.87	13916.10
	2/10/2014	13:30	2/10/2014 13:30	48	30	24.5	26	71	51.6		5109.0	584.47	14500.57
	2/10/2014	15:02	2/10/2014 15:02	45	30	23.5	26	71	51.6		4745.4	542.88	15043.45
	2/10/2014	16:53	2/10/2014 16:53	45	30	23.5	26	67	51.8		5736.7	656.28	15699.73
	2/10/2014	17:45	2/10/2014 17:45	48	30	23.5	26	63	52.0		2698.0	308.66	16008.38
	2/10/2014	17:48	2/10/2014 17:48			20				Valve shut	156.0	17.84	16026.23
SW-19 Event 12	2/11/2014	8:32	2/11/2014 8:32		23	22.2	5		9.8				16026.23
	2/11/2014	8:34	2/11/2014 8:34	49	29.5	24	18.2	56	36.4		46.2	5.29	16031.51
	2/11/2014	9:08	2/11/2014 9:08		28	22.5	23	59	45.1		1386.3	158.60	16190.11
	2/11/2014	9:10	2/11/2014 9:10			17				Valve shut	90.2	10.32	16200.43
	2/11/2014	12:22	2/11/2014 12:22			29		66	0.0		0.0	0.00	16200.43
	2/11/2014	12:23	2/11/2014 12:23	49	29	25	20.3	66	40.0		20.0	2.29	16202.72
	2/11/2014	12:25	2/11/2014 12:25	49	29	24	21.8	66	43.0		83.0	9.49	16212.21
	2/11/2014	13:50	2/11/2014 13:50	48	28	23	23.9	62	46.7		3812.4	436.13	16648.35
	2/11/2014	13:51	2/11/2014 13:51	48	29	24	26	62	51.4		49.1	5.62	16653.96
	2/11/2014	15:00	2/11/2014 15:00	47	29	23.5	26	59	51.6		3555.0	406.69	17060.66
	2/11/2014	17:08	2/11/2014 17:08	49	29.5	23	26	56	52.1		6633.7	758.90	17819.56
	2/11/2014	17:10	2/11/2014 17:10			20				Valve shut	104.1	11.91	17831.47
SW-19 Event 13	2/12/2014	8:19	2/12/2014 8:19	53	25	24	3.8	49	7.3				17831.47
	2/12/2014	8:20	2/12/2014 8:20	53	30	25	14	49	28.4		17.8	2.04	17833.50
	2/12/2014	8:52	2/12/2014 8:52	48	28	22.5	21	51	41.5		1118.6	127.97	17961.47
	2/12/2014	8:53	2/12/2014 8:53	48	29.5	24	25.2	51	50.7		46.1	5.28	17966.74
	2/12/2014	10:29	2/12/2014 10:29	48	29.5	24	26.2	54	52.6		4956.8	567.06	18533.80
	2/12/2014	11:59	2/12/2014 11:59	49	29.5	24	26.2	53	52.6		4732.8	541.43	19075.23
	2/12/2014	12:00	2/12/2014 12:00			18				Valve shut	52.6	6.02	19081.25
Note: a red value, i.e. 75 °F, indicates that value was interpolated from field data											Total CO_2 Mass (lbs):		19081.25

SW-20 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
SW-20 Event 1	11/20/2013	9:20	11/20/2013 9:20	55	28			64	0.0				
	11/20/2013	9:23	11/20/2013 9:23		32	33	<2	66	0.0		0.0	0.00	0.00
	11/20/2013	10:09	11/20/2013 10:09		30	31	2	66	4.0		91.7	10.49	10.49
	11/20/2013	10:11	11/20/2013 10:11		36	36	7	66	14.9		18.9	2.16	12.65
	11/20/2013	10:59	11/20/2013 10:59		36	35.5	8	66	17.0		765.1	87.53	100.18
	11/20/2013	12:46	11/20/2013 12:46		36	35	10	66	21.3		2046.7	234.14	334.32
	11/20/2013	14:40	11/20/2013 14:40		36	34.5	10.5	65	22.3		2484.7	284.25	618.57
	11/20/2013	15:17	11/20/2013 15:17		36	34.5	10.5	65	22.3		826.5	94.55	713.12
	11/20/2013	15:18	11/20/2013 15:18							Valve shut	22.3	2.56	715.68
	11/20/2013	15:19	11/20/2013 15:19			28.5							715.68
SW-20 Event 2	12/4/2013	12:12	12/4/2013 12:12	50	36	35	<2	76					715.68
	12/4/2013	13:04	12/4/2013 13:04	55	35	33.5	6	85	12.4		644.4	73.72	789.40
	12/4/2013	13:42	12/4/2013 13:42	52	34	33	7	84	14.3		507.6	58.07	847.47
	12/4/2013	13:43	12/4/2013 13:43	52	36	35.5	10.5	84	21.9		18.1	2.07	849.55
	12/4/2013	14:42	12/4/2013 14:42	50	36	35	11	74	23.2		1331.2	152.29	1001.83
	12/4/2013	15:48	12/4/2013 15:48	52	36	35	12	78	25.2		1597.3	182.73	1184.56
	12/4/2013	17:13	12/4/2013 17:13	52	36	34.5	14	70	29.6		2330.9	266.65	1451.21
	12/4/2013	17:14	12/4/2013 17:14							Valve shut	29.6	3.39	1454.60
	12/4/2013	17:15	12/4/2013 17:15										1454.60
SW-20 Event 3	12/17/2013	12:43	12/17/2013 12:43	48	35	35	<2	74	0.0		0.0	0.00	1454.60
	12/17/2013	13:24	12/17/2013 13:24	48	34	33.6	5	76	10.3		211.4	24.18	1478.78
	12/17/2013	14:25	12/17/2013 14:25	45	33	32.8	7.5	76	15.3		781.2	89.37	1568.15
	12/17/2013	15:40	12/17/2013 15:40	45	32	32.4	8.5	74	17.2		1218.5	139.40	1707.55
	12/17/2013	15:41	12/17/2013 15:41	45	34.5	34	12	74.0	24.9		21.1	2.41	1709.96
	12/17/2013	17:02	12/17/2013 17:02	45	34.5	34.4	12.5	66.0	26.2		2069.0	236.69	1946.65
	12/17/2013	17:03	12/17/2013 17:03							Valve shut	26.2	2.99	1949.64
	12/17/2013	17:04	12/17/2013 17:04			28.4							1949.64
SW-20 Event 4	1/8/2014	7:57	1/8/2014 7:57					34	0.0		0.0	0.00	1949.64
	1/8/2014	7:58	1/8/2014 7:58	25	26	23	<2	34.0	0.0		0.0	0.00	1949.64
	1/8/2014	8:13	1/8/2014 8:13	55	34	32	6	38.0	12.9		96.4	11.03	1960.67
	1/8/2014	8:30	1/8/2014 8:30	52	35	32	6	42	12.9		219.2	25.08	1985.75
	1/8/2014	8:44	1/8/2014 8:44	49	35	32	6	42.0	12.9		181.1	20.72	2006.46
	1/8/2014	8:45	1/8/2014 8:45	48	38	34	9.5	42.0	21.1		17.0	1.95	2008.41
	1/8/2014	9:46	1/8/2014 9:46	46	37	34	10	50.0	21.8		1308.9	149.74	2158.15
	1/8/2014	10:37	1/8/2014 10:37	45	36	33	11	50.0	23.8		1162.1	132.95	2291.10
	1/8/2014	11:15	1/8/2014 11:15	45	36	32.5	12	56.0	25.8		940.9	107.63	2398.73
	1/8/2014	11:16	1/8/2014 11:16	45	37	34	14	56.0	30.4		28.1	3.21	2401.94
	1/8/2014	12:25	1/8/2014 12:25	40	37	33.5	14	58.0	30.3		2092.3	239.36	2641.31
	1/8/2014	12:26	1/8/2014 12:26							Valve shut	30.3	3.47	2644.77
	1/8/2014	12:27	1/8/2014 12:27			26							2644.77
SW-20 Event 5	1/10/2014	8:50	1/10/2014 8:50										2644.77
	1/10/2014	8:51	1/10/2014 8:51	53	34	33	3	67	6.2		6.2	0.71	2645.49
	1/10/2014	8:55	1/10/2014 8:55	53	31	29	10	67	20.1		52.8	6.04	2651.52
	1/10/2014	8:59	1/10/2014 8:59	50	40	34.5	19	67	41.9		124.1	14.20	2665.72
	1/10/2014	10:05	1/10/2014 10:05	42	36	32	21	65	44.7		2858.0	326.96	2992.68
	1/10/2014	10:06	1/10/2014 10:06	42	40	33.5	22	65	48.6		46.7	5.34	2998.02
	1/10/2014	11:44	1/10/2014 11:44	41	39	33	22	67	48.1		4740.5	542.31	3540.33
	1/10/2014	13:00	1/10/2014 13:00	40	38	31	22	66	47.7		3639.8	416.39	3956.72
	1/10/2014	13:01	1/10/2014 13:01							Valve shut	47.7	5.46	3962.17
	1/10/2014	13:02	1/10/2014 13:02			23							3962.17
SW-20 Event 6	1/14/2014	7:50	1/14/2014 7:50	50	28	29.2	<2	62	0.0		0.0	0.00	3962.17
	1/14/2014	7:51	1/14/2014 7:51	50	33.5	34	5	62	10.4		5.2	0.59	3962.77
	1/14/2014	7:53	1/14/2014 7:53	50	33	33.6	7	62	14.5		24.9	2.85	3965.61

SW-20 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	1/14/2014	8:44	1/14/2014 8:44	46	32	32.6	9	62	18.4		838.9	95.97	4061.59
	1/14/2014	10:05	1/14/2014 10:05	44	32	32.4	10.5	63	21.5		1615.4	184.80	4246.38
	1/14/2014	10:09	1/14/2014 10:09	44	34	34	13.8	63	28.8		100.6	11.51	4257.89
	1/14/2014	11:32	1/14/2014 11:32	38	34	33.4	13	63	27.2		2322.8	265.73	4523.62
	1/14/2014	11:56	1/14/2014 11:56	38	34	33.4	13.9	63	29.0		674.2	77.12	4600.74
	1/14/2014	11:57	1/14/2014 11:57			29				Valve shut	29.0	3.32	4604.06
SW-20 Event 7	1/16/2014	8:03	1/16/2014 8:03	55	30	33	2	40	4.1		0.0	0.00	4604.06
	1/16/2014	8:05	1/16/2014 8:05	55	29	31.4	6	42	12.1		16.2	1.85	4605.92
	1/16/2014	8:06	1/16/2014 8:06	55	32	33	12	42	25.1		18.6	2.13	4608.04
	1/16/2014	9:00	1/16/2014 9:00	46	31	31.4	16	54	32.6		1558.1	178.25	4786.29
	1/16/2014	9:02	1/16/2014 9:02	46	33	33	18.5	54	38.6		71.2	8.15	4794.44
	1/16/2014	10:25	1/16/2014 10:25	42	33	32	19.8	57	41.2		3309.3	378.59	5173.03
	1/16/2014	11:19	1/16/2014 11:19	40	32.5	31	20	58	41.3		2227.0	254.77	5427.80
	1/16/2014	11:20	1/16/2014 11:20	40	34	32	22	58	46.2		43.7	5.00	5432.80
	1/16/2014	12:16	1/16/2014 12:16	43	34	32.4	23.8	58	50.0		2691.7	307.93	5740.73
	1/16/2014	12:18	1/16/2014 12:18			28				Valve shut	99.9	11.43	5752.16
SW-20 Event 8	1/17/2014	8:33	1/17/2014 8:33	48	26	29	29	5	54.0				5752.16
	1/17/2014	8:34	1/17/2014 8:34	48	31	32.4	32.4	7.5	54.0		54.0	6.18	5758.34
	1/17/2014	8:35	1/17/2014 8:35	48	32	33	33	7.8	54.0		54.0	6.18	5764.52
	1/17/2014	10:17	1/17/2014 10:17	45	31.5	32.4	32.4	8.5	59.0		5763.0	659.29	6423.80
	1/17/2014	11:21	1/17/2014 11:21	45	31	31.2	31.2	9.2	65.0		3968.0	453.94	6877.74
	1/17/2014	11:22	1/17/2014 11:22	45	33	32.8	32.8	14.2	65.0		65.0	7.44	6885.18
	1/17/2014	12:13	1/17/2014 12:13	45	33	32.6	32.6	12.8	65.0		3315.0	379.24	7264.42
	1/17/2014	12:14	1/17/2014 12:14							Valve shut	65.0	7.44	7271.85
SW-20 Event 9	1/20/2014	8:39	1/20/2014 8:39	50	32.5	34	<2	47	0.0				7271.85
	1/20/2014	8:44	1/20/2014 8:44	50	32	32.6	6	49	12.4		31.1	3.56	7275.41
	1/20/2014	8:48	1/20/2014 8:48	50	32	32.6	6.5	49	13.5		51.8	5.93	7281.34
	1/20/2014	8:49	1/20/2014 8:49	49	33.5	34.2	10	51	21.0		17.3	1.97	7283.31
	1/20/2014	9:13	1/20/2014 9:13	49	33.5	34.2	10	58	20.9		502.9	57.53	7340.84
	1/20/2014	10:27	1/20/2014 10:27	47	33.5	33.6	10.2	64	21.2		1555.8	177.99	7518.83
	1/20/2014	11:26	1/20/2014 11:26	44	33.2	33	10.5	67	21.7		1263.5	144.54	7663.37
	1/20/2014	13:05	1/20/2014 13:05		32.5	32.4	10.8	69	22.1		2164.6	247.62	7911.00
	1/20/2014	13:06	1/20/2014 13:06			26				Valve shut	22.1	2.52	7913.52
SW-20 Event 10	1/21/2014	7:54	1/21/2014 7:54	55	27.5	27.8	<2	50	0.0		0.0	0.00	7913.52
	1/21/2014	7:55	1/21/2014 7:55	55	33	33.6	8	50	16.8		8.4	0.96	7914.48
	1/21/2014	8:01	1/21/2014 8:01	55	33	33.6	10	50	20.9		113.1	12.93	7927.42
	1/21/2014	8:45	1/21/2014 8:45	50	32	32.8	10.5	56	21.6		936.2	107.10	8034.52
	1/21/2014	9:54	1/21/2014 9:54	38	32	32.8	10.5	62	21.5		1487.1	170.13	8204.65
	1/21/2014	11:16	1/21/2014 11:16	38	32	32.8	10.5	66	21.4		1758.5	201.18	8405.83
	1/21/2014	12:20	1/21/2014 12:20	41	32	32.4	10.5	71	21.3		1366.5	156.32	8562.15
	1/21/2014	12:21	1/21/2014 12:21			27.6				Valve shut	21.3	2.44	8564.59
SW-20 Event 11	1/22/2014	8:27	1/22/2014 8:27	54	27	29.6	<2	37	0.0		0.0	0.00	8564.59
	1/22/2014	8:29	1/22/2014 8:29	54	33	34.2	7	37	14.9		14.9	1.70	8566.29
	1/22/2014	8:34	1/22/2014 8:34	53	33	33.8	9.5	40	20.1		87.4	10.00	8576.28
	1/22/2014	9:00	1/22/2014 9:00	51	33	33.6	10.3	46	21.7		542.8	62.09	8638.38
	1/22/2014	9:03	1/22/2014 9:03	56	32	33	10	50	20.7		63.6	7.27	8645.65
	1/22/2014	11:00	1/22/2014 11:00	44	32	32.6	10.5	55	21.6		2477.7	283.44	8929.09
	1/22/2014	12:07	1/22/2014 12:07	41	32	32.4	11	56	22.6		1483.6	169.72	9098.82
	1/22/2014	12:34	1/22/2014 12:34	44	32	32.4	11.2	57	23.0		616.7	70.55	9169.37
	1/22/2014	12:35	1/22/2014 12:35			25				Valve shut	23.0	2.64	9172.00
SW-20 Event 12	1/28/2014	7:20	1/28/2014 7:20										9172.00
	1/28/2014	7:22	1/28/2014 7:22	57	36	34	<2	56	0.0		0.0	0.00	9172.00
	1/28/2014	7:27	1/28/2014 7:27	56	36	32	4	56	8.6		21.5	2.46	9174.46

SW-20 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	1/28/2014	7:28	1/28/2014 7:28	55	38	34	6.5	56	14.2		11.4	1.31	9175.76
	1/28/2014	8:05	1/28/2014 8:05	54	38	34	8	56	17.5		587.3	67.19	9242.95
	1/28/2014	8:27	1/28/2014 8:27	54	38	34	8	56	17.5		385.3	44.08	9287.04
	1/28/2014	10:00	1/28/2014 10:00	54	37	33.5	9	56	19.5		1721.8	196.98	9484.01
	1/28/2014	11:18	1/28/2014 11:18	51	37	33.5	10	54	21.7		1608.3	183.99	9668.01
	1/28/2014	11:23	1/28/2014 11:23							Valve shut	108.6	12.43	9680.43
	1/28/2014	11:24	1/28/2014 11:24			26							9680.43
SW-20 Event 13	2/5/2013	7:54	2/5/2013 7:54	55	33	35	3.2	62	6.6				9680.43
	2/5/2013	8:45	2/5/2013 8:45	49	32	31.5	9.8	65	20.0		678.7	77.64	9758.08
	2/5/2013	10:26	2/5/2013 10:26	45	32	31.5	9.8	68	19.9		2016.6	230.70	9988.78
	2/5/2013	11:28	2/5/2013 11:28	45	32	31.5	9.8	70	19.9		1234.9	141.27	10130.05
	2/5/2013	12:40	2/5/2013 12:40	45	32	31.5	9.8	72	19.9		1431.3	163.74	10293.79
	2/5/2013	13:33	2/5/2013 13:33	45	32	31.5	9.8	74	19.8		1051.5	120.29	10414.08
	2/5/2013	13:36	2/5/2013 13:36	45	33	32.5	13	74	26.6		69.6	7.96	10422.04
	2/5/2013	14:47	2/5/2013 14:47	46	33	32.5	13	74	26.6		1887.0	215.87	10637.91
	2/5/2013	15:40	2/5/2013 15:40	46	33	32.5	13	70	26.7		1411.3	161.46	10799.37
	2/5/2013	15:58	2/5/2013 15:58	46	33	32.5	13	73	26.6	Valve shut	479.6	54.86	10854.23
	2/5/2013	16:00	2/5/2013 16:00			26							10854.23
SW-20 Event 14	2/7/2014	8:25	2/7/2014 8:25	50	30	31	3.2	48	6.5				10854.23
	2/7/2014	8:27	2/7/2014 8:27	50	33.2	33	7	48	14.7		21.2	2.43	10856.66
	2/7/2014	9:21	2/7/2014 9:21	45	33	33	9.3	55	19.4		920.5	105.30	10961.96
	2/7/2014	11:40	2/7/2014 11:40	45	33	33	9.3	62	19.2		2683.6	307.00	11268.96
	2/7/2014	13:10	2/7/2014 13:10	44	33	33	9.8	64	20.2		1776.2	203.20	11472.15
	2/7/2014	14:26	2/7/2014 14:26	46	33	33	10	64	20.6		1553.4	177.70	11649.86
	2/7/2014	15:42	2/7/2014 15:42	49	32	33	10.8	62	22.1		1624.4	185.83	11835.69
	2/7/2014	16:20	2/7/2014 16:20	49	32	33	10.8	60	22.1		840.7	96.18	11931.87
	2/7/2014	16:31	2/7/2014 16:31	49	32	33	10.9	57	22.4		245.1	28.04	11959.91
	2/7/2014	16:32	2/7/2014 16:32			26				Valve shut	22.4	2.56	11962.47
SW-20 Event 15	2/10/2014	9:30	2/10/2014 9:30	52	27	27.5	<2	60	0.0				11962.47
	2/10/2014	9:33	2/10/2014 9:33	51	33	33	5	60	10.4		15.5	1.78	11964.25
	2/10/2014	10:11	2/10/2014 10:11	49	32.5	32.5	8.5	67	17.4		527.6	60.35	12024.60
	2/10/2014	10:16	2/10/2014 10:16	48	33.5	32.5	11	67	22.8		100.4	11.49	12036.09
	2/10/2014	11:40	2/10/2014 11:40	48	33.5	32.5	9.8	71	20.2		1804.5	206.43	12242.52
	2/10/2014	13:25	2/10/2014 13:25	48	33.5	32.5	9.8	71	20.2		2121.0	242.65	12485.17
	2/10/2014	14:58	2/10/2014 14:58	47	33	32.5	10	73	20.5		1890.9	216.32	12701.48
	2/10/2014	16:45	2/10/2014 16:45	46	33	32.5	10.5	69	21.6		2248.9	257.27	12958.75
	2/10/2014	17:52	2/10/2014 17:52	54	33	32.5	10.8	63	22.3		1470.3	168.20	13126.96
	2/10/2014	17:53	2/10/2014 17:53			29				Valve shut	22.3	2.55	13129.51
SW-20 Event 16	2/11/2014	8:19	2/11/2014 8:19		30	31	10.2	55	20.6				13129.51
	2/11/2014	8:22	2/11/2014 8:22	50	33.5	32	16	55	33.5		81.1	9.28	13138.79
	2/11/2014	9:02	2/11/2014 9:02	48	33.5	32	16.8	58	35.1		1371.7	156.93	13295.71
	2/11/2014	9:03	2/11/2014 9:03			24				Valve shut	35.1	4.01	13299.73
Note: a red value, i.e. 75 °F, indicates that value was interpolated from field data											Total CO_2 Mass (lbs):		13299.73

SW-21 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
SW-21 Event 1	11/22/2013	13:01	11/22/2013 13:01										
	11/22/2013	13:02	11/22/2013 13:02		28	30		84	0.0		0.0	0.00	0.00
	11/22/2013	13:32	11/22/2013 13:32	55	30	29.5	<2	88	0.0		0.0	0.00	0.00
	11/22/2013	13:58	11/22/2013 13:58	55	33	33	5	87	10.1		131.2	15.01	15.01
	11/22/2013	14:20	11/22/2013 14:20	52	34	33	6	80	12.3		246.6	28.21	43.23
	11/22/2013	15:00	11/22/2013 15:00	50	34	32.5	7	77	14.4		534.9	61.19	104.42
	11/22/2013	15:44	11/22/2013 15:44	50	34	32.5	8	80	16.4		678.8	77.65	182.07
	11/22/2013	16:40	11/22/2013 16:40	50	34	32	9	76	18.6		979.7	112.08	294.15
	11/22/2013	17:11	11/22/2013 17:11	50	34	32	9	72	18.6		576.4	65.94	360.10
	11/22/2013	17:12	11/22/2013 17:12							Valve shut	18.6	2.13	362.23
	11/22/2013	17:13	11/22/2013 17:13			25							362.23
SW-21 Event 2	11/25/2013	10:54	11/25/2013 10:54	50	26			62					362.23
	11/25/2013	10:58	11/25/2013 10:58	55	29	30	<2	64	0.0		0.0	0.00	362.23
	11/25/2013	11:25	11/25/2013 11:25	55	34	33.5	5	62	10.5		141.1	16.14	378.37
	11/25/2013	12:35	11/25/2013 12:35	55	34	33	8	64	16.7		950.0	108.69	487.06
	11/25/2013	13:55	11/25/2013 13:55	54	33	32.5	10	65	20.6		1492.6	170.76	657.81
	11/25/2013	15:05	11/25/2013 15:05	55	32	32	12	64	24.5		1579.7	180.72	838.53
	11/25/2013	16:05	11/25/2013 16:05	55	32	31	12	61	24.6		1472.7	168.48	1007.01
	11/25/2013	16:07	11/25/2013 16:07							Valve shut	49.2	5.62	1012.64
	11/25/2013	16:08	11/25/2013 16:08			25							1012.64
SW-21 Event 3	12/5/2013	12:12	12/5/2013 12:12	50	32	32	<2	81	0.0				1012.64
	12/5/2013	14:18	12/5/2013 14:18	52	31	31	6	87	11.9		746.8	85.44	1098.08
	12/5/2013	15:22	12/5/2013 15:22	49	31	30	7.5	83	14.9		855.3	97.85	1195.92
	12/5/2013	16:35	12/5/2013 16:35	49	31	30	9	78	17.9		1197.5	137.00	1332.92
	12/5/2013	16:54	12/5/2013 16:54	49	31	30	9.5	75	19.0		350.7	40.13	1373.04
	12/5/2013	16:55	12/5/2013 16:55							Valve shut	19.0	2.17	1375.22
	12/5/2013	16:56	12/5/2013 16:56			25							1375.22
SW-21 Event 4	12/19/2013	8:58	12/19/2013 8:58	47	34	31	<2	52	0.0				1375.22
	12/19/2013	9:29	12/19/2013 9:29	42	33	30	3.5	62	7.2		112.2	12.84	1388.06
	12/19/2013	10:03	12/19/2013 10:03	40	33	30	4	66	8.2		263.2	30.11	1418.16
	12/19/2013	11:26	12/19/2013 11:26	40	32.5	30	6	70	12.2		850.3	97.28	1515.44
	12/19/2013	12:50	12/19/2013 12:50	45	31	29	7	72	14.0		1103.7	126.26	1641.71
	12/19/2013	12:58	12/19/2013 12:58							Valve shut	112.2	12.84	1654.55
	12/19/2013	12:59	12/19/2013 12:59			25							1654.55
SW-21 Event 5	1/6/2014	13:00	1/6/2014 13:00										1654.55
	1/6/2014	13:01	1/6/2014 13:01	57	32	29.5	<2	60	0.0				1654.55
	1/6/2014	13:25	1/6/2014 13:25	55	31	29	2	60	4.1		48.7	5.57	1660.12
	1/6/2014	13:56	1/6/2014 13:56	55	31	29	2	58	4.1		125.9	14.40	1674.52
	1/6/2014	15:02	1/6/2014 15:02	55	31	28.5	3.5	58	7.1		368.8	42.20	1716.71
	1/6/2014	15:04	1/6/2014 15:04	55	32	29.5	6	58	12.3		19.4	2.22	1718.94
	1/6/2014	16:02	1/6/2014 16:02	54	33	29.5	6	55	12.5		720.0	82.37	1801.30
	1/6/2014	17:03	1/6/2014 17:03	54	33	29.5	7	52	14.6		827.3	94.65	1895.95
	1/6/2014	17:15	1/6/2014 17:15	54	33	29.5	7.5	52	15.7		181.8	20.80	1916.75
	1/6/2014	17:16	1/6/2014 17:16							Valve shut	15.7	1.79	1918.54
	1/6/2014	17:17	1/6/2014 17:17			29							1918.54
SW-21 Event 6	1/7/2014	7:29	1/7/2014 7:29					27					1918.54
	1/7/2014	7:30	1/7/2014 7:30	26	25	22	4	27	7.8		7.8	0.89	1919.44
	1/7/2014	7:49	1/7/2014 7:49	15	20	16.5	2	27	3.6		108.9	12.46	1931.89
	1/7/2014	9:02	1/7/2014 9:02	55	33	30	11.5	42	24.3		1019.3	116.61	2048.51
	1/7/2014	10:22	1/7/2014 10:22	50	34	30	10	47	21.2		1820.2	208.23	2256.73
	1/7/2014	11:21	1/7/2014 11:21	48	34	30	11	50	23.3		1312.8	150.19	2406.92
	1/7/2014	13:56	1/7/2014 13:56	52	34	29.5	13.5	52	28.5		4013.3	459.13	2866.04
	1/7/2014	15:16	1/7/2014 15:16	50	34	29.5	14	55	29.5		2319.3	265.33	3131.37

SW-21 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	1/7/2014	16:25	1/7/2014 16:25	47	34	29.5	14	50	29.6		2038.9	233.25	3364.62
	1/7/2014	17:08	1/7/2014 17:08	50	34	29	15	47	31.8		1321.5	151.18	3515.80
	1/7/2014	17:09	1/7/2014 17:09							Valve shut	31.8	3.64	3519.44
	1/7/2014	17:10	1/7/2014 17:10										3519.44
SW-21 Event 7	1/10/2014	8:41	1/10/2014 8:41										3519.44
	1/10/2014	8:42	1/10/2014 8:42	55	30.5	31.2	3	67	6.0		6.0	0.69	3520.13
	1/10/2014	9:02	1/10/2014 9:02	50	30	30.4	6	67	11.9		179.6	20.54	3540.67
	1/10/2014	10:04	1/10/2014 10:04	42	30	30.4	6	65	12.0		741.6	84.84	3625.52
	1/10/2014	11:42	1/10/2014 11:42	41	30	30	6.5	67	12.9		1221.0	139.69	3765.20
	1/10/2014	13:05	1/10/2014 13:05	45	30	29.8	7	66	14.0		1116.4	127.72	3892.92
	1/10/2014	14:08	1/10/2014 14:08	49	29.5	29.2	8	69	15.8		937.7	107.27	4000.19
	1/10/2014	14:09	1/10/2014 14:09	49	31	30.6	12.5	69	25.1		20.5	2.34	4002.53
	1/10/2014	15:12	1/10/2014 15:12	49	31	20.6	13	69	26.1		1614.7	184.72	4187.25
	1/10/2014	16:19	1/10/2014 16:19	47	31	30.2	13.5	68	27.2		1785.4	204.25	4391.50
	1/10/2014	17:48	1/10/2014 17:48	45	31	29.6	14	65	28.3		2466.1	282.12	4673.63
	1/10/2014	17:49	1/10/2014 17:49	45	32	30.8	16	65	32.6		30.5	3.48	4677.11
	1/10/2014	21:51	1/10/2014 21:51	44	32	30.6	17.5	63	35.8		8279.4	947.16	5624.27
	1/11/2014	7:55	1/11/2014 7:55	40	31	28.8	20	64	40.4		23006.4	2631.94	8256.21
	1/11/2014	7:56	1/11/2014 7:56							Valve shut	40.4	4.62	8260.83
	1/11/2014	7:57	1/11/2014 7:57										8260.83
SW-21 Event 8	1/23/2014	12:10	1/23/2014 12:10		27	24	<2	56	0.0		0.0	0.00	8260.83
	1/23/2014	12:11	1/23/2014 12:11	46	32.5	31	2	56	4.1		2.1	0.24	8261.06
	1/23/2014	12:13	1/23/2014 12:13	46	32.5	29.5	3	56	6.2		10.3	1.18	8262.25
	1/23/2014	12:53	1/23/2014 12:53	46	32.5	29.5	5.2	58	10.7		339.0	38.79	8301.04
	1/23/2014	14:16	1/23/2014 14:16	50	32.5	28	7	55	14.5		1047.7	119.86	8420.90
	1/23/2014	14:17	1/23/2014 14:17	50	33	30	12.2	54.5	25.4		20.0	2.28	8423.18
	1/23/2014	15:06	1/23/2014 15:06	50	33	30	12.2	54	25.4		1246.3	142.58	8565.76
	1/23/2014	16:38	1/23/2014 16:38	55	34	29.8	13	54	27.4		2430.5	278.05	8843.81
	1/23/2014	16:39	1/23/2014 16:39			25				Valve shut	27.4	3.13	8846.95
Note: a red value, i.e. 75 °F, indicates that value was interpolated from field data											Total CO_2 Mass (lbs):		8846.95

SW-22 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
SW-22 Event 1	11/14/2013	7:53	11/14/2013 7:53	30	11				0.0				
	11/14/2013	7:56	11/14/2013 7:56	39	36	32	<2	34.5	0.0		0.0	0.00	0.00
	11/14/2013	8:00	11/14/2013 8:00	30	31.5	29	<2	36.6	0.0		0.0	0.00	0.00
	11/14/2013	8:04	11/14/2013 8:04	32	32.5	29	4.5	40.4	7.7		15.3	1.76	1.76
	11/14/2013	8:08	11/14/2013 8:08	33	33	29	4.5	41.5	7.7		30.8	3.52	5.27
	11/14/2013	8:10	11/14/2013 8:10	36	35	31	6.25	41.3	10.9		18.6	2.13	7.41
	11/14/2013	8:14	11/14/2013 8:14	38	37	33	8	38.6	14.3		50.5	5.78	13.18
	11/14/2013	8:36	11/14/2013 8:36	38	36	32.5	9.75	28.1	17.5		349.6	39.99	53.18
	11/14/2013	9:01	11/14/2013 9:01	38	35	30.5	10.5	27.5	18.6		451.2	51.62	104.80
	11/14/2013	9:02	11/14/2013 9:02	42	38	32.5	13.5	27.8	24.7		21.7	2.48	107.27
	11/14/2013	9:03	11/14/2013 9:03	43	38.5	34	13.25	27.3	24.3		24.5	2.80	110.08
	11/14/2013	9:07	11/14/2013 9:07	43	38.5	34	13.25	26	24.4		97.5	11.15	121.23
	11/14/2013	9:40	11/14/2013 9:40	42	38	33	14	26.7	25.6		825.1	94.39	215.62
	11/14/2013	10:03	11/14/2013 10:03	42	37	33	14.5	28.7	26.2		596.2	68.20	283.82
	11/14/2013	10:43	11/14/2013 10:43	42	37	32	15.25	31.7	27.5		1074.2	122.88	406.70
	11/14/2013	11:50	11/14/2013 11:50	42	36	31	16	34.7	28.5		1874.3	214.42	621.13
	11/14/2013	12:07	11/14/2013 12:07							Valve shut	483.9	55.35	676.48
	11/14/2013	12:08	11/14/2013 12:08	26	26	21		37.2					676.48
SW-22 Event 2	12/10/2013	12:43	12/10/2013 12:43	52.5	32.5	32.2	<2	80	0.0				676.48
	12/10/2013	13:07	12/10/2013 13:07	52.5	28	25.2	20	76	38.6		463.0	52.96	729.44
	12/10/2013	13:59	12/10/2013 13:59	50.0	28	25.2	21.5	70	41.7		2087.7	238.83	968.28
	12/10/2013	14:01	12/10/2013 14:01	50.0	30	27	24	72	47.6		89.3	10.21	978.49
	12/10/2013	14:30	12/10/2013 14:30	49.0	30	27	24.5	72	48.6		1393.8	159.45	1137.94
	12/10/2013	15:10	12/10/2013 15:10	47.5	30	27	24.5	72	48.6		1942.3	222.20	1360.14
	12/10/2013	15:16	12/10/2013 15:16	47.5	32	27.6	26	72	52.7		303.7	34.75	1394.89
	12/10/2013	15:43	12/10/2013 15:43	47.5	31	27.6	26	72	52.1		1414.8	161.85	1556.74
	12/10/2013	16:21	12/10/2013 16:21	45	31	28	26	70	52.2		1982.2	226.76	1783.51
	12/10/2013	16:55	12/10/2013 16:55	45	31	28	26	70	52.2		1775.3	203.09	1986.60
	12/10/2013	16:58	12/10/2013 16:58							Valve shut	156.6	17.92	2004.52
	12/10/2013	16:59	12/10/2013 16:59			15							2004.52
SW-22 Event 3	12/20/2013	7:47	12/20/2013 7:47	48	30	31	16	56	32.2				2004.52
	12/20/2013	7:49	12/20/2013 7:49	48	31		19	56	38.7		70.9	8.11	2012.63
	12/20/2013	8:10	12/20/2013 8:10	45	31	25	22	60	44.6		874.7	100.07	2112.70
	12/20/2013	8:14	12/20/2013 8:14	44	35	28	27	60	57.1		203.5	23.28	2135.99
	12/20/2013	8:16	12/20/2013 8:16	43	37.5	30	29	60	62.9		120.1	13.74	2149.72
	12/20/2013	9:48	12/20/2013 9:48	40	36	29	28	68	59.4		5626.8	643.71	2793.43
	12/20/2013	9:49	12/20/2013 9:49	40	36	29	28	68	59.4		59.4	6.79	2800.23
	12/20/2013	10:35	12/20/2013 10:35	39	36	28	28	72	59.2		2726.7	311.93	3112.16
	12/20/2013	11:29	12/20/2013 11:29	39	34	27	28.5	74	58.9		3187.1	364.60	3476.76
	12/20/2013	11:49	12/20/2013 11:49	42	39	28.5	30	74	65.1		1240.2	141.88	3618.64
	12/20/2013	11:50	12/20/2013 11:50							Valve shut	65.1	7.45	3626.09
	12/20/2013	11:51	12/20/2013 11:51			16							3626.09
SW-22 Event 4	1/8/2014	12:30	1/8/2014 12:30						0.0				3626.09
	1/8/2014	12:31	1/8/2014 12:31	45	34	24	16	58	33.6		16.8	1.92	3628.01
	1/8/2014	12:33	1/8/2014 12:33							valve shut	67.2	7.68	3635.69
SW-22 Event 5	2/4/2014	14:20	2/4/2014 14:20	48	28	25	<2	62	0.0				3635.69
	2/4/2014	14:21	2/4/2014 14:21	48	33	29	14	62	29.0		14.5	1.66	3637.35
	2/4/2014	14:23	2/4/2014 14:23	48	31	29	18	62	36.4		65.4	7.48	3644.83
	2/4/2014	14:45	2/4/2014 14:45	48	31	23	22	62	44.5		890.6	101.89	3746.72
	2/4/2014	15:36	2/4/2014 15:36	47	31	22	25	62	50.6		2425.9	277.52	4024.24
	2/4/2014	16:30	2/4/2014 16:30	46	30	22	25.2	60	50.5		2730.8	312.41	4336.64
	2/4/2014	17:30	2/4/2014 17:30	48	30		25.2	60	50.5		3032.3	346.90	4683.54
	2/4/2014	17:32	2/4/2014 17:32			9				Valve shut	101.1	11.56	4695.10

SW-22 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
SW-22 Event 6	2/6/2014	10:47	2/6/2014 10:47	47	29	32.2	12	60	23.8				4695.10
	2/6/2014	10:49	2/6/2014 10:49	47	28	27.6	16.5	60	32.3		56.1	6.42	4701.52
	2/6/2014	11:08	2/6/2014 11:08	46	27	24.4	20.5	61	39.6		683.8	78.23	4779.75
	2/6/2014	12:10	2/6/2014 12:10	45	26.5	23.4	21.8	62	41.9		2526.9	289.08	5068.83
	2/6/2014	12:13	2/6/2014 12:13	45	30	26.2	27	62.5	54.0		143.8	16.45	5085.28
	2/6/2014	14:09	2/6/2014 14:09	42	30	26	27.8	63	55.6		6356.8	727.22	5812.51
	2/6/2014	15:21	2/6/2014 15:21	43	30	26	28	60	56.2		4022.7	460.19	6272.70
	2/6/2014	16:35	2/6/2014 16:35	43	30	26	28	58	56.3		4159.5	475.85	6748.55
	2/6/2014	17:18	2/6/2014 17:18	47	30	26	28.5	58	57.3		2441.0	279.25	7027.80
	2/7/2014	8:02	2/7/2014 8:02	49	29	24.4	31	54	61.8		52642.7	6022.33	13050.13
	2/7/2014	8:04	2/7/2014 8:04			12				Valve shut	123.7	14.15	13064.28
SW-22 Event 7	2/7/2014	10:07	2/7/2014 10:07	45	25	26.5	6	57	11.4				13064.28
	2/7/2014	10:09	2/7/2014 10:09	43	32	28	20	57	41.1		52.5	6.01	13070.28
	2/7/2014	10:16	2/7/2014 10:16	43	29.5	25	25.9	58	51.7		325.1	37.19	13107.47
	2/7/2014	11:30	2/7/2014 11:30	42	29	24.5	26.5	60	52.5		3858.7	441.43	13548.90
	2/7/2014	13:04	2/7/2014 13:04	42	29	24	26.5	60	52.5		4938.6	564.98	14113.88
	2/7/2014	14:22	2/7/2014 14:22	45	29	24	2.5	60	5.0		2242.3	256.52	14370.40
	2/7/2014	15:39	2/7/2014 15:39	46	29	24	26.5	60	52.5		2213.6	253.23	14623.63
	2/7/2014	16:39	2/7/2014 16:39	46	29	24	26.5	58	52.6		3155.5	360.98	14984.62
	2/7/2014	17:28	2/7/2014 17:28	49	29	24	26.5	57	52.7		2580.8	295.25	15279.86
	2/7/2014	17:29	2/7/2014 17:29			16				Valve shut	52.7	6.03	15285.89
SW-22 Event 8	2/12/2014	8:10	2/12/2014 8:10	55	31	30.5	<2	46	0.0				15285.89
	2/12/2014	8:11	2/12/2014 8:11	51	32.5	27	23.5	46	49.1		24.6	2.81	15288.70
	2/12/2014	8:50	2/12/2014 8:50	45	31	26	27	50	55.3		2036.9	233.02	15521.73
	2/12/2014	10:25	2/12/2014 10:25	45	30	25	28.2	51	57.1		5338.2	610.69	16132.42
	2/12/2014	11:52	2/12/2014 11:52	44	30	24	28.2	51	57.1		4965.0	568.00	16700.42
	2/12/2014	11:53	2/12/2014 11:53			17				Valve shut	57.1	6.53	16706.95
Note: a red value, i.e. 75 °F, indicates that value was interpolated from field data											Total CO_2 Mass (lbs):		16706.95

SW-23 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
SW-23 Event 1	11/13/2013	8:51	11/13/2013 8:51										
	11/13/2013	8:54	11/13/2013 8:54	32	33	30	<2	32.3	0.0		0.0	0.00	0.00
	11/13/2013	8:59	11/13/2013 8:59	28	28	24.5	3.5	34.6	5.7		14.3	1.63	1.63
	11/13/2013	9:00	11/13/2013 9:00	34	34	30	8	36.8	13.9		9.8	1.12	2.75
	11/13/2013	9:03	11/13/2013 9:03	34	32.5	28.5	9.25	36.8	15.8		44.6	5.10	7.86
	11/13/2013	9:06	11/13/2013 9:06	37	34	30	11.75	35.2	20.5		54.4	6.23	14.09
	11/13/2013	9:07	11/13/2013 9:07	41	36	31.5	13.75	27.9	24.6		22.6	2.58	16.67
	11/13/2013	9:36	11/13/2013 9:36	40	35	31	15.5	19.7	27.7		759.5	86.88	103.55
	11/13/2013	10:13	11/13/2013 10:13	40	34	30	16	20.6	28.3		1036.9	118.62	222.17
	11/13/2013	10:18	11/13/2013 10:18	44	36	31.5	18.25	19.7	33.0		153.3	17.53	239.70
	11/13/2013	10:45	11/13/2013 10:45	44	36	31	18.75	17.4	34.0		904.2	103.44	343.15
	11/13/2013	12:20	11/13/2013 12:20	44	34.5	30	19.75	17.2	35.3		3289.1	376.27	719.42
	11/13/2013	12:24	11/13/2013 12:24	48	36	31	21.5	21.7	38.8		148.1	16.94	736.36
	11/13/2013	12:29	11/13/2013 12:29	51	37.5	32.5	22.75	15.9	41.9		201.8	23.08	759.45
	11/13/2013	12:53	11/13/2013 12:53	52	38	33	23	26.2	42.1		1008.5	115.37	874.81
	11/13/2013	13:00	11/13/2013 13:00		25	21				Valve shut	294.8	33.72	908.54
	11/13/2013	13:02	11/13/2013 13:02	24	25	21							908.54
SW-23 Event 2	12/10/2013	8:37	12/10/2013 8:37	52	36	36	<2	72.0	0.0				908.54
	12/10/2013	8:38	12/10/2013 8:38	52	33	36	<2	72.0	0.0		0.0	0.00	908.54
	12/10/2013	8:50	12/10/2013 8:50	52	33	32.4	<2	72.0	0.0		0.0	0.00	908.54
	12/10/2013	9:27	12/10/2013 9:27	50	32	32	<2	72.0	0.0		0.0	0.00	908.54
	12/10/2013	10:00	12/10/2013 10:00	50	31	32	<2	73.0	0.0		0.0	0.00	908.54
	12/10/2013	10:48	12/10/2013 10:48	47.5	31	31.6	<2	75.0	0.0		0.0	0.00	908.54
	12/10/2013	10:51	12/10/2013 10:51	47.5	32.5	32.4	5.5	75.0	11.2		0.0	0.00	908.54
	12/10/2013	11:41	12/10/2013 11:41	45	32.5	32.4	6	74.0	12.2		558.7	63.91	972.45
	12/10/2013	12:34	12/10/2013 12:34	51	32.5	32	6.5	78.0	13.2		646.6	73.98	1046.43
	12/10/2013	12:37	12/10/2013 12:37							Valve shut	39.5	4.52	1050.95
	12/10/2013	12:38	12/10/2013 12:38			24							1050.95
SW-23 Event 3	12/12/2013	11:43	12/12/2013 11:43		28	33.2	14	72	27.1				1050.95
	12/12/2013	11:51	12/12/2013 11:51		28	29.2	16.1	72	31.2		233.2	26.67	1077.62
	12/12/2013	12:58	12/12/2013 12:58		28	25.2	19	72	36.8		2277.0	260.49	1338.11
	12/12/2013	13:00	12/12/2013 13:00		32	28.6	23	72	46.6		83.4	9.54	1347.65
	12/12/2013	15:43	12/12/2013 15:43	45	32	28	24	70	48.7		7770.1	888.90	2236.55
	12/12/2013	15:44	12/12/2013 15:44	45	34	29	26	70	53.9		51.3	5.87	2242.42
	12/12/2013	16:40	12/12/2013 16:40	45	34	29	26.5	66	55.2		3055.0	349.49	2591.91
	12/12/2013	17:00	12/12/2013 17:00	45	34	29	27	64	56.3		1115.1	127.57	2719.48
	12/12/2013	17:01	12/12/2013 17:01							Valve shut	56.3	6.44	2725.93
	12/12/2013	17:02	12/12/2013 17:02			18							2725.93
SW-23 Event 4	12/19/2013	8:44	12/19/2013 8:44	48	33	34	10	58	20.8				2725.93
	12/19/2013	9:20	12/19/2013 9:20	43	30	26	23	61	46.1		1203.3	137.66	2863.59
	12/19/2013	9:21	12/19/2013 9:21	43	32	27.5	24	61	49.2		47.6	5.45	2869.03
	12/19/2013	10:12	12/19/2013 10:12	40	31	26	25	66	50.4		2539.0	290.46	3159.49
	12/19/2013	11:10	12/19/2013 11:10	40	31	26	25	70	50.2		2917.7	333.78	3493.27
	12/19/2013	12:39	12/19/2013 12:39	45	31	26	26	74	52.0		4548.7	520.37	4013.64
	12/19/2013	12:41	12/19/2013 12:41							Valve shut	104.0	11.90	4025.54
	12/19/2013	12:42	12/19/2013 12:42			17							4025.54
SW-23 Event 5	1/7/2014	9:44	1/7/2014 9:44					40					4025.54
	1/7/2014	9:46	1/7/2014 9:46	54	30	33	7	40	14.3		28.7	3.28	4028.82
	1/7/2014	10:34	1/7/2014 10:34	50	28	27	17	42	33.9		1158.0	132.48	4161.29
	1/7/2014	10:36	1/7/2014 10:36	49	33.5	30.5	23	42	48.8		82.7	9.47	4170.76
	1/7/2014	11:39	1/7/2014 11:39	46	33	30	24	44	50.6		3130.4	358.12	4528.88
	1/7/2014	13:30	1/7/2014 13:30	47	32.5	28.5	26	48	54.3		5817.6	665.53	5194.41
	1/7/2014	13:31	1/7/2014 13:31							Valve shut	54.3	6.21	5200.62

SW-23 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	1/7/2014	13:32	1/7/2014 13:32			20							5200.62
SW-23 Event 6	1/9/2014	13:08	1/9/2014 13:08	41	34	34	4	64	8.3		0.0	0.00	5200.62
	1/9/2014	13:15	1/9/2014 13:15	40	32	28	15	64	30.6		136.4	15.61	5216.23
	1/9/2014	14:49	1/9/2014 14:49	39	32	26	17	62	34.8		3075.1	351.79	5568.02
	1/9/2014	14:54	1/9/2014 14:54	39	32.5	28	20.5	62	42.2		192.4	22.01	5590.03
	1/9/2014	14:59	1/9/2014 14:59	40	35	29	21	62	44.4		216.3	24.75	5614.78
	1/9/2014	15:30	1/9/2014 15:30	40	35	28.5	21.5	61	45.5		1392.2	159.26	5774.04
	1/9/2014	17:14	1/9/2014 17:14	51	37	28.5	23.9	60	51.6		5047.6	577.45	6351.49
	1/9/2014	17:18	1/9/2014 17:18			25				Valve shut			6351.49
SW-23 Event 7	1/23/2014	11:27	1/23/2014 11:27	45	28	30	<2	56	0.0		0.0	0.00	6351.49
	1/23/2014	11:28	1/23/2014 11:28	45	32.8	31.3	7	56	14.5		7.3	0.83	6352.32
	1/23/2014	12:56	1/23/2014 12:56	45	30	29.5	14.3	58	28.7		1904.0	217.82	6570.14
	1/23/2014	12:57	1/23/2014 12:57	45	33	31.5	18.5	58	38.4		33.6	3.84	6573.98
	1/23/2014	14:21	1/23/2014 14:21	48	33	30	20	56	41.6		3361.9	384.60	6958.58
	1/23/2014	15:50	1/23/2014 15:50	48	32	29.8	21.8	56	44.9		3849.4	440.38	7398.96
	1/23/2014	16:24	1/23/2014 16:24		32	29	21.9	56	45.1		1529.5	174.97	7573.94
	1/23/2014	16:32	1/23/2014 16:32			21				Valve shut	360.7	41.26	7615.20
SW-23 Event 8	1/24/2014	7:41	1/24/2014 7:41	56	30	30.5	<2	40	0.0				7615.20
	1/24/2014	7:42	1/24/2014 7:42	55	32	31	10.8	40	22.6		11.3	1.29	7616.49
	1/24/2014	7:45	1/24/2014 7:45	55	30.5	29.5	16	40	32.9		83.3	9.53	7626.02
	1/24/2014	7:48	1/24/2014 7:48	55	32	30.5	20	40	41.9		112.2	12.83	7638.86
	1/24/2014	8:00	1/24/2014 8:00	53	32	30	20.3	41	42.4		505.8	57.86	7696.72
	1/24/2014	8:27	1/24/2014 8:27	50	32	29.5	20.8	44	43.4		1158.2	132.50	7829.22
	1/24/2014	8:52	1/24/2014 8:52	49	32	29.5	20.8	45	43.3		1083.2	123.92	7953.13
	1/24/2014	8:54	1/24/2014 8:54	48	33.5	30.5	23.2	45	49.1		92.4	10.57	7963.70
	1/24/2014	9:41	1/24/2014 9:41	47	33.5	30	23.8	49	50.1		2332.0	266.79	8230.49
	1/24/2014	10:43	1/24/2014 10:43	46	33	29.5	24.1	51	50.4		3117.3	356.62	8587.11
	1/24/2014	11:45	1/24/2014 11:45	45	33	29	24.7	54	51.5		3159.4	361.44	8948.55
	1/24/2014	11:58	1/24/2014 11:58	45	33	29	24.7	54	51.5		669.6	76.60	9025.15
	1/24/2014	12:01	1/24/2014 12:01			21				Valve shut	154.5	17.68	9042.83
SW-23 Event 9	1/29/2014	11:45	1/29/2014 11:45	50	28	29	8	40	16.0				9042.83
	1/29/2014	11:50	1/29/2014 11:50	50	29	29.5	8	40	16.2		80.5	9.20	9052.04
	1/29/2014	13:00	1/29/2014 13:00	48	26	28	10.5	40	20.5		1283.7	146.85	9198.89
	1/29/2014	14:00	1/29/2014 14:00	45	26	28	10.5	40	20.5		1229.4	140.65	9339.54
	1/29/2014	15:00	1/29/2014 15:00	46	28	28	12.5	40	25.0		1364.6	156.11	9495.64
	1/29/2014	16:20	1/29/2014 16:20	46	29	28.5	12.5	40	25.3		2011.5	230.11	9725.75
	1/29/2014	16:25	1/29/2014 16:25			20				Valve shut	126.5	14.47	9740.22
SW-23 Event 10	2/3/2014	8:44	2/3/2014 8:44	54	27	25	<2	68	0.0		0.0	0.00	9740.22
	2/3/2014	8:46	2/3/2014 8:46	54	33	31	7	68	14.4		14.4	1.65	9741.87
	2/3/2014	8:47	2/3/2014 8:47		33	30	11	68	22.6		18.5	2.12	9743.98
	2/3/2014	8:49	2/3/2014 8:49	53	32	29	14	68	28.5		51.1	5.85	9749.83
	2/3/2014	8:51	2/3/2014 8:51	53	33	28	17.8	68	36.6		65.1	7.45	9757.28
	2/3/2014	8:52	2/3/2014 8:52	53	33	27	19	68	39.1		37.8	4.33	9761.60
	2/3/2014	9:13	2/3/2014 9:13		32.5	27	20	70	40.8		838.9	95.98	9857.58
	2/3/2014	10:16	2/3/2014 10:16	52	32	26	20.5	74	41.5		2592.1	296.54	10154.12
	2/3/2014	11:58	2/3/2014 11:58	51	31.5	25	21.3	77	42.7		4293.3	491.16	10645.28
	2/3/2014	12:00	2/3/2014 12:00	50	33	27	25	77	51.0		93.7	10.72	10655.99
	2/3/2014	13:22	2/3/2014 13:22	50	34	27	25	74	51.7		4207.1	481.29	11137.29
	2/3/2014	14:22	2/3/2014 14:22	50	34	27	25	73	51.7		3100.5	354.70	11491.99
	2/3/2014	15:28	2/3/2014 15:28	50	34	26	25.5	70	52.9		3451.5	394.85	11886.84
	2/3/2014	16:55	2/3/2014 16:55	50	34	26	26.2	70	54.3		4664.6	533.63	12420.47
	2/4/2014	9:30	2/4/2014 9:30	48	34	24	28.7	61	60.1		56914.4	6511.01	18931.47
	2/4/2014	9:33	2/4/2014 9:33			19				Valve shut	180.2	20.61	18952.09

SW-23 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
SW-23 Event 11	2/5/2014	8:12	2/5/2014 8:12	54	32.5	35	6.5	64	13.3				18952.09
	2/5/2014	8:37	2/5/2014 8:37	48	29	30	18	64	35.5		611.2	69.92	19022.00
	2/5/2014	9:23	2/5/2014 9:23	45	29	29	19	66	37.4		1678.8	192.06	19214.06
	2/5/2014	9:25	2/5/2014 9:25	45	32	29	23	66	46.9		84.3	9.65	19223.71
	2/5/2014	10:23	2/5/2014 10:23	44	32	29	23.2	68	47.2		2728.4	312.12	19535.83
	2/5/2014	11:24	2/5/2014 11:24	44	32	28.8	23.2	70	47.1		2876.3	329.04	19864.88
	2/5/2014	12:36	2/5/2014 12:36	44	32	28.8	22.2	72	45.0		3315.3	379.28	20244.15
	2/5/2014	13:30	2/5/2014 13:30	43	32	28.2	23	76	46.4		2468.2	282.36	20526.51
	2/5/2014	14:44	2/5/2014 14:44	45	32	27.8	24	76	48.4		3510.4	401.59	20928.10
	2/5/2014	15:38	2/5/2014 15:38	45	32	27.6	24.3	71	49.3		2638.9	301.89	21229.99
	2/5/2014	17:10	2/5/2014 17:10	48	32	27.6	24	72	48.6		4504.6	515.32	21745.32
	2/5/2014	21:19	2/5/2014 21:19	48	32	28	25	62	51.2		12424.8	1421.39	23166.71
	2/6/2014	7:58	2/6/2014 7:58	48	31.5	28.2	26	56	53.2		33355.6	3815.88	26982.59
	2/6/2014	8:00	2/6/2014 8:00			22				Valve shut	106.5	12.18	26994.77
SW-23 Event 12	2/7/2014	8:15	2/7/2014 8:15	53	31	33.4	<2		0.0				26994.77
	2/7/2014	8:48	2/7/2014 8:48	46	28	27.6	14.5	56	28.5		470.7	53.84	27048.62
	2/7/2014	8:51	2/7/2014 8:51	44	31	29.2	20.5	56	41.7		105.4	12.06	27060.67
	2/7/2014	9:38	2/7/2014 9:38	43	30.5	28.6	22.5	56	45.6		2051.7	234.71	27295.38
	2/7/2014	10:00	2/7/2014 10:00	43	30.5	28.2	24	57	48.5		1035.2	118.43	27413.81
	2/7/2014	10:01	2/7/2014 10:01			22				Valve shut	48.5	5.55	27419.37
Note: a red value, i.e. 75 °F, indicates that value was interpolated from field data											Total CO_2 Mass (lbs):		27419.37

SW-24 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
SW-24 Event 1	11/22/2013	8:21	11/22/2013 8:21	50	28			72	0.0				
	11/22/2013	8:23	11/22/2013 8:23	55	32	32	<2	72	0.0		0.0	0.00	0.00
	11/22/2013	8:47	11/22/2013 8:47		31	31	<2	74	0.0		0.0	0.00	0.00
	11/22/2013	8:48	11/22/2013 8:48	54	34	34	2	78	4.1		2.1	0.24	0.24
	11/22/2013	9:56	11/22/2013 9:56		35	34	2	78	4.2		281.3	32.19	32.42
	11/22/2013	9:57	11/22/2013 9:57	50	37	36.5	4	82	8.5		6.3	0.72	33.14
	11/22/2013	11:06	11/22/2013 11:06		38	36.5	4	80	8.6		586.7	67.12	100.26
	11/22/2013	12:01	11/22/2013 12:01		38	36.5	4.5	84	9.6		498.8	57.06	157.32
	11/22/2013	13:17	11/22/2013 13:17		37	36.5	5	84	10.5		765.0	87.51	244.83
	11/22/2013	14:13	11/22/2013 14:13		37	36.5	5.5	80	11.6		621.4	71.09	315.92
	11/22/2013	15:27	11/22/2013 15:27	50	37	36	6	76	12.8		902.8	103.28	419.19
	11/22/2013	16:40	11/22/2013 16:40		37	36	6	75	12.8		931.5	106.56	525.75
	11/22/2013	17:29	11/22/2013 17:29	54	37	36	6	72	12.8		626.4	71.67	597.42
	11/22/2013	17:30	11/22/2013 17:30							Valve shut	12.8	1.46	598.88
	11/22/2013	17:31	11/22/2013 17:31										598.88
SW-24 Event 2	12/6/2013	13:31	12/6/2013 13:31	50	33	33	<2	86	0.0				598.88
	12/6/2013	13:44	12/6/2013 13:44	49	32	32.5	<2	88	0.0				598.88
	12/6/2013	14:45	12/6/2013 14:45	49	32	32	<2	86	0.0				598.88
	12/6/2013	14:46	12/6/2013 14:46	47	34	34.5	4	86	8.2		4.1	0.47	599.35
	12/6/2013	16:00	12/6/2013 16:00	45	34	35	4	78	8.2		606.9	69.42	668.77
	12/6/2013	16:30	12/6/2013 16:30	45	34	34.5	4	77	8.2		247.1	28.27	697.04
	12/6/2013	17:32	12/6/2013 17:32	50	34	34.5	5.5	71	11.4		608.7	69.64	766.68
	12/6/2013	17:34	12/6/2013 17:34			28				Valve shut	22.8	2.61	769.29
SW-24 Event 3	12/10/2013	13:22	12/10/2013 13:22	54	33	33	<2	82	0.0				769.29
	12/10/2013	13:41	12/10/2013 13:41	54	33	32	<2	80	0.0				769.29
	12/10/2013	14:14	12/10/2013 14:14	52	32	31.5	<2	75	0.0				769.29
	12/10/2013	14:37	12/10/2013 14:37	50	32	31.5	<2	74	0.0				769.29
	12/10/2013	15:26	12/10/2013 15:26	51	32	31.5	<2	76	0.0				769.29
	12/10/2013	15:52	12/10/2013 15:52	50	32.5	31.5	<2	76	0.0				769.29
	12/10/2013	16:30	12/10/2013 16:30	50	32	31	<2	72	0.0				769.29
	12/10/2013	17:13	12/10/2013 17:13	50	32	31	<2	68	0.0				769.29
	12/10/2013	22:36	12/10/2013 22:36	54	30	30	8	58	16.1		2596.3	297.01	1066.30
	12/11/2013	7:53	12/11/2013 7:53	50	30	30	6.5	58	13.1	Valve shut	8114.9	928.34	1994.64
SW-24 Event 4	12/12/2013	15:40	12/12/2013 15:40	50	37	34	<2	70	0.0				1994.64
	12/12/2013	16:24	12/12/2013 16:24	45	34	33	3.5	70	7.3		159.7	18.27	2012.91
	12/12/2013	17:29	12/12/2013 17:29	52	34	33	3.5	63	7.3		473.5	54.17	2067.08
	12/12/2013	22:16	12/12/2013 22:16	50	32.5	31.5	5	58	10.3		2531.2	289.57	2356.64
	12/13/2013	9:44	12/13/2013 9:44	50	33	30.5	9.5	68	19.5		10273.5	1175.29	3531.94
	12/13/2013	9:45	12/13/2013 9:45	50	37.5	32	13	68	28.0		23.8	2.72	3534.66
	12/13/2013	10:47	12/13/2013 10:47	45	32	31.5	12	70	24.4		1622.9	185.66	3720.31
	12/13/2013	12:40	12/13/2013 12:40	45	32	31	12.5	70	25.4		2810.6	321.53	4041.85
	12/13/2013	13:47	12/13/2013 13:47	45	32	31	12	70	24.4		1666.5	190.64	4232.49
	12/13/2013	13:48	12/13/2013 13:48	45	32	33	16	70	32.5		28.4	3.25	4235.74
	12/13/2013	14:56	12/13/2013 14:56	45	35	33.5	15.5	70	32.5		2208.9	252.70	4488.45
	12/13/2013	14:57	12/13/2013 14:57							Valve shut	32.5	3.72	4492.16
	12/13/2013	14:58	12/13/2013 14:58										4492.16
SW-24 Event 5	12/18/2013	12:34	12/18/2013 12:34	50	32	33	<2	66	0.0		0.0	0.00	4492.16
	12/18/2013	13:16	12/18/2013 13:16	51	31	32	4	68	8.0		169.0	19.34	4511.50
	12/18/2013	13:17	12/18/2013 13:17	50	34	34	7	68	14.5		11.3	1.29	4512.79
	12/18/2013	14:37	12/18/2013 14:37	50	34	34	7	69	14.5		1163.2	133.07	4645.86
	12/18/2013	16:10	12/18/2013 16:10	45	33	34	7	68	14.4		1345.1	153.88	4799.75
	12/18/2013	17:06	12/18/2013 17:06	45	33	34	7.5	64	15.5		836.6	95.71	4895.45
	12/18/2013	17:50	12/18/2013 17:50	48	33	34	8	58	16.6		706.2	80.79	4976.24

SW-24 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	12/18/2013	17:51	12/18/2013 17:51							Valve shut	16.6	1.90	4978.14
	12/18/2013	17:52	12/18/2013 17:52			28							4978.14
SW-24 Event 6	1/8/2014	8:28	1/8/2014 8:28	51	33	35	<2	40	0.0				4978.14
	1/8/2014	8:29	1/8/2014 8:29	51	32	35	<2	40	0.0		0.0	0.00	4978.14
	1/8/2014	8:44	1/8/2014 8:44	51	32	34	<2	42	0.0		0.0	0.00	4978.14
	1/8/2014	9:13	1/8/2014 9:13	50	32	33	3.5	46	7.3		105.6	12.08	4990.22
	1/8/2014	9:58	1/8/2014 9:58	49	32	33	3.5	50	7.2		326.9	37.40	5027.62
	1/8/2014	11:01	1/8/2014 11:01	47	31	32.5	3.8	48	7.8		474.1	54.24	5081.85
	1/8/2014	11:02	1/8/2014 11:02	47	32	33.5	5	48	10.4		9.1	1.04	5082.89
	1/8/2014	12:24	1/8/2014 12:24	47	32	33.5	5	60	10.3		845.9	96.77	5179.66
	1/8/2014	12:35	1/8/2014 12:35	47	32	33.5	5	60	10.3		112.8	12.90	5192.56
	1/8/2014	12:36	1/8/2014 12:36							Valve shut	10.3	1.17	5193.74
	1/8/2014	13:24	1/8/2014 13:24	50	32	32.5	8	59	16.4	Restart	788.2	90.17	5283.91
	1/8/2014	13:55	1/8/2014 13:55	50	32	33	6	58	12.3		445.6	50.98	5334.88
	1/8/2014	15:03	1/8/2014 15:03	50	32.5	33	6	60	12.4		839.7	96.07	5430.95
	1/8/2014	16:25	1/8/2014 16:25	50	32	33	6	55	12.4		1014.2	116.02	5546.97
	1/8/2014	17:14	1/8/2014 17:14	54	32	33	6	53	12.4		606.5	69.39	5616.36
	1/8/2014	21:19	1/8/2014 21:19	53	33	32.5	7	50	14.7		3313.3	379.04	5995.39
	1/8/2014	21:21	1/8/2014 21:21	53	32	34	8.5	50	17.6		32.3	3.69	5999.09
	1/9/2014	7:14	1/9/2014 7:14	52	32	32	11.5	54	23.7		12254.6	1401.93	7401.01
	1/9/2014	8:16	1/9/2014 8:16	52	32	32	11.5	55	23.7		1470.2	168.19	7569.20
	1/9/2014	8:17	1/9/2014 8:17							Valve shut	23.7	2.71	7571.91
	1/9/2014	8:18	1/9/2014 8:18			27							7571.91
SW-24 Event 7	1/10/2014	9:18	1/10/2014 9:18										7571.91
	1/10/2014	9:19	1/10/2014 9:19	50	33	29	6	67	12.4		12.4	1.41	7573.32
	1/10/2014	9:25	1/10/2014 9:25	49	36	34	16	67	34.0		139.0	15.90	7589.22
	1/10/2014	10:13	1/10/2014 10:13	45	35	33	18	68	37.8		1722.4	197.04	7786.26
	1/10/2014	11:52	1/10/2014 11:52	45	35	33	18	69	37.8		3739.9	427.85	8214.11
	1/10/2014	12:49	1/10/2014 12:49	44	35	33	17.5	68	36.7		2123.4	242.91	8457.03
	1/10/2014	14:18	1/10/2014 14:18	48	35	33	18	67	37.8		3318.8	379.67	8836.69
	1/10/2014	15:16	1/10/2014 15:16	47	35	33	18	67	37.8		2194.3	251.03	9087.72
	1/10/2014	16:23	1/10/2014 16:23	46	35	33	18	68	37.8		2533.6	289.84	9377.56
	1/10/2014	17:14	1/10/2014 17:14	45	35	33	18	66	37.9		1929.5	220.73	9598.29
	1/10/2014	17:42	1/10/2014 17:42	46	35	33	18	66	37.9		1060.4	121.31	9719.60
	1/10/2014	22:01	1/10/2014 22:01	45	35	33	16	64	33.7		9272.2	1060.73	10780.33
	1/11/2014	8:21	1/11/2014 8:21	45	34.5	32.5	18	64	37.8		22158.9	2534.98	13315.31
	1/11/2014	8:22	1/11/2014 8:22							Valve shut	37.8	4.32	13319.63
	1/11/2014	8:23	1/11/2014 8:23			28							13319.63
Note: a red value, i.e. 75 °F, indicates that value was interpolated from field data											Total CO_2 Mass (lbs):		13319.63

SW-25 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
SW-25 Event 1	11/23/2013	8:05	11/23/2013 8:05	50	30			60	0.0				
	11/23/2013	8:06	11/23/2013 8:06	57	39	38.8	<2	60	0.0		0.0	0.00	0.00
	11/23/2013	8:13	11/23/2013 8:13	55	37	37.6	4	63	8.6		30.1	3.45	3.45
	11/23/2013	8:24	11/23/2013 8:24	55	37	37.2	5	65	10.7		106.5	12.18	15.63
	11/23/2013	8:41	11/23/2013 8:41	54	37	36.4	6	66	12.9		200.8	22.97	38.60
	11/23/2013	9:17	11/23/2013 9:17		36	35.6	6	76	12.6		459.1	52.52	91.12
	11/23/2013	10:16	11/23/2013 10:16		36	32.8	7.0	80	14.7		805.4	92.14	183.26
	11/23/2013	10:19	11/23/2013 10:19		40	38.8	11	80	24.0		58.0	6.63	189.89
	11/23/2013	11:22	11/23/2013 11:22		40	38.4	12	80	26.1		1578.6	180.60	370.49
	11/23/2013	12:33	11/23/2013 12:33	47	40	38	12	78	26.2		1858.2	212.58	583.07
	11/23/2013	12:43	11/23/2013 12:43		39	38	12.5	78	27.0		266.2	30.45	613.52
	11/23/2013	12:45	11/23/2013 12:45							Valve shut	54.1	6.19	619.71
	11/23/2013	12:46	11/23/2013 12:46			31.2							619.71
SW-25 Event 2	12/12/2013	13:13	12/12/2013 13:13					70					619.71
	12/12/2013	13:18	12/12/2013 13:18		33	35	<2	70	0.0				619.71
	12/12/2013	14:49	12/12/2013 14:49	50	32	33	4	70	8.1		369.5	42.27	661.98
	12/12/2013	14:50	12/12/2013 14:50	50	33	34.5	5	70	10.3		9.2	1.05	663.03
	12/12/2013	15:35	12/12/2013 15:35	50	34	34	6	70	12.4		510.9	58.45	721.48
	12/12/2013	16:28	12/12/2013 16:28	45	33	3.5	6.5	70	13.3		683.3	78.17	799.65
	12/12/2013	16:29	12/12/2013 16:29	46	34	35	9	70	18.7		16.0	1.83	801.48
	12/12/2013	17:30	12/12/2013 17:30	52	36	35	9	70	19.1		1150.4	131.61	933.09
	12/12/2013	22:17	12/12/2013 22:17	50	34	33	12	58	25.2		6348.4	726.26	1659.35
	12/13/2013	8:50	12/13/2013 8:50	48	34	32	14.5	58	30.4		17604.5	2013.95	3673.31
	12/13/2013	8:51	12/13/2013 8:51							Valve shut	30.4	3.48	3676.79
	12/13/2013	8:52	12/13/2013 8:52										3676.79
SW-25 Event 3	12/18/2013	12:32	12/18/2013 12:32	52	34	33	<2	66	0.0		0.0	0.00	3676.79
	12/18/2013	13:14	12/18/2013 13:14	51	34	32	3.5	68	7.3		152.7	17.47	3694.26
	12/18/2013	13:15	12/18/2013 13:15	50	34	34	7	68	14.5		10.9	1.25	3695.51
	12/18/2013	14:25	12/18/2013 14:25	50	34	34	6.5	69.0	13.5		981.5	112.28	3807.79
	12/18/2013	16:08	12/18/2013 16:08	45	34	33	8	68.0	16.6		1551.2	177.46	3985.25
	12/18/2013	17:04	12/18/2013 17:04	45	34	33	9	64.0	18.8		991.3	113.40	4098.65
	12/18/2013	17:45	12/18/2013 17:45	45	35	33	10	58.0	21.2		819.7	93.77	4192.43
	12/18/2013	17:47	12/18/2013 17:47							Valve shut	42.4	4.85	4197.28
	12/18/2013	17:50	12/18/2013 17:50			28							4197.28
SW-25 Event 4	1/9/2014	8:29	1/9/2014 8:29										4197.28
	1/9/2014	8:30	1/9/2014 8:30	55	36	35.5	<2	53	0.0				4197.28
	1/9/2014	8:33	1/9/2014 8:33	55	35.5	35	3	53	6.4		9.6	1.10	4198.38
	1/9/2014	8:55	1/9/2014 8:55	51	35	34.5	6.5	54	13.8		222.9	25.51	4223.89
	1/9/2014	9:35	1/9/2014 9:35	51	34	34.5	7.5	54	15.8		592.9	67.83	4291.72
	1/9/2014	10:03	1/9/2014 10:03	50	34	34	8	56	16.8		456.8	52.26	4343.98
	1/9/2014	10:04	1/9/2014 10:04	50	35.5	35	12	56	25.6		21.2	2.43	4346.41
	1/9/2014	11:05	1/9/2014 11:05	42	35.5	35	12	61	25.5		1559.6	178.41	4524.82
	1/9/2014	12:25	1/9/2014 12:25	40	34.5	33.5	12	62	25.2		2028.8	232.09	4756.92
	1/9/2014	12:27	1/9/2014 12:27	39	36	35	13.5	62	28.8		54.0	6.18	4763.10
	1/9/2014	14:18	1/9/2014 14:18	39	35.5	34.5	14	60	29.8		3251.7	371.99	5135.09
	1/9/2014	16:02	1/9/2014 16:02	43	38	36	18	48	39.7		3614.8	413.54	5548.62
	1/9/2014	17:14	1/9/2014 17:14	51	42	36.5	22	56	50.0		3230.3	369.55	5918.17
	1/9/2014	17:15	1/9/2014 17:15							Valve shut	50.0	5.72	5923.89
	1/9/2014	17:16	1/9/2014 17:16			28							5923.89
SW-25 Event 5	1/10/2014	17:32	1/10/2014 17:32										5923.89
	1/10/2014	17:35	1/10/2014 17:35	47	38.5	35.5	18	64	39.3		117.8	13.48	5937.37
	1/10/2014	17:44	1/10/2014 17:44	46	39	36	18	64	39.5		354.4	40.54	5977.91
	1/10/2014	22:05	1/10/2014 22:05	45	37.5	36	18	62	39.0		10238.0	1171.23	7149.14

SW-25 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	1/11/2014	8:45	1/11/2014 8:45	42	35	32.5	21.5	63	45.4		26992.4	3087.93	10237.07
	1/11/2014	8:46	1/11/2014 8:46							Valve shut	45.4	5.19	10242.26
	1/11/2014	8:47	1/11/2014 8:47			28							10242.26
Note: a red value, i.e. 75 °F, indicates that value was interpolated from field data											Total CO_2 Mass (lbs):		10242.26

SW-26 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
SW-26 Event 1	11/22/2013	8:00	11/22/2013 8:00	52	30			67	0.0				
	11/22/2013	8:02	11/22/2013 8:02		28		<2	66.5	0.0		0.0	0.00	0.00
	11/22/2013	8:03	11/22/2013 8:03		27	33.2	4	66	7.7		3.8	0.44	0.44
	11/22/2013	8:04	11/22/2013 8:04		34	34	8	69	16.6		12.2	1.39	1.83
	11/22/2013	8:12	11/22/2013 8:12		34	32.8	11	69	22.8		157.8	18.05	19.88
	11/22/2013	8:13	11/22/2013 8:13		35	33.2	12	69	25.2		24.0	2.75	22.63
	11/22/2013	8:44	11/22/2013 8:44		34	32.8	13	68	27.0		808.9	92.54	115.17
	11/22/2013	8:45	11/22/2013 8:45		34	33.6	15	71	31.1		29.0	3.32	118.49
	11/22/2013	9:52	11/22/2013 9:52		34	33.6	15	74	31.0		2079.4	237.88	356.37
	11/22/2013	9:54	11/22/2013 9:54		36	34.4	16	74	33.7		64.7	7.41	363.78
	11/22/2013	11:03	11/22/2013 11:03		36	34.8	17	74	35.8		2400.7	274.64	638.42
	11/22/2013	11:56	11/22/2013 11:56		36	34.4	17	75	35.8		1899.0	217.25	855.67
	11/22/2013	12:51	11/22/2013 12:51		36	34.4	17	76	35.8		1968.8	225.23	1080.90
	11/22/2013	12:52	11/22/2013 12:52							Valve shut	35.8	4.09	1084.99
	11/22/2013	12:53	11/22/2013 12:53										1084.99
SW-26 Event 2	12/5/2013	12:51	12/5/2013 12:51	53	35	37	4	80	8.3				1084.99
	12/5/2013	14:35	12/5/2013 14:35	50	34	35	8.5	80	17.5		1339.6	153.25	1238.24
	12/5/2013	15:40	12/5/2013 15:40	47	33	34	10.5	75	21.4		1264.4	144.65	1382.89
	12/5/2013	15:42	12/5/2013 15:42	49	34	34.5	12	75	24.8		46.2	5.29	1388.17
	12/5/2013	16:50	12/5/2013 16:50	47	34	34	13.5	72	27.9		1792.3	205.04	1593.21
	12/5/2013	17:12	12/5/2013 17:12	53	34	34	14	70	29.0		626.8	71.71	1664.92
	12/5/2013	17:13	12/5/2013 17:13							Valve shut	29.0	3.32	1668.24
	12/5/2013	17:14	12/5/2013 17:14			30							1668.24
SW-26 Event 3	12/11/2013	12:55	12/11/2013 12:55	50	34	35	<2	66	0.0				1668.24
	12/11/2013	14:06	12/11/2013 14:06	50	32	32	7.5	68	15.3		541.7	61.97	1730.21
	12/11/2013	14:07	12/11/2013 14:07	49	32.5	34	11	68	22.5		18.9	2.16	1732.36
	12/11/2013	14:48	12/11/2013 14:48	50	32.5	33	11.5	66	23.6		944.4	108.04	1840.40
	12/11/2013	14:54	12/11/2013 14:54	45	35	34.5	14	66	29.5		159.1	18.20	1858.60
	12/11/2013	15:26	12/11/2013 15:26	45	35	34	14.5	66	30.5		959.4	109.75	1968.36
	12/11/2013	16:44	12/11/2013 16:44	35	31	32	14.5	62	29.3		2334.4	267.06	2235.41
	12/11/2013	16:55	12/11/2013 16:55							Valve shut	322.8	36.93	2272.34
	12/11/2013	16:56	12/11/2013 16:56										2272.34
SW-26 Event 4	12/19/2013	8:35	12/19/2013 8:35	52	34	33	<2	45	0.0				2272.34
	12/19/2013	8:54	12/19/2013 8:54	45	32	29	12	53	24.8		235.4	26.93	2299.28
	12/19/2013	8:58	12/19/2013 8:58	45	35	33	20	53	42.6		134.8	15.42	2314.70
	12/19/2013	9:38	12/19/2013 9:38	41	35	32	19.5	64	41.1		1674.8	191.59	2506.29
	12/19/2013	11:46	12/19/2013 11:46	40	34	30	20	68	41.6		5291.0	605.29	3111.58
	12/19/2013	12:34	12/19/2013 12:34	45	34	31	22	68	45.7		2094.8	239.65	3351.22
	12/19/2013	12:35	12/19/2013 12:35							Valve shut	45.7	5.23	3356.46
	12/19/2013	12:36	12/19/2013 12:36			24							3356.46
SW-26 Event 5	12/20/2013	7:26	12/20/2013 7:26	50	33	32.5	<2	60					3356.46
	12/20/2013	7:35	12/20/2013 7:35	49	31	34	10	60	20.3		182.5	20.88	3377.34
	12/20/2013	7:56	12/20/2013 7:56	45	31	28	12	56	24.4		469.5	53.71	3431.05
	12/20/2013	8:02	12/20/2013 8:02	45	35	32	21	56	44.6		207.2	23.70	3454.75
	12/20/2013	8:04	12/20/2013 8:04	45	37	34	22.5	56	48.8		93.4	10.69	3465.44
	12/20/2013	8:49	12/20/2013 8:49	42	37	34	22	60	47.5		2166.5	247.85	3713.29
	12/20/2013	10:02	12/20/2013 10:02	40	36	32	22	66	46.8		3440.7	393.61	4106.90
	12/20/2013	10:48	12/20/2013 10:48	39	36	31	22	68	46.7		2148.7	245.81	4352.71
	12/20/2013	10:54	12/20/2013 10:54	39	35	31	22	68	46.2		278.6	31.87	4384.58
	12/20/2013	11:36	12/20/2013 11:36	39	35	31	22	70	46.1		1938.3	221.74	4606.32
	12/20/2013	11:37	12/20/2013 11:37							Valve shut	46.1	5.27	4611.60
	12/20/2013	11:38	12/20/2013 11:38			24							4611.60
SW-26 Event 6	1/8/2014	13:07	1/8/2014 13:07						0.0		0.0	0.00	4611.60

SW-26 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	1/8/2014	13:14	1/8/2014 13:14	54	33	34	<2	58	0.0		0.0	0.00	4611.60
	1/8/2014	13:51	1/8/2014 13:51	52	33	33	4	57	8.3		153.8	17.60	4629.20
	1/8/2014	13:52	1/8/2014 13:52	52	35	34.5	7.5	57	15.9		12.1	1.39	4630.58
	1/8/2014	15:01	1/8/2014 15:01	50	35	34.5	8	60	16.9		1133.5	129.67	4760.25
	1/8/2014	16:21	1/8/2014 16:21	50	35	33.5	10	53	21.3		1529.9	175.02	4935.27
	1/8/2014	16:22	1/8/2014 16:22	50	36	35	14	53	30.1		25.7	2.94	4938.21
	1/8/2014	17:22	1/8/2014 17:22	55	36	34.5	14	52	30.2		1809.7	207.02	5145.24
	1/8/2014	17:23	1/8/2014 17:23							Valve shut	30.2	3.45	5148.69
	1/8/2014	17:24	1/8/2014 17:24			29							5148.69
SW-26 Event 7	1/10/2014	13:25	1/10/2014 13:25										5148.69
	1/10/2014	13:28	1/10/2014 13:28	50	35	34	7	66	14.7		44.2	5.05	5153.75
	1/10/2014	14:23	1/10/2014 14:23	48	34.5	33.5	13	65	27.2		1154.0	132.02	5285.77
	1/10/2014	14:24	1/10/2014 14:24	48	36	35	16.5	65	35.1		31.2	3.57	5289.33
	1/10/2014	15:21	1/10/2014 15:21	46	36	35	17.5	64	37.3		2062.5	235.95	5525.29
	1/10/2014	16:28	1/10/2014 16:28	45	36	34	18	66	38.3		2530.0	289.43	5814.72
	1/10/2014	17:30	1/10/2014 17:30	46	35	34	20	62	42.2		2495.5	285.49	6100.21
	1/10/2014	17:31	1/10/2014 17:31							Valve shut	42.2	4.83	6105.04
	1/10/2014	17:32	1/10/2014 17:32			27							6105.04
SW-26 Event 8	1/14/2014	12:10	1/14/2014 12:10										6105.04
	1/14/2014	12:12	1/14/2014 12:12	46	35	35	5	65	10.5		21.1	2.41	6107.45
	1/14/2014	12:29	1/14/2014 12:29	45	32.5	32	8.5	66	17.4		237.6	27.18	6134.63
	1/14/2014	12:30	1/14/2014 12:30	45	36	34.5	13.5	66	28.7		23.1	2.64	6137.27
	1/14/2014	13:42	1/14/2014 13:42	48	36	34	14.5	69	30.7		2139.0	244.71	6381.98
	1/14/2014	14:15	1/14/2014 14:15	48	36	34	14.5	69	30.7		1014.0	116.00	6497.97
	1/14/2014	16:00	1/14/2014 16:00	46	35	32.5	17	70	35.6		3483.5	398.51	6896.48
	1/14/2014	16:16	1/14/2014 16:16	46	35	32.5	18	70	37.7		586.8	67.13	6963.61
	1/14/2014	16:17	1/14/2014 16:17							Valve shut	37.7	4.32	6967.93
	1/14/2014	16:18	1/14/2014 16:18			27							6967.93
SW-26 Event 9	1/16/2014	12:46	1/16/2014 12:46	47	34	35	<2	58	0.0		0.0	0.00	6967.93
	1/16/2014	12:47	1/16/2014 12:47	47	34	35	6	58	12.6		6.3	0.72	6968.65
	1/16/2014	12:48	1/16/2014 12:48	47	33	32.5	8	58	16.6		14.6	1.67	6970.32
	1/16/2014	12:49	1/16/2014 12:49	47	34	33	13	58	27.3		22.0	2.51	6972.83
	1/16/2014	14:53	1/16/2014 14:53	47	32	31.5	15.8	60	32.4		3700.5	423.34	7396.16
	1/16/2014	14:54	1/16/2014 14:54	47	34	32.5	18	60	37.7		35.1	4.01	7400.17
	1/16/2014	15:34	1/16/2014 15:34	50	34	32	18	60	37.7		1508.2	172.54	7572.71
	1/16/2014	15:35	1/16/2014 15:35			26				Valve shut	37.7	4.31	7577.03
SW-26 Event 10	1/21/2014	8:28	1/21/2014 8:28	50	32	33	<2	56			0.0	0.00	7577.03
	1/21/2014	8:30	1/21/2014 8:30	50	33	33	8	56	16.6		33.3	3.81	7580.84
	1/21/2014	8:34	1/21/2014 8:34	50	33	32	9.8	58	20.4		74.0	8.47	7589.30
	1/21/2014	9:26	1/21/2014 9:26	46	32	31	11	64	22.5		1113.3	127.37	7716.67
	1/21/2014	9:27	1/21/2014 9:27	46	34	32.5	15.7	64	32.8		27.6	3.16	7719.83
	1/21/2014	10:08	1/21/2014 10:08	42	33	32	14.5	64	29.9		1285.2	147.03	7866.85
	1/21/2014	11:35	1/21/2014 11:35	40	32	30.5	15	67	30.5		2631.0	300.98	8167.84
	1/21/2014	12:58	1/21/2014 12:58	46	34	31	17.8	66	37.1		2805.8	320.99	8488.82
	1/21/2014	13:00	1/21/2014 13:00							Valve shut	74.1	8.48	8497.30
Note: a red value, i.e. 75 °F, indicates that value was interpolated from field data											Total CO_2 Mass (lbs):		8497.30

SW-27 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
SW-27 Event 1	11/22/2013	13:24	11/22/2013 13:24										
	11/22/2013	13:25	11/22/2013 13:25	55	31	31	<2	81.5	0.0		0.0	0.00	0.00
	11/22/2013	13:26	11/22/2013 13:26	55	33	33	<2	81.5	0.0		0.0	0.00	0.00
	11/22/2013	13:47	11/22/2013 13:47	55	34	30.5	6	83	12.3		129.0	14.76	14.76
	11/22/2013	14:11	11/22/2013 14:11	54	37	33	13	84	27.4		476.5	54.51	69.28
	11/22/2013	14:39	11/22/2013 14:39	51	36	33	14	80	29.4		794.8	90.92	160.20
	11/22/2013	15:11	11/22/2013 15:11	50	38	33.5	16.0	79	34.2		1017.5	116.40	276.60
	11/22/2013	15:53	11/22/2013 15:53	50	38	33.5	16.5	82	35.2		1458.5	166.85	443.45
	11/22/2013	16:48	11/22/2013 16:48	50	38	33.5	16.5	76	35.4		1942.2	222.19	665.64
	11/22/2013	17:25	11/22/2013 17:25	57	38	33.5	16.5	71	35.6		1313.6	150.27	815.91
	11/22/2013	17:26	11/22/2013 17:26							Valve shut	35.6	4.07	819.99
	11/22/2013	17:28	11/22/2013 17:28										819.99
SW-27 Event 2	12/5/2013	8:10	12/5/2013 8:10										819.99
	12/5/2013	8:12	12/5/2013 8:12	56	26	27	<2	64	0.0				819.99
	12/5/2013	8:13	12/5/2013 8:13		34	34.5	<2	64	0.0				819.99
	12/5/2013	8:38	12/5/2013 8:38	53		33.5	<2	64	0.0				819.99
	12/5/2013	8:48	12/5/2013 8:48	52	34	32	5.5	66	11.5		57.3	6.55	826.54
	12/5/2013	8:51	12/5/2013 8:51		34.5	33.5	7.5	66	15.7		40.7	4.66	831.20
	12/5/2013	9:05	12/5/2013 9:05	52	33	32.5	8.5	68	17.5		232.2	26.57	857.76
	12/5/2013	9:06	12/5/2013 9:06	52	34.5		11	68	23.0		20.2	2.31	860.08
	12/5/2013	9:23	12/5/2013 9:23	50	35	34.5	12	70	25.1		409.1	46.80	906.88
	12/5/2013	10:27	12/5/2013 10:27	49	35	33	16.5	76	34.4		1904.8	217.90	1124.78
	12/5/2013	11:44	12/5/2013 11:44	48	35	33.5	16	76	33.3		2606.9	298.23	1423.01
	12/5/2013	12:40	12/5/2013 12:40	49	35	33	17	75	35.5		1926.0	220.34	1643.35
	12/5/2013	12:41	12/5/2013 12:41							Valve shut	35.5	4.06	1647.40
	12/5/2013	12:42	12/5/2013 12:42			26							1647.40
SW-27 Event 3	12/11/2013	8:58	12/11/2013 8:58	55	37.5	34	<2	62	0.0				1647.40
	12/11/2013	9:27	12/11/2013 9:27	53	30	30	<2	68	0.0				1647.40
	12/11/2013	9:28	12/11/2013 9:28	53	33	32	4	68	8.2		4.1	0.47	1647.87
	12/11/2013	9:59	12/11/2013 9:59	52	33	32	4	67	8.2		253.8	29.03	1676.90
	12/11/2013	11:24	12/11/2013 11:24	50	34	31	6.5	72	13.5		919.9	105.24	1782.14
	12/11/2013	11:25	12/11/2013 11:25	49	34	33	10	72	20.7		17.1	1.95	1784.09
	12/11/2013	11:57	12/11/2013 11:57	48	35	34	12.5	71	26.2		749.9	85.79	1869.88
	12/11/2013	12:50	12/11/2013 12:50	45	35	34	13	68	27.3		1416.9	162.09	2031.97
	12/11/2013	12:58	12/11/2013 12:58							Valve shut	218.4	24.98	2056.95
	12/11/2013	12:59	12/11/2013 12:59										2056.95
SW-27 Event 4	12/18/2013	8:38	12/18/2013 8:38	48	29	32	<2	53	0.0		0.0	0.00	2056.95
	12/18/2013	9:14	12/18/2013 9:14	50	28	29	<2	60	0.0		0.0	0.00	2056.95
	12/18/2013	9:16	12/18/2013 9:16	50	32	34	6	60	12.3		12.3	1.41	2058.36
	12/18/2013	10:00	12/18/2013 10:00							Valve shut	541.4	61.93	2120.29
	12/18/2013	14:02	12/18/2013 14:02	49	31	33	<2	68	0.0	Restart	0.0	0.00	2120.29
	12/18/2013	14:40	12/18/2013 14:40	47	31	32	6	70	12.0		228.9	26.19	2146.48
	12/18/2013	14:42	12/18/2013 14:42	47	32	33	8	70	16.2		28.3	3.24	2149.72
	12/18/2013	16:13	12/18/2013 16:13	40	32	33	9.5	69	19.3		1617.6	185.05	2334.77
	12/18/2013	17:08	12/18/2013 17:08	45	32	32	10.5	62	21.5		1121.9	128.34	2463.11
	12/18/2013	17:09	12/18/2013 17:09	45	34	34	13.5	62	28.2		24.9	2.84	2465.96
	12/18/2013	17:53	12/18/2013 17:53	47	35	34	14.5	56	30.8		1298.8	148.58	2614.54
	12/18/2013	17:54	12/18/2013 17:54							Valve shut	30.8	3.53	2618.06
	12/18/2013	17:55	12/18/2013 17:55			29							2618.06
SW-27 Event 5	12/19/2013	12:36	12/19/2013 12:36	50	30	34	<2	68	0.0				2618.06
	12/19/2013	13:03	12/19/2013 13:03	50	29	39.5	4	74	7.8		105.6	12.08	2630.14
	12/19/2013	13:04	12/19/2013 13:04	50	32	32	9	74	18.2		13.0	1.49	2631.63
	12/19/2013	13:08	12/19/2013 13:08	50	34	34	10	74	20.7		77.7	8.89	2640.53

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)	Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	12/19/2013	16:04	12/19/2013 16:04	45	33	32	13.5	70	27.7	4256.3	486.92	3127.45
	12/19/2013	16:47	12/19/2013 16:47	45	32	31	14	66	28.5	1209.3	138.34	3265.79
	12/19/2013	16:48	12/19/2013 16:48						Valve shut	28.5	3.26	3269.05
	12/19/2013	16:49	12/19/2013 16:49			25						3269.05
SW-27 Event 6	1/8/2014	8:33	1/8/2014 8:33			34.5	<2		0.0	0.0	0.00	3269.05
	1/8/2014	8:33	1/8/2014 8:33	51	31	30.5	<2	36	0.0	0.0	0.00	3269.05
	1/8/2014	8:35	1/8/2014 8:35	51	33	33.5	5.5	37	11.7	145.9	16.69	3285.74
	1/8/2014	9:00	1/8/2014 9:00	48	33	33	7	45	14.7	13.2	1.51	3287.25
	1/8/2014	9:01	1/8/2014 9:01	48	34	33.8	8	45	17.0	809.6	92.61	3379.87
	1/8/2014	9:52	1/8/2014 9:52	46	34	34	8	50	16.9	984.4	112.61	3492.48
	1/8/2014	10:50	1/8/2014 10:50	45	33	33.5	9.5	56	19.8	1614.8	184.73	3677.21
	1/8/2014	12:18	1/8/2014 12:18	45	33	33	11	58	22.8	490.1	56.07	3733.28
	1/8/2014	12:41	1/8/2014 12:41	44	32	32.5	11	57	22.6	22.7	2.60	3735.88
	1/8/2014	12:42	1/8/2014 12:42			28			Valve shut	22.6	2.59	3738.46
	1/8/2014	12:43	1/8/2014 12:43									3738.46
SW-27 Event 7	1/10/2014	9:37	1/10/2014 9:37									3738.46
	1/10/2014	9:38	1/10/2014 9:38	50	34	32	6	64	12.5	12.5	1.43	3739.90
	1/10/2014	9:45	1/10/2014 9:45	42	36	34	13	64	27.7	140.7	16.10	3755.99
	1/10/2014	10:17	1/10/2014 10:17	42	35	34	13.5	64	28.5	898.3	102.76	3858.76
	1/10/2014	11:47	1/10/2014 11:47	41	34	33	14	65	29.2	2593.8	296.73	4155.49
	1/10/2014	12:54	1/10/2014 12:54	40	32.5	32	15	64	30.8	2009.4	229.88	4385.37
	1/10/2014	13:15	1/10/2014 13:15	40	32	32	16	64	32.7	666.6	76.25	4461.62
	1/10/2014	13:16	1/10/2014 13:16						Valve shut	32.7	3.74	4465.36
	1/10/2014	13:17	1/10/2014 13:17			24						4465.36
SW-27 Event 8	1/13/2014	7:45	1/13/2014 7:45									4465.36
	1/13/2014	7:47	1/13/2014 7:47	55	34	34	7	44	14.9	29.8	3.41	4468.77
	1/13/2014	7:56	1/13/2014 7:56	53	33.5	33	13.5	50	28.4	194.9	22.30	4491.07
	1/13/2014	7:57	1/13/2014 7:57	50	37	34	17	50	37.1	32.8	3.75	4494.82
	1/13/2014	8:19	1/13/2014 8:19	45	36	34	17	56	36.5	809.4	92.59	4587.41
	1/13/2014	10:14	1/13/2014 10:14	42	35	33.5	17	64	35.8	4159.1	475.80	5063.21
	1/13/2014	11:22	1/13/2014 11:22	40	34	31.5	17	64	35.5	2424.4	277.35	5340.56
	1/13/2014	11:23	1/13/2014 11:23	40	35	32	18	64	37.9	36.7	4.20	5344.76
	1/13/2014	11:50	1/13/2014 11:50	40	34	32	18	64	37.6	1019.3	116.60	5461.37
	1/13/2014	11:51	1/13/2014 11:51						Valve shut	37.6	4.30	5465.66
	1/13/2014	11:52	1/13/2014 11:52			27						5465.66
SW-27 Event 9	1/14/2014	12:20	1/14/2014 12:20									5465.66
	1/14/2014	12:22	1/14/2014 12:22	45	32	31	4	64	8.2	16.3	1.87	5467.53
	1/14/2014	12:32	1/14/2014 12:32	44	29.5	29	6.5	63	12.9	105.5	12.07	5479.60
	1/14/2014	12:33	1/14/2014 12:33	42	35.5	34	16	63	33.9	23.4	2.68	5482.28
	1/14/2014	13:47	1/14/2014 13:47	50	36	34	16	69	33.9	2510.1	287.15	5769.43
	1/14/2014	14:18	1/14/2014 14:18	50	36	34	16	69	33.9	1051.0	120.24	5889.67
	1/14/2014	16:02	1/14/2014 16:02	48	34	32	18.4	70	38.2	3747.5	428.72	6318.39
	1/14/2014	16:37	1/14/2014 16:37	53	34	32	19	70	39.4	1357.5	155.30	6473.69
	1/14/2014	16:38	1/14/2014 16:38						Valve shut	39.4	4.51	6478.19
	1/14/2014	16:39	1/14/2014 16:39			27						6478.19
SW-27 Event 10	1/16/2014	11:53	1/16/2014 11:53	45	26	26	<2	56	0.0	0.0	0.00	6478.19
	1/16/2014	11:54	1/16/2014 11:54	45	32	32	<2	56	0.0	0.0	0.00	6478.19
	1/16/2014	11:55	1/16/2014 11:55	45	33.5	33	10	56	20.9	10.5	1.20	6479.39
	1/16/2014	13:02	1/16/2014 13:02	50	32.5	32	12	56	24.8	1533.0	175.38	6654.77
	1/16/2014	14:58	1/16/2014 14:58	48	31.5	30	13.5	60	27.5	3037.6	347.50	7002.26
	1/16/2014	16:04	1/16/2014 16:04	50	31.5	30	14	60	28.6	1850.7	211.73	7213.99
	1/16/2014	16:05	1/16/2014 16:05			26			Valve shut	28.6	3.27	7217.26
SW-27 Event 11	1/17/2014	11:53	1/17/2014 11:53	44	32	33.8	3.5	66	7.1			7217.26

SW-27 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	1/17/2014	12:41	1/17/2014 12:41	45	30	28	12	63	24.0		747.1	85.47	7302.72
	1/17/2014	12:42	1/17/2014 12:42	45	33.5	32.2	17.5	63	36.4		30.2	3.45	7306.17
	1/17/2014	13:57	1/17/2014 13:57	43	33.5	32.2	17.8	64	36.9		2748.8	314.46	7620.64
	1/17/2014	14:17	1/17/2014 14:17	43	33.5	32.2	18	64	37.4		743.0	85.00	7705.64
	1/17/2014	15:47	1/17/2014 15:47	52	33.5	32.2	19.5	64	40.5		3502.4	400.68	8106.32
	1/17/2014	15:48	1/17/2014 15:48							Valve shut	40.5	4.63	8110.95
	1/17/2014	15:49	1/17/2014 15:49			27							8110.95
SW-27 Event 12	1/21/2014	9:02	1/21/2014 9:02	49	29	29	<2	52	0.0				8110.95
	1/21/2014	9:03	1/21/2014 9:03	48	34	33	9	52	19.0		9.5	1.09	8112.03
	1/21/2014	10:02	1/21/2014 10:02	40	33	31.5	15	60	31.1		1477.9	169.07	8281.10
	1/21/2014	11:24	1/21/2014 11:24	36	32	31	13.8	64	28.2		2430.4	278.03	8559.13
	1/21/2014	11:25	1/21/2014 11:25	35	33	31.8	14.5	64	29.9		29.1	3.32	8562.46
	1/21/2014	13:13	1/21/2014 13:13	45	36	35	22.7	62	48.4		4232.1	484.16	9046.62
	1/21/2014	13:14	1/21/2014 13:14			30				Valve shut	48.4	5.54	9052.16
Note: a red value, i.e. 75 °F, indicates that value was interpolated from field data											Total CO_2 Mass (lbs):		9052.16

SW-28 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
SW-28 Event 1	11/22/2013	8:36	11/22/2013 8:36	55	29			70	0.0				
	11/22/2013	8:38	11/22/2013 8:38	55	34	32	<2	70	0.0		0.0	0.00	0.00
	11/22/2013	8:51	11/22/2013 8:51		32	31	2	72	4.1		26.3	3.01	3.01
	11/22/2013	8:52	11/22/2013 8:52	55	35	34	5	74	10.4		7.2	0.83	3.84
	11/22/2013	9:47	11/22/2013 9:47		35	32	10	80	20.8		857.8	98.13	101.97
	11/22/2013	9:49	11/22/2013 9:49		37	33.5	11	79	23.3		44.1	5.04	107.01
	11/22/2013	10:57	11/22/2013 10:57		37	33	12	79	25.4		1657.4	189.60	296.62
	11/22/2013	10:58	11/22/2013 10:58	52	39	34	14	78	30.3		27.9	3.19	299.80
	11/22/2013	11:46	11/22/2013 11:46	52	37	34	14	82	29.6		1436.8	164.37	464.17
	11/22/2013	12:40	11/22/2013 12:40		38	34	14	87	29.7		1601.6	183.23	647.39
	11/22/2013	12:41	11/22/2013 12:41							Valve shut	29.7	3.40	650.80
	11/22/2013	12:42	11/22/2013 12:42		26	24.5							650.80
SW-28 Event 2	12/5/2013	12:47	12/5/2013 12:47	55	34	34	4	79.0	8.2		41.1	4.70	655.50
	12/5/2013	14:32	12/5/2013 14:32	50	33	31.5	12	80.0	24.4		1712.3	195.89	851.39
	12/5/2013	14:33	12/5/2013 14:33	50	35	34	16.5	80.0	34.2		29.3	3.35	854.74
	12/5/2013	15:38	12/5/2013 15:38	47	35	34	18	75.0	37.5		2332.9	266.88	1121.63
	12/5/2013	16:48	12/5/2013 16:48	47	35	33.5	19	72.0	39.7		2704.7	309.42	1431.04
	12/5/2013	17:08	12/5/2013 17:08	47	35	33.5	9.5	70.0	19.9		596.5	68.24	1499.28
	12/5/2013	17:09	12/5/2013 17:09							Valve shut	19.9	2.28	1501.56
	12/5/2013	17:10	12/5/2013 17:10										1501.56
SW-28 Event 3	12/11/2013	13:04	12/11/2013 13:04	50	35	34	3	68	6.3				1501.56
	12/11/2013	14:10	12/11/2013 14:10	49	32.5	31	11	68	22.5		950.4	108.72	1610.28
	12/11/2013	14:12	12/11/2013 14:12	49	32.5	31	13	68	26.6		49.1	5.62	1615.89
	12/11/2013	14:50	12/11/2013 14:50	50	32.5	31	13.5	66	27.7		1030.9	117.94	1733.83
	12/11/2013	14:53	12/11/2013 14:53	49	35	33	16.5	66	34.7		93.6	10.70	1744.53
	12/11/2013	15:28	12/11/2013 15:28	45	35	33	16.5	66	34.7		1215.0	139.00	1883.53
	12/11/2013	16:46	12/11/2013 16:46	35	35	30	16.5	62	34.9		2713.1	310.38	2193.91
	12/11/2013	17:04	12/11/2013 17:04							Valve shut	627.3	71.77	2265.68
	12/11/2013	17:05	12/11/2013 17:05			24							2265.68
SW-28 Event 4	12/19/2013	8:33	12/19/2013 8:33	54	32	33	<2	44	0.0				2265.68
	12/19/2013	8:55	12/19/2013 8:55	45	31	31	4	53	8.2		89.9	10.28	2275.96
	12/19/2013	9:00	12/19/2013 9:00	45	33	34	8	53	16.7		62.2	7.11	2283.07
	12/19/2013	9:40	12/19/2013 9:40	41	33	33.5	9	64	18.6		705.6	80.72	2363.80
	12/19/2013	11:44	12/19/2013 11:44	40	31	32	12	68	24.1		2649.1	303.05	2666.85
	12/19/2013	12:31	12/19/2013 12:31	41	31	32	13	68	26.2		1182.1	135.24	2802.09
	12/19/2013	12:32	12/19/2013 12:32							Valve shut	26.2	2.99	2805.08
	12/19/2013	12:33	12/19/2013 12:33										2805.08
SW-28 Event 5	12/20/2013	7:28	12/20/2013 7:28	44	35	35	9.5	60	20.1				2805.08
	12/20/2013	7:58	12/20/2013 7:58	45	34	33	13	56	27.3		711.7	81.42	2886.50
	12/20/2013	8:47	12/20/2013 8:47	42	32	31	13.5	60	27.7		1348.1	154.22	3040.72
	12/20/2013	10:00	12/20/2013 10:00	40	32	31	14.5	66	29.6		2089.2	239.01	3279.73
	12/20/2013	10:46	12/20/2013 10:46	40	32	30	14.5	68	29.5		1358.3	155.39	3435.12
	12/20/2013	10:47	12/20/2013 10:47	39	32	31	16	68	32.6		31.0	3.55	3438.67
	12/20/2013	11:34	12/20/2013 11:34	39	32	30	17	70	34.5		1576.1	180.30	3618.97
	12/20/2013	11:35	12/20/2013 11:35							Valve shut	34.5	3.95	3622.92
	12/20/2013	11:36	12/20/2013 11:36			24							3622.92
SW-28 Event 6	1/8/2014	13:00	1/8/2014 13:00	52	34	34	<2	58	0.0		0.0	0.00	3622.92
	1/8/2014	13:03	1/8/2014 13:03	52	34	34	<2	58	0.0		0.0	0.00	3622.92
	1/8/2014	13:10	1/8/2014 13:10	52	34	34	3	58	6.3		22.0	2.52	3625.44
	1/8/2014	13:15	1/8/2014 13:15	54	34	34	3	58	6.3		31.5	3.60	3629.04
	1/8/2014	13:50	1/8/2014 13:50	52	33	34	5	57	10.4		292.1	33.42	3662.46
	1/8/2014	15:00	1/8/2014 15:00	50	32.5	34	7.5	60	15.5		905.0	103.53	3766.00
	1/8/2014	16:20	1/8/2014 16:20	50	31.5	34	9.5	53	19.5		1399.0	160.04	3926.04

SW-28 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	1/8/2014	17:19	1/8/2014 17:19	55	31	34	10	52	20.4		1178.7	134.84	4060.88
	1/8/2014	17:20	1/8/2014 17:20							Valve shut	20.4	2.34	4063.22
	1/8/2014	17:21	1/8/2014 17:21			26							4063.22
SW-28 Event 7	1/10/2014	13:24	1/10/2014 13:24										4063.22
	1/10/2014	13:27	1/10/2014 13:27	50	35	34	7	66	14.7		44.2	5.05	4068.27
	1/10/2014	14:22	1/10/2014 14:22	48	34.5	34	10.5	65	22.0		1010.0	115.54	4183.82
	1/10/2014	15:19	1/10/2014 15:19	46	33	34	13	64	26.8		1391.9	159.23	4343.05
	1/10/2014	16:27	1/10/2014 16:27	45	33	34	14	66	28.8		1893.3	216.59	4559.64
	1/10/2014	17:27	1/10/2014 17:27	45	32.5	34	14.5	62	29.8		1760.4	201.39	4761.04
	1/10/2014	17:28	1/10/2014 17:28							Valve shut	29.8	3.41	4764.45
	1/10/2014	17:29	1/10/2014 17:29			27							4764.45
SW-28 Event 8	1/13/2014	11:54	1/13/2014 11:54						0.0		0.0	0.00	4764.45
	1/13/2014	11:55	1/13/2014 11:55	45	35	35	2	66	4.2		2.1	0.24	4764.69
	1/13/2014	12:08	1/13/2014 12:08	49	34	34	4.5	69	9.3		88.1	10.08	4774.77
	1/13/2014	12:36	1/13/2014 12:36	49	34	34	4.5	70	9.3		261.5	29.91	4804.68
	1/13/2014	13:45	1/13/2014 13:45	45	33.5	34	6	71	12.4		748.7	85.65	4890.33
	1/13/2014	13:46	1/13/2014 13:46	42	33	33.5	7	71	14.4		13.4	1.53	4891.86
	1/13/2014	16:05	1/13/2014 16:05	40	32.5	33	6.5	70	13.3		1919.7	219.62	5111.47
	1/13/2014	16:06	1/13/2014 16:06							Valve shut	13.3	1.52	5112.99
	1/13/2014	16:07	1/13/2014 16:07			27							5112.99
SW-28 Event 9	1/15/2014	11:41	1/15/2014 11:41	40	34	34.5	<2	70	0.0		0.0	0.00	5112.99
	1/15/2014	12:26	1/15/2014 12:26	45	32	32.5	6.2	68	12.6		283.8	32.47	5145.46
	1/15/2014	12:27	1/15/2014 12:27	45	33	33.2	8	68	16.5		14.5	1.66	5147.12
	1/15/2014	12:50	1/15/2014 12:50	48	33	33.2	7.9	67	16.3		376.2	43.04	5190.16
	1/15/2014	13:49	1/15/2014 13:49	48	33	33	8.5	65	17.5		996.9	114.04	5304.20
	1/15/2014	15:45	1/15/2014 15:45	48	32.5	32	10	70	20.4		2200.8	251.78	5555.98
	1/15/2014	16:40	1/15/2014 16:40	54	32.2	32	10.2	68	20.8		1133.3	129.65	5685.62
	1/15/2014	16:42	1/15/2014 16:42							Valve shut	41.6	4.76	5690.38
	1/15/2014	16:43	1/15/2014 16:43			27							5690.38
SW-28 Event 10	1/17/2014	8:59	1/17/2014 8:59	50	27	27	3	46	5.9		0.0	0.00	5690.38
	1/17/2014	9:01	1/17/2014 9:01	50	32.5	32.5	9	46	18.8		24.7	2.83	5693.21
	1/17/2014	9:02	1/17/2014 9:02	50	33.5	33	10.5	46	22.2		20.5	2.35	5695.55
	1/17/2014	10:34	1/17/2014 10:34	46	33	32.5	10.7	55	22.3		2046.2	234.09	5929.64
	1/17/2014	11:43	1/17/2014 11:43	46	32.5	32	12	66	24.6		1617.5	185.04	6114.68
	1/17/2014	11:44	1/17/2014 11:44	46	34	32.2	13.9	66	28.9		26.8	3.06	6117.75
	1/17/2014	12:29	1/17/2014 12:29	43	34	32.3	14	62	29.3		1309.8	149.84	6267.58
	1/17/2014	12:55	1/17/2014 12:55	43	34	32.2	14	64	29.2		760.2	86.97	6354.55
	1/17/2014	14:16	1/17/2014 14:16	43	34	32.2	14.2	64	29.6		2382.9	272.60	6627.16
	1/17/2014	15:38	1/17/2014 15:38	48	34	32.2	15	64	31.3		2497.9	285.75	6912.91
	1/17/2014	15:39	1/17/2014 15:39							Valve shut	31.3	3.58	6916.49
	1/17/2014	15:40	1/17/2014 15:40			27							6916.49
SW-28 Event 11	1/20/2014	7:57	1/20/2014 7:57	55	28	31	3.5	40	7.0				6916.49
	1/20/2014	7:58	1/20/2014 7:58	55	31	30	8	40	16.6		11.8	1.35	6917.84
	1/20/2014	7:59	1/20/2014 7:59	55	33.5	32.5	11	40	23.4		20.0	2.29	6920.12
	1/20/2014	8:31	1/20/2014 8:31	50	33	32	13	48	27.3		810.7	92.75	7012.87
	1/20/2014	8:32	1/20/2014 8:32	50	34	32.3	14	48	29.7		28.5	3.26	7016.13
	1/20/2014	9:11	1/20/2014 9:11	50	34	32.3	14.5	54	30.6		1174.7	134.39	7150.52
	1/20/2014	9:23	1/20/2014 9:23	47	34	32.3	15	64	31.3		371.1	42.46	7192.98
	1/20/2014	11:15	1/20/2014 11:15	45	33.5	32.3	15	65	31.1		3494.3	399.75	7592.72
	1/20/2014	12:47	1/20/2014 12:47	50	33.5	32.3	15.2	65	31.5		2880.4	329.52	7922.24
	1/20/2014	13:10	1/20/2014 13:10	50	33.5	32.2	15.2	66	31.5		724.5	82.88	8005.13
	1/20/2014	14:07	1/20/2014 14:07	50	33.5	32.2	15.8	68	32.7		1828.2	209.15	8214.28
	1/20/2014	15:18	1/20/2014 15:18	52	33.5	32.2	15.9	70	32.8		2324.2	265.88	8480.17

SW-28 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	1/20/2014	16:25	1/20/2014 16:25	52	33.5	32.2	16.5	68	34.1		2241.7	256.45	8736.62
	1/20/2014	16:26	1/20/2014 16:26							Valve shut	34.1	3.90	8740.52
	1/20/2014	16:35	1/20/2014 16:35			23							8740.52
SW-28 Event 12	1/21/2014	9:08	1/21/2014 9:08	47	28	30.5	5.5	52	10.9				8740.52
	1/21/2014	9:09	1/21/2014 9:09	47	32	30.5	12	52	24.8		17.8	2.04	8742.56
	1/21/2014	9:10	1/21/2014 9:10	47	34	32.5	16	52	33.8		29.3	3.35	8745.91
	1/21/2014	10:04	1/21/2014 10:04	39	33	32	13	61	26.9		1639.1	187.51	8933.42
	1/21/2014	11:00	1/21/2014 11:00	36	33	31.5	13.8	64	28.5		1551.5	177.49	9110.91
	1/21/2014	11:28	1/21/2014 11:28	36	33.5	31.8	13.8	64	28.6		799.9	91.50	9202.41
	1/21/2014	13:15	1/21/2014 13:15	47	36	34	17.7	62	37.8		3552.9	406.46	9608.87
	1/21/2014	13:16	1/21/2014 13:16			27				Valve shut	37.8	4.32	9613.19
SW-28 Event 13	2/10/2014	9:27	2/10/2014 9:27	51	32	32.5	<2	60	0.0				9613.19
	2/10/2014	9:29	2/10/2014 9:29		33	32.5	2.5	63.5	5.2		5.2	0.59	9613.78
	2/10/2014	10:10	2/10/2014 10:10	48	31.5	31	6	67	12.2		355.0	40.61	9654.39
	2/10/2014	10:15	2/10/2014 10:15	48	33.5	33.5	9.7	69	20.0		80.5	9.20	9663.60
	2/10/2014	11:42	2/10/2014 11:42	47	33.5	32.5	9	71	18.6		1678.4	192.01	9855.61
	2/10/2014	13:27	2/10/2014 13:27	47	33.5	32.5	9.9	71	20.4		2045.3	233.98	10089.59
	2/10/2014	14:59	2/10/2014 14:59	46	33.5	32.5	10.5	73	21.6		1932.3	221.06	10310.65
	2/10/2014	16:46	2/10/2014 16:46	45	32.5	31.5	11.5	69	23.5		2412.9	276.03	10586.68
	2/10/2014	17:50	2/10/2014 17:50	54	32.5	31.5	11.7	63	24.0		1521.6	174.07	10760.75
	2/10/2014	17:51	2/10/2014 17:51			26				Valve shut	24.0	2.75	10763.50
SW-28 Event 14	2/11/2014	8:14	2/11/2014 8:14	54	25.5	26	4.5	54	8.6				10763.50
	2/11/2014	8:16	2/11/2014 8:16	54	33.5	31.5	13	54	27.3		35.9	4.10	10767.60
	2/11/2014	8:20	2/11/2014 8:20	50	32.5	30.5	14.5	55	30.0		114.6	13.11	10780.71
	2/11/2014	9:00	2/11/2014 9:00	46	32.5	30.5	15	58	31.0		1220.7	139.64	10920.35
	2/11/2014	9:01	2/11/2014 9:01			23				Valve shut	31.0	3.54	10923.90
	2/11/2014	12:16	2/11/2014 12:16	50	32	31	15.7	69	31.9	Restart	6222.2	711.82	11635.72
	2/11/2014	12:18	2/11/2014 12:18	50	33.5	31	16.7	69	34.5		66.4	7.60	11643.31
	2/11/2014	13:45	2/11/2014 13:45	47	34.3	32.5	17	63	35.6		3049.6	348.87	11992.19
	2/11/2014	14:53	2/11/2014 14:53	47	34.3	32.5	17.8	60	37.4		2482.6	284.01	12276.20
	2/11/2014	17:04	2/11/2014 17:04	46	34.3	32	16.8	56	35.4		4771.5	545.86	12822.06
	2/11/2014	17:06	2/11/2014 17:06			27				Valve shut	70.9	8.11	12830.17
SW-28 Event 15	2/12/2014	8:31	2/12/2014 8:31	45	27	27.5	9	47	17.7				12830.17
	2/12/2014	8:33	2/12/2014 8:33	45	33.5	31	17	48	35.9		53.5	6.12	12836.29
	2/12/2014	8:54	2/12/2014 8:54	45	33.5	30.2	17	53	35.7		751.1	85.93	12922.21
	2/12/2014	10:33	2/12/2014 10:33	46	33.5	31	16.5	55	34.6		3476.4	397.70	13319.92
	2/12/2014	11:55	2/12/2014 11:55	47	33.5	31.5	16.5	54	34.6		2835.0	324.33	13644.24
	2/12/2014	13:59	2/12/2014 13:59	48	33	30.5	17	51	35.6		4349.3	497.56	14141.80
	2/12/2014	14:55	2/12/2014 14:55	48	33	30.5	17.2	51	36.0		2003.0	229.14	14370.94
	2/12/2014	15:55	2/12/2014 15:55	48	33	30.5	18	51	37.7		2208.8	252.69	14623.63
	2/12/2014	16:54	2/12/2014 16:54	48	32.5	30	18	51	37.4		2215.4	253.45	14877.08
	2/12/2014	17:55	2/12/2014 17:55	48	32.5	30	18	52	37.4		2283.2	261.20	15138.28
	2/13/2014	7:12	2/13/2014 7:12	47	30.5	23	20	49	40.8		31161.9	3564.92	18703.20
	2/13/2014	7:14	2/13/2014 7:14							Valve shut			18703.20
Note: a red value, i.e. 75 °F, indicates that value was interpolated from field data											Total CO_2 Mass (lbs):		18703.20

SW-29 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
SW-29 Event 1	11/21/2013	9:52	11/21/2013 9:52	54	30			66	0.0				
	11/21/2013	9:54	11/21/2013 9:54		34	34	<2	66	0.0		0.0	0.00	0.00
	11/21/2013	10:02	11/21/2013 10:02		33	32.5	<2	67	0.0		0.0	0.00	0.00
	11/21/2013	10:25	11/21/2013 10:25	52	32	32	3.5	68	7.1		81.9	9.37	9.37
	11/21/2013	10:28	11/21/2013 10:28	52.5	35	34	5.8	68	12.2		28.9	3.31	12.68
	11/21/2013	11:37	11/21/2013 11:37	50	35	33.5	7.5	71	15.7		961.9	110.04	122.72
	11/21/2013	11:41	11/21/2013 11:41	50	35.5	33.5	8.0	71	16.8		65.1	7.44	130.16
	11/21/2013	13:27	11/21/2013 13:27	49	35	33.5	9.0	74	18.8		1887.9	215.98	346.14
	11/21/2013	17:15	11/21/2013 17:15	55	34	32	12	66	25.0		4990.3	570.89	917.03
	11/21/2013	17:20	11/21/2013 17:20							Valve shut	124.9	14.29	931.32
	11/21/2013	17:22	11/21/2013 17:22			25							931.32
SW-29 Event 2	12/5/2013	8:04	12/5/2013 8:04	55	37	36	3	65	6.4				931.32
	12/5/2013	8:42	12/5/2013 8:42	53	35	35	7	69	14.7		401.5	45.93	977.25
	12/5/2013	9:18	12/5/2013 9:18	51	35	35	8	72	16.7		565.5	64.69	1041.94
	12/5/2013	10:18	12/5/2013 10:18	50	35	35	8	78	16.6		1001.0	114.52	1156.46
	12/5/2013	11:32	12/5/2013 11:32	50	35	34.5	9	80	18.7		1306.6	149.48	1305.94
	12/5/2013	12:08	12/5/2013 12:08	50	35	34	9.5	80	19.7		691.1	79.06	1385.00
	12/5/2013	12:09	12/5/2013 12:09							Valve shut	19.7	2.26	1387.25
	12/5/2013	12:10	12/5/2013 12:10			29							1387.25
SW-29 Event 3	12/13/2013	8:44	12/13/2013 8:44	52	32	31	<2	58	0.0				1387.25
	12/13/2013	8:45	12/13/2013 8:45	52	35	34	3	58	6.4		3.2	0.36	1387.62
	12/13/2013	9:32	12/13/2013 9:32	49	35	33	8	63	16.9		546.2	62.49	1450.11
	12/13/2013	10:19	12/13/2013 10:19	45	34	32.5	8	66	16.7		788.2	90.17	1540.27
	12/13/2013	10:20	12/13/2013 10:20	45	35	33.5	11	66	23.1		19.9	2.28	1542.55
	12/13/2013	12:01	12/13/2013 12:01	45	35	33	11.5	70	24.1		2385.8	272.93	1815.48
	12/13/2013	14:28	12/13/2013 14:28	45	35	32	14	68	29.4		3932.0	449.82	2265.30
	12/13/2013	15:23	12/13/2013 15:23	55	36	31	15	70	31.8		1681.7	192.38	2457.68
	12/13/2013	15:24	12/13/2013 15:24							Valve shut	31.8	3.63	2461.31
	12/13/2013	15:25	12/13/2013 15:25										2461.31
SW-29 Event 4	12/18/2013	8:25	12/18/2013 8:25	50	36	34	<2	54.0	0.0		0.0	0.00	2461.31
	12/18/2013	8:35	12/18/2013 8:35	48	36	34	<2	56.0	0.0		0.0	0.00	2461.31
	12/18/2013	9:31	12/18/2013 9:31	48	36	32.5	4	61.0	8.5		239.2	27.37	2488.68
	12/18/2013	9:32	12/18/2013 9:32	45	38	35	10	61.0	21.8		15.2	1.73	2490.42
	12/18/2013	9:40	12/18/2013 9:40							Valve shut	174.3	19.94	2510.35
	12/18/2013	13:55	12/18/2013 13:55	50	38	38	<2	76.0	0.0	Restart	0.0	0.00	2510.35
	12/18/2013	13:57	12/18/2013 13:57	50	35	32	6	76.0	12.5		12.5	1.43	2511.78
	12/18/2013	14:50	12/18/2013 14:50	47	35	32	10	72.0	20.9		885.5	101.30	2613.09
	12/18/2013	14:52	12/18/2013 14:52	47	36	33.5	12.5	72.0	26.4		47.3	5.41	2618.50
	12/18/2013	15:37	12/18/2013 15:37	40	37	33	13	70.0	27.8		1219.6	139.52	2758.02
	12/18/2013	16:50	12/18/2013 16:50	45	37	33	14	65.0	30.1		2112.5	241.67	2999.69
	12/18/2013	17:53	12/18/2013 17:53	45	36	32	15	56.0	32.2		1961.9	224.44	3224.13
	12/18/2013	17:54	12/18/2013 17:54			27				Valve shut	32.2	3.68	3227.82
SW-29 Event 5	1/7/2014	12:58	1/7/2014 12:58					46					3227.82
	1/7/2014	12:59	1/7/2014 12:59	51	35	34	3	46	6.4		6.4	0.74	3228.55
	1/7/2014	14:02	1/7/2014 14:02	53	35	32	4.5	46	9.7		507.2	58.02	3286.58
	1/7/2014	14:04	1/7/2014 14:04	53	36	34	8	46	17.4		27.0	3.09	3289.67
	1/7/2014	15:19	1/7/2014 15:19	51	36	34	8	49	17.3		1299.3	148.64	3438.30
	1/7/2014	16:28	1/7/2014 16:28	50	36	34	8.5	43	18.5		1234.7	141.25	3579.55
	1/7/2014	17:16	1/7/2014 17:16	55	36	34	9.5	40	20.7		941.4	107.70	3687.25
	1/7/2014	17:17	1/7/2014 17:17							Valve shut	20.7	2.37	3689.62
	1/7/2014	17:18	1/7/2014 17:18			27							3689.62
SW-29 Event 6	1/9/2014	13:00	1/9/2014 13:00	44	36	35	4	62	8.5		0.0	0.00	3689.62
	1/9/2014	13:06	1/9/2014 13:06	42	36	35	6.5	62	13.9		67.2	7.69	3697.31

SW-29 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	1/9/2014	13:10	1/9/2014 13:10	41	35	33	7	64	14.8		57.3	6.55	3703.86
	1/9/2014	14:48	1/9/2014 14:48	39	35	32.5	8.3	62	17.5		1582.1	181.00	3884.86
	1/9/2014	15:33	1/9/2014 15:33	40	35	32.5	8.3	61	17.5		789.3	90.30	3975.16
	1/9/2014	17:11	1/9/2014 17:11	49	35	32.5	10.5	60	22.2		1948.9	222.95	4198.11
	1/9/2014	17:13	1/9/2014 17:13			27.8				Valve shut	44.4	5.08	4203.19
SW-29 Event 7	1/13/2014	8:18	1/13/2014 8:18	48	34	33.2	2.5	48	5.3		0.0	0.00	4203.19
	1/13/2014	8:22	1/13/2014 8:22	48	30	30.4	8	48	16.2		43.1	4.93	4208.12
	1/13/2014	8:23	1/13/2014 8:23	48	33	34	9	48	18.9		17.6	2.01	4210.13
	1/13/2014	8:44	1/13/2014 8:44	45	32	32.8	10.5	54	21.7		425.7	48.70	4258.83
	1/13/2014	8:45	1/13/2014 8:45	45	33	33.6	12.5	54	26.1		23.9	2.73	4261.56
	1/13/2014	9:53	1/13/2014 9:53	45	33	33	13	64	26.8		1798.8	205.78	4467.34
	1/13/2014	11:06	1/13/2014 11:06	43	33	32.8	12.5	69	25.7		1916.9	219.30	4686.64
	1/13/2014	12:18	1/13/2014 12:18	44	33	32.6	12.5	70	25.7		1848.0	211.42	4898.05
	1/13/2014	13:00	1/13/2014 13:00	44	33	32.6	13	70	26.7		1099.0	125.73	5023.78
	1/13/2014	13:02	1/13/2014 13:02	44	35	33	16	70	33.5		60.2	6.89	5030.67
	1/13/2014	14:30	1/13/2014 14:30	40	34.5	33	17	70	35.4		3034.8	347.18	5377.86
	1/13/2014	15:47	1/13/2014 15:47	38	33.5	32.8	15	66	31.1		2560.8	292.96	5670.81
	1/13/2014	16:41	1/13/2014 16:41	38	33.5	32.6	16	66	33.1		1733.8	198.34	5869.15
	1/13/2014	17:03	1/13/2014 17:03	45	33.5	32.6	17	66	35.2		751.9	86.02	5955.17
	1/13/2014	17:04	1/13/2014 17:04			28				Valve shut	35.2	4.03	5959.20
SW-29 Event 8	1/15/2014	8:21	1/15/2014 8:21	54	31	32	<2	46	0.0				5959.20
	1/15/2014	8:22	1/15/2014 8:22	54	31	32	5	46	10.3		5.1	0.59	5959.79
	1/15/2014	8:24	1/15/2014 8:24	54	32	33	9.8	46	20.4		30.7	3.51	5963.30
	1/15/2014	8:58	1/15/2014 8:58	50	31	31.2	13.2	58	26.8		802.5	91.81	6055.11
	1/15/2014	8:59	1/15/2014 8:59	50	35	34	19.2	58	40.7		33.8	3.86	6058.97
	1/15/2014	9:38	1/15/2014 9:38	43	35	34	18.2	64	38.4		1542.2	176.42	6235.40
	1/15/2014	10:50	1/15/2014 10:50	40	34	33.6	17.8	68	37.0		2712.9	310.36	6545.75
	1/15/2014	11:20	1/15/2014 11:20	39	34	32.8	17.2	68	35.7		1091.0	124.82	6670.57
	1/15/2014	12:30	1/15/2014 12:30	42	35	32.8	19	67	39.9		2648.8	303.02	6973.59
	1/15/2014	12:31	1/15/2014 12:31	42	36	33.6	21	67	44.6		42.3	4.83	6978.43
	1/15/2014	13:48	1/15/2014 13:48	48	37.5	34.8	22	64	47.6		3547.3	405.81	7384.24
	1/15/2014	15:36	1/15/2014 15:36	45	37.5	34.4	22	67	47.4		5127.8	586.62	7970.85
	1/15/2014	16:33	1/15/2014 16:33	48	37.5	34.2	23	65	49.7		2766.5	316.49	8287.34
	1/15/2014	16:34	1/15/2014 16:34							Valve shut	49.7	5.68	8293.02
	1/15/2014	16:37	1/15/2014 16:37			28							8293.02
SW-29 Event 9	1/17/2014	7:25	1/17/2014 7:25	55	31	30.4	2.5	37	5.2				8293.02
	1/17/2014	7:27	1/17/2014 7:27	55	33	34.8	6	37	12.7		17.9	2.05	8295.07
	1/17/2014	7:28	1/17/2014 7:28	55	33	32	10.5	37	22.3		17.5	2.00	8297.08
	1/17/2014	8:19	1/17/2014 8:19	48	32	32	15	53	31.0		1358.1	155.37	8452.45
	1/17/2014	8:20	1/17/2014 8:20							Valve shut	31.0	3.54	8455.99
Note: a red value, i.e. 75 °F, indicates that value was interpolated from field data											Total CO_2 Mass (lbs):		8455.99

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
SW-30 Event 1	11/14/2013	12:20	11/14/2013 12:20	26	11		0	53	0.0				
	11/14/2013	12:22	11/14/2013 12:22	30	30	29	<2	53	0.0		0.0	0.00	0.00
	11/14/2013	12:25	11/14/2013 12:25	34	35	33	<2	54.5	0.0		0.0	0.00	0.00
	11/14/2013	12:28	11/14/2013 12:28	34	33.5	30	<2	56.8	0.0		0.0	0.00	0.00
	11/14/2013	12:32	11/14/2013 12:32	36	35	33	3.5	60.6	6.0		12.0	1.37	1.37
	11/14/2013	12:36	11/14/2013 12:36	38	35	32.5	4.25	70.7	7.2		26.4	3.02	4.40
	11/14/2013	12:41	11/14/2013 12:41	36	35	32.5	5	74.4	8.5		39.2	4.48	8.88
	11/14/2013	12:42	11/14/2013 12:42	38	36	33.5	6.5	73.9	11.1		9.8	1.12	10.00
	11/14/2013	12:50	11/14/2013 12:50	38	36	33.5	7	73.4	12.0		92.3	10.56	20.56
	11/14/2013	13:40	11/14/2013 13:40	37	33	31	9.5	70.3	15.8		694.3	79.43	99.99
	11/14/2013	13:47	11/14/2013 13:47	40	36	33	11.5	7	21.1		129.1	14.77	114.76
	11/14/2013	15:00	11/14/2013 15:00	40	36	33	12.5	64.2	21.6		1557.1	178.13	292.89
	11/14/2013	15:51	11/14/2013 15:51	40	36	32.5	12.75	52.7	22.3		1117.7	127.87	420.76
	11/14/2013	15:55	11/14/2013 15:55	42	36	33	13.5	52.7	23.6		91.7	10.49	431.25
	11/14/2013	16:30	11/14/2013 16:30	42	37	33	13.5	41	24.1		834.1	95.42	526.67
	11/14/2013	16:32	11/14/2013 16:32							Valve shut	48.2	5.51	532.18
	11/14/2013	16:33	11/14/2013 16:33	26	25	21							532.18
SW-30 Event 2	12/4/2013	12:25	12/4/2013 12:25	51	38	37.6	<2	80	0.0				532.18
	12/4/2013	13:05	12/4/2013 13:05	55	36	35.6	3	85	6.3		125.2	14.32	546.51
	12/4/2013	13:45	12/4/2013 13:45	52	36	35	4.5	85	9.4		313.0	35.80	582.31
	12/4/2013	14:43	12/4/2013 14:43	50	36	35.2	5	74	10.5		578.0	66.13	648.44
	12/4/2013	15:50	12/4/2013 15:50	52	36	35.2	6	78	12.6		775.4	88.71	737.14
	12/4/2013	17:18	12/4/2013 17:18	54	35	35.2	6	69	12.6		1108.3	126.79	863.94
	12/4/2013	17:20	12/4/2013 17:20							Valve shut	25.2	2.88	866.82
	12/4/2013	17:21	12/4/2013 17:21			26							866.82
SW-30 Event 3	12/17/2013	12:34	12/17/2013 12:34	48	37	37	<2	71	0.0		0.0	0.00	866.82
	12/17/2013	12:34	12/17/2013 12:34	48	30	31	<2	71	0.0		0.0	0.00	866.82
	12/17/2013	12:36	12/17/2013 12:36	48	36		<2	71	0.0		0.0	0.00	866.82
	12/17/2013	13:25	12/17/2013 13:25	48	35	33	<2	76	0.0		0.0	0.00	866.82
	12/17/2013	14:24	12/17/2013 14:24	45	35	32.5	<2	75	0.0		0.0	0.00	866.82
	12/17/2013	15:38	12/17/2013 15:38	45	36	33	<2	74	0.0		0.0	0.00	866.82
	12/17/2013	17:01	12/17/2013 17:01	45	36	32	3	66	6.4		264.6	30.27	897.09
	12/17/2013	22:16	12/17/2013 22:16	45	35	32	4	56	8.5		2343.0	268.04	1165.13
	12/18/2013	8:15	12/18/2013 8:15	48	35	31	6	54	12.8		6372.3	728.99	1894.11
	12/18/2013	8:18	12/18/2013 8:18							Valve shut	38.3	4.38	1898.50
	12/18/2013	8:19	12/18/2013 8:19			26							1898.50
SW-30 Event 4	1/8/2014	8:22	1/8/2014 8:22	56	35	33	<2	39	0.0		0.0	0.00	1898.50
	1/8/2014	9:00	1/8/2014 9:00	50	35	31.5	<2	40	0.0		0.0	0.00	1898.50
	1/8/2014	9:55	1/8/2014 9:55	47	34	32.5	<2	48	0.0		0.0	0.00	1898.50
	1/8/2014	10:49	1/8/2014 10:49	46	35	34.5	<2	52	0.0		0.0	0.00	1898.50
	1/8/2014	12:05	1/8/2014 12:05	45	34	33	<2	60	0.0		0.0	0.00	1898.50
	1/8/2014	13:18	1/8/2014 13:18	52	35	31.5	<2	58	0.0		0.0	0.00	1898.50
	1/8/2014	13:20	1/8/2014 13:20	52	36	33	5.5	58	11.8		11.8	1.35	1899.85
	1/8/2014	14:20	1/8/2014 14:20	50	35.5	33	6	56	12.8		738.0	84.42	1984.27
	1/8/2014	16:27	1/8/2014 16:27	50	35.5	32.5	9	53	19.3		2038.2	233.17	2217.44
	1/8/2014	21:15	1/8/2014 21:15	55	35	31	11	50	23.5		6163.3	705.08	2922.51
	1/8/2014	21:16	1/8/2014 21:16	54	41	34	18	50	40.8		32.2	3.68	2926.19
	1/9/2014	7:10	1/9/2014 7:10	54	41	34	18	54	40.6		24178.1	2765.98	5692.17
	1/9/2014	8:26	1/9/2014 8:26	52	41	34	18.2	54	41.1		3104.3	355.13	6047.30
	1/9/2014	8:27	1/9/2014 8:27							Valve shut	41.1	4.70	6052.00
SW-30 Event 5	1/10/2014	9:06	1/10/2014 9:06	50	35	34.5	<2	66	0.0				6052.00
	1/10/2014	9:09	1/10/2014 9:09	50	35	34.5	<2	66	0.0				6052.00
	1/10/2014	9:55	1/10/2014 9:55	45	34	33	4	66	8.3		191.6	21.92	6073.91

SW-30 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	1/10/2014	9:57	1/10/2014 9:57	45	35	34.5	5	66	10.5		18.8	2.16	6076.07
	1/10/2014	10:51	1/10/2014 10:51	45	35	34.5	5	72	10.5		566.4	64.79	6140.86
	1/10/2014	12:42	1/10/2014 12:42	42	35	34.5	6	72	12.5		1276.9	146.08	6286.94
	1/10/2014	14:29	1/10/2014 14:29	50	35	34.5	6.5	70	13.6		1400.1	160.18	6447.11
	1/10/2014	16:25	1/10/2014 16:25	46	35	34	7.5	71	15.7		1700.8	194.57	6641.68
	1/10/2014	17:42	1/10/2014 17:42	47	34	33	8	68	16.6		1244.6	142.38	6784.06
	1/10/2014	17:43	1/10/2014 17:43	47	35	34	11	68	23.1		19.9	2.27	6786.34
	1/10/2014	22:02	1/10/2014 22:02	45	35	33	11	66	23.1		5988.1	685.04	7471.38
	1/10/2014	22:06	1/10/2014 22:06	45	36	34	13	66	27.6		101.5	11.62	7482.99
	1/11/2014	11:41	1/11/2014 11:41	40	34	32	15.5	74	32.0		24308.4	2780.89	10263.88
	1/11/2014	11:42	1/11/2014 11:42							Valve shut	32.0	3.66	10267.54
	1/11/2014	11:48	1/11/2014 11:48			26							10267.54
SW-30 Event 6	2/11/2014	10:01	2/11/2014 10:01	52	36	34.5	<2	60	0.0				10267.54
	2/11/2014	10:03	2/11/2014 10:03	52	34	34	<2	60	0.0		0.0	0.00	10267.54
	2/11/2014	10:31	2/11/2014 10:31	51	32.5	32.5	<2	62	0.0		0.0	0.00	10267.54
	2/11/2014	10:34	2/11/2014 10:34	51	34	33.5	2	62	4.2		6.3	0.72	10268.26
	2/11/2014	11:51	2/11/2014 11:51	51	34	33.5	2.5	63	5.2		362.0	41.41	10309.67
	2/11/2014	12:46	2/11/2014 12:46	45	34	33.5	3	63	6.3		315.9	36.14	10345.81
	2/11/2014	14:10	2/11/2014 14:10	45	34	33.5	3.8	60	8.0		597.5	68.35	10414.16
	2/11/2014	16:59	2/11/2014 16:59	45	33	33.5	4.3	55	9.0		1429.6	163.54	10577.70
	2/11/2014	17:20	2/11/2014 17:20	45	33	33.5	4.3	54	9.0		188.2	21.53	10599.23
	2/11/2014	17:21	2/11/2014 17:21			29				Valve shut	9.0	1.03	10600.26
Note: a red value, i											Total CO_2 Mass (lbs):		10600.26

SW-31 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
SW-31 Event 1	11/13/2013	13:08	11/13/2013 13:08	28	12		0		0.0				
	11/13/2013	13:09	11/13/2013 13:09	32	32	31	<2	49.8	0.0		0.0	0.00	0.00
	11/13/2013	13:11	11/13/2013 13:11	34	34	32	<2	53.2	0.0		0.0	0.00	0.00
	11/13/2013	13:12	11/13/2013 13:12	30	28	25	4.5	55	7.2		3.6	0.41	0.41
	11/13/2013	13:14	11/13/2013 13:14	36	33	25	12	55	20.3		27.4	3.14	3.55
	11/13/2013	13:16	11/13/2013 13:16	34	27.5	27	14.75	56.3	23.4		43.6	4.99	8.54
	11/13/2013	13:17	11/13/2013 13:17	38	32	26.5	15.25	55.2	25.5		24.4	2.79	11.34
	11/13/2013	13:18	11/13/2013 13:18	42	34	28	18.5	53.6	31.6		28.5	3.27	14.60
	11/13/2013	13:50	11/13/2013 13:50	42	31	24	21.5	38.7	36.1		1083.8	123.99	138.59
	11/13/2013	13:51	11/13/2013 13:51	46	33	25	22.5	37.5	38.7		37.4	4.28	142.87
	11/13/2013	13:52	11/13/2013 13:52	53	36	27.5	25	34.8	44.5		41.6	4.76	147.62
	11/13/2013	13:54	11/13/2013 13:54	57	38	28	26	34.5	47.2		91.7	10.48	158.11
	11/13/2013	13:56	11/13/2013 13:56	60	40	30	27	33.6	50.0		97.2	11.12	169.22
	11/13/2013	14:30	11/13/2013 14:30	62	39.5	28.5	28.75	29.7	53.2		1754.2	200.69	369.91
	11/13/2013	15:10	11/13/2013 15:10	62	39	28	27.75	27.5	51.2		2088.6	238.94	608.85
	11/13/2013	15:16	11/13/2013 15:16	66	40	28.5	28.75	24.8	53.7		314.9	36.02	644.88
	11/13/2013	15:24	11/13/2013 15:24	70	43	30	30	24.2	57.7		445.6	50.98	695.85
	11/13/2013	16:08	11/13/2013 16:08	72	43	30.5	30	19.5	58.0		2544.0	291.03	986.89
	11/13/2013	16:59	11/13/2013 16:59	72	43.5	29.5	30.75	-4	61.3		3041.6	347.95	1334.84
	11/13/2013	17:11	11/13/2013 17:11		22	16.5				Valve shut	735.7	84.17	1419.01
SW-31 Event 2	12/4/2013	8:10	12/4/2013 8:10										1419.01
	12/4/2013	8:13	12/4/2013 8:13	48	30	24	32	64	63.9		191.8	21.94	1440.94
	12/4/2013	8:42	12/4/2013 8:42	46	31	22.4	34	68	68.4		1918.9	219.52	1660.46
	12/4/2013	8:45	12/4/2013 8:45	46	27	20.8	32	68	61.5		194.8	22.29	1682.75
	12/4/2013	9:10	12/4/2013 9:10	46	27	21.6	32	70	61.3		1535.2	175.62	1858.37
	12/4/2013	10:01	12/4/2013 10:01	46	27	23.6	28	70	53.7		2933.2	335.55	2193.93
	12/4/2013	11:02	12/4/2013 11:02	45	30	23.2	28	74	55.4		3326.5	380.55	2574.48
	12/4/2013	12:17	12/4/2013 12:17	50	28	22.4	29	76	55.9		4174.8	477.60	3052.08
	12/4/2013	12:18	12/4/2013 12:18							Valve shut	55.9	6.40	3058.48
	12/4/2013	12:19	12/4/2013 12:19			16							3058.48
SW-31 Event 3	12/17/2013	8:27	12/17/2013 8:27	46	33	32	7.5	48.0	15.7				3058.48
	12/17/2013	9:56	12/17/2013 9:56	42	28	24	18	66.0	35.1		2256.7	258.17	3316.65
	12/17/2013	10:03	12/17/2013 10:03	40	32	27	23	66.0	46.9		286.8	32.81	3349.46
	12/17/2013	11:07	12/17/2013 11:07	39	32	25	23.5	68.0	47.8		3030.1	346.65	3696.11
	12/17/2013	12:25	12/17/2013 12:25	45	33	27	24	70.0	49.3		3785.5	433.07	4129.17
	12/17/2013	12:28	12/17/2013 12:28			18				Valve shut	147.8	16.90	4146.08
SW-31 Event 4	1/9/2014	8:43	1/9/2014 8:43	53	34	32.5	<2	54.0	0.0				4146.08
	1/9/2014	8:48	1/9/2014 8:48	53	34	32.5	<2	55.0	0.0		0.0	0.00	4146.08
	1/9/2014	10:20	1/9/2014 10:20	49	31	29.5	6.5	59.0	13.2		607.0	69.44	4215.52
	1/9/2014	10:22	1/9/2014 10:22	49	31	32	9	59.0	18.3		31.5	3.60	4219.12
	1/9/2014	11:36	1/9/2014 11:36	40	30	31	12	67.0	23.9		1560.3	178.50	4397.62
	1/9/2014	11:38	1/9/2014 11:38	40	31	31.2	12.5	67.0	25.2		49.1	5.61	4403.24
	1/9/2014	12:50	1/9/2014 12:50	40	31	30.5	13.5	63.0	27.3		1889.1	216.11	4619.35
	1/9/2014	12:51	1/9/2014 12:51			20				Valve shut	27.3	3.12	4622.48
SW-31 Event 5	1/14/2014	8:09	1/14/2014 8:09	49	32	30.5	<2	62.0	0.0		0.0	0.00	4622.48
	1/14/2014	8:11	1/14/2014 8:11	49	34	32	<2	62.0	0.0		0.0	0.00	4622.48
	1/14/2014	8:51	1/14/2014 8:51	47	31	30	5	62.0	10.1		202.4	23.16	4645.63
	1/14/2014	8:55	1/14/2014 8:55	47	33	31.5	7	62.0	14.5		49.2	5.63	4651.26
	1/14/2014	10:00	1/14/2014 10:00	45	33	31	8.2	64.0	16.8		1017.9	116.45	4767.71
	1/14/2014	11:26	1/14/2014 11:26	40	32	31	9.8	64.0	20.0		1584.8	181.30	4949.00
	1/14/2014	13:12	1/14/2014 13:12	47	32	30	11	69.0	22.4		2245.7	256.91	5205.91
	1/14/2014	15:40	1/14/2014 15:40	47	31	30	12.5	72.0	25.1		3508.4	401.36	5607.27
	1/14/2014	16:28	1/14/2014 16:28	53	31	30	13	72.0	26.1	Valve shut	1226.6	140.33	5747.60

SW-31 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	1/14/2014	16:29	1/14/2014 16:29			24							5747.60
SW-31 Event 6	1/16/2014	8:15	1/16/2014 8:15	55	29	28	<2	48.0	0.0		0.0	0.00	5747.60
	1/16/2014	8:16	1/16/2014 8:16	55	33	32	<2	48.0	0.0		0.0	0.00	5747.60
	1/16/2014	9:10	1/16/2014 9:10	49	31	31	3	50.0	6.1		165.9	18.98	5766.58
	1/16/2014	9:11	1/16/2014 9:11	49	32	31.5	4	50.0	8.3		7.2	0.83	5767.41
	1/16/2014	10:20	1/16/2014 10:20	45	32	31.5	5.5	55.0	11.3		676.9	77.44	5844.85
	1/16/2014	11:22	1/16/2014 11:22	43	32	31	6.5	57.0	13.4		765.8	87.61	5932.46
	1/16/2014	13:09	1/16/2014 13:09	49	31	30.5	7.5	58.0	15.2		1530.7	175.11	6107.56
	1/16/2014	14:47	1/16/2014 14:47	49	31	30.5	8.2	58.0	16.7		1563.4	178.85	6286.41
	1/16/2014	15:50	1/16/2014 15:50	50	31	30	8.5	58.0	17.3		1069.0	122.30	6408.71
	1/16/2014	16:20	1/16/2014 16:20	54	31	30	8.8	58.0	17.9		527.4	60.33	6469.04
	1/16/2014	16:42	1/16/2014 16:42	56	31	30	8.8	58.0	17.9		393.4	45.01	6514.05
	1/16/2014	16:43	1/16/2014 16:43							Valve shut	17.9	2.05	6516.10
SW-31 Event 7	1/21/2014	12:36	1/21/2014 12:36	45	33	34	<2	71.0	0.0				6516.10
	1/21/2014	13:32	1/21/2014 13:32	51	31	33.5	<2	72.0	0.0		0.0	0.00	6516.10
	1/21/2014	14:42	1/21/2014 14:42	50	31	33.2	2	72.0	4.0		140.3	16.05	6532.15
	1/21/2014	14:43	1/21/2014 14:43	50	32	33.2	3	72.0	6.1		5.0	0.58	6532.72
	1/21/2014	15:49	1/21/2014 15:49	54	32	33.2	3.7	68.0	7.5		447.7	51.21	6583.94
	1/21/2014	16:50	1/21/2014 16:50	55	31	33.2	4.5	68.0	9.1		504.5	57.71	6641.65
	1/21/2014	16:51	1/21/2014 16:51			24				Valve shut			6641.65
SW-31 Event 8	1/23/2014	8:04	1/23/2014 8:04	55	27	28.8	<2	40.0	0.0				6641.65
	1/23/2014	8:06	1/23/2014 8:06	55	31	32.4	<2	40.0	0.0		0.0	0.00	6641.65
	1/23/2014	8:16	1/23/2014 8:16	52	30	32.2	<2	44.0	0.0		0.0	0.00	6641.65
	1/23/2014	8:53	1/23/2014 8:53	49	29	31.6	<2	50.0	0.0		0.0	0.00	6641.65
	1/23/2014	9:32	1/23/2014 9:32	46	29	31.4	<2	50.0	0.0		0.0	0.00	6641.65
	1/23/2014	9:34	1/23/2014 9:34	46	32	33.4	2	50.0	4.1		4.1	0.47	6642.13
	1/23/2014	10:07	1/23/2014 10:07	45	32	33.4	2.5	50.0	5.2		153.8	17.59	6659.72
	1/23/2014	11:13	1/23/2014 11:13	42	32	33.2	3.5	52.0	7.2		409.6	46.86	6706.58
	1/23/2014	12:02	1/23/2014 12:02	41	31	32.6	3.8	54.0	7.8		367.2	42.01	6748.59
	1/23/2014	12:54	1/23/2014 12:54	46	31	32.4	3.9	58.0	7.9		407.7	46.64	6795.23
	1/23/2014	14:17	1/23/2014 14:17	50	30	31.6	4	55.0	8.1		663.5	75.90	6871.13
	1/23/2014	15:55	1/23/2014 15:55	50	30	31.4	4.2	54.0	8.5		810.3	92.69	6963.83
	1/23/2014	16:35	1/23/2014 16:35	55	30	31.4	4.2	54.0	8.5		339.0	38.78	7002.60
	1/23/2014	16:37	1/23/2014 16:37							Valve shut	16.9	1.94	7004.54
	1/23/2014	16:40	1/23/2014 16:40			22							7004.54
SW-31 Event 9	1/28/2014	7:24	1/28/2014 7:24										7004.54
	1/28/2014	7:25	1/28/2014 7:25	56	34	34.4	<2	56	0.0		0.0	0.00	7004.54
	1/28/2014	7:29	1/28/2014 7:29	55	34	34.4	<2	56	0.0		0.0	0.00	7004.54
	1/28/2014	8:06	1/28/2014 8:06	54	33	33.6	<2	56	0.0		0.0	0.00	7004.54
	1/28/2014	8:28	1/28/2014 8:28	54	33	33.6	<2	56	0.0		0.0	0.00	7004.54
	1/28/2014	10:02	1/28/2014 10:02	54	32.5	33.2	3.5	56	7.2		340.5	38.95	7043.50
	1/28/2014	11:15	1/28/2014 11:15	51	32.5	33.2	4	54	8.3		567.3	64.90	7108.39
	1/28/2014	11:44	1/28/2014 11:44	50	32.5	33.2	4.5	53	9.3		255.8	29.26	7137.66
	1/28/2014	13:20	1/28/2014 13:20	48	32	33.2	4.5	51	9.3		895.4	102.44	7240.09
	1/28/2014	14:25	1/28/2014 14:25	48	31	32.4	4.5	51	9.2		601.9	68.86	7308.96
	1/28/2014	15:45	1/28/2014 15:45	48	31	32.4	4	50	8.2		696.2	79.64	7388.60
	1/28/2014	16:40	1/28/2014 16:40	51	31	32.4	4	50	8.2		450.7	51.56	7440.16
	1/28/2014	16:42	1/28/2014 16:42			22.4				Valve shut	16.4	1.87	7442.04
SW-31 Event 10	1/29/2014	8:00	1/29/2014 8:00	51	32	34.8	<2	40	0.0				7442.04
	1/29/2014	8:10	1/29/2014 8:10	51	32	34.8	<2	40	0.0		0.0	0.00	7442.04
	1/29/2014	9:30	1/29/2014 9:30	48	32	34.8	<2	40	0.0		0.0	0.00	7442.04
	1/29/2014	10:30	1/29/2014 10:30	49	32	34	2.5	40	5.2		157.0	17.96	7459.99
	1/29/2014	11:40	1/29/2014 11:40	49	32	34	2.5	40	5.2		366.2	41.90	7501.89

SW-31 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	1/29/2014	13:00	1/29/2014 13:00	48.5	32	34	4	40	8.4		544.1	62.25	7564.14
	1/29/2014	14:00	1/29/2014 14:00	46	32	34	4	40	8.4		502.3	57.46	7621.60
	1/29/2014	15:00	1/29/2014 15:00	45	32	34	4	40	8.4		502.3	57.46	7679.06
	1/29/2014	16:30	1/29/2014 16:30	50	32	34	4.5	40	9.4	Valve shut	800.5	91.58	7770.64
	1/29/2014	16:31	1/29/2014 16:31			26							7770.64
SW-31 Event 11	1/30/2014	7:40	1/30/2014 7:40	55	34	35	<2	38	0.0				7770.64
	1/30/2014	8:30	1/30/2014 8:30	50	34	34	2	38	4.3		107.1	12.26	7782.90
	1/30/2014	8:50	1/30/2014 8:50	50	32.5	34	2.5	38	5.3		95.6	10.93	7793.83
	1/30/2014	9:30	1/30/2014 9:30	50	32.5	34	2.5	40	5.3		210.6	24.10	7817.93
	1/30/2014	10:50	1/30/2014 10:50	50	32	34	3	42	6.3		461.0	52.74	7870.67
	1/30/2014	12:00	1/30/2014 12:00	50	32	34	3.5	44	7.3		474.6	54.29	7924.97
	1/30/2014	13:30	1/30/2014 13:30	50	32	34	4.2	44	8.8		722.2	82.62	8007.58
	1/30/2014	13:31	1/30/2014 13:31			23				Valve shut	8.8	1.00	8008.58
SW-31 Event 12	2/3/2014	8:36	2/3/2014 8:36	55	32	34	<2	68	0.0		0.0	0.00	8008.58
	2/3/2014	8:42	2/3/2014 8:42	54	32	34	<2	68	0.0		0.0	0.00	8008.58
	2/3/2014	8:52	2/3/2014 8:52	53	32	33.4	<2	68	0.0		0.0	0.00	8008.58
	2/3/2014	9:14	2/3/2014 9:14	53	32	33	<2	70	0.0		0.0	0.00	8008.58
	2/3/2014	10:17	2/3/2014 10:17	52	32	32.6	3	74	6.1		191.1	21.87	8030.45
	2/3/2014	11:56	2/3/2014 11:56	51	32	32	3.9	77	7.9		689.7	78.90	8109.35
	2/3/2014	12:02	2/3/2014 12:02	50	33	32.6	4.5	77	9.2		51.1	5.85	8115.19
	2/3/2014	13:20	2/3/2014 13:20	50	33	32.6	5.2	74	10.6		772.3	88.36	8203.55
	2/3/2014	14:20	2/3/2014 14:20	50	33	32.6	5.8	73	11.9		675.0	77.22	8280.77
	2/3/2014	15:30	2/3/2014 15:30	50	33	32.6	6	70	12.3		846.4	96.83	8377.60
	2/3/2014	16:57	2/3/2014 16:57	50	33	32.6	6.5	70	13.3		1116.0	127.67	8505.27
	2/4/2014	9:32	2/4/2014 9:32		32	31	13.2	70	26.8		19970.6	2284.63	10789.90
	2/4/2014	9:33	2/4/2014 9:33			22				Valve shut	26.8	3.07	10792.97
SW-31 Event 13	2/5/2014	8:04	2/5/2014 8:04	55	25	24		63	0.0				10792.97
	2/5/2014	8:06	2/5/2014 8:06	55	32.5	31	<2	63	0.0		0.0	0.00	10792.97
	2/5/2014	8:15	2/5/2014 8:15	54	32.5	31	<2	64	0.0		0.0	0.00	10792.97
	2/5/2014	8:16	2/5/2014 8:16	54	35	32	<2	64	0.0		0.0	0.00	10792.97
	2/5/2014	8:38	2/5/2014 8:38	48	35	32	3.7	64	7.8		85.8	9.82	10802.78
	2/5/2014	9:22	2/5/2014 9:22	45	35	32	4.5	66	9.5		379.9	43.46	10846.24
	2/5/2014	10:21	2/5/2014 10:21	44	35	32	5	68	10.5		589.0	67.38	10913.62
	2/5/2014	11:23	2/5/2014 11:23	44	35	32	5.5	70	11.5		682.8	78.11	10991.73
	2/5/2014	12:35	2/5/2014 12:35	44	35	32	5.8	72	12.1		851.6	97.43	11089.16
	2/5/2014	13:29	2/5/2014 13:29	43	35	32	5.9	76	12.3		659.4	75.44	11164.60
	2/5/2014	14:43	2/5/2014 14:43	45	35	32	5.9	76	12.3		909.6	104.06	11268.66
	2/5/2014	15:36	2/5/2014 15:36	45	35	31.5	6	71	12.6		658.6	75.35	11344.00
	2/5/2014	17:09	2/5/2014 17:09		35	31.5	6	66.5	12.6		1170.8	133.94	11477.94
	2/5/2014	21:20	2/5/2014 21:20	48	35	31.5	7	62	14.8		3439.1	393.43	11871.38
	2/6/2014	7:56	2/6/2014 7:56	48	33	28.3	11.3	56	23.5		12180.2	1393.42	13264.79
	2/6/2014	7:59	2/6/2014 7:59			20				Valve shut	70.5	8.07	13272.87
SW-31 Event 14	2/7/2014	8:12	2/7/2014 8:12	53	32	32	<2	52	0.0				13272.87
	2/7/2014	8:16	2/7/2014 8:16	53	32	32	<2	54	0.0		0.0	0.00	13272.87
	2/7/2014	8:47	2/7/2014 8:47	46	29	29	3	56	6.0		92.6	10.59	13283.45
	2/7/2014	8:49	2/7/2014 8:49	46	32	31.5	5	56	10.3		16.3	1.86	13285.31
	2/7/2014	9:37	2/7/2014 9:37	43	32	31.5	6.1	56	12.6		548.5	62.74	13348.06
	2/7/2014	11:27	2/7/2014 11:27	42	31.5	30.5	7	60	14.3		1475.9	168.84	13516.90
	2/7/2014	11:29	2/7/2014 11:29	42	33	31.5	9.2	60	19.1		33.3	3.81	13520.72
	2/7/2014	13:05	2/7/2014 13:05	42	33	31.5	9.2	60	19.1		1830.7	209.43	13730.15
	2/7/2014	14:21	2/7/2014 14:21	45	33	31.5	9.6	60	19.9		1480.8	169.40	13899.55
	2/7/2014	15:37	2/7/2014 15:37	46	33	31	10	60	20.7		1543.8	176.61	14076.16
	2/7/2014	16:36	2/7/2014 16:36	46	33	30.5	10.1	58	21.0		1230.3	140.74	14216.90

SW-31 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	2/7/2014	17:27	2/7/2014 17:27	46	33	30.5	10.3	57	21.4		1081.0	123.66	14340.57
	2/7/2014	17:28	2/7/2014 17:28							Valve shut	21.4	2.45	14343.02
SW-31 Event 15	2/11/2014	7:54	2/11/2014 7:54	57	31	32.5	<2	55	0.0				14343.02
	2/11/2014	7:55	2/11/2014 7:55	55	32	33.2	<2	55	0.0		0.0	0.00	14343.02
	2/11/2014	9:16	2/11/2014 9:16	54	30.5	32.5	3.8	60	7.7		310.4	35.51	14378.52
	2/11/2014	9:18	2/11/2014 9:18	54	32	33.5	4.7	60	9.6		17.3	1.98	14380.50
	2/11/2014	10:29	2/11/2014 10:29	53	32	33.5	5.7	66	11.6		754.6	86.33	14466.83
	2/11/2014	11:49	2/11/2014 11:49	53	32	33.5	6	66	12.2		954.0	109.13	14575.97
	2/11/2014	12:44	2/11/2014 12:44	47	32	33.5	6.2	66	12.6		683.9	78.24	14654.20
	2/11/2014	14:00	2/11/2014 14:00	47	31.8	33.5	6.5	63	13.3		984.1	112.58	14766.79
	2/11/2014	16:48	2/11/2014 16:48	47	31.8	33.5	7.2	56	14.8		2356.3	269.56	15036.35
	2/11/2014	17:25	2/11/2014 17:25	53	31.5	33.5	7.2	54	14.8		546.9	62.57	15098.92
	2/11/2014	17:26	2/11/2014 17:26			26				Valve shut	14.8	1.69	15100.61
Note: a red value, i.e. 75 °F, indicates that value was interpolated from field data											Total CO_2 Mass (lbs):		15100.61

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
SW-32 Event 1	11/11/2013	12:45	11/11/2013 12:45		30	28	0	72	0.0				
	11/11/2013	12:46	11/11/2013 12:46		23	21	0	72	0.0		0.0	0.00	0.00
	11/11/2013	12:47	11/11/2013 12:47		28	26	<2	72	0.0		0.0	0.00	0.00
	11/11/2013	12:48	11/11/2013 12:48		31	29	<2	72	0.0		0.0	0.00	0.00
	11/11/2013	12:49	11/11/2013 12:49		32	30	<2	72	0.0		0.0	0.00	0.00
	11/11/2013	12:59	11/11/2013 12:59		28	26	<2	72	0.0		0.0	0.00	0.00
	11/11/2013	13:00	11/11/2013 13:00		31	29	5.5	72	11.0		5.5	0.63	0.63
	11/11/2013	13:22	11/11/2013 13:22	33	30	28	8	72	15.9		295.7	33.83	34.46
	11/11/2013	13:35	11/11/2013 13:35	32	30	28	8	72	15.9		206.1	23.58	58.04
	11/11/2013	13:50	11/11/2013 13:50	32	29	27	8.5	72	16.7		243.8	27.89	85.93
	11/11/2013	14:07	11/11/2013 14:07	32	29	27	9	72	17.6		291.5	33.34	119.27
	11/11/2013	14:44	11/11/2013 14:44	32	29	27	9.5	72	18.6		670.6	76.72	195.99
	11/11/2013	14:54	11/11/2013 14:54	36	31	29	11	75.5	17.8		182.1	20.83	216.82
	11/11/2013	14:58	11/11/2013 14:58	40	33	31	12.5	73	20.7		77.1	8.82	225.64
	11/11/2013	15:03	11/11/2013 15:03	40	33	31	12.75	73	21.1		104.7	11.98	237.62
	11/11/2013	15:09	11/11/2013 15:09	42	35	33	14	70.5	23.8		134.8	15.42	253.04
	11/11/2013	15:13	11/11/2013 15:13						0.0		47.5	5.44	258.47
	11/11/2013	15:16	11/11/2013 15:16	42	35	33	14.5	66.2	24.7		37.1	4.24	262.72
	11/11/2013	15:19	11/11/2013 15:19	40	33	31	14	68.1	23.3		72.1	8.25	270.96
	11/11/2013	15:23	11/11/2013 15:23	38	32	30	13.5	69.9	22.2		91.1	10.42	281.39
	11/11/2013	15:26	11/11/2013 15:26	36	30	28	12.5	69.5	20.1		63.5	7.27	288.65
	11/11/2013	15:43	11/11/2013 15:43	36	30	28	12.5	62.6	20.3		343.4	39.28	327.94
	11/11/2013	16:15	11/11/2013 16:15	36	30	28	12.5	56.3	20.4		650.6	74.43	402.37
	11/11/2013	16:24	11/11/2013 16:24	34	29	27	12	56.3	19.4		178.9	20.46	422.83
	11/11/2013	16:26	11/11/2013 16:26	32	28	26	11	56.3	17.5		36.9	4.22	427.05
	11/11/2013	16:34	11/11/2013 16:34	30	26	24	10.5	56.2	16.3		135.5	15.50	442.55
	11/11/2013	16:43	11/11/2013 16:43	28	25	23	9	54.8	13.8		135.8	15.54	458.09
	11/11/2013	17:06	11/11/2013 17:06	28	22	20	9	45.6	13.4		313.7	35.89	493.98
	11/11/2013	17:08	11/11/2013 17:08	30	24	22	10.5	48	16.1		29.5	3.37	497.35
	11/11/2013	17:11	11/11/2013 17:11	32	26	24	11.5	48	18.0		51.2	5.85	503.20
	11/11/2013	17:15	11/11/2013 17:15	34	27	25	12.5	48	19.9		75.8	8.67	511.87
	11/11/2013	17:17	11/11/2013 17:17	36	28	26	13.5	50.3	21.7		41.5	4.75	516.62
	11/11/2013	17:20	11/11/2013 17:20	40	31	29	15	48	25.0		69.9	8.00	524.62
	11/11/2013	17:24	11/11/2013 17:24	42	32	30	15.5	42.5	26.2		102.4	11.71	536.33
	11/11/2013	17:25	11/11/2013 17:25	38	30	28	14	44.5	23.1		24.7	2.82	539.16
	11/11/2013	17:39	11/11/2013 17:39							Valve Shut	323.7	37.03	576.18
	11/11/2013	17:40	11/11/2013 17:40		18								576.18
SW-32 Event 2	12/6/2013	8:20	12/6/2013 8:20	52	25	27	<2	71	0.0				576.18
	12/6/2013	8:22	12/6/2013 8:22	52	32	31	<2	71	0.0				576.18
	12/6/2013	8:48	12/6/2013 8:48	50	30	30.5	8	76	15.8		205.3	23.49	599.67
	12/6/2013	8:51	12/6/2013 8:51	50	30	30.5	10	76	19.7		53.3	6.10	605.77
	12/6/2013	9:00	12/6/2013 9:00	45	29	30.5	10	76	19.5		176.7	20.21	625.98
	12/6/2013	9:01	12/6/2013 9:01	45	32	33	12	76	24.2		21.9	2.50	628.48
	12/6/2013	10:13	12/6/2013 10:13	50	32	32	15	79	30.2		1958.9	224.10	852.59
	12/6/2013	10:56	12/6/2013 10:56	50	31	31.5	15	82	29.8		1289.3	147.50	1000.09
	12/6/2013	10:58	12/6/2013 10:58	50	32	33	16.25	82	32.6		62.4	7.14	1007.22
	12/6/2013	12:40	12/6/2013 12:40	45	32	33	18	84	36.1		3502.3	400.66	1407.88
	12/6/2013	12:42	12/6/2013 12:42	45	32	33	19	84	38.1	Valve Shut	74.1	8.48	1416.36
	12/6/2013	12:43	12/6/2013 12:43			19.5							1416.36
SW-32 Event 3	12/12/2013	8:40	12/12/2013 8:40	55	35	33	<2	58	0.0				1416.36
	12/12/2013	9:38	12/12/2013 9:38	50	35	31	8	64	16.9		489.1	55.95	1472.31
	12/12/2013	9:39	12/12/2013 9:39	50	30	32.5	10	64	20.0		18.4	2.11	1474.42
	12/12/2013	10:27	12/12/2013 10:27	50	30	32	12	67	23.9		1053.0	120.46	1594.88

SW-32 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	12/12/2013	11:15	12/12/2013 11:15	45	30	31.5	13.5	68	26.9		1218.3	139.37	1734.25
	12/12/2013	11:16	12/12/2013 11:16	43	31	32.5	15	68	30.2		28.5	3.26	1737.51
	12/12/2013	12:32	12/12/2013 12:32	45	31	32	16	70	32.1		2367.9	270.89	2008.41
	12/12/2013	12:40	12/12/2013 12:40							Valve Shut	257.1	29.41	2037.81
	12/12/2013	12:41	12/12/2013 12:41			19.5							2037.81
SW-32 Event 4	12/18/2013	8:09	12/18/2013 8:09	45	31	30	<2	54	0.0		0.0	0.00	2037.81
	12/18/2013	8:12	12/18/2013 8:12	45	33	32	<2	54	0.0		0.0	0.00	2037.81
	12/18/2013	9:21	12/18/2013 9:21	48	32	31	6.5	60	13.3		459.8	52.61	2090.42
	12/18/2013	9:22	12/18/2013 9:22	48	35	33.5	9	60	19.0		16.2	1.85	2092.27
	12/18/2013	10:21	12/18/2013 10:21	50	35	33	11	63	23.2		1246.7	142.62	2234.89
	12/18/2013	11:34	12/18/2013 11:34	50	35	33	11.5	66	24.2		1730.4	197.95	2432.84
	12/18/2013	12:09	12/18/2013 12:09	50	35	33	11.5	68	24.1		846.0	96.78	2529.63
	12/18/2013	13:01	12/18/2013 13:01	55	34	32	12	68	24.9		1276.2	146.00	2675.62
	12/18/2013	14:18	12/18/2013 14:18	47	34	32.5	13	68	27.0		2000.3	228.83	2904.45
	12/18/2013	15:53	12/18/2013 15:53	40	34	32.5	13	65	27.1		2570.4	294.05	3198.50
	12/18/2013	16:18	12/18/2013 16:18	40	34	33	13	65	27.1		677.4	77.50	3276.00
	12/18/2013	16:19	12/18/2013 16:19							Valve Shut	27.1	3.10	3279.10
	12/18/2013	16:20	12/18/2013 16:20			18							3279.10
SW-32 Event 5	12/19/2013	12:44	12/19/2013 12:44	50	27	26	<2	74	0.0				3279.10
	12/19/2013	12:45	12/19/2013 12:45	50	35	34	<2	74	0.0				3279.10
	12/19/2013	12:47	12/19/2013 12:47	50	32	32	<2	74	0.0		0	0.00	3279.10
	12/19/2013	13:49	12/19/2013 13:49	50	31	30	9	74	18.0		558.1	63.85	3342.95
	12/19/2013	13:58	12/19/2013 13:58	45	33.5	32	13	74	26.7		201.2	23.02	3365.97
	12/19/2013	15:05	12/19/2013 15:05	43	33.5	31	14.2	75	29.2		1871.8	214.13	3580.10
	12/19/2013	15:07	12/19/2013 15:07	41	34.5	32	16.8	75	34.9		64.0	7.32	3587.43
	12/19/2013	16:20	12/19/2013 16:20	42	34	32	17.5	72	36.2		2594.5	296.81	3884.23
	12/19/2013	16:48	12/19/2013 16:48	45	34	32	17.5	70	36.3		1015.3	116.15	4000.39
	12/19/2013	16:50	12/19/2013 16:50							Valve Shut	72.6	8.30	4008.69
SW-32 Event 6	1/7/2014	13:35	1/7/2014 13:35					48					4008.69
	1/7/2014	13:36	1/7/2014 13:36	51	31	33.5	<2	48	0.0				4008.69
	1/7/2014	15:32	1/7/2014 15:32	50	28.5	30	6	48	12.0		694.3	79.42	4088.12
	1/7/2014	15:33	1/7/2014 15:33	50	30.5	32	8	48	16.3		14.2	1.62	4089.73
	1/7/2014	16:35	1/7/2014 16:35	47	30.5	32	9.5	44	19.5		1110.0	126.98	4216.71
	1/7/2014	17:30	1/7/2014 17:30	56	30	31	10	40	20.5		1098.4	125.65	4342.37
	1/7/2014	17:31	1/7/2014 17:31							Valve Shut	20.5	2.34	4344.71
	1/7/2014	17:32	1/7/2014 17:32			22							4344.71
SW-32 Event 7	1/11/2014	8:08	1/11/2014 8:08	46	30	31	<2	65	0.0				4344.71
	1/11/2014	8:09	1/11/2014 8:09	46	31	32	<2	65	0.0				4344.71
	1/11/2014	8:32	1/11/2014 8:32	44	30	32	3.8	66	7.6		87.1	9.97	4354.67
	1/11/2014	9:02	1/11/2014 9:02	42	30	31.5	5.2	67	10.4		269.0	30.77	4385.45
	1/11/2014	9:04	1/11/2014 9:04	42	31	32	6	67	12.1		22.4	2.57	4388.01
	1/11/2014	10:36	1/11/2014 10:36	38	31	31.5	9	72	18.0		1385.7	158.52	4546.54
	1/11/2014	11:38	1/11/2014 11:38	38	31	31.5	9.8	74	19.6		1166.9	133.50	4680.03
	1/11/2014	12:10	1/11/2014 12:10	42	30.5	30.5	10.5	76	20.8		647.2	74.04	4754.08
	1/11/2014	12:12	1/11/2014 12:12							Valve Shut	41.7	4.77	4758.85
	1/11/2014	12:13	1/11/2014 12:13			21							4758.85
SW-32 Event 8	1/13/2014	7:32	1/13/2014 7:32	60	33	33	<2	47	0.0		0.0	0.00	4758.85
	1/13/2014	7:38	1/13/2014 7:38	60	28	29	<2	47	0.0		0.0	0.00	4758.85
	1/13/2014	7:39	1/13/2014 7:39	60	33	33	<2	47	0.0		0.0	0.00	4758.85
	1/13/2014	7:44	1/13/2014 7:44	58	33	33	<2	48	0.0		0.0	0.00	4758.85
	1/13/2014	8:31	1/13/2014 8:31	47	31	31.5	9	51	18.4		432.9	49.52	4808.37
	1/13/2014	8:33	1/13/2014 8:33	47	32	32	10.2	51	21.1		39.5	4.52	4812.89
	1/13/2014	9:37	1/13/2014 9:37	45	32	31.5	12	59	24.6		1463.6	167.44	4980.33

SW-32 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	1/13/2014	9:38	1/13/2014 9:38	45	32.5	32.2	13.8	59	28.5		26.6	3.04	4983.36
	1/13/2014	10:54	1/13/2014 10:54	45	32.5	31.5	15	70	30.6		2245.8	256.92	5240.29
	1/13/2014	10:55	1/13/2014 10:55	45	33	32	16.2	70	33.2		31.9	3.65	5243.94
	1/13/2014	11:57	1/13/2014 11:57	44	33	32	17	70	34.9		2112.3	241.65	5485.59
	1/13/2014	12:56	1/13/2014 12:56	45	33.5	33	17.5	72	36.0		2092.3	239.36	5724.95
	1/13/2014	14:22	1/13/2014 14:22	40	34	33	15	71	31.1		2886.1	330.17	6055.12
	1/13/2014	15:42	1/13/2014 15:42	39	33	32.5	14.5	70	29.8		2433.6	278.41	6333.53
	1/13/2014	16:25	1/13/2014 16:25	40	33	32.5	14.5	70	29.8		1279.7	146.39	6479.92
	1/13/2014	16:47	1/13/2014 16:47	39	33	33	14.5	68	29.8		655.3	74.97	6554.89
	1/13/2014	16:49	1/13/2014 16:49							Valve Shut	59.6	6.82	6561.71
	1/13/2014	16:51	1/13/2014 16:51			21							6561.71
SW-32 Event 9	1/15/2014	7:58	1/15/2014 7:58	55	30	33	<2	46	0.0		0.0	0.00	6561.71
	1/15/2014	8:39	1/15/2014 8:39	52	27	28.5	<2	55	0.0		0.0	0.00	6561.71
	1/15/2014	8:41	1/15/2014 8:41	52	32	32	5	55	10.3		10.3	1.18	6562.89
	1/15/2014	9:48	1/15/2014 9:48	44	31	31.5	7.8	64	15.8		873.1	99.88	6662.77
	1/15/2014	9:49	1/15/2014 9:49	44	32.5	32.5	9	64	18.5		17.1	1.96	6664.73
	1/15/2014	10:56	1/15/2014 10:56	40	32.5	32	10	69	20.4		1303.7	149.14	6813.87
	1/15/2014	12:00	1/15/2014 12:00	41	32.5	32	11	69	22.5		1373.2	157.09	6970.96
	1/15/2014	13:43	1/15/2014 13:43	49	32	31.5	11.2	67	22.8		2332.2	266.80	7237.76
	1/15/2014	15:25	1/15/2014 15:25	48	31.5	31	12.5	70	25.2		2450.5	280.34	7518.10
	1/15/2014	16:22	1/15/2014 16:22	46	31	31	13	68	26.2		1464.9	167.58	7685.69
	1/15/2014	16:23	1/15/2014 16:23			21				Valve shut	26.2	2.99	7688.68
SW-32 Event 10	1/17/2014	7:08	1/17/2014 7:08	57	30	31	<2	40	0.0				7688.68
	1/17/2014	7:09	1/17/2014 7:09	57	32	33	<2	40	0.0				7688.68
	1/17/2014	7:59	1/17/2014 7:59	51	31	32.5	2	44	4.1		103.1	11.79	7700.47
	1/17/2014	8:46	1/17/2014 8:46	50	31	32	3.5	54	7.1		264.7	30.28	7730.75
	1/17/2014	10:22	1/17/2014 10:22	45	31	32	4.2	60	8.5		751.7	85.99	7816.74
	1/17/2014	11:27	1/17/2014 11:27	46	30	32	5	69	9.9		599.9	68.62	7885.37
	1/17/2014	12:33	1/17/2014 12:33	46	30	32	5.5	72	10.9		687.7	78.67	7964.04
	1/17/2014	13:07	1/17/2014 13:07	45	30	32	5.7	72	11.3		377.4	43.17	8007.21
	1/17/2014	14:22	1/17/2014 14:22	44	30	32	5.8	70	11.5		855.6	97.88	8105.09
	1/17/2014	15:51	1/17/2014 15:51	55	30	31	6	70	11.9		1042.8	119.29	8224.38
	1/17/2014	15:52	1/17/2014 15:52							Valve shut	11.9	1.36	8225.74
	1/17/2014	15:53	1/17/2014 15:53			23							8225.74
SW-32 Event 11	1/30/2014	7:30	1/30/2014 7:30	50	30	32	<2	46	0.0				8225.74
	1/30/2014	8:30	1/30/2014 8:30	50	28	32	2	40	4.0		120.0	13.73	8239.46
	1/30/2014	9:30	1/30/2014 9:30	50	28	31	2	40	4.0		240.0	27.45	8266.92
	1/30/2014	10:50	1/30/2014 10:50	50	28	31	2	42	4.0		319.6	36.56	8303.48
	1/30/2014	12:00	1/30/2014 12:00	50	29	31	2	42	4.0		281.0	32.15	8335.63
	1/30/2014	13:32	1/30/2014 13:32	50	29	30	2.5	44	5.0		417.5	47.76	8383.39
	1/30/2014	13:35	1/30/2014 13:35			21				Valve shut	15.1	1.73	8385.12
SW-32 Event 12	2/3/2014	8:10	2/3/2014 8:10	55	33	33	<2	68	0.0		0.0	0.00	8385.12
	2/3/2014	8:16	2/3/2014 8:16	55	33	32	<2	68	0.0		0.0	0.00	8385.12
	2/3/2014	8:31	2/3/2014 8:31	55	32	32	<2	70	0.0		0.0	0.00	8385.12
	2/3/2014	8:59	2/3/2014 8:59	54	31	32	<2	75	0.0		0.0	0.00	8385.12
	2/3/2014	10:10	2/3/2014 10:10	54	31	32	<2	82	0.0		0.0	0.00	8385.12
	2/3/2014	10:14	2/3/2014 10:14	54	33.5	33	<2	82	0.0		0.0	0.00	8385.12
	2/3/2014	11:50	2/3/2014 11:50	53	33.5	33	<2	86	0.0		0.0	0.00	8385.12
	2/3/2014	11:54	2/3/2014 11:54	54	34.5	34	<2	86	0.0		0.0	0.00	8385.12
	2/3/2014	13:18	2/3/2014 13:18	52	34.5	33.5	2	85	4.1		172.6	19.75	8404.86
	2/3/2014	14:28	2/3/2014 14:28	51	34.5	33.2	2.5	84	5.1		323.8	37.05	8441.91
	2/3/2014	15:23	2/3/2014 15:23	51	34.5	33.2	3	82	6.2		311.4	35.63	8477.54
	2/3/2014	16:49	2/3/2014 16:49	50	34.5	33	3.8	82	7.8		602.6	68.94	8546.47

SW-32 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	2/4/2014	9:20	2/4/2014 9:20	48	33.5	32.5	6.3	62	13.1		10372.2	1186.58	9733.05
	2/4/2014	9:22	2/4/2014 9:22			24				Valve shut	26.2	3.00	9736.05
SW-32 Event 13	2/5/2014	8:19	2/5/2014 8:19	53	27	25.5	3.5	65	6.7				9736.05
	2/5/2014	8:21	2/5/2014 8:21		33	33	6.3	66	13.0		19.7	2.26	9738.30
	2/5/2014	9:06	2/5/2014 9:06	47	33	33	5.9	68	12.1		565.1	64.64	9802.94
	2/5/2014	10:17	2/5/2014 10:17	45	33	33	5.9	70	12.1		860.6	98.45	9901.39
	2/5/2014	11:18	2/5/2014 11:18	45	33	33	6	72	12.3		744.2	85.13	9986.53
	2/5/2014	12:30	2/5/2014 12:30	45	33	33	6.2	78	12.6		897.0	102.62	10089.14
	2/5/2014	13:25	2/5/2014 13:25	45	33	33	6.5	80	13.2		710.5	81.29	10170.43
	2/5/2014	14:39	2/5/2014 14:39	46	33	32.5	6.5	80	13.2		977.7	111.85	10282.28
	2/5/2014	15:32	2/5/2014 15:32	46	33		6.8	77	13.9		717.4	82.08	10364.35
	2/5/2014	17:05	2/5/2014 17:05	49	33	32	7	79	14.2		1306.8	149.50	10513.85
	2/5/2014	20:12	2/5/2014 20:12		33	32	7.3	64	15.1		2740.8	313.54	10827.39
	2/6/2014	7:35	2/6/2014 7:35	45	32.5	32	9.6	47	20.1		11995.5	1372.28	12199.67
	2/6/2014	7:44	2/6/2014 7:44			24				Valve shut	180.5	20.65	12220.32
SW-32 Event 14	2/7/2014	7:38	2/7/2014 7:38	53	28.5	27	<2		0.0				12220.32
	2/7/2014	7:39	2/7/2014 7:39	53	33	31	8.1	49	17.0		8.5	0.97	12221.29
	2/7/2014	7:42	2/7/2014 7:42	53	33	31	8.1	49	17.0		50.9	5.83	12227.12
	2/7/2014	8:57	2/7/2014 8:57	46	33	31	8	58	16.6		1259.7	144.11	12371.23
	2/7/2014	9:42	2/7/2014 9:42	44	33	31	7.9	54	16.5		744.5	85.17	12456.40
	2/7/2014	11:48	2/7/2014 11:48	44	33	31	8.2	61	17.0		2107.6	241.11	12697.51
	2/7/2014	13:31	2/7/2014 13:31	45	33	31	8.5	64	17.5		1778.2	203.43	12900.94
	2/7/2014	14:41	2/7/2014 14:41	48	32.5	31	8.5	62	17.5		1226.3	140.29	13041.23
	2/7/2014	15:52	2/7/2014 15:52	48	32.5	31	8.5	60	17.5		1243.0	142.20	13183.43
	2/7/2014	16:32	2/7/2014 16:32	48	32.5	31	9	59	18.6		722.0	82.59	13266.02
	2/7/2014	17:22	2/7/2014 17:22	48	32.5	31	9	58	18.6		929.2	106.30	13372.32
	2/7/2014	17:23	2/7/2014 17:23							Valve shut	18.6	2.13	13374.45
SW-32 Event 15	2/11/2014	7:40	2/11/2014 7:40	56	32.5	32.2	<2	55	0.0				13374.45
	2/11/2014	8:48	2/11/2014 8:48	47	25	25	<2	56	0.0		0.0	0.00	13374.45
	2/11/2014	8:49	2/11/2014 8:49	47	32.5	32.2	<2	56	0.0		0.0	0.00	13374.45
	2/11/2014	9:31	2/11/2014 9:31	51	32	32	<2	61	0.0		0.0	0.00	13374.45
	2/11/2014	9:32	2/11/2014 9:32	51	33	33.2	<2	61	0.0		0.0	0.00	13374.45
	2/11/2014	9:51	2/11/2014 9:51	50	33.2	33.2	<2	63	0.0		0.0	0.00	13374.45
	2/11/2014	10:21	2/11/2014 10:21	53	33.2	33.2	<2	66	0.0		0.0	0.00	13374.45
	2/11/2014	11:43	2/11/2014 11:43	53	34.5	33.2	<2	66	0.0		0.0	0.00	13374.45
	2/11/2014	11:44	2/11/2014 11:44	53	34.5	34	<2	66	0.0		0.0	0.00	13374.45
	2/11/2014	12:38	2/11/2014 12:38	46	34.5	34	2	66	4.2		113.0	12.93	13387.38
	2/11/2014	13:57	2/11/2014 13:57	46	34.5	34	2	64	4.2		331.0	37.87	13425.25
	2/11/2014	16:37	2/11/2014 16:37	46	34.5	34	3.5	56	7.4		927.5	106.11	13531.36
	2/11/2014	17:35	2/11/2014 17:35	57	34.5	34	3.6	54	7.6		435.7	49.85	13581.21
	2/11/2014	17:36	2/11/2014 17:36			26				Valve shut	7.6	0.87	13582.08
SW-32 Event 16	2/12/2014	8:07	2/12/2014 8:07	55	33	32	<2	49	0.0				13582.08
	2/12/2014	8:42	2/12/2014 8:42	47	27	27	<2	49	0.0		0.0	0.00	13582.08
	2/12/2014	8:43	2/12/2014 8:43	47	32.5	32	6	49	12.5		6.3	0.72	13582.80
	2/12/2014	10:20	2/12/2014 10:20	47	32	30.5	10.2	51	21.1		1630.3	186.51	13769.30
	2/12/2014	11:49	2/12/2014 11:49	45	31.5	29	12.8	50	26.4		2112.7	241.69	14010.99
	2/12/2014	13:54	2/12/2014 13:54	50	30.5	28	14	49	28.6		3432.5	392.68	14403.67
	2/12/2014	13:55	2/12/2014 13:55	50	32.5	28.5	17	49	35.4		32.0	3.66	14407.33
	2/12/2014	14:40	2/12/2014 14:40	50	32.5	28.5	17	49	35.4		1594.8	182.45	14589.78
	2/12/2014	15:50	2/12/2014 15:50	50	32.5	28	17.5	47	36.6		2520.0	288.28	14878.06
	2/12/2014	16:50	2/12/2014 16:50	50	32.5	28	17.9	47	37.4		2218.6	253.80	15131.86
	2/12/2014	17:50	2/12/2014 17:50	50	32.5	28	18.1	48	37.8		2255.0	257.97	15389.84
	2/13/2014	7:08	2/13/2014 7:08	49	32	27	19.8	45	41.2		31519.7	3605.86	18995.69

SW-32 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	2/13/2014	7:56	2/13/2014 7:56	50	32	27	19.4	44	40.4		1959.8	224.20	19219.89
	2/13/2014	9:02	2/13/2014 9:02	50	32	27	19.4	45	40.4		2667.2	305.13	19525.02
	2/13/2014	9:50	2/13/2014 9:50	50	32	27	19.6	45	40.8		1948.8	222.94	19747.96
	2/13/2014	10:30	2/13/2014 10:30	50	32	27	19.7	46	41.0		1635.6	187.12	19935.07
	2/13/2014	11:00	2/13/2014 11:00	50	32	27	19.7	46	41.0		1229.2	140.62	20075.69
	2/13/2014	11:30	2/13/2014 11:30	50	32	27	19.7	47	40.9		1228.6	140.55	20216.24
	2/13/2014	12:00	2/13/2014 12:00	50	32	27	19.7	50	40.8		1226.1	140.26	20356.51
	2/13/2014	12:30	2/13/2014 12:30	50	32	27	19.7	53	40.7		1222.3	139.83	20496.34
	2/13/2014	13:00	2/13/2014 13:00	50	32	26.5	19.2	55	39.6		1203.8	137.71	20634.05
	2/13/2014	14:01	2/13/2014 14:01	50	32	26.5	19.2	56	39.5		2412.5	275.99	20910.04
	2/13/2014	15:00	2/13/2014 15:00	50	32	26.5	19.2	58	39.4		2329.9	266.54	21176.58
	2/13/2014	15:18	2/13/2014 15:18			20				Valve shut	710.1	81.24	21257.81
Note: a red value, i.e. 75 °F, indicates that value was interpolated from field data											Total CO_2 Mass (lbs):		21257.81

SW-33 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
SW-33 Event 1	11/19/2013	13:12	11/19/2013 13:12	55	26			70	0.0				
	11/19/2013	13:14	11/19/2013 13:14		29	30	<2	70	0.0		0.0	0.00	0.00
	11/19/2013	13:26	11/19/2013 13:26		27	22	21	70	40.3		241.6	27.63	27.63
	11/19/2013	13:28	11/19/2013 13:28		34	26	26	70	53.9		94.2	10.77	38.41
	11/19/2013	13:57	11/19/2013 13:57	55	34	24	28	70	58.1		1624.0	185.79	224.20
	11/19/2013	13:58	11/19/2013 13:58		36	25	30	70	63.5		60.8	6.95	231.15
	11/19/2013	14:45	11/19/2013 14:45	52	35	25	29	70	60.8		2920.6	334.12	565.27
	11/19/2013	17:09	11/19/2013 17:09	50	34.5	25	29	62	60.9		8763.5	1002.55	1567.82
	11/19/2013	17:11	11/19/2013 17:11							Turned off		0.00	1567.82
	11/19/2013	17:12	11/19/2013 17:12									0.00	1567.82
	11/19/2013	17:15	11/19/2013 17:15			30				Turned on		0.00	1567.82
	11/19/2013	17:16	11/19/2013 17:16	52	34	29	24	62.0	50.2		1304.5	149.24	1717.05
	11/19/2013	17:42	11/19/2013 17:42		35	28.5	25	60.0	52.9		103.1	11.79	1728.85
	11/19/2013	17:44	11/19/2013 17:44							Valve shut	52.9	6.05	1734.90
	11/19/2013	17:45	11/19/2013 17:45		20	20							1734.90
SW-33 Event 2	12/3/2013	15:47	12/3/2013 15:47										1734.90
	12/3/2013	15:48	12/3/2013 15:48	48	28	31.5	6	73	11.6		11.6	1.33	1736.23
	12/3/2013	15:49	12/3/2013 15:49	48	28	27	12.5	73	24.2		17.9	2.05	1738.28
	12/3/2013	15:50	12/3/2013 15:50	47.5	28	28.5	16	73	31.0		27.6	3.15	1741.43
	12/3/2013	15:53	12/3/2013 15:53	47.5	28	28.5	17	73	32.9		95.8	10.96	1752.38
	12/3/2013	15:54	12/3/2013 15:54	46	30.5	29.5	18	73	35.8		34.4	3.93	1756.32
	12/3/2013	16:05	12/3/2013 16:05	45	33	30	24	72	49.2		467.5	53.48	1809.80
	12/3/2013	16:18	12/3/2013 16:18	45	32	29.5	25	70	50.8		649.5	74.30	1884.10
	12/3/2013	16:20	12/3/2013 16:20	45	35	30.5	26	70	54.5		105.2	12.04	1896.14
	12/3/2013	16:33	12/3/2013 16:33	45	34	30	26	68	54.0		705.4	80.69	1976.84
	12/3/2013	16:34	12/3/2013 16:34	44	35	30.5	27.5	68	57.7		55.9	6.39	1983.23
	12/3/2013	16:50	12/3/2013 16:50	44	35	30.5	27.5	67	57.8		924.3	105.75	2088.98
	12/3/2013	16:51	12/3/2013 16:51							Valve shut	57.8	6.61	2095.59
	12/3/2013	16:52	12/3/2013 16:52										2095.59
SW-33 Event 3	12/4/2013	13:24	12/4/2013 13:24										2095.59
	12/4/2013	13:25	12/4/2013 13:25	53	32	31	6	84	12.0		48.1	5.50	2101.09
	12/4/2013	13:29	12/4/2013 13:29	53	27	25	16.5	84	31.2		21.6	2.47	2103.56
	12/4/2013	13:30	12/4/2013 13:30	53	27	27	19.5	84	36.9		476.7	54.53	2158.09
	12/4/2013	13:44	12/4/2013 13:44	52	27	26	21	84	39.7		38.3	4.38	2162.47
	12/4/2013	13:45	12/4/2013 13:45	52	28	26.5	22	84	42.1		2250.6	257.46	2419.94
	12/4/2013	14:40	12/4/2013 14:40	50	28	25	22.5	79	43.3		170.8	19.54	2439.47
	12/4/2013	14:44	12/4/2013 14:44							Valve shut	43.3	4.95	2444.43
	12/4/2013	14:45	12/4/2013 14:45				18						2444.43
SW-33 Event 4	12/5/2013	13:14	12/5/2013 13:14										2444.43
	12/5/2013	13:15	12/5/2013 13:15	54	31	35	<2	85	0.0				2444.43
	12/5/2013	13:18	12/5/2013 13:18	54	31	33	5	85	9.9		19.8	2.26	2446.69
	12/5/2013	13:22	12/5/2013 13:22	52	29	32	8	84	15.5		76.2	8.71	2455.41
	12/5/2013	13:28	12/5/2013 13:28	52	29	31.5	10	84	19.4		627.6	71.79	2527.20
	12/5/2013	14:04	12/5/2013 14:04	50	29	30	13.5	85	26.1		22.7	2.60	2529.80
	12/5/2013	14:05	12/5/2013 14:05	50	28	31.25	14.5	85	27.7		134.6	15.40	2545.20
	12/5/2013	14:10	12/5/2013 14:10	50	29	31.25	14.5	85	28.1		223.2	25.53	2570.73
	12/5/2013	14:18	12/5/2013 14:18	50	29	30.5	15	85	29.0		28.5	3.27	2574.00
	12/5/2013	14:19	12/5/2013 14:19							Valve shut	29.0	3.32	2577.32
	12/5/2013	14:20	12/5/2013 14:20			22							2577.32
SW-33 Event 5	12/6/2013	15:52	12/6/2013 15:52	45	28	32	<2	79	0.0				2577.32
	12/6/2013	16:12	12/6/2013 16:12	44	26	29	7.5	78	14.1		7.0	0.81	2578.13
	12/6/2013	16:13	12/6/2013 16:13	43	29	31	11	78	21.4		923.6	105.66	2683.78
	12/6/2013	17:05	12/6/2013 17:05	42.5	27.5	30	14.5	76	27.8		24.6	2.82	2686.60

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	12/6/2013	17:06	12/6/2013 17:06							Valve shut	27.8	3.18	2689.78
	12/6/2013	17:07	12/6/2013 17:07			20.5							2689.78
SW-33 Event 6	12/9/2013	13:43	12/9/2013 13:43										2689.78
	12/9/2013	13:46	12/9/2013 13:46	50	32	30	<2	84	0.0		0.0	0.00	2689.78
	12/9/2013	13:56	12/9/2013 13:56	50	30	30	4	84	7.8		39.2	4.48	2694.26
	12/9/2013	14:11	12/9/2013 14:11	50	30	28	7	84	13.7		161.6	18.49	2712.75
	12/9/2013	14:30	12/9/2013 14:30	45	30	27	9	84	17.6		297.8	34.07	2746.82
	12/9/2013	14:55	12/9/2013 14:55	48	30	26.5	10	82	19.6		465.8	53.29	2800.11
	12/9/2013	14:56	12/9/2013 14:56	48	32	28.5	12	82	24.1		21.9	2.50	2802.61
	12/9/2013	14:59	12/9/2013 14:59	48	32	28.5	12	82	24.1	Valve shut	72.3	8.27	2810.88
	12/9/2013	15:00	12/9/2013 15:00			20							2810.88
SW-33 Event 7	12/10/2013	16:38	12/10/2013 16:38	45	30	34	3	70	6.0		0.0	0.00	2810.88
	12/10/2013	16:40	12/10/2013 16:40	45	28	34	**9**	70	17.5		23.4	2.68	2813.55
	12/10/2013	16:42	12/10/2013 16:42	45	28	32	10	70	19.4		36.9	4.22	2817.77
	12/10/2013	16:56	12/10/2013 16:56	45	28	31	11	68	21.4		285.5	32.66	2850.43
	12/10/2013	17:24	12/10/2013 17:24	45	28	30	13	63	25.4		654.9	74.93	2925.36
	12/10/2013	17:35	12/10/2013 17:35	45	28	30	13.5	62	26.4	Valve shut	284.9	32.59	2957.95
SW-33 Event 8	12/11/2013	14:18	12/11/2013 14:18	50	30	31	<2	68	0.0				2957.95
	12/11/2013	14:38	12/11/2013 14:38		28	24.5	8	68	12.6		126.1	14.42	2972.37
	12/11/2013	15:33	12/11/2013 15:33		26	28	11.5	64	17.8		835.0	95.52	3067.89
	12/11/2013	15:35	12/11/2013 15:35	46	28	30	14	64	22.1		39.9	4.56	3072.46
	12/11/2013	15:44	12/11/2013 15:44	46	28	30	14	64	22.1		199.3	22.80	3095.26
	12/11/2013	15:45	12/11/2013 15:45							Valve shut	22.1	2.53	3097.79
	12/11/2013	15:46	12/11/2013 15:46			22							3097.79
SW-33 Event 9	12/12/2013	12:42	12/12/2013 12:42	45	30	32	<2	70	0.0				3097.79
	12/12/2013	13:50	12/12/2013 13:50	50	29	30	10.5	70	20.6		700.8	80.18	3177.97
	12/12/2013	13:55	12/12/2013 13:55	50	29	30	10.5	70	20.6		103.1	11.79	3189.76
	12/12/2013	14:03	12/12/2013 14:03	50	29	29	10.5	70	20.6		164.9	18.87	3208.63
	12/12/2013	14:04	12/12/2013 14:04	50	29	30.5	12.5	70	24.5		22.6	2.58	3211.21
	12/12/2013	14:15	12/12/2013 14:15	45	30	30	12.5	70	24.8		271.5	31.06	3242.27
	12/12/2013	14:16	12/12/2013 14:16							Valve shut	24.8	2.84	3245.11
	12/12/2013	14:17	12/12/2013 14:17			20							3245.11
SW-33 Event 10	12/16/2013	8:12	12/16/2013 8:12	50	26	26	<2	48	0.0		0.0	0.00	3245.11
	12/16/2013	8:15	12/16/2013 8:15	50	30	31	<2	48	0.0		0.0	0.00	3245.11
	12/16/2013	8:17	12/16/2013 8:17	50	30	31	3.5	48	7.1		7.1	0.81	3245.92
	12/16/2013	8:22	12/16/2013 8:22	50	30	31	6	49	12.2		48.2	5.51	3251.43
	12/16/2013	8:57	12/16/2013 8:57	45	30	30	9	50	18.2		532.0	60.86	3312.29
	12/16/2013	9:01	12/16/2013 9:01	45	30	31.5	11.5	50	23.3		83.1	9.50	3321.79
	12/16/2013	9:13	12/16/2013 9:13	44	30	31	11.5	52	23.2		279.3	31.95	3353.74
	12/16/2013	9:14	12/16/2013 9:14							Valve shut	23.2	2.66	3356.40
	12/16/2013	9:15	12/16/2013 9:15			22							3356.40
SW-33 Event 11	12/17/2013	12:11	12/17/2013 12:11	45	33	32	<2	72	0.0		0.0	0.00	3356.40
	12/17/2013	13:07	12/17/2013 13:07	50	31	29	10	72	20.0		561.2	64.20	3420.60
	12/17/2013	13:08	12/17/2013 13:08	50	32	30.5	13.5	72	27.4		23.7	2.71	3423.31
	12/17/2013	13:09	12/17/2013 13:09	50	35	32	14.5	72	30.3		28.8	3.30	3426.61
	12/17/2013	14:10	12/17/2013 14:10	45	33	30.5	18	73	36.8		2048.4	234.34	3660.96
	12/17/2013	15:20	12/17/2013 15:20	45	33	29	20	72	41.0		2723.1	311.52	3972.47
	12/17/2013	15:21	12/17/2013 15:21	45	35	30	23	72	48.1		44.5	5.09	3977.57
	12/17/2013	16:32	12/17/2013 16:32	45	35	31	23	70	48.2		3418.8	391.11	4368.68
	12/17/2013	22:08	12/17/2013 22:08	45	29	29	24.5	56	48.8		16290.5	1863.64	6232.32
	12/18/2013	8:02	12/18/2013 8:02	42	32.5	28	25	52	52.0		29916.1	3422.40	9654.72
	12/18/2013	8:03	12/18/2013 8:03							Valve shut	52.0	5.94	9660.66
	12/18/2013	8:04	12/18/2013 8:04			20							9660.66

SW-33 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
SW-33 Event 12	1/21/2014	12:13	1/21/2014 12:13	40	32	33	<2	71	0.0		0.0	0.00	9660.66
	1/21/2014	13:25	1/21/2014 13:25	51	29	30.5	5	74	9.8		352.0	40.27	9700.93
	1/21/2014	13:26	1/21/2014 13:26	51	31	32.2	6.3	74	12.6		11.2	1.28	9702.21
	1/21/2014	14:38	1/21/2014 14:38	48	31	31	8.5	74	17.0		1065.8	121.93	9824.14
	1/21/2014	15:46	1/21/2014 15:46	52	30	30.5	10.5	68	20.9		1288.4	147.40	9971.54
	1/21/2014	16:41	1/21/2014 16:41	53	30	30.2	11.9	68	23.7		1225.7	140.22	10111.76
	1/21/2014	16:42	1/21/2014 16:42							Valve shut	23.7	2.71	10114.47
	1/21/2014	16:44	1/21/2014 16:44			22							10114.47
SW-33 Event 13	1/28/2014	9:45	1/28/2014 9:45										10114.47
	1/28/2014	9:46	1/28/2014 9:46	52	33	32.5	<2	56	0.0		0.0	0.00	10114.47
	1/28/2014	10:13	1/28/2014 10:13	52	33	32	2	56	4.2		56.2	6.43	10120.90
	1/28/2014	10:56	1/28/2014 10:56	52	33	32	3.5	56	7.3		246.1	28.15	10149.05
	1/28/2014	11:37	1/28/2014 11:37	52	32	32	4.5	54	9.3		339.6	38.85	10187.90
	1/28/2014	13:15	1/28/2014 13:15	50	31	31	5	51	10.2		956.3	109.40	10297.30
	1/28/2014	14:20	1/28/2014 14:20	50	31	30.5	4.5	51	9.2		631.9	72.29	10369.59
	1/28/2014	15:40	1/28/2014 15:40	50	30	30	6	50	12.2		854.6	97.76	10467.36
	1/28/2014	16:45	1/28/2014 16:45	58	30	29.5	10	50	20.3		1053.4	120.51	10587.87
	1/28/2014	16:46	1/28/2014 16:46			21				Valve shut	20.3	2.32	10590.18
SW-33 Event 14	2/4/2014	9:24	2/4/2014 9:24	47	33	32	<2	62	0.0				10590.18
	2/4/2014	10:10	2/4/2014 10:10	53	31.5	31.5	2	62	4.1		93.6	10.71	10600.89
	2/4/2014	10:11	2/4/2014 10:11	53	32.5	32	3.7	62	7.6		5.8	0.67	10601.56
	2/4/2014	10:32	2/4/2014 10:32	53	32.5	32	4	63	8.2		166.3	19.02	10620.58
	2/4/2014	11:33	2/4/2014 11:33	52	32	31.5	6	65	12.2		624.2	71.41	10691.99
	2/4/2014	12:34	2/4/2014 12:34	50	32	31	6.8	66	13.9		796.2	91.08	10783.07
	2/4/2014	13:15	2/4/2014 13:15	48	32	30.5	7.2	67	14.7		584.7	66.89	10849.96
	2/4/2014	14:10	2/4/2014 14:10	48	31	30	9.2	64	18.6		914.3	104.60	10954.56
	2/4/2014	14:41	2/4/2014 14:41	48	32.5	30.5	12	64	24.6		670.0	76.65	11031.21
	2/4/2014	15:08	2/4/2014 15:08	50	32.5	30	13	62	26.7		693.8	79.37	11110.58
	2/4/2014	16:21	2/4/2014 16:21	50	32	39	14	60	28.7		2024.2	231.57	11342.14
	2/4/2014	16:22	2/4/2014 16:22	50	33.5	30.5	16.5	60	34.4		31.5	3.61	11345.75
	2/4/2014	17:26	2/4/2014 17:26	48	33.5	30	16.5	59	34.4		2201.6	251.86	11597.61
	2/4/2014	17:27	2/4/2014 17:27			25				Valve shut	34.4	3.94	11601.55
SW-33 Event 15	2/6/2014	7:46	2/6/2014 7:46	52	30	32	<2	47	0.0				11601.55
	2/6/2014	8:33	2/6/2014 8:33	55	24	23	<2	53	0.0		0.0	0.00	11601.55
	2/6/2014	8:34	2/6/2014 8:34	55	33	32	2	53	4.2		2.1	0.24	11601.79
	2/6/2014	9:10	2/6/2014 9:10	56	32.5	31.5	6	56	12.4		298.7	34.17	11635.96
	2/6/2014	10:24	2/6/2014 10:24	47	31	29	8.7	60	17.6		1112.4	127.26	11763.22
	2/6/2014	10:27	2/6/2014 10:27	47	33	31	12	60	24.9		63.8	7.30	11770.51
	2/6/2014	11:04	2/6/2014 11:04	46	33	31	12.5	62	25.9		938.5	107.37	11877.88
	2/6/2014	12:06	2/6/2014 12:06	45	33	29.5	14.3	66	29.5		1715.0	196.20	12074.08
	2/6/2014	14:02	2/6/2014 14:02	45	33	28.5	16	64	33.0		3624.8	414.68	12488.76
	2/6/2014	14:04	2/6/2014 14:04		34	29.5	19	64	39.6		72.7	8.31	12497.07
	2/6/2014	15:16	2/6/2014 15:16	44	34	29.5	19	61	39.8		2858.5	327.01	12824.08
	2/6/2014	16:30	2/6/2014 16:30	44	34	29.5	19	58	39.9		2946.7	337.10	13161.18
	2/6/2014	17:12	2/6/2014 17:12	44	34	29.5	19	57	39.9		1675.8	191.71	13352.90
	2/6/2014	17:13	2/6/2014 17:13			23				Valve shut	39.9	4.57	13357.46
SW-33 Event 16	2/10/2014	8:30	2/10/2014 8:30	57	32	32	<2	54	0.0				13357.46
	2/10/2014	8:40	2/10/2014 8:40	57	29.5	29.5	<2	54	0.0		0.0	0.00	13357.46
	2/10/2014	8:41	2/10/2014 8:41	57	32	32	<2	54	0.0		0.0	0.00	13357.46
	2/10/2014	9:00	2/10/2014 9:00	54	32	32.2	4.2	59	8.6		81.9	9.37	13366.83
	2/10/2014	9:49	2/10/2014 9:49	49	32	32	6	66	12.2		510.9	58.44	13425.28
	2/10/2014	11:05	2/10/2014 11:05	48	31	30.5	9	6	19.3		1199.2	137.19	13562.47
	2/10/2014	13:05	2/10/2014 13:05	47	30	29.5	11	79	21.7		2459.0	281.31	13843.77

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Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	2/10/2014	13:06	2/10/2014 13:06				22			Valve shut	21.7	2.48	13846.25
Note: a red value, i.e. 75 °F, indicates that value was interpolated from field data											Total CO_2 Mass (lbs):		13846.25

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Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
SW-34 Event 1	11/19/2013	10:09	11/19/2013 10:09	55	26			72	0.0				
	11/19/2013	10:13	11/19/2013 10:13		27	28.5	<2	71.5	0.0		0.0	0.00	0.00
	11/19/2013	10:20	11/19/2013 10:20		26	22.5	15.5	71.5	29.3		102.6	11.74	11.74
	11/19/2013	10:21	11/19/2013 10:21		29	24	20	71	39.2		34.3	3.92	15.66
	11/19/2013	10:23	11/19/2013 10:23		34	25	25	70.5	51.8		91.1	10.42	26.07
	11/19/2013	10:25	11/19/2013 10:25		37	25	30	70.3	64.1		116.0	13.27	39.34
	11/19/2013	11:47	11/19/2013 11:47	54	36	22.5	33	70	69.9		5493.4	628.45	667.79
	11/19/2013	11:50	11/19/2013 11:50							Valve shut	209.6	23.98	691.76
	11/19/2013	11:51	11/19/2013 11:51			13							691.76
SW-34 Event 2	12/4/2013	7:48	12/4/2013 7:48										691.76
	12/4/2013	7:49	12/4/2013 7:49	55	28	28	6	64	11.7		11.7	1.34	693.10
	12/4/2013	7:57	12/4/2013 7:57	53	26	22.5	17	64	32.4		176.4	20.18	713.28
	12/4/2013	8:04	12/4/2013 8:04	53	26	22	18	64	34.3		233.3	26.69	739.97
	12/4/2013	8:05	12/4/2013 8:05	53	28	23	22	64	42.9		38.6	4.42	744.39
	12/4/2013	8:09	12/4/2013 8:09	53	28	22.5	22	66	42.9		171.6	19.63	764.02
	12/4/2013	8:10	12/4/2013 8:10	53	30	23	23.5	66	46.8		44.9	5.13	769.15
	12/4/2013	8:34	12/4/2013 8:34	48	29	22.5	24	70	47.1		1127.6	129.00	898.14
	12/4/2013	9:26	12/4/2013 9:26	47	29	22.5	25	73	48.9		2497.4	285.70	1183.84
	12/4/2013	9:59	12/4/2013 9:59	47	29	22	25	75	48.8		1613.3	184.57	1368.41
	12/4/2013	11:10	12/4/2013 11:10	46	28	22	25	80	48.0		3439.3	393.46	1761.87
	12/4/2013	12:09	12/4/2013 12:09	46	28	22	24	82	46.0		2775.2	317.48	2079.35
	12/4/2013	12:11	12/4/2013 12:11							Valve shut	92.1	10.53	2089.88
	12/4/2013	12:12	12/4/2013 12:12										2089.88
SW-34 Event 3	12/10/2013	7:55	12/10/2013 7:55	53	28	30	<2	70	0.0				2089.88
	12/10/2013	8:02	12/10/2013 8:02	51	26	28	8	70	15.1		53.0	6.07	2095.94
	12/10/2013	8:20	12/10/2013 8:20	51	26	26	12	70	22.7		340.9	38.99	2134.94
	12/10/2013	8:32	12/10/2013 8:32	52	26	26	13.5	72	25.5		289.4	33.11	2168.05
	12/10/2013	9:07	12/10/2013 9:07	50	26	25	16	72	30.2		975.7	111.62	2279.67
	12/10/2013	9:40	12/10/2013 9:40	50	26	24	17	72	32.1		1029.1	117.73	2397.40
	12/10/2013	10:17	12/10/2013 10:17	50	26	24	18	74	34.0		1222.6	139.86	2537.26
	12/10/2013	11:12	12/10/2013 11:12	46	25	23.5	17	74	31.7		1804.6	206.44	2743.70
	12/10/2013	11:13	12/10/2013 11:13	46	26	25	21	74	39.6		35.6	4.08	2747.78
	12/10/2013	11:15	12/10/2013 11:15	45	26	25	23	74	43.4		83.0	9.50	2757.28
	12/10/2013	12:02	12/10/2013 12:02	45	27.5	25	22	76	42.2		2010.9	230.05	2987.33
	12/10/2013	12:03	12/10/2013 12:03							Valve shut	42.2	4.83	2992.15
	12/10/2013	12:04	12/10/2013 12:04			20							2992.15
SW-34 Event 4	12/17/2013	8:09	12/17/2013 8:09	45	30	28	<2	52	0.0		0.0	0.00	2992.15
	12/17/2013	8:25	12/17/2013 8:25	47	27	26	10	56	19.4		155.5	17.79	3009.94
	12/17/2013	8:33	12/17/2013 8:33	45	27	26	11.5	58	22.3		167.0	19.10	3029.05
	12/17/2013	8:53	12/17/2013 8:53	46	26	24	13.3	60	25.4		477.4	54.62	3083.66
	12/17/2013	10:16	12/17/2013 10:16	42	25	23	16	66	30.0		2302.0	263.35	3347.01
	12/17/2013	10:18	12/17/2013 10:18	40	29	25	22	66	43.4		73.4	8.40	3355.41
	12/17/2013	11:15	12/17/2013 11:15	38	29	24	22.5	70	44.2		2494.6	285.38	3640.79
	12/17/2013	11:16	12/17/2013 11:16	38	31	25	26	70	52.2		48.2	5.51	3646.31
	12/17/2013	12:00	12/17/2013 12:00	40	32	25.5	26.5	71	53.8		2331.3	266.70	3913.01
	12/17/2013	12:09	12/17/2013 12:09							Valve shut	483.8	55.34	3968.35
	12/17/2013	12:10	12/17/2013 12:10			19							3968.35
SW-34 Event 5	1/7/2014	9:41	1/7/2014 9:41					40					3968.35
	1/7/2014	9:42	1/7/2014 9:42	55	30	29	<2	40	0.0				3968.35
	1/7/2014	10:30	1/7/2014 10:30	50	27	25.5	11.5	42	22.7		544.2	62.25	4030.60
	1/7/2014	10:32	1/7/2014 10:32	50	30.5	28	16	42	32.9		55.5	6.35	4036.96
	1/7/2014	11:33	1/7/2014 11:33	47	28	25.5	16.5	44	32.9		2004.6	229.32	4266.28
	1/7/2014	11:34	1/7/2014 11:34	46	30.5	27	21.5	44	44.1		38.5	4.40	4270.68

SW-34 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	1/7/2014	13:38	1/7/2014 13:38	51	28	24.5	22.5	50	44.5		5493.4	628.45	4899.13
	1/7/2014	13:39	1/7/2014 13:39							Valve shut	44.5	5.09	4904.22
	1/7/2014	13:40	1/7/2014 13:40										4904.22
SW-34 Event 6	1/9/2014	12:05	1/9/2014 12:05	40	28.5	28	<2	64	0.0		0.0	0.00	4904.22
	1/9/2014	12:06	1/9/2014 12:06	40	29.5	27.5	9	64	17.9		8.9	1.02	4905.24
	1/9/2014	13:18	1/9/2014 13:18	39	26.5	25	15	62	28.8		1680.5	192.25	5097.50
	1/9/2014	13:20	1/9/2014 13:20	39	30	26.5	20	62	40.0		68.8	7.87	5105.37
	1/9/2014	14:35	1/9/2014 14:35	36	30	25.5	20.5	62	41.0		3039.8	347.75	5453.12
	1/9/2014	14:36	1/9/2014 14:36	36	30.5	28	22.5	62	45.3		43.2	4.94	5458.06
	1/9/2014	15:23	1/9/2014 15:23	40	33	28	26	60	53.9		2330.8	266.64	5724.70
	1/9/2014	16:47	1/9/2014 16:47	42	32.5	27	26.5	60	54.6		4558.1	521.45	6246.15
	1/9/2014	16:48	1/9/2014 16:48							Valve shut	54.6	6.25	6252.40
	1/9/2014	16:57	1/9/2014 16:57			20							6252.40
SW-34 Event 7	1/17/2014	8:43	1/17/2014 8:43	50	28.5	28.5	<2	52	0.0		0.0	0.00	6252.40
	1/17/2014	10:20	1/17/2014 10:20	45	26	27	10	60	19.1		927.5	106.10	6358.50
	1/17/2014	11:29	1/17/2014 11:29	45	25	23	15.5	69	29.0		1660.7	189.98	6548.49
	1/17/2014	12:34	1/17/2014 12:34	46	25	23	16	72	29.9		1913.4	218.89	6767.38
	1/17/2014	12:35	1/17/2014 12:35	46	28	24	21.7	72	42.0		35.9	4.11	6771.49
	1/17/2014	13:05	1/17/2014 13:05	45	28	24	21.7	72	42.0		1260.7	144.22	6915.71
	1/17/2014	14:24	1/17/2014 14:24	44	28	24	21.9	70	42.5		3338.3	381.90	7297.61
	1/17/2014	14:25	1/17/2014 14:25			20				Valve shut	42.5	4.86	7302.47
SW-34 Event 8	1/20/2014	12:37	1/20/2014 12:37	46	29	29.5	<2	71	0.0		0.0	0.00	7302.47
	1/20/2014	13:53	1/20/2014 13:53	50	26	24.5	14	73	26.4		1004.5	114.92	7417.39
	1/20/2014	13:54	1/20/2014 13:54	50	29	26	20	73	39.1		32.8	3.75	7421.14
	1/20/2014	14:24	1/20/2014 14:24	50	29	26	20	74	39.1		1173.9	134.29	7555.43
	1/20/2014	15:03	1/20/2014 15:03	49	29	26	20	74	39.1		1525.3	174.50	7729.93
	1/20/2014	16:13	1/20/2014 16:13	53	29	26	21	73	41.1		2807.6	321.19	8051.12
	1/20/2014	16:50	1/20/2014 16:50	56	29	25	21.7	72	42.5		1547.0	176.98	8228.10
	1/20/2014	16:51	1/20/2014 16:51			20				Valve shut	42.5	4.86	8232.97
SW-34 Event 9	1/27/2014	12:13	1/27/2014 12:13										8232.97
	1/27/2014	12:14	1/27/2014 12:14	58	31	29	3	80	6.0		6.0	0.68	8233.65
	1/27/2014	12:21	1/27/2014 12:21	55	29	28	10	80	19.4		88.9	10.17	8243.82
	1/27/2014	12:49	1/27/2014 12:49	53	27.5	26	14	80	26.7		646.6	73.97	8317.80
	1/27/2014	12:51	1/27/2014 12:51	51	31	28.5	18	80	35.8		62.5	7.15	8324.95
	1/27/2014	13:11	1/27/2014 13:11	50	30.5	27	19	80	37.6		733.8	83.95	8408.90
	1/27/2014	13:12	1/27/2014 13:12	49	33.5	29	22	80	45.0		41.3	4.72	8413.62
	1/27/2014	14:44	1/27/2014 14:44	47	32.5	27	24.5	80	49.5		4346.4	497.23	8910.85
	1/27/2014	14:45	1/27/2014 14:45	47	35	29	28	80	58.1		53.8	6.16	8917.00
	1/27/2014	15:42	1/27/2014 15:42	46	35	28.5	28	77	58.3		3317.1	379.48	9296.48
	1/27/2014	16:15	1/27/2014 16:15	46	34.5	28	28.5	77	59.0		1935.4	221.41	9517.89
	1/27/2014	16:16	1/27/2014 16:16							valve shut	59.0	6.75	9524.64
	1/27/2014	16:18	1/27/2014 16:18			20							9524.64
Note: a red value, i.e. 75 °F, indicates that value was interpolated from field data											Total CO_2 Mass (lbs):		9524.64

SW-35 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
SW-35 Event 1	11/19/2013	13:20	11/19/2013 13:20	57	24			80	0.0		0	0	0
	11/19/2013	13:22	11/19/2013 13:22		27	28	<2	80	0.0		0.0	0.00	0.00
	11/19/2013	13:41	11/19/2013 13:41		26	25.2	9	80	16.9		160.4	18.35	18.35
	11/19/2013	13:43	11/19/2013 13:43		29	28.4	12	80	23.3		40.2	4.60	22.95
	11/19/2013	15:00	11/19/2013 15:00	52	28	24	19	76	36.7		2309.4	264.19	287.14
	11/19/2013	15:05	11/19/2013 15:05	50	32	26.6	22	76	44.4		202.7	23.18	310.32
	11/19/2013	15:12	11/19/2013 15:12		34	27.2	23.5	68	48.8		326.4	37.34	347.66
	11/19/2013	17:20	11/19/2013 17:20	49	34.5	26.9	25	60	52.6		6494.6	742.99	1090.64
	11/19/2013	17:49	11/19/2013 17:49	50	34	26.4	26	60	54.5		1553.0	177.67	1268.31
	11/19/2013	17:55	11/19/2013 17:55	50	34	26.4	26	60	54.5		326.8	37.38	1305.69
	11/19/2013	17:57	11/19/2013 17:57							Valve shut	108.9	12.46	1318.15
	11/19/2013	17:59	11/19/2013 17:59			15.6							1318.15
SW-35 Event 2	12/4/2013	7:43	12/4/2013 7:43										1318.15
	12/4/2013	7:45	12/4/2013 7:45	58	31	31	<2	64	0.0		0.0	0.00	1318.15
	12/4/2013	7:51	12/4/2013 7:51		31	30	6	64	12.1		36.4	4.16	1322.31
	12/4/2013	7:55	12/4/2013 7:55	58	27.5	23	17	64	33.0		90.2	10.32	1332.63
	12/4/2013	8:16	12/4/2013 8:16	52	27.5	23	16	66	31.0		671.6	76.83	1409.46
	12/4/2013	8:18	12/4/2013 8:18	50	30	26	22	6	46.7		77.7	8.89	1418.35
	12/4/2013	9:03	12/4/2013 9:03	50	30	24	24	70	47.7		2123.4	242.92	1661.27
	12/4/2013	10:05	12/4/2013 10:05	47.5	30	23	25	75	49.4		3009.0	344.23	2005.50
	12/4/2013	11:09	12/4/2013 11:09	47.5	30	23	24	82	47.1		3088.5	353.33	2358.83
	12/4/2013	12:27	12/4/2013 12:27	50	30	23	24	82	47.1		3674.7	420.39	2779.22
	12/4/2013	12:36	12/4/2013 12:36	50	30	23	24	82	47.1		424.0	48.51	2827.72
	12/4/2013	12:37	12/4/2013 12:37							Valve shut	47.1	5.39	2833.11
	12/4/2013	12:38	12/4/2013 12:38			17							2833.11
SW-35 Event 3	12/10/2013	7:32	12/10/2013 7:32										2833.11
	12/10/2013	7:33	12/10/2013 7:33	53	29	30	<2		0.0		0.0	0.00	2833.11
	12/10/2013	7:38	12/10/2013 7:38	53	29	28	15	70	29.4		73.6	8.42	2841.53
	12/10/2013	7:41	12/10/2013 7:41	53	27.5	22	19.5	70	37.6		100.6	11.51	2853.04
	12/10/2013	8:25	12/10/2013 8:25	51	27	20	20.5	72	39.2		1690.3	193.38	3046.42
	12/10/2013	9:04	12/10/2013 9:04	51	27	20	21.5	72	41.1		1567.1	179.27	3225.69
	12/10/2013	9:39	12/10/2013 9:39	50	27	20	22	72	42.1		1456.6	166.63	3392.32
	12/10/2013	10:12	12/10/2013 10:12	50	27	20	22	72	42.1		1389.1	158.91	3551.23
	12/10/2013	10:13	12/10/2013 10:13	49	26	20	24	72	45.4		43.7	5.00	3556.23
	12/10/2013	11:05	12/10/2013 11:05	47.5	27.5	20	24	74	46.1		2378.2	272.07	3828.30
	12/10/2013	11:50	12/10/2013 11:50	45	27.5	21	25.5	74	49.0		2139.8	244.79	4073.09
	12/10/2013	12:02	12/10/2013 12:02	45	27.5	20	25.5	74	49.0	Valve shut	587.9	67.26	4140.35
	12/10/2013	12:03	12/10/2013 12:03			16							4140.35
SW-35 Event 4	12/17/2013	8:40	12/17/2013 8:40	47	20	18	10	54	17.7				4140.35
	12/17/2013	8:41	12/17/2013 8:41	47	26	22	18	54	34.6		26.2	3.00	4143.35
	12/17/2013	8:42	12/17/2013 8:42	47	27	23.5	23	54	44.8		39.7	4.54	4147.89
	12/17/2013	8:47	12/17/2013 8:47	47	27	23.5	24	55	46.7		228.7	26.17	4174.06
	12/17/2013	9:35	12/17/2013 9:35	45	27	22	24.5	60	47.4		2259.1	258.44	4432.50
	12/17/2013	10:40	12/17/2013 10:40	40	25	21	24.5	68	45.9		3033.4	347.02	4779.52
	12/17/2013	11:33	12/17/2013 11:33	39	26	20	24	72	45.4		2418.5	276.67	5056.19
	12/17/2013	12:48	12/17/2013 12:48	50	25	20	24.5	78	45.5		3405.8	389.63	5445.82
	12/17/2013	12:49	12/17/2013 12:49							Valve shut	45.5	5.20	5451.02
	12/17/2013	12:50	12/17/2013 12:50			16							5451.02
SW-35 Event 5	1/11/2014	8:14	1/11/2014 8:14	45	28	24	10	65	19.5				5451.02
	1/11/2014	8:17	1/11/2014 8:17	45	28	24	19	65	37.0		84.8	9.70	5460.72
	1/11/2014	8:31	1/11/2014 8:31	44	26	22	22	66	41.8		552.1	63.16	5523.88
	1/11/2014	9:06	1/11/2014 9:06	42	26	22	22.8	67	43.3		1489.7	170.42	5694.30
	1/11/2014	10:32	1/11/2014 10:32	38	26	21	23	72	43.5		3731.2	426.85	6121.15

SW-35 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	1/11/2014	11:36	1/11/2014 11:36	38	26	21	23.5	74	44.3		2809.6	321.41	6442.56
	1/11/2014	12:19	1/11/2014 12:19	43	26	21	23.8	77	44.8		1915.5	219.14	6661.70
	1/11/2014	12:20	1/11/2014 12:20							Valve shut	44.8	5.12	6666.82
SW-35 Event 6	1/13/2014	12:34	1/13/2014 12:34	47	29.5	29	<2	72	0.0		0.0	0.00	6666.82
	1/13/2014	12:39	1/13/2014 12:39	47	28.5	27	9	72	17.5		43.8	5.01	6671.84
	1/13/2014	13:14	1/13/2014 13:14	45	26.5	24	14	72	26.6		772.7	88.40	6760.24
	1/13/2014	13:17	1/13/2014 13:17	44	29.5	26.5	20	72	39.4		99.1	11.33	6771.57
	1/13/2014	14:19	1/13/2014 14:19	40	29.5	25	22	71	43.4		2567.1	293.68	7065.25
	1/13/2014	15:44	1/13/2014 15:44	39	28	23.5	22.8	70	44.2		3724.5	426.08	7491.33
	1/13/2014	16:23	1/13/2014 16:23	40	28	23.5	23	70	44.6		1732.8	198.24	7689.57
	1/13/2014	16:50	1/13/2014 16:50	40	28	23.5	23.8	68	46.3		1227.1	140.38	7829.95
	1/13/2014	16:51	1/13/2014 16:51							Valve shut	46.3	5.29	7835.24
	1/13/2014	16:55	1/13/2014 16:55			17							7835.24
SW-35 Event 7	1/23/2014	7:51	1/23/2014 7:51	55	23	27	14.5	38	27.3				7835.24
	1/23/2014	7:52	1/23/2014 7:52		25	25	17.5	38	33.8		30.5	3.49	7838.73
	1/23/2014	8:10	1/23/2014 8:10	52	23.5	22.5	18.5	38	35.0		619.4	70.86	7909.59
	1/23/2014	8:43	1/23/2014 8:43	50	23	22	19.2	44	35.9		1170.2	133.87	8043.46
	1/23/2014	9:22	1/23/2014 9:22	47	23	21.5	19.5	46	36.4		1409.3	161.22	8204.68
	1/23/2014	10:12	1/23/2014 10:12	45	23	21.5	19.5	48	36.3		1817.1	207.87	8412.56
	1/23/2014	11:22	1/23/2014 11:22	43	23	21.5	19	50	35.3		2506.2	286.71	8699.27
	1/23/2014	12:16	1/23/2014 12:16	45	23	21.5	19.2	54	35.5		1912.5	218.79	8918.06
	1/23/2014	12:17	1/23/2014 12:17			17				Valve shut	35.5	4.06	8922.12
SW-35 Event 8	1/24/2014	7:38	1/24/2014 7:38	55	27	26	<2	40	0.0				8922.12
	1/24/2014	7:39	1/24/2014 7:39	55	29.5	27.5	<2	40	0.0		0.0	0.00	8922.12
	1/24/2014	7:47	1/24/2014 7:47	55	29	27.5	4	40	8.1		32.4	3.70	8925.83
	1/24/2014	8:02	1/24/2014 8:02	53	27.5	26	8.5	41	16.9		187.3	21.43	8947.25
	1/24/2014	8:24	1/24/2014 8:24	50	26.5	25	11.9	44	23.3		441.6	50.52	8997.77
	1/24/2014	8:25	1/24/2014 8:25	50	29	27	15	44	30.2		26.7	3.06	9000.83
	1/24/2014	8:26	1/24/2014 8:26	50	30	27.5	16.8	44	34.2		32.2	3.69	9004.52
	1/24/2014	8:50	1/24/2014 8:50	49	30	27	18	45	36.7		850.7	97.32	9101.85
	1/24/2014	9:39	1/24/2014 9:39	47	29.8	26	19.8	49	40.1		1879.4	215.01	9316.85
	1/24/2014	10:40	1/24/2014 10:40	46	29.5	25.2	20.5	51	41.2		2479.9	283.71	9600.56
	1/24/2014	11:43	1/24/2014 11:43	45	29.2	25	21	54	42.0		2621.8	299.94	9900.49
	1/24/2014	11:59	1/24/2014 11:59	45	29.2	25	21	54	42.0		671.7	76.84	9977.34
	1/24/2014	12:00	1/24/2014 12:00			12				Valve shut	42.0	4.80	9982.14
											Total CO_2 Mass (lbs):		9982.14

Note: a red value, i.e. 75 °F, indicates that value was interpolated from field data

SW-36 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
SW-36 Event 1	11/23/2013	8:09	11/23/2013 8:09	50	24			63	0.0				
	11/23/2013	8:11	11/23/2013 8:11	55	24	23.5	<2	63	0.0		0.0	0.00	0.00
	11/23/2013	8:24	11/23/2013 8:24	55	24	23.5	<2	65	0.0		0.0	0.00	0.00
	11/23/2013	8:29	11/23/2013 8:29		33	33	<2	65	0.0		0.0	0.00	0.00
	11/23/2013	8:42	11/23/2013 8:42	54	34	33	2	66	4.2		27.1	3.10	3.10
	11/23/2013	9:18	11/23/2013 9:18		34	32	2	76	4.1		149.2	17.07	20.16
	11/23/2013	9:20	11/23/2013 9:20		36	36	5	78	10.5		14.6	1.67	21.84
	11/23/2013	10:17	11/23/2013 10:17		36	36	8	80	16.8		777.3	88.93	110.76
	11/23/2013	11:23	11/23/2013 11:23		36	35.5	9	80	18.9		1176.1	134.55	245.31
	11/23/2013	12:34	11/23/2013 12:34	47	36	35	10	78	21.0		1415.5	161.93	407.25
	11/23/2013	12:51	11/23/2013 12:51		36	35	10	80	21.0		356.7	40.81	448.06
	11/23/2013	12:52	11/23/2013 12:52							Valve shut	21.0	2.40	450.46
	11/23/2013	12:53	11/23/2013 12:53										450.46
SW-36 Event 2	12/12/2013	9:09	12/12/2013 9:09	50	34	33	<2	62	0.0				450.46
	12/12/2013	9:51	12/12/2013 9:51	50	34	32.5	<2	67	0.0				450.46
	12/12/2013	10:47	12/12/2013 10:47	49	32.5	32	4	68	8.2		229.1	26.21	476.66
	12/12/2013	11:42	12/12/2013 11:42	45	32	31	5	70	10.2		504.2	57.68	534.34
	12/12/2013	13:10	12/12/2013 13:10	50	36	32	6	70	12.7		1005.6	115.04	649.38
	12/12/2013	13:11	12/12/2013 13:11							Valve shut	12.7	1.45	650.83
	12/12/2013	13:12	12/12/2013 13:12			26							650.83
SW-36 Event 3	12/13/2013	8:35	12/13/2013 8:35	50	35	35	<2	50	0.0				650.83
	12/13/2013	8:36	12/13/2013 8:36	50	30	28	<2	50	0.0				650.83
	12/13/2013	8:58	12/13/2013 8:58	50	32	33	<2	50	0.0				650.83
	12/13/2013	9:52	12/13/2013 9:52	48	32	33	<2	68	0.0				650.83
	12/13/2013	10:54	12/13/2013 10:54	45	32	33	3	70	6.1		188.8	21.60	672.43
	12/13/2013	12:42	12/13/2013 12:42	45	32	32	3.5	72	7.1		711.9	81.44	753.88
	12/13/2013	13:35	12/13/2013 13:35	45	31	32	4	73	8.0		400.2	45.78	799.66
	12/13/2013	15:01	12/13/2013 15:01	45	31	32	4	73	8.0		688.8	78.80	878.46
	12/13/2013	15:02	12/13/2013 15:02							Valve shut	8.0	0.92	879.38
	12/13/2013	15:03	12/13/2013 15:03			26							879.38
SW-36 Event 4	12/16/2013	8:45	12/16/2013 8:45	48	32	32	<2	50	0.0		0.0	0.00	879.38
	12/16/2013	9:26	12/16/2013 9:26	48	32.5	31	<2	58	0.0		0.0	0.00	879.38
	12/16/2013	9:28	12/16/2013 9:28	48	32	32	4	58	8.2		8.2	0.94	880.32
	12/16/2013	10:16	12/16/2013 10:16	47.5	32	32	4	56	8.2		394.9	45.18	925.50
	12/16/2013	11:18	12/16/2013 11:18	45	32	31.5	5	70	10.2		570.0	65.21	990.70
	12/16/2013	13:26	12/16/2013 13:26	50	30	31	6	68	11.9		1413.8	161.74	1152.44
	12/16/2013	13:27	12/16/2013 13:27							Valve shut	11.9	1.37	1153.81
	12/16/2013	13:28	12/16/2013 13:28			24							1153.81
	12/16/2013	14:53	12/16/2013 14:53	45	30	30	11.5	70	22.8	Restart	1941.1	222.07	1375.87
	12/16/2013	15:22	12/16/2013 15:22	45	32	31	8	69	16.3		566.9	64.85	1440.72
	12/16/2013	16:10	12/16/2013 16:10	45	32	31	8	68	16.3		780.8	89.33	1530.05
	12/16/2013	22:14	12/16/2013 22:14	50	32	30.5	9.5	58	19.5		6514.6	745.27	2275.32
	12/17/2013	8:54	12/17/2013 8:54	45	32	30	12	64	24.5		14089.2	1611.80	3887.13
	12/17/2013	10:53	12/17/2013 10:53	41	32	30	12	68	24.4		2910.9	333.00	4220.13
	12/17/2013	13:37	12/17/2013 13:37	45	31	30	12	69	24.1		3979.9	455.30	4675.43
	12/17/2013	13:38	12/17/2013 13:38	46	32	31	16	69	32.5		28.3	3.24	4678.67
	12/17/2013	14:35	12/17/2013 14:35	45	32	31	15	70	30.5		1794.8	205.32	4883.99
	12/17/2013	15:58	12/17/2013 15:58	45	32	31	15	69	30.5		2529.1	289.33	5173.32
	12/17/2013	16:00	12/17/2013 16:00							Valve shut	61.0	6.98	5180.29
	12/17/2013	16:01	12/17/2013 16:01			24							5180.29
SW-36 Event 5	1/7/2014	9:19	1/7/2014 9:19					40					5180.29
	1/7/2014	9:21	1/7/2014 9:21	54	30	29	<2	40	0.0				5180.29
	1/7/2014	9:22	1/7/2014 9:22	53	34	32	<2	40	0.0				5180.29

SW-36 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	1/7/2014	9:53	1/7/2014 9:53	54	33	30.5	3	43	6.3		98.1	11.22	5191.51
	1/7/2014	9:55	1/7/2014 9:55	53	33	32.5	5	43	10.5		16.9	1.93	5193.44
	1/7/2014	10:44	1/7/2014 10:44	51	33	32.5	5.5	46	11.6		541.7	61.96	5255.41
	1/7/2014	11:44	1/7/2014 11:44	50	33	32.5	6.5	48	13.6		756.0	86.49	5341.90
	1/7/2014	13:18	1/7/2014 13:18	50	33	32	7	50	14.7		1329.8	152.13	5494.03
	1/7/2014	14:08	1/7/2014 14:08	50	33	32	7.5	50	15.7		759.0	86.83	5580.86
	1/7/2014	15:26	1/7/2014 15:26	50	33	31.5	8	53	16.7		1263.7	144.57	5725.43
	1/7/2014	16:40	1/7/2014 16:40	49	33	31.5	8.5	48	17.8		1277.7	146.17	5871.61
	1/7/2014	17:24	1/7/2014 17:24	54	33	31	8.5	45	17.9		785.9	89.91	5961.51
	1/7/2014	17:25	1/7/2014 17:25							Valve shut	17.9	2.05	5963.56
	1/7/2014	17:26	1/7/2014 17:26			25							5963.56
SW-36 Event 6	1/14/2014	7:55	1/14/2014 7:55										5963.56
	1/14/2014	7:56	1/14/2014 7:56	50	34	34.5	<2	62	0.0		0.0	0.00	5963.56
	1/14/2014	8:20	1/14/2014 8:20	45	32.5	33	4	62	8.2		98.8	11.30	5974.86
	1/14/2014	9:50	1/14/2014 9:50	45	31.5	32	5.5	64	11.2		873.1	99.88	6074.74
	1/14/2014	10:58	1/14/2014 10:58	43	32	32.5	6	65	12.2		796.1	91.07	6165.82
	1/14/2014	12:28	1/14/2014 12:28	45	32	32	6	66	12.2		1101.3	125.99	6291.80
	1/14/2014	13:45	1/14/2014 13:45	48	31	32	7.5	69	15.1		1051.3	120.27	6412.07
	1/14/2014	14:14	1/14/2014 14:14	48	31	32	7.5	69	15.1		437.2	50.02	6462.09
	1/14/2014	15:58	1/14/2014 15:58	46	30	31	8.2	70	16.3		1630.7	186.56	6648.65
	1/14/2014	16:15	1/14/2014 16:15	46	30	31	8.2	70	16.3	Valve shut	276.8	31.67	6680.32
	1/14/2014	16:16	1/14/2014 16:16			25							6680.32
SW-36 Event 7	1/16/2014	8:32	1/16/2014 8:32	51	26	20	<2	48	0.0		0.0	0.00	6680.32
	1/16/2014	8:33	1/16/2014 8:33	51	30	31.5	<2	48	0.0		0.0	0.00	6680.32
	1/16/2014	9:26	1/16/2014 9:26	48	28.5	30	5.2	46	10.4		275.5	31.51	6711.83
	1/16/2014	9:27	1/16/2014 9:27	48	32	32	7	46	14.6		12.5	1.43	6713.26
	1/16/2014	10:32	1/16/2014 10:32	45	32	32	7.2	48	14.9		958.9	109.69	6822.95
	1/16/2014	11:33	1/16/2014 11:33	43	31	31.5	7.8	49	16.0		943.7	107.96	6930.91
	1/16/2014	12:59	1/16/2014 12:59	47	31	31.5	8	48	16.4		1394.0	159.48	7090.39
	1/16/2014	14:52	1/16/2014 14:52	47	31	31.5	9	60	18.3		1959.2	224.13	7314.52
	1/16/2014	15:35	1/16/2014 15:35	50	31	31.5	9.2	60	18.7		793.6	90.79	7405.31
	1/16/2014	16:32	1/16/2014 16:32	52	31	31.5	9.8	60	19.9		1098.2	125.64	7530.95
	1/16/2014	16:33	1/16/2014 16:33							Valve shut	19.9	2.27	7533.22
	1/16/2014	16:34	1/16/2014 16:34			25							7533.22
SW-36 Event 8	1/21/2014	8:24	1/21/2014 8:24	53	26	27	<2	56	0.0		0.0	0.00	7533.22
	1/21/2014	8:25	1/21/2014 8:25	53	32	33	<2	56	0.0		0.0	0.00	7533.22
	1/21/2014	8:29	1/21/2014 8:29	50	31	33	3	56	6.1		12.2	1.40	7534.62
	1/21/2014	8:35	1/21/2014 8:35	50	31	33	3.8	56	7.7		41.5	4.75	7539.37
	1/21/2014	9:28	1/21/2014 9:28	46	31	32.5	5	64	10.1		472.7	54.08	7593.45
	1/21/2014	10:10	1/21/2014 10:10	42	30	32.5	5.8	64	11.6		455.4	52.10	7645.55
	1/21/2014	11:33	1/21/2014 11:33	40	30	31.8	6	68	11.9		976.2	111.68	7757.23
	1/21/2014	13:00	1/21/2014 13:00	46	30	32	6.8	66	13.6		1109.0	126.87	7884.11
	1/21/2014	14:14	1/21/2014 14:14	50	30	31.5	7	68	13.9		1016.9	116.34	8000.44
	1/21/2014	15:59	1/21/2014 15:59	50	30	31.5	7.2	66	14.4		1484.8	169.86	8170.30
	1/21/2014	17:07	1/21/2014 17:07	50	30	31.5	7.5	64	15.0		997.4	114.10	8284.41
	1/21/2014	17:08	1/21/2014 17:08							Valve shut	15.0	1.71	8286.12
	1/21/2014	17:09	1/21/2014 17:09			26							8286.12
Note: a red value, i.e. 75 °F, indicates that value was interpolated from field data											Total CO_2 Mass (lbs):		8286.12

SW-37 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
SW-37 Event 1	11/22/2013	13:02	11/22/2013 13:02	50	28			80	0.0				
	11/22/2013	13:05	11/22/2013 13:05		36	36.4	<2	80	0.0		0.0	0.00	0.00
	11/22/2013	13:20	11/22/2013 13:20		35	34.4	5.5	81	11.4		85.5	9.78	9.78
	11/22/2013	14:06	11/22/2013 14:06		34	33.6	8	82	16.4		639.5	73.16	82.94
	11/22/2013	15:22	11/22/2013 15:22	48	34	33.2	9	75	18.6		1329.1	152.05	235.00
	11/22/2013	16:56	11/22/2013 16:56		34	33.2	9.5	74	19.6		1795.6	205.41	440.41
	11/22/2013	17:19	11/22/2013 17:19	50	34	33.2	9.5	70	19.7		452.3	51.74	492.16
	11/22/2013	17:20	11/22/2013 17:20							Valve shut	19.7	2.25	494.41
	11/22/2013	17:21	11/22/2013 17:21										494.41
SW-37 Event 2	12/6/2013	8:37	12/6/2013 8:37	54	32	32.5	<2	75	0.0				494.41
	12/6/2013	9:18	12/6/2013 9:18	48	31	31.5	3	82	6.0		122.1	13.97	508.38
	12/6/2013	9:19	12/6/2013 9:19	47	34	34	6	82	12.3		9.1	1.04	509.42
	12/6/2013	10:29	12/6/2013 10:29	45	34	33.5	6	84	12.3		860.2	98.41	607.83
	12/6/2013	11:23	12/6/2013 11:23	44	34	33.5	7	85	14.3		717.9	82.12	689.96
	12/6/2013	13:15	12/6/2013 13:15	50	34	33.5	8	83	16.4		1719.0	196.65	886.60
	12/6/2013	13:16	12/6/2013 13:16							Valve shut	16.4	1.87	888.48
	12/6/2013	13:18	12/6/2013 13:18			26							888.48
SW-37 Event 3	12/11/2013	9:08	12/11/2013 9:08	52	34	33	<2	68	0.0				888.48
	12/11/2013	9:33	12/11/2013 9:33	53	34	32	<2	70	0.0				888.48
	12/11/2013	10:04	12/11/2013 10:04	51	34	32	<2	70	0.0				888.48
	12/11/2013	11:10	12/11/2013 11:10	51	32.5	32	<2	74	0.0				888.48
	12/11/2013	11:18	12/11/2013 11:18	50	32.5	33	5.5	74	11.2		44.7	5.12	893.60
	12/11/2013	11:49	12/11/2013 11:49	50	34	33	5.5	72	11.4		349.8	40.02	933.62
	12/11/2013	11:50	12/11/2013 11:50	50	35	34	7	72	14.6		13.0	1.49	935.11
	12/11/2013	12:38	12/11/2013 12:38	50	35	34	7	70	14.7		703.4	80.47	1015.58
	12/11/2013	13:38	12/11/2013 13:38							Valve shut	880.2	100.69	1116.27
	12/11/2013	13:39	12/11/2013 13:39			28							1116.27
SW-37 Event 4	12/13/2013	8:37	12/13/2013 8:37	50	35	33	<2	50	0.0				1116.27
	12/13/2013	8:44	12/13/2013 8:44	50	35	32	3	50	6.4		22.4	2.57	1118.84
	12/13/2013	8:45	12/13/2013 8:45	50	36	36	6	50	13.0		9.7	1.11	1119.95
	12/13/2013	8:46	12/13/2013 8:46	50	35	34	4	50	8.6		10.8	1.23	1121.18
	12/13/2013	9:54	12/13/2013 9:54	48	36	34	5.5	68	11.7		687.4	78.64	1199.82
	12/13/2013	10:56	12/13/2013 10:56	45	35	33	7.5	70	15.7		848.9	97.11	1296.93
	12/13/2013	12:44	12/13/2013 12:44	45	35	32	10.5	72	22.0		2034.6	232.76	1529.69
	12/13/2013	13:37	12/13/2013 13:37	45	35	32	11	73	23.0		1191.1	136.26	1665.95
	12/13/2013	13:38	12/13/2013 13:38	43	35	33.5	14.5	73	30.3		26.6	3.05	1669.00
	12/13/2013	15:04	12/13/2013 15:04	45	35	33.5	14.5	73	30.3		2605.6	298.08	1967.08
	12/13/2013	15:05	12/13/2013 15:05							Valve shut	30.3	3.47	1970.55
	12/13/2013	15:06	12/13/2013 15:06			27							1970.55
SW-37 Event 5	12/19/2013	12:38	12/19/2013 12:38	48	35	34.5	<2	68	0.0				1970.55
	12/19/2013	13:05	12/19/2013 13:05	50	35	33	<2	74	0.0				1970.55
	12/19/2013	16:05	12/19/2013 16:05	45	34	31	6	70	12.4		1120.0	128.13	2098.68
	12/19/2013	16:06	12/19/2013 16:06	42	35	33.5	12	70	25.1		18.8	2.15	2100.83
	12/19/2013	16:48	12/19/2013 16:48	45	35	33.5	10.5	66	22.1		992.0	113.49	2214.31
	12/19/2013	16:49	12/19/2013 16:49							Valve shut	22.1	2.53	2216.84
	12/19/2013	16:50	12/19/2013 16:50										2216.84
SW-37 Event 6	1/8/2014	8:23	1/8/2014 8:23						0.0		0.0	0.00	2216.84
	1/8/2014	8:25	1/8/2014 8:25	52	38	35	<2	40	0.0		0.0	0.00	2216.84
	1/8/2014	8:26	1/8/2014 8:26	51	35.5	34	<2	40	0.0		0.0	0.00	2216.84
	1/8/2014	8:31	1/8/2014 8:31		35.5	34	2.5	40	5.4		13.6	1.55	2218.39
	1/8/2014	8:44	1/8/2014 8:44		35.5	34	3	42	6.5		77.5	8.87	2227.26
	1/8/2014	9:08	1/8/2014 9:08	50	33	32	3	44	6.3		153.9	17.60	2244.86
	1/8/2014	9:09	1/8/2014 9:09	50	33	33.5	4	44	8.4		7.4	0.84	2245.71

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	1/8/2014	9:11	1/8/2014 9:11	50	34	33.5	5	45	10.6		19.1	2.18	2247.89
	1/8/2014	9:56	1/8/2014 9:56	49	33	33.5	5.5	50	11.5		498.4	57.02	2304.90
	1/8/2014	10:58	1/8/2014 10:58	48	33	33.5	5.8	58	12.0		730.4	83.56	2388.46
	1/8/2014	12:22	1/8/2014 12:22	47	32.5	33	5.5	60	11.3		982.2	112.36	2500.83
	1/8/2014	12:34	1/8/2014 12:34	47	32.5	33	5.5	60	11.3		136.1	15.57	2516.39
	1/8/2014	12:35	1/8/2014 12:35							Valve shut	11.3	1.30	2517.69
	1/8/2014	12:36	1/8/2014 12:36			29							2517.69
	1/8/2014	13:28	1/8/2014 13:28	49	35	30.5	13	59	27.5	Restart	1432.2	163.84	2681.53
	1/8/2014	13:56	1/8/2014 13:56	50	34	32.5	9.5	58	19.9		664.8	76.05	2757.58
	1/8/2014	15:04	1/8/2014 15:04	50	34	32.5	9.5	60	19.9		1354.6	154.96	2912.54
	1/8/2014	16:26	1/8/2014 16:26	50	33.5	32	9.5	55	19.9		1631.6	186.66	3099.20
	1/8/2014	16:27	1/8/2014 16:27	59	36	33.5	14	55	30.1		25.0	2.86	3102.06
	1/8/2014	17:04	1/8/2014 17:04	50	36	34	14	55	30.1		1113.1	127.34	3229.40
	1/8/2014	17:05	1/8/2014 17:05							Valve shut	30.1	3.44	3232.84
	1/8/2014	17:06	1/8/2014 17:06			28							3232.84
SW-37 Event 7	1/10/2014	9:14	1/10/2014 9:14										3232.84
	1/10/2014	9:15	1/10/2014 9:15	52	32	32	4	67	8.1		8.1	0.93	3233.78
	1/10/2014	9:27	1/10/2014 9:27	49	34	34	6	67	12.5		123.8	14.16	3247.93
	1/10/2014	10:14	1/10/2014 10:14	45	34	34	6	68	12.5		586.3	67.08	3315.01
	1/10/2014	11:51	1/10/2014 11:51	45	33	34	6	69	12.3		1202.6	137.57	3452.59
	1/10/2014	12:50	1/10/2014 12:50	44	33	34	6	68	12.3		727.6	83.24	3535.82
	1/10/2014	14:19	1/10/2014 14:19	48	32.5	34	6	67	12.3		1095.7	125.35	3661.18
	1/10/2014	15:17	1/10/2014 15:17	47	32.5	34	6.5	67	13.3		742.2	84.91	3746.08
	1/10/2014	16:24	1/10/2014 16:24	46	32	34	7	68	14.2		922.9	105.58	3851.66
	1/10/2014	17:15	1/10/2014 17:15	45	32	34	8	66	16.3		779.0	89.11	3940.78
	1/10/2014	17:16	1/10/2014 17:16							Valve shut	16.3	1.87	3942.64
	1/10/2014	17:17	1/10/2014 17:17			29							3942.64
SW-37 Event 8	1/13/2014	8:14	1/13/2014 8:14						0.0				3942.64
	1/13/2014	8:15	1/13/2014 8:15	50	33	33	4	48	8.4		4.2	0.48	3943.12
	1/13/2014	8:16	1/13/2014 8:16	50	35	34	8	48	17.1		12.8	1.46	3944.58
	1/13/2014	8:25	1/13/2014 8:25	50	35	33.5	9.5	52	20.3		168.3	19.26	3963.84
	1/13/2014	10:11	1/13/2014 10:11	48	35	33.5	9.5	68	19.9		2131.5	243.85	4207.69
	1/13/2014	11:19	1/13/2014 11:19	48	35	33	9.5	70	19.9		1355.1	155.02	4362.71
	1/13/2014	11:20	1/13/2014 11:20	48	36	34	13	70	27.5		23.7	2.71	4365.43
	1/13/2014	12:14	1/13/2014 12:14	49	34	33.5	10	71	20.7		1302.5	149.01	4514.43
	1/13/2014	12:42	1/13/2014 12:42	48	34	33	10	70	20.7		580.5	66.41	4580.84
	1/13/2014	12:43	1/13/2014 12:43	48	36.5	34	15	70	31.9		26.3	3.01	4583.85
	1/13/2014	13:47	1/13/2014 13:47	45	36	34	15	68	31.8		2039.4	233.30	4817.15
	1/13/2014	14:45	1/13/2014 14:45	44	35.5	33.5	15	68	31.7		1840.7	210.58	5027.74
	1/13/2014	16:03	1/13/2014 16:03	42	34.5	33	15	67	31.4		2457.9	281.18	5308.92
	1/13/2014	17:07	1/13/2014 17:07	46	36	33.5	17.5	66	37.2		2193.9	250.98	5559.90
	1/13/2014	17:08	1/13/2014 17:08							Valve shut	37.2	4.25	5564.15
	1/13/2014	17:09	1/13/2014 17:09			27							5564.15
SW-37 Event 9	1/15/2014	9:28	1/15/2014 9:28	47	33	34.2	<2	62	0.0		0.0	0.00	5564.15
	1/15/2014	10:13	1/15/2014 10:13	44	31	33	7	68	14.1		316.9	36.26	5600.41
	1/15/2014	11:27	1/15/2014 11:27	42	31	31.5	7	68	14.1		1042.3	119.24	5719.65
	1/15/2014	11:28	1/15/2014 11:28	42	33.5	33	10	68	20.7		17.4	1.99	5721.64
	1/15/2014	12:45	1/15/2014 12:45	47	37	36	14	67	30.0		1951.8	223.28	5944.92
	1/15/2014	12:47	1/15/2014 12:47	47	34	34	10	67	20.8		50.8	5.81	5950.73
	1/15/2014	13:57	1/15/2014 13:57	50	33.5	33	11.5	67	23.8		1561.0	178.58	6129.31
	1/15/2014	15:50	1/15/2014 15:50	48	33.5	33	13	70	26.8		2860.0	327.19	6456.50
	1/15/2014	17:25	1/15/2014 17:25	51	33.5	32.5	14	65	29.0		2652.9	303.49	6759.99
	1/15/2014	17:26	1/15/2014 17:26							Valve shut	29.0	3.32	6763.31

SW-37 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	1/15/2014	17:27	1/15/2014 17:27			28							6763.31
SW-37 Event 10	1/17/2014	7:40	1/17/2014 7:40	53	32	33	3.8	40	8.0				6763.31
	1/17/2014	9:07	1/17/2014 9:07	50	31	32	6.8	62	13.8		944.7	108.07	6871.38
	1/17/2014	9:08	1/17/2014 9:08	50	32	32.2	8	62	16.4		15.1	1.72	6873.11
	1/17/2014	10:36	1/17/2014 10:36	49	32	32.2	8.2	65	16.7		1456.5	166.63	7039.74
	1/17/2014	11:47	1/17/2014 11:47	47	32	32.2	9	69	18.3		1243.3	142.24	7181.97
	1/17/2014	12:46	1/17/2014 12:46	46	32	32.2	9.5	67	19.3		1110.3	127.02	7308.99
	1/17/2014	13:58	1/17/2014 13:58	47	32	32.2	10.3	70	20.9		1449.3	165.80	7474.79
	1/17/2014	14:19	1/17/2014 14:19	47	32	32.2	10.3	70	20.9		439.2	50.24	7525.03
	1/17/2014	15:44	1/17/2014 15:44	49	32	32.2	11	70	22.3		1838.0	210.27	7735.31
	1/17/2014	15:45	1/17/2014 15:45							Valve shut	22.3	2.56	7737.86
	1/17/2014	15:46	1/17/2014 15:46			28							7737.86
SW-37 Event 11	1/20/2014	8:05	1/20/2014 8:05	53	34	34	3	42	6.4				7737.86
	1/20/2014	8:14	1/20/2014 8:14	53	34	33.5	7.2	46	15.3		97.6	11.17	7749.03
	1/20/2014	8:54	1/20/2014 8:54	49	33	33.5	7.2	59	14.9		604.7	69.18	7818.21
	1/20/2014	10:05	1/20/2014 10:05	47	32.5	33.5	7.5	64	15.4		1077.1	123.22	7941.43
	1/20/2014	11:07	1/20/2014 11:07	45	32.5	33	7.8	66	16.0		973.0	111.31	8052.74
	1/20/2014	12:42	1/20/2014 12:42	49	32.5	33	8.5	64	17.5		1588.4	181.72	8234.46
	1/20/2014	13:08	1/20/2014 13:08	52	32.5	33	9	68	18.4		466.2	53.34	8287.80
	1/20/2014	14:03	1/20/2014 14:03	50	32	32.5	9	71	18.3		1008.3	115.35	8403.14
	1/20/2014	14:04	1/20/2014 14:04	50	33	33	11	71	22.6		20.4	2.33	8405.48
	1/20/2014	15:14	1/20/2014 15:14	50	33	33	11.9	71	24.4		1643.4	188.00	8593.48
	1/20/2014	16:16	1/20/2014 16:16	50	33	33	12	72	24.6		1518.4	173.70	8767.18
	1/20/2014	16:22	1/20/2014 16:22	50	33	33	12	72	24.6	Valve shut	147.5	16.87	8784.05
	1/20/2014	16:23	1/20/2014 16:23			29							8784.05
SW-37 Event 12	1/22/2014	8:21	1/22/2014 8:21	54	32	34	<2	41	0.0		0.0	0.00	8784.05
	1/22/2014	8:23	1/22/2014 8:23	54	32	34	3.8	41	7.9		7.9	0.91	8784.96
	1/22/2014	8:53	1/22/2014 8:53	53	30.5	31	6.8	46	13.9		327.8	37.50	8822.46
	1/22/2014	8:55	1/22/2014 8:55	53	33.5	33.5	9.8	46	20.7		34.6	3.96	8826.42
	1/22/2014	9:50	1/22/2014 9:50	50	33.5	33.5	10	50	21.0		1148.5	131.39	8957.81
	1/22/2014	10:58	1/22/2014 10:58	47	33.5	33.5	10	54	21.0		1428.5	163.42	9121.23
	1/22/2014	12:03	1/22/2014 12:03	45	33.2	33.2	10.2	54	21.3		1374.1	157.20	9278.42
	1/22/2014	12:49	1/22/2014 12:49	48	33.2	33.2	11.5	54	24.0		1043.0	119.32	9397.74
	1/22/2014	14:03	1/22/2014 14:03	48	33.2	33	12	56	25.0		1815.2	207.66	9605.40
	1/22/2014	15:10	1/22/2014 15:10	49	33	32.5	13	58	27.0		1742.9	199.39	9804.79
	1/22/2014	16:04	1/22/2014 16:04	50	32.5	32	13.5	59	27.9		1481.2	169.45	9974.24
	1/22/2014	16:05	1/22/2014 16:05	50	33.5	33	15	59	31.3		29.6	3.38	9977.62
	1/22/2014	16:36	1/22/2014 16:36	49	33.5	33	15.7	58	32.8		993.1	113.61	10091.23
	1/22/2014	16:38	1/22/2014 16:38			28				Valve shut	65.6	7.50	10098.73
SW-37 Event 13	1/28/2014	7:40	1/28/2014 7:40										10098.73
	1/28/2014	7:42	1/28/2014 7:42	55	34	33	4	54	8.4		16.9	1.93	10100.66
	1/28/2014	8:12	1/28/2014 8:12	55	33.5	32.5	6	54	12.6		315.1	36.05	10136.71
	1/28/2014	8:13	1/28/2014 8:13	55	35	34	9.5	54	20.2		16.4	1.88	10138.59
	1/28/2014	8:33	1/28/2014 8:33	55	35	34	9	54	19.2		393.9	45.07	10183.65
	1/28/2014	10:06	1/28/2014 10:06	53	35	34	8.5	54	18.1		1732.8	198.23	10381.88
	1/28/2014	11:06	1/28/2014 11:06	53	34	33.5	9.5	54	20.0		1143.6	130.83	10512.71
	1/28/2014	11:50	1/28/2014 11:50	51	34	33.5	10	54	21.1		904.1	103.43	10616.14
	1/28/2014	13:05	1/28/2014 13:05	50	34	33	10.5	54	22.1		1620.1	185.34	10801.48
	1/28/2014	14:05	1/28/2014 14:05	50	33.5	32.5	11	53	23.1		1356.4	155.17	10956.65
	1/28/2014	14:07	1/28/2014 14:07	59	36	33.5	14	53	30.1		53.2	6.09	10962.74
	1/28/2014	15:00	1/28/2014 15:00	59	36	33.5	14.5	52	31.3		1627.1	186.14	11148.87
	1/28/2014	16:37	1/28/2014 16:37	51	36	33.5	14.5	50	31.3		3034.7	347.17	11496.05
	1/28/2014	16:38	1/28/2014 16:38							valve shut	31.3	3.58	11499.63

SW-37 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	1/28/2014	16:39	1/28/2014 16:39			28							11499.63
SW-37 Event 14	1/29/2014	8:15	1/29/2014 8:15										11499.63
	1/29/2014	8:16	1/29/2014 8:16	50	35	33	18	40	38.9		38.9	4.45	11504.08
	1/29/2014	9:09	1/29/2014 9:09	50	37	34	18.5	44	40.6		2106.6	240.99	11745.07
	1/29/2014	10:26	1/29/2014 10:26	50	37	34	18	44	39.5		3084.6	352.88	12097.95
	1/29/2014	12:40	1/29/2014 12:40	50	37	34	18	45	39.5		5291.7	605.37	12703.32
	1/29/2014	13:57	1/29/2014 13:57	48	37	33.5	18.5	45	40.6		3081.4	352.51	13055.83
	1/29/2014	14:57	1/29/2014 14:57	48	37	33.5	18.5	44	40.6		2435.2	278.59	13334.42
	1/29/2014	16:29	1/29/2014 16:29	48	37	33.5	18.5	43	40.7		3737.9	427.62	13762.03
	1/29/2014	16:30	1/29/2014 16:30							Valve shut	40.7	4.65	13766.68
	1/29/2014	16:31	1/29/2014 16:31			27							13766.68
SW-37 Event 15	1/30/2014	7:37	1/30/2014 7:37										13766.68
	1/30/2014	7:38	1/30/2014 7:38	53	35	29	23	39	49.7		49.7	5.69	13772.37
	1/30/2014	7:46	1/30/2014 7:46	50	35	30	23.5	42	50.7		401.6	45.94	13818.32
	1/30/2014	9:02	1/30/2014 9:02	50	35	34	21	46	45.1		3638.3	416.23	14234.54
	1/30/2014	9:58	1/30/2014 9:58	50	36	34	20.5	47	44.4		2506.0	286.68	14521.22
	1/30/2014	10:58	1/30/2014 10:58	50	36	34	20.5	47	44.4		2664.8	304.86	14826.08
	1/30/2014	12:24	1/30/2014 12:24	50	37	34	21	50	45.8		3879.7	443.83	15269.92
	1/30/2014	13:31	1/30/2014 13:31	50	37	34	21.5	50	46.9		3105.9	355.31	15625.23
	1/30/2014	13:32	1/30/2014 13:32							Valve shut	46.9	5.37	15630.59
	1/30/2014	13:33	1/30/2014 13:33			28							15630.59
SW-37 Event 16	2/5/2014	7:43	2/5/2014 7:43	55	32	31.5	3	61	6.1				15630.59
	2/5/2014	7:44	2/5/2014 7:44		33	32.5	4	61	8.3		7.2	0.83	15631.42
	2/5/2014	7:46	2/5/2014 7:46		34	33.5	8.1	61	17.0		25.2	2.89	15634.30
	2/5/2014	7:57	2/5/2014 7:57	55	34	33.5	8.1	62	16.9		186.4	21.32	15655.62
	2/5/2014	8:48	2/5/2014 8:48		34	33.5	8.1	66	16.9		861.9	98.60	15754.23
	2/5/2014	10:28	2/5/2014 10:28		34	33.5	9	68	18.7		1778.5	203.46	15957.69
	2/5/2014	11:29	2/5/2014 11:29		33.5	33.5	9.5	70	19.6		1168.3	133.65	16091.34
	2/5/2014	12:41	2/5/2014 12:41	45	33.5	33.5	10	72	20.6		1447.0	165.53	16256.87
	2/5/2014	13:35	2/5/2014 13:35	45	33.5	33.5	10.2	74	21.0		1122.0	128.36	16385.23
	2/5/2014	14:49	2/5/2014 14:49		33	32.5	11	74	22.5		1607.7	183.92	16569.15
	2/5/2014	15:42	2/5/2014 15:42		32.5	32.5	11.2	70	22.9		1201.8	137.49	16706.64
	2/5/2014	16:01	2/5/2014 16:01	47	32.5	32.5	11.2	73	22.8		433.8	49.62	16756.27
	2/5/2014	16:02	2/5/2014 16:02			28.5				Valve shut	22.8	2.61	16758.87
SW-37 Event 17	2/7/2014	8:20	2/7/2014 8:20	50	33	32	4	46	8.4				16758.87
	2/7/2014	8:22	2/7/2014 8:22	50	33.5	33	8.2	46	17.3		25.7	2.94	16761.82
	2/7/2014	9:24	2/7/2014 9:24	45	32.5	32	8.8	55	18.2		1102.5	126.13	16887.95
	2/7/2014	9:25	2/7/2014 9:25	45	33.5	33.3	12.2	55	25.6		21.9	2.50	16890.45
	2/7/2014	10:13	2/7/2014 10:13	44	33.5	33.3	11.5	59	24.0		1188.9	136.01	17026.47
	2/7/2014	10:14	2/7/2014 10:14			29				Valve shut	24.0	2.74	17029.21
SW-37 Event 18	2/11/2014	12:32	2/11/2014 12:32	50	32.5	33.5	<2	69	0.0				17029.21
	2/11/2014	12:34	2/11/2014 12:34	49	33.3	34	6.1	69	12.6		12.6	1.44	17030.65
	2/11/2014	13:52	2/11/2014 13:52	49	33.2	34	7.3	66	15.1		1078.2	123.34	17153.99
	2/11/2014	14:57	2/11/2014 14:57	49	33.2	34	7.5	62	15.5		995.2	113.85	17267.84
	2/11/2014	17:12	2/11/2014 17:12	51	33.2	34	9	56	18.8		2316.4	265.00	17532.84
	2/11/2014	17:13	2/11/2014 17:13			30				Valve shut	18.8	2.15	17534.99
SW-37 Event 19	2/12/2014	8:25	2/12/2014 8:25	50	25		4	47	7.7				17534.99
	2/12/2014	8:27	2/12/2014 8:27	50	33.5		19	47	40.1		47.8	5.46	17540.45
	2/12/2014	8:58	2/12/2014 8:58	45	34		17.8	53	37.6		1203.9	137.72	17678.17
	2/12/2014	10:31	2/12/2014 10:31	46	34		17	55	35.8		3410.4	390.14	18068.32
	2/12/2014	11:54	2/12/2014 11:54	47	34.2		17	54	35.9		2975.2	340.36	18408.68

SW-37 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	2/12/2014	13:58	2/12/2014 13:58	49	34.2		17.2	51	36.4		4484.8	513.07	18921.75
	2/12/2014	14:54	2/12/2014 14:54	48	34.2		17.8	51	37.7		2075.9	237.49	19159.23
	2/12/2014	15:54	2/12/2014 15:54	48	34.2		18.5	51	39.2		2306.8	263.90	19423.14
	2/12/2014	16:53	2/12/2014 16:53	48	34.2		19	51	40.2		2343.4	268.08	19691.22
	2/12/2014	17:54	2/12/2014 17:54	48	34.2		19.5	52	41.3		2486.1	284.41	19975.63
	2/13/2014	7:11	2/13/2014 7:11	47	32		22.2	49	46.0		34787.6	3979.70	23955.33
	2/13/2014	7:59	2/13/2014 7:59	51	32.5		22.8	47	47.6		2247.9	257.16	24212.49
	2/13/2014	9:05	2/13/2014 9:05	51	32.5		22.8	48	47.6		3142.0	359.44	24571.93
	2/13/2014	9:54	2/13/2014 9:54	52	32.5		23	47	48.0		2342.9	268.03	24839.96
	2/13/2014	10:34	2/13/2014 10:34	52	32.5		23	47	48.0		1921.9	219.87	25059.82
	2/13/2014	11:03	2/13/2014 11:03	52	32.5		23.2	48	48.4		1398.7	160.01	25219.84
	2/13/2014	11:35	2/13/2014 11:35	52	32.5		23.3	49	48.6		1551.9	177.53	25397.37
	2/13/2014	12:04	2/13/2014 12:04	52	32.2		23.5	51	48.7		1411.0	161.42	25558.78
	2/13/2014	12:34	2/13/2014 12:34	52	32.2		23.7	51	49.1		1468.2	167.97	25726.75
	2/13/2014	13:04	2/13/2014 13:04	52	32.2		23.8	53	49.3		1476.1	168.86	25895.61
	2/13/2014	14:08	2/13/2014 14:08	52	32		23.8	56	49.0		3144.2	359.69	26255.30
	2/13/2014	15:05	2/13/2014 15:05	52	32		23.8	58	48.9		2790.2	319.20	26574.50
	2/13/2014	15:24	2/13/2014 15:24							Valve shut	929.1	106.29	26680.79
Note: a red value, i.e. 75 °F, indicates that value was interpolated from field data											Total CO_2 Mass (lbs):		26680.79

SW-38 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
SW-38 Event 1	11/22/2013	12:58	11/22/2013 12:58	50	26			78	0.0				
	11/22/2013	13:00	11/22/2013 13:00		27	27	<2	80	0.0		0.0	0.00	0.00
	11/22/2013	13:01	11/22/2013 13:01		34	34	<2	80	0.0		0.0	0.00	0.00
	11/22/2013	13:22	11/22/2013 13:22		35	33	<2	82	0.0		0.0	0.00	0.00
	11/22/2013	13:23	11/22/2013 13:23		37	36.5	4	82	8.5		4.2	0.48	0.48
	11/22/2013	14:08	11/22/2013 14:08		36	35	10	82	20.9		661.0	75.62	76.10
	11/22/2013	15:24	11/22/2013 15:24	48	36	34.5	12	75	25.3		1755.8	200.86	276.96
	11/22/2013	16:37	11/22/2013 16:37		36	34	12	74	25.3		1846.3	211.22	488.18
	11/22/2013	17:17	11/22/2013 17:17	50	36	34	12	70	25.4		1014.2	116.02	604.20
	11/22/2013	17:18	11/22/2013 17:18							Valve shut	25.4	2.91	607.10
	11/22/2013	17:19	11/22/2013 17:19										607.10
SW-38 Event 2	12/4/2013	13:20	12/4/2013 13:20	55	38	38	<2	85	0.0				607.10
	12/4/2013	13:22	12/4/2013 13:22	55	35	35	2	85	4.1		4.1	0.47	607.58
	12/4/2013	13:54	12/4/2013 13:54	50	35	36	7.5	84	15.5		314.2	35.94	643.52
	12/4/2013	14:51	12/4/2013 14:51	50	36	35.5	8.5	74	17.9		952.7	108.99	752.51
	12/4/2013	15:58	12/4/2013 15:58	50	35	34.5	11	75	22.9		1368.9	156.61	909.12
	12/4/2013	17:42	12/4/2013 17:42	50	35	33	14	75	29.2		2711.1	310.15	1219.27
	12/4/2013	17:43	12/4/2013 17:43							Valve shut	29.2	3.34	1222.61
	12/4/2013	17:44	12/4/2013 17:44			25							1222.61
SW-38 Event 3	12/10/2013	13:38	12/10/2013 13:38	50	34	34	<2	78	0.0				1222.61
	12/10/2013	13:40	12/10/2013 13:40	50	30	30	<2	78	0.0				1222.61
	12/10/2013	14:20	12/10/2013 14:20	50	27.5	30	<2	72	0.0				1222.61
	12/10/2013	14:52	12/10/2013 14:52	50	28	30	<2	72	0.0				1222.61
	12/10/2013	14:53	12/10/2013 14:53	50	30	32	5.5	72	10.9		5.5	0.62	1223.23
	12/10/2013	15:28	12/10/2013 15:28	50	30	32	5.5	72	10.9		381.5	43.65	1266.88
	12/10/2013	15:29	12/10/2013 15:29	50	32.5	33.5	7.5	72	15.3		13.1	1.50	1268.37
	12/10/2013	15:55	12/10/2013 15:55	45	32	33.5	7.5	70	15.2		396.6	45.37	1313.75
	12/10/2013	16:34	12/10/2013 16:34	45	32.5	33.5	8	68	16.4		616.0	70.47	1384.22
	12/10/2013	17:16	12/10/2013 17:16	50	32	33	9	66	18.3		728.9	83.38	1467.61
	12/10/2013	22:32	12/10/2013 22:32	52	32	31.5	13.5	60	27.7		7272.5	831.97	2299.58
	12/11/2013	7:56	12/11/2013 7:56	49	30	29	15.5	60	31.1	Valve shut	16572.5	1895.90	4195.48
SW-38 Event 4	12/17/2013	12:37	12/17/2013 12:37	48	34	34	<2	69	0.0				4195.48
	12/17/2013	13:32	12/17/2013 13:32	49	32	30	5	70	10.2		279.2	31.94	4227.41
	12/17/2013	13:33	12/17/2013 13:33	47	36	34	13.5	70	28.6		19.4	2.22	4229.63
	12/17/2013	14:47	12/17/2013 14:47	45	36	34	13.5	70	28.6		2114.8	241.94	4471.57
	12/17/2013	16:10	12/17/2013 16:10	45	36	33.5	16	68	33.9		2594.5	296.81	4768.37
	12/17/2013	22:30	12/17/2013 22:30	45	35	30	21	58	44.5		14910.1	1705.71	6474.09
	12/17/2013	22:32	12/17/2013 22:32	43	36	31	26	58	55.7		100.2	11.47	6485.55
	12/18/2013	8:13	12/18/2013 8:13	41	37	30	28	57	60.6		33799.3	3866.64	10352.20
	12/18/2013	8:14	12/18/2013 8:14							Valve shut	60.6	6.94	10359.13
	12/18/2013	8:15	12/18/2013 8:15			25							10359.13
Note: a red value, i.e. 75 °F, indicates that value was interpolated from field data											Total CO_2 Mass (lbs):		10359.13

SW-39 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
SW-39 Event 1	11/20/2013	8:42	11/20/2013 8:42	59.5		16			0.0		0	0	0
	11/20/2013	8:48	11/20/2013 8:48			8		64	0.0		0.0	0.00	0.00
	11/20/2013	8:49	11/20/2013 8:49	57.5	34	34	<2	64	0.0		0.0	0.00	0.00
	11/20/2013	8:50	11/20/2013 8:50	57.5	35	36	<2	64	0.0		0.0	0.00	0.00
	11/20/2013	9:40	11/20/2013 9:40	57.5	34	32	7	64	14.6		365.1	41.77	41.77
	11/20/2013	11:10	11/20/2013 11:10	55	34	31.5	9	66	18.7		1500.5	171.66	213.43
	11/20/2013	11:12	11/20/2013 11:12	55	36	32.5	11	66	23.4		42.1	4.82	218.25
	11/20/2013	11:15	11/20/2013 11:15	55	37	33	11.5	66	24.7		72.1	8.25	226.50
	11/20/2013	12:55	11/20/2013 12:55	52.5	36	33	12.25	64	26.1		2538.6	290.42	516.92
	11/20/2013	14:30	11/20/2013 14:30	52.5	36	32	12.5	64	26.6		2503.5	286.41	803.32
	11/20/2013	14:49	11/20/2013 14:49	52	35	32.5	14	63	29.5		533.5	61.04	864.36
	11/20/2013	14:53	11/20/2013 14:53	52	40	33.5	14.5	63	32.1		123.3	14.11	878.47
	11/20/2013	15:09	11/20/2013 15:09	55	40	33.5	15	63	33.2		522.9	59.82	938.29
	11/20/2013	15:12	11/20/2013 15:12	55	40	33.5	15	63	33.2	Valve shut	99.7	11.41	949.69
	11/20/2013	15:13	11/20/2013 15:13			29							949.69
SW-39 Event 2	12/4/2013	13:23	12/4/2013 13:23	52	33	31.5	4	85	8.1				988.91
	12/4/2013	13:54	12/4/2013 13:54	50	32	31	7	84	14.0		342.8	39.21	993.14
	12/4/2013	13:56	12/4/2013 13:56	50	36	35.5	11	84	23.0		37.0	4.23	1134.27
	12/4/2013	14:52	12/4/2013 14:52	50	36	35.5	10	74	21.1		1233.7	141.13	1306.42
	12/4/2013	16:00	12/4/2013 16:00	50	36	35.5	11	75	23.2		1504.8	172.15	1624.66
	12/4/2013	17:45	12/4/2013 17:45	55	36	33.5	14	64	29.8		2781.8	318.24	1628.07
	12/4/2013	17:46	12/4/2013 17:46							Valve shut	29.8	3.41	1628.07
	12/4/2013	17:47	12/4/2013 17:47										1628.07
SW-39 Event 3	12/10/2013	13:36	12/10/2013 13:36	51	35	24	<2	78	0.0				1628.07
	12/10/2013	13:37	12/10/2013 13:37	51	35	33	6	78	12.5		6.2	0.71	1628.79
	12/10/2013	13:40	12/10/2013 13:40		35	33	6.5	78	13.5		39.0	4.46	1633.25
	12/10/2013	14:20	12/10/2013 14:20	50	35	33	7	70	14.7		563.7	64.49	1697.74
	12/10/2013	14:56	12/10/2013 14:56	50	35	33	7	72	14.6		527.6	60.36	1758.09
	12/10/2013	15:30	12/10/2013 15:30	50	35	33	7	72	14.6		497.8	56.95	1815.04
	12/10/2013	15:57	12/10/2013 15:57	45	35	33	7.5	70	15.7		409.8	46.88	1861.92
	12/10/2013	16:35	12/10/2013 16:35	45	35	32.5	8	68	16.8		617.8	70.68	1932.60
	12/10/2013	17:17	12/10/2013 17:17	50	35	32	8.5	66	17.9		728.3	83.32	2015.92
	12/10/2013	22:30	12/10/2013 22:30	52	34	30	17	60	35.6		8371.8	957.73	2973.65
	12/11/2013	7:58	12/11/2013 7:58	49	34	30	17	60	35.6	Valve shut	20226.9	2313.96	5287.61
SW-39 Event 4	12/17/2013	12:36	12/17/2013 12:36	48	34	34	5.5	69	11.4				5287.61
	12/17/2013	13:30	12/17/2013 13:30	49	32.5	33	6	70	12.2		639.0	73.10	5360.71
	12/17/2013	14:45	12/17/2013 14:45	45	32.5	33	6.5	70	13.3		956.9	109.47	5470.18
	12/17/2013	16:12	12/17/2013 16:12	45	32	33	7	68	14.2		1196.7	136.90	5607.08
	12/17/2013	22:16	12/17/2013 22:16	45	32	32	10	58	20.5		6331.3	724.31	6331.39
	12/18/2013	8:12	12/18/2013 8:12	41	30	30	12.5	57	25.1		13615.8	1557.65	7889.04
	12/18/2013	8:13	12/18/2013 8:13							Valve shut	25.1	2.88	7891.92
	12/18/2013	8:14	12/18/2013 8:14			26							7891.92
SW-39 Event 5	1/21/2014	9:19	1/21/2014 9:19	47	28	28	<2	62	0.0				7891.92
	1/21/2014	9:21	1/21/2014 9:21	47	34	33	5.5	62	11.5		11.5	1.32	7893.23
	1/21/2014	10:12	1/21/2014 10:12	40	33	32	9	66	18.5		766.1	87.64	7980.87
	1/21/2014	11:39	1/21/2014 11:39	48	33	31.2	9	70	18.5		1610.2	184.20	8165.07
	1/21/2014	12:27	1/21/2014 12:27	44	32.5	31	9.7	71	19.8		918.1	105.03	8270.10
	1/21/2014	12:29	1/21/2014 12:29			29				Valve shut	39.6	4.53	8274.63
SW-39 Event 6	1/22/2014	8:00	1/22/2014 8:00	57	28	29	3	40	6.0				8274.63
	1/22/2014	8:01	1/22/2014 8:01	57	32.5	30.5	10	40	21.0		13.5	1.55	8276.18
	1/22/2014	8:39	1/22/2014 8:39	57	31.5	29.5	15	44	31.1		990.5	113.32	8389.49
	1/22/2014	8:42	1/22/2014 8:42	52	33.5	31	19	44	40.2		107.0	12.24	8401.74
	1/22/2014	9:40	1/22/2014 9:40	47	34	31.5	18	47	38.2		2275.0	260.26	8662.00

SW-39 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	1/22/2014	10:49	1/22/2014 10:49	45	34	31	18	50	38.1		2632.2	301.12	8963.12
	1/22/2014	11:52	1/22/2014 11:52	43	33	30.5	18.3	54	38.2		2401.9	274.78	9237.89
	1/22/2014	12:23	1/22/2014 12:23	42	33	30.5	18.3	55	38.1		1182.4	135.27	9373.16
	1/22/2014	12:24	1/22/2014 12:24							Valve shut	38.1	4.36	9377.52
	1/22/2014	12:26	1/22/2014 12:26			26							9377.52
Note: a red value, i.e. 75 °F, indicates that value was interpolated from field data											Total CO_2 Mass (lbs):		9377.52

SW-40 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
SW-40 Event 1	11/15/2013	7:43	11/15/2013 7:43	28	11.5			63.3	0.0				
	11/15/2013	7:45	11/15/2013 7:45	33	33.5		<2	57	0.0		0.0	0.00	0.00
	11/15/2013	7:46	11/15/2013 7:46		39	36	<2	57	0.0		0.0	0.00	0.00
	11/15/2013	7:46	11/15/2013 7:46		38	35	<2	50.7	0.0		0.0	0.00	0.00
	11/15/2013	7:47	11/15/2013 7:47	33	33	33	<2	50.7	0.0		0.0	0.00	0.00
	11/15/2013	7:51	11/15/2013 7:51	37	35	32.5	4.5	50.7	7.8		15.6	1.78	1.78
	11/15/2013	7:52	11/15/2013 7:52	38	36	33.5	5.5	49.6	9.6		8.7	1.00	2.78
	11/15/2013	7:57	11/15/2013 7:57	38	36	33.5	6.3	49.6	11.0		51.7	5.91	8.69
	11/15/2013	8:02	11/15/2013 8:02	37	36	33	6.3	49.6	11.0		55.2	6.31	15.00
	11/15/2013	8:03	11/15/2013 8:03	39	37.5	34	7.75	48.5	13.8		12.4	1.42	16.42
	11/15/2013	8:35	11/15/2013 8:35	38	37	33	9.25	45.3	16.4		483.7	55.33	71.75
	11/15/2013	8:41	11/15/2013 8:41	40	37.5	34	10.5	37.9	18.9		106.0	12.13	83.88
	11/15/2013	9:19	11/15/2013 9:19	40	37.5	34	11.5	30.5	20.9		755.3	86.40	170.28
	11/15/2013	10:11	11/15/2013 10:11	40	37	33.5	12	41	21.4		1099.2	125.74	296.03
	11/15/2013	10:14	11/15/2013 10:14	42	38	34	13	40.4	23.4		67.3	7.70	303.72
	11/15/2013	11:12	11/15/2013 11:12	42	38	34	13.5	32.1	24.6		1392.2	159.27	462.99
	11/15/2013	11:50	11/15/2013 11:50							Valve shut	933.4	106.78	569.77
	11/15/2013	11:51	11/15/2013 11:51	27									569.77
SW-40 Event 2	12/5/2013	7:58	12/5/2013 7:58	56	36	36	<2	66	0.0				569.77
	12/5/2013	8:20	12/5/2013 8:20	55	36	35.5	4	68	8.5		93.3	10.68	580.45
	12/5/2013	8:31	12/5/2013 8:31							Valve shut			580.45
	12/5/2013	8:34	12/5/2013 8:34							Restart			580.45
	12/5/2013	8:36	12/5/2013 8:36	55	35	35	6	70	12.6		25.1	2.88	583.33
	12/5/2013	9:11	12/5/2013 9:11	53	35	35	6	74	12.5		439.2	50.25	633.57
	12/5/2013	10:13	12/5/2013 10:13	51	35	35	6.5	80	13.5		806.5	92.26	725.83
	12/5/2013	11:20	12/5/2013 11:20	50	35	35	7	85	14.5		936.3	107.11	832.94
	12/5/2013	12:00	12/5/2013 12:00	50	35	35	7	85	14.5		578.3	66.16	899.10
	12/5/2013	14:13	12/5/2013 14:13	51	34	34	10	87	20.4		2318.4	265.22	1164.32
	12/5/2013	15:20	12/5/2013 15:20	49	34	34	10	86	20.4		1367.7	156.47	1320.79
	12/5/2013	16:29	12/5/2013 16:29	50	34	33.5	10.5	82	21.5		1447.3	165.57	1486.36
	12/5/2013	16:30	12/5/2013 16:30	50	35	35.5	13.5	82	28.0		24.7	2.83	1489.19
	12/5/2013	17:52	12/5/2013 17:52	55	35	35.5	14	70	29.3		2349.4	268.77	1757.97
	12/5/2013	22:01	12/5/2013 22:01	55	35	34.5	17	68	35.7		8096.8	926.28	2684.24
	12/6/2013	7:04	12/6/2013 7:04	54	34	32.2	20	66	41.6		20998.3	2402.20	5086.44
	12/6/2013	9:29	12/6/2013 9:29	45	34	32.2	19	77	39.1		5857.0	670.04	5756.49
	12/6/2013	9:30	12/6/2013 9:30	44	36	33.2	23	78	48.3		43.7	5.00	5761.49
	12/6/2013	10:37	12/6/2013 10:37	41	36	33.5	21	84	43.9		3087.7	353.23	6114.72
	12/6/2013	11:33	12/6/2013 11:33	40	36	33.5	20.5	86	42.7		2424.5	277.36	6392.08
	12/6/2013	13:47	12/6/2013 13:47	45	39	35	24	88	51.4		6307.6	721.59	7113.67
	12/6/2013	14:28	12/6/2013 14:28	45	39	35	24	86	51.5		2109.9	241.37	7355.04
	12/6/2013	15:27	12/6/2013 15:27	45	39	34.5	23	80	49.6		2984.1	341.38	7696.42
	12/6/2013	17:15	12/6/2013 17:15	46	38	35	24.5	74	52.7		5526.2	632.19	8328.61
	12/6/2013	17:17	12/6/2013 17:17			29				Valve shut	105.4	12.06	8340.67
SW-40 Event 3	12/10/2013	12:26	12/10/2013 12:26	55	30	30	<2	78	0.0				8340.67
	12/10/2013	12:28	12/10/2013 12:28	54	34	35	4	78	8.2		8.2	0.94	8341.61
	12/10/2013	12:48	12/10/2013 12:48	50	34	34	7.5	80	15.4		236.4	27.04	8368.65
	12/10/2013	12:58	12/10/2013 12:58	54	34	34	8	80	16.4		159.2	18.21	8386.86
	12/10/2013	13:56	12/10/2013 13:56	54	33	34	8.5	71	17.4		982.0	112.34	8499.20
	12/10/2013	14:23	12/10/2013 14:23	50	34	34	8	72	16.6		458.8	52.49	8551.69
	12/10/2013	15:00	12/10/2013 15:00	50	34	34	8	72	16.6		612.7	70.10	8621.79
	12/10/2013	15:34	12/10/2013 15:34	50	34	34	8.5	74	17.6		580.1	66.36	8688.15
	12/10/2013	16:13	12/10/2013 16:13	50	34	34	9	72	18.6		705.7	80.74	8768.89
	12/10/2013	16:45	12/10/2013 16:45	47.5	34	34	9	68	18.7		597.3	68.34	8837.22

SW-40 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	12/10/2013	17:21	12/10/2013 17:21	45	32	33	10	66	20.4		703.6	80.49	8917.71
	12/10/2013	22:26	12/10/2013 22:26	52	34	32	13	54	27.4		7286.6	833.58	9751.30
	12/11/2013	7:44	12/11/2013 7:44	50	34	32	12.5	50	26.5	Valve shut	15023.4	1718.68	11469.98
SW-40 Event 4	12/17/2013	12:21	12/17/2013 12:21	50	37	34	<2	72	0.0				11469.98
	12/17/2013	13:13	12/17/2013 13:13	50	35	32	8	73	16.7		434.6	49.72	11519.70
	12/17/2013	13:17	12/17/2013 13:17	50	35	33	12	73	25.1		83.6	9.56	11529.26
	12/17/2013	14:21	12/17/2013 14:21	46	35	33	12	74	25.0		1604.0	183.49	11712.75
	12/17/2013	15:30	12/17/2013 15:30	45	35	33	12.5	72	26.1		1766.2	202.05	11914.80
	12/17/2013	16:45	12/17/2013 16:45	45	35	32	13	69	27.3		2003.0	229.15	12143.95
	12/17/2013	22:14	12/17/2013 22:14	45	36	32	14.5	54	31.2		9616.7	1100.16	13244.10
	12/18/2013	9:02	12/18/2013 9:02	48	35	30	17.3	58	36.7		21993.0	2516.00	15760.11
	12/18/2013	9:04	12/18/2013 9:04							Valve shut	73.4	8.39	15768.50
	12/18/2013	9:05	12/18/2013 9:05			27							15768.50
Note: a red value, i.e. 75 °F, indicates that value was interpolated from field data											Total CO_2 Mass (lbs):		15768.50

SW-41 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
SW-41 Event 1	11/18/2013	7:36	11/18/2013 7:36	26	12			65.1	0.0				
	11/18/2013	7:38	11/18/2013 7:38	30	29	29	<2	61.8	0.0		0.0	0.00	0.00
	11/18/2013	7:42	11/18/2013 7:42	36	36	30	<2	61.8	0.0		0.0	0.00	0.00
	11/18/2013	7:47	11/18/2013 7:47	34	31	30	8	61.8	13.1		32.8	3.75	3.75
	11/18/2013	7:48	11/18/2013 7:48	36	33	29	10.5	58.4	17.7		15.4	1.76	5.52
	11/18/2013	7:51	11/18/2013 7:51	36	33	29	11	55.2	18.6		54.4	6.22	11.74
	11/18/2013	7:53	11/18/2013 7:53	41	35	30	13.75	48	23.9		42.4	4.86	16.59
	11/18/2013	7:55	11/18/2013 7:55	45	38.5	32	15.5	47.4	27.9		51.8	5.92	22.51
	11/18/2013	7:57	11/18/2013 7:57	48	40	33.5	17	38.3	31.3		59.2	6.77	29.29
	11/18/2013	8:17	11/18/2013 8:17	48	39	32	18.25	20.6	33.9		652.6	74.66	103.95
	11/18/2013	8:18	11/18/2013 8:18	51	41	33	19.5	19.9	37.0		35.5	4.06	108.01
	11/18/2013	9:00	11/18/2013 9:00	51	40	31	20.5	-5.3	39.6		1609.3	184.11	292.11
	11/18/2013	9:01	11/18/2013 9:01	54	41.5	31.5	21.5	-6.4	42.2		40.9	4.68	296.79
	11/18/2013	9:12	11/18/2013 9:12	58	43	32.5	23	-16.1	46.3		487.0	55.71	352.50
	11/18/2013	10:00	11/18/2013 10:00	58	43	32	23.25	-19	47.0		2239.5	256.19	608.70
	11/18/2013	10:03	11/18/2013 10:03							Valve shut	141.0	16.13	624.82
	11/18/2013	10:04	11/18/2013 10:04		23	18.5							624.82
SW-41 Event 2	11/20/2013	8:07	11/20/2013 8:07										624.82
	11/20/2013	8:20	11/20/2013 8:20	28	11			59.7	0.0		0.0	0.00	624.82
	11/20/2013	8:23	11/20/2013 8:23	28	27	28	5.5	52.5	8.7		13.0	1.49	626.32
	11/20/2013	8:26	11/20/2013 8:26	34	31		10.5	52.8	17.4		39.1	4.48	630.79
	11/20/2013	8:27	11/20/2013 8:27	37	32.5		12.5	52.9	21.0		19.2	2.20	632.99
	11/20/2013	8:28	11/20/2013 8:28	44	36	30.5	16	53	27.9		24.5	2.80	635.79
	11/20/2013	10:18	11/20/2013 10:18	42	32.5	26.5	19.25	57.7	32.2		3309.3	378.59	1014.38
	11/20/2013	10:21	11/20/2013 10:21	48	35	28	21.5	45.6	37.4		104.5	11.96	1026.34
	11/20/2013	12:38	11/20/2013 12:38	48	35	27.5	22.25	33.4	39.2		5251.6	600.78	1627.12
	11/20/2013	12:39	11/20/2013 12:39	58	39	30	25.5	33.4	46.8		43.0	4.92	1632.04
	11/20/2013	15:37	11/20/2013 15:37	59	40	30	26	21.7	48.8		8503.2	972.76	2604.80
	11/20/2013	17:13	11/20/2013 17:13	59	39	28	26.5	17.7	49.5		4714.3	539.31	3144.12
	11/20/2013	17:16	11/20/2013 17:16							Valve shut	148.4	16.97	3161.09
	11/20/2013	17:21	11/20/2013 17:21		19								3161.09
SW-41 Event 3	11/21/2013	7:04	11/21/2013 7:04					56.4	0.0				3161.09
	11/21/2013	7:11	11/21/2013 7:11		28		13.5	31.4	22.1		77.3	8.84	3169.93
	11/21/2013	7:14	11/21/2013 7:14		31		15.5	82.3	24.9		70.5	8.07	3178.00
	11/21/2013	7:17	11/21/2013 7:17		30	25	17.5	32.5	29.3		81.3	9.30	3187.30
	11/21/2013	7:19	11/21/2013 7:19		33.5	28	20	29.6	34.9		64.1	7.34	3194.63
	11/21/2013	10:21	11/21/2013 10:21		33	27	20.5	38.3	35.2		6377.1	729.54	3924.18
	11/21/2013	10:40	11/21/2013 10:40		35.8	26.5	23	38.3	40.7		721.0	82.49	4006.66
	11/21/2013	13:23	11/21/2013 13:23		35	26.5	23	46.9	40.0		6574.3	752.10	4758.76
	11/21/2013	14:36	11/21/2013 14:36		34	26.5	23	51	39.4		2898.0	331.53	5090.30
	11/21/2013	17:11	11/21/2013 17:11		34	26	24.3	32	42.5		6345.7	725.94	5816.24
	11/21/2013	17:26	11/21/2013 17:26		34	26	24.3	29.1	42.6		638.0	72.99	5889.23
	11/21/2013	17:27	11/21/2013 17:27							Valve shut	42.6	4.87	5894.10
	11/21/2013	17:29	11/21/2013 17:29										5894.10
SW-41 Event 4	12/6/2013	8:53	12/6/2013 8:53	50	32	31	8	76	16.1				5894.10
	12/6/2013	8:55	12/6/2013 8:55	50	35	28	15	76	31.3		47.4	5.42	5899.53
	12/6/2013	9:02	12/6/2013 9:02	45	33	28	19.5	76	39.8		248.6	28.44	5927.97
	12/6/2013	9:03	12/6/2013 9:03	45	34	28	21	76	43.3		41.5	4.75	5932.72
	12/6/2013	10:15	12/6/2013 10:15	40	33	27	21.5	79	43.7		3133.6	358.49	6291.21
	12/6/2013	10:29	12/6/2013 10:29	40	34	27.5	22.5	80	46.2		629.7	72.04	6363.25
	12/6/2013	10:55	12/6/2013 10:55	40	34	26.5	22.5	82	46.1		1200.5	137.34	6500.59
	12/6/2013	11:00	12/6/2013 11:00	40	35	27.5	23	82	47.6		234.4	26.82	6527.40
	12/6/2013	12:08	12/6/2013 12:08	39	35	26.5	23	84	47.6		3236.6	370.27	6897.67

SW-41 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	12/6/2013	13:04	12/6/2013 13:04	44	37.5	24.5	25	82	53.1		2818.0	322.38	7220.05
	12/6/2013	13:08	12/6/2013 13:08			20				Valve shut	212.4	24.29	7244.34
SW-41 Event 5	12/9/2013	8:36	12/9/2013 8:36	55	34	32	6.5	64	13.6				7244.34
	12/9/2013	8:40	12/9/2013 8:40	55	30.5	27.5	14	64	28.1		83.4	9.54	7253.88
	12/9/2013	8:42	12/9/2013 8:42	55	32	28	17	64	34.7		62.8	7.19	7261.07
	12/9/2013	9:18	12/9/2013 9:18	50	32	27	19	64	38.8		1323.5	151.41	7412.48
	12/9/2013	9:54	12/9/2013 9:54	50	31	27.5	18	70	36.1		1349.2	154.35	7566.83
	12/9/2013	11:07	12/9/2013 11:07	50	31	27.5	18	77	35.9		2629.9	300.86	7867.69
	12/9/2013	11:36	12/9/2013 11:36	50	31	27	18	82	35.7		1038.7	118.83	7986.52
	12/9/2013	12:34	12/9/2013 12:34	50	31	27	18	86	35.6		2068.5	236.64	8223.16
	12/9/2013	12:55	12/9/2013 12:55							Valve shut	747.5	85.52	8308.67
	12/9/2013	12:56	12/9/2013 12:56			20							8308.67
SW-41 Event 6	12/12/2013	8:58	12/12/2013 8:58	55	34	31	<2	58	0.0				8308.67
	12/12/2013	9:45	12/12/2013 9:45	50	28	24	20	62	39.1		919.1	105.15	8413.82
	12/12/2013	9:46	12/12/2013 9:46	50	31	26	23.5	62	47.6		43.3	4.96	8418.78
	12/12/2013	9:47	12/12/2013 9:47	49	32.5	28	25	62	51.4		49.5	5.66	8424.44
	12/12/2013	10:30	12/12/2013 10:30	45	32.5	27	25	66	51.2		2207.5	252.54	8676.98
	12/12/2013	10:31	12/12/2013 10:31	45	36	29	28	66	59.5		55.4	6.33	8683.32
	12/12/2013	10:32	12/12/2013 10:32	45	38	30	29.5	66	63.9		61.7	7.06	8690.38
	12/12/2013	11:25	12/12/2013 11:25	45	38	29.5	29.5	68	63.8		3385.6	387.32	9077.69
	12/12/2013	13:35	12/12/2013 13:35	45	36	29.5	31	70	65.6		8413.7	962.53	10040.23
	12/12/2013	13:36	12/12/2013 13:36							Valve shut	65.6	7.51	10047.73
	12/12/2013	13:37	12/12/2013 13:37			18							10047.73
SW-41 Event 7	12/16/2013	8:24	12/16/2013 8:24	50	31	31	7	48	14.4		0.0	0.00	10047.73
	12/16/2013	8:50	12/16/2013 8:50	45	29	26	15.5	50	31.0		590.3	67.54	10115.27
	12/16/2013	8:51	12/16/2013 8:51	45	30	29	20	50	40.5		35.8	4.09	10119.36
	12/16/2013	10:07	12/16/2013 10:07	45	30	28	20	48	40.6		3082.3	352.62	10471.98
	12/16/2013	11:04	12/16/2013 11:04	40	31	28	20	66	40.3		2306.2	263.83	10735.81
	12/16/2013	11:05	12/16/2013 11:05	40	32	30	23	66	46.9		43.6	4.99	10740.80
	12/16/2013	11:06	12/16/2013 11:06	40	34	31	26	66	54.1		50.5	5.78	10746.58
	12/16/2013	13:12	12/16/2013 13:12	45	40	33	26	67	57.4		7025.6	803.73	11550.31
	12/16/2013	13:13	12/16/2013 13:13							Valve shut	57.4	6.56	11556.87
	12/16/2013	13:14	12/16/2013 13:14			22							11556.87
	12/16/2013	14:42	12/16/2013 14:42	50	40	31.5	29.5	68	65.0	Restart	5723.3	654.75	12211.62
	12/16/2013	15:36	12/16/2013 15:36	45	37.5	32	26.5	68	57.0		3296.3	377.10	12588.72
	12/16/2013	16:33	12/16/2013 16:33	40	37	30.5	25.5	64	54.8		3189.0	364.82	12953.54
	12/16/2013	16:35	12/16/2013 16:35	40	37	31	26	64	55.9		110.8	12.67	12966.22
	12/16/2013	17:18	12/16/2013 17:18	40	37	30	25	60	54.0		2363.0	270.33	13236.54
	12/16/2013	17:19	12/16/2013 17:19							Valve shut	54.0	6.18	13242.72
	12/16/2013	17:20	12/16/2013 17:20			22							13242.72
Note: a red value, i.e. 75 °F, indicates that value was interpolated from field data										Total CO_2 Mass (lbs):			13242.72

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)	Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
SW-42 Event 1	11/12/2013	8:28	11/12/2013 8:28	24					0.0			
	11/12/2013	8:31	11/12/2013 8:31	31	31	28	<2	54.8	0.0	0.0	0.00	0.00
	11/12/2013	8:33	11/12/2013 8:33	30	30	28	<2	54.1	0.0	0.0	0.00	0.00
	11/12/2013	8:35	11/12/2013 8:35	33	33	30	<2	54.5	0.0	0.0	0.00	0.00
	11/12/2013	8:39	11/12/2013 8:39	36	35	33.5	<2	58.4	0.0	0.0	0.00	0.00
	11/12/2013	8:42	11/12/2013 8:42	35	36	33.5	<2	58.6	0.0	0.0	0.00	0.00
	11/12/2013	8:44	11/12/2013 8:44	35	34	32.5	<2	59.5	0.0	0.0	0.00	0.00
	11/12/2013	8:59	11/12/2013 8:59		33	31	<2	60	0.0	0.0	0.00	0.00
	11/12/2013	9:04	11/12/2013 9:04	33	33		<2	60	0.0	0.0	0.00	0.00
	11/12/2013	9:05	11/12/2013 9:05	35	34.5	32	<2	60	0.0	0.0	0.00	0.00
	11/12/2013	9:10	11/12/2013 9:10	35	34.5		<2	59.3	0.0	0.0	0.00	0.00
	11/12/2013	9:14	11/12/2013 9:14	35	34	32	<2	59.0	0.0	0.0	0.00	0.00
	11/12/2013	9:15	11/12/2013 9:15	36	35	34	3.5	58.6	6.0	3.0	0.34	0.34
	11/12/2013	9:25	11/12/2013 9:25	37	36	34	3.5	58.2	6.1	60.4	6.92	7.26
	11/12/2013	9:40	11/12/2013 9:40	37	36	33.5	4	58.1	6.9	97.7	11.17	18.43
	11/12/2013	10:05	11/12/2013 10:05	36	35	33	4.5	58.2	7.7	183.5	20.99	39.42
	11/12/2013	10:36	11/12/2013 10:36	38	37	34	5.25	60.9	9.2	262.2	29.99	69.42
	11/12/2013	10:53	11/12/2013 10:53	38	37	34.5	5.5	60.6	9.6	159.8	18.28	87.70
	11/12/2013	11:00	11/12/2013 11:00	40	38	36	6.5	60.8	11.5	73.9	8.45	96.15
	11/12/2013	11:20	11/12/2013 11:20	40	38	36	6.5	60.4	11.5	229.6	26.27	122.42
	11/12/2013	11:45	11/12/2013 11:45	40	38	35.5	7	61.7	12.4	297.9	34.09	156.51
	11/12/2013	12:20	11/12/2013 12:20	40	37.5	35.5	7.5	63.5	13.1	446.2	51.05	207.55
	11/12/2013	12:36	11/12/2013 12:36	40	37	35	7.5	66.7	13.0	209.5	23.97	231.52
	11/12/2013	12:38	11/12/2013 12:38	41	39	36.5	8.5	67.4	15.1	28.1	3.21	234.73
	11/12/2013	13:07	11/12/2013 13:07	42	39	36.5	8.75	67.6	15.5	443.0	50.68	285.42
	11/12/2013	13:17	11/12/2013 13:17						Valve shut	155.0	17.73	303.14
	11/12/2013	13:19	11/12/2013 13:19									303.14
SW-42 Event 2	11/26/2013	7:45	11/26/2013 7:45	54	25			68	0.0			303.14
	11/26/2013	7:48	11/26/2013 7:48	55	34	34	<2	68	0.0	0	0.00	303.14
	11/26/2013	8:10	11/26/2013 8:10	55	33	33	<2	68	0.0	0	0.00	303.14
	11/26/2013	8:12	11/26/2013 8:12	52	37	38	<2	68	0.0	0	0.00	303.14
	11/26/2013	8:15	11/26/2013 8:15	52	35	36	<2	68	0.0	0	0.00	303.14
	11/26/2013	9:12	11/26/2013 9:12	52	36	35.5	<2	68	0.0	0	0.00	303.14
	11/26/2013	11:17	11/26/2013 11:17	50	37	36	<2	68	0.0	0	0.00	303.14
	11/26/2013	12:20	11/26/2013 12:20	50	37	36	<2	68	0.0	0	0.00	303.14
	11/26/2013	12:21	11/26/2013 12:21						Valve shut	0	0.00	303.14
	11/26/2013	12:23	11/26/2013 12:23			30						303.14
SW-42 Event 3	12/4/2013	8:01	12/4/2013 8:01									303.14
	12/4/2013	8:02	12/4/2013 8:02	53	28	30	<2	64	0.0	0	0.00	303.14
	12/4/2013	8:06	12/4/2013 8:06	53	28	30	<2	64	0.0	0	0.00	303.14
	12/4/2013	8:07	12/4/2013 8:07	53	32	34	<2	66	0.0	0	0.00	303.14
	12/4/2013	8:35	12/4/2013 8:35	48	32	34	<2	70	0.0	0	0.00	303.14
	12/4/2013	8:38	12/4/2013 8:38	48	34	37.5	<2	70	0.0	0	0.00	303.14
	12/4/2013	9:28	12/4/2013 9:28	47	34	37.5	<2	73	0.0	0	0.00	303.14
	12/4/2013	9:58	12/4/2013 9:58	47	34	37.5	<2	74	0.0	0	0.00	303.14
	12/4/2013	11:12	12/4/2013 11:12	46	34	36.5	2	80	4.1	152.0	17.39	320.53
	12/4/2013	12:09	12/4/2013 12:09	50	34	36.5	3.5	82	7.2	321.6	36.79	357.32
	12/4/2013	12:14	12/4/2013 12:14						Valve shut			357.32
	12/4/2013	12:15	12/4/2013 12:15			28						357.32
SW-42 Event 4	12/10/2013	8:00	12/10/2013 8:00	51	35	34	<2	70	0.0			357.32
	12/10/2013	8:20	12/10/2013 8:20	51	35	34	<2	70	0.0			357.32
	12/10/2013	8:34	12/10/2013 8:34	52	36	34	<2	72	0.0			357.32
	12/10/2013	9:08	12/10/2013 9:08	50	36	34	<2	72	0.0			357.32

SW-42 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	12/10/2013	9:42	12/10/2013 9:42	50	35	34	<2	72	0.0				357.32
	12/10/2013	10:19	12/10/2013 10:19	50	35	34	<2	74	0.0				357.32
	12/10/2013	11:17	12/10/2013 11:17	45	35	34	<2	74	0.0				357.32
	12/10/2013	12:00	12/10/2013 12:00	45	35	34	<2	76	0.0				357.32
	12/10/2013	13:54	12/10/2013 13:54	45	35	33	3	76	6.3		356.3	40.76	398.08
	12/10/2013	15:06	12/10/2013 15:06	50	35	33	4	72	8.4		526.2	60.20	458.28
	12/10/2013	16:00	12/10/2013 16:00	50	35	33	4	72	8.4		451.8	51.68	509.96
	12/10/2013	17:25	12/10/2013 17:25	50	35	33	4	66	8.4		713.2	81.59	591.55
	12/10/2013	20:14	12/10/2013 20:14							Valve shut	1422.2	162.70	754.26
	12/10/2013	20:17	12/10/2013 20:17							Restart			754.26
	12/10/2013	22:20	12/10/2013 22:20	50	36	35	11.5	54	24.7		3042.7	348.08	1102.34
	12/11/2013	7:38	12/11/2013 7:38	50	37.5	35	9.5	52	20.8	Valve shut	12700.2	1452.90	2555.24
SW-42 Event 5	12/17/2013	8:30	12/17/2013 8:30	45	34	34.5	<2	58	0.0				2555.24
	12/17/2013	8:56	12/17/2013 8:56	46	34	34.5	<2	60	0.0		0.0	0.00	2555.24
	12/17/2013	10:14	12/17/2013 10:14	42	34	34	<2	66	0.0		0.0	0.00	2555.24
	12/17/2013	11:17	12/17/2013 11:17	38	32	34	<2	70	0.0		0.0	0.00	2555.24
	12/17/2013	12:02	12/17/2013 12:02	40	32	34	<2	71	0.0		0.0	0.00	2555.24
	12/17/2013	14:12	12/17/2013 14:12	45	32	33	<2	73	0.0		0.0	0.00	2555.24
	12/17/2013	15:22	12/17/2013 15:22	45	31	33	<2	72	0.0		0.0	0.00	2555.24
	12/17/2013	16:30	12/17/2013 16:30	45	31	33	<2	70	0.0		0.0	0.00	2555.24
	12/17/2013	22:09	12/17/2013 22:09	45	31	33	3	56	6.1		1035.5	118.46	2673.70
	12/18/2013	8:04	12/18/2013 8:04	44	31	32.5	4	52	8.2		4250.4	486.24	3159.94
	12/18/2013	12:15	12/18/2013 12:15							Valve shut	2052.7	234.83	3394.77
SW-42 Event 6	1/8/2014	8:00	1/8/2014 8:00	58	33	34	<2	38	0.0		0.0	0.00	3394.77
	1/8/2014	8:25	1/8/2014 8:25	51	33	34	<2	38	0.0		0.0	0.00	3394.77
	1/8/2014	9:02	1/8/2014 9:02	49	32	34	<2	40	0.0		0.0	0.00	3394.77
	1/8/2014	10:01	1/8/2014 10:01	46	32	34	<2	48	0.0		0.0	0.00	3394.77
	1/8/2014	10:42	1/8/2014 10:42	45	32	34	<2	52	0.0		0.0	0.00	3394.77
	1/8/2014	12:05	1/8/2014 12:05	43	32	32.5	<2	60	0.0		0.0	0.00	3394.77
	1/8/2014	13:25	1/8/2014 13:25	50	32	32.5	<2	58	0.0		0.0	0.00	3394.77
	1/8/2014	14:29	1/8/2014 14:29	50	32	32.5	<2	58	0.0		0.0	0.00	3394.77
	1/8/2014	17:00	1/8/2014 17:00	50	32	32.5	<2	54	0.0		0.0	0.00	3394.77
	1/8/2014	21:05	1/8/2014 21:05	55	31	32.5	3	50	6.1		752.9	86.13	3480.90
	1/8/2014	21:07	1/8/2014 21:07	55	33.5	33.5	5	50	10.5		16.7	1.91	3482.81
	1/9/2014	7:02	1/9/2014 7:02	53	32.5	33.5	6	53	12.5		6837.3	782.19	4265.00
	1/9/2014	8:50	1/9/2014 8:50	51	32.5	33.5	6.5	55	13.5		1400.0	160.16	4425.16
	1/9/2014	10:30	1/9/2014 10:30	48	32.5	33.5	7.5	61	15.4		1445.8	165.40	4590.56
	1/9/2014	11:48	1/9/2014 11:48	40	32.5	33	7.9	66	16.2		1233.9	141.16	4731.71
	1/9/2014	14:40	1/9/2014 14:40	35	32	33	8.5	62	17.4		2888.4	330.43	5062.14
	1/9/2014	15:25	1/9/2014 15:25	40	32	33	9	61	18.4		806.2	92.23	5154.38
	1/9/2014	16:49	1/9/2014 16:49	45	32	33	9	60	18.5		1549.5	177.26	5331.63
	1/9/2014	16:50	1/9/2014 16:50							Valve shut	18.5	2.11	5333.74
	1/9/2014	16:51	1/9/2014 16:51			28							5333.74
SW-42 Event 7	1/10/2014	8:57	1/10/2014 8:57		28	28	10	66	19.5				5333.74
	1/10/2014	8:59	1/10/2014 8:59		32	32	11.5	66	23.4		42.9	4.91	5338.65
	1/10/2014	9:50	1/10/2014 9:50	43	34	34	12	66	25.0		1234.9	141.28	5479.93
	1/10/2014	10:46	1/10/2014 10:46	44	34	34.5	11	70	22.8		1338.5	153.12	5633.05
	1/10/2014	12:34	1/10/2014 12:34	41	34.5	35.5	10	71	20.8		2356.8	269.61	5902.67
	1/10/2014	14:18	1/10/2014 14:18	50	35	35	10	70	21.0		2172.8	248.57	6151.24
	1/10/2014	16:14	1/10/2014 16:14	48	35	35	10.2	70	21.4		2455.2	280.88	6432.12
	1/10/2014	17:49	1/10/2014 17:49	48	35	34.5	10.2	68	21.4		2032.7	232.54	6664.65
	1/10/2014	21:53	1/10/2014 21:53	45	35	35	11	65	23.2		5439.2	622.24	7286.90
	1/11/2014	8:00	1/11/2014 8:00	40	35	34	11	65	23.2		14061.7	1608.66	8895.56

SW-42 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	1/11/2014	8:02	1/11/2014 8:02			29				Valve shut			8895.56
SW-42 Event 8	1/23/2014	7:43	1/23/2014 7:43	58	32	34.2	<2	38	0.0				8895.56
	1/23/2014	8:25	1/23/2014 8:25	57	31	33.8	<2	40	0.0		0.0	0.00	8895.56
	1/23/2014	8:49	1/23/2014 8:49	51	31	33.8	<2	44	0.0		0.0	0.00	8895.56
	1/23/2014	9:28	1/23/2014 9:28	48	31	33.8	<2	46	0.0		0.0	0.00	8895.56
	1/23/2014	9:31	1/23/2014 9:31	48	32	34	2	46	4.2		6.2	0.71	8896.27
	1/23/2014	10:01	1/23/2014 10:01	47	32	34	2	48	4.2		124.7	14.26	8910.53
	1/23/2014	11:07	1/23/2014 11:07	45	32	34	2	50	4.1		273.7	31.31	8941.84
	1/23/2014	11:56	1/23/2014 11:56	44	32	34	2	53	4.1		202.7	23.19	8965.03
	1/23/2014	11:57	1/23/2014 11:57	44	33.5	35	3	53	6.3		5.2	0.60	8965.63
	1/23/2014	12:49	1/23/2014 12:49	48	33.2	35	2.5	58	5.2		299.0	34.20	8999.83
	1/23/2014	14:10	1/23/2014 14:10	52	33	35	3.8	57	7.9		530.7	60.71	9060.54
	1/23/2014	15:46	1/23/2014 15:46	51	32.8	34.8	4.2	56	8.7		797.9	91.28	9151.82
	1/23/2014	16:14	1/23/2014 16:14	51	32.8	34.8	4.3	56	8.9		247.1	28.27	9180.09
	1/23/2014	16:16	1/23/2014 16:16			30				Valve shut	17.9	2.04	9182.13
SW-42 Event 9	1/30/2014	7:28	1/30/2014 7:28	59	35	34.5	<2	40	0.0				9182.13
	1/30/2014	7:29	1/30/2014 7:29	53	34.5	34	<2	40	0.0				9182.13
	1/30/2014	7:52	1/30/2014 7:52	53	34	33.5	<2	42	0.0		0.0	0.00	9182.13
	1/30/2014	8:53	1/30/2014 8:53	52	36	35	3.5	42	7.6		232.5	26.60	9208.73
	1/30/2014	10:00	1/30/2014 10:00	50	36	35	3.5	42	7.6		510.7	58.42	9267.15
	1/30/2014	10:55	1/30/2014 10:55	50	36	35	3.75	44	8.1		433.7	49.62	9316.77
	1/30/2014	12:28	1/30/2014 12:28	50	36	35	4	48	8.7		781.5	89.41	9406.18
	1/30/2014	13:42	1/30/2014 13:42	56	36	35	4	48	8.7		640.6	73.29	9479.47
	1/30/2014	13:43	1/30/2014 13:43							Valve shut	8.7	0.99	9480.46
	1/30/2014	13:44	1/30/2014 13:44			28							9480.46
SW-42 Event 10	2/3/2014	8:21	2/3/2014 8:21	53	33.5	34	<2	68	0.0		0.0	0.00	9480.46
	2/3/2014	8:27	2/3/2014 8:27	52	33.5	34	<2	68	0.0		0.0	0.00	9480.46
	2/3/2014	8:57	2/3/2014 8:57	53	33	33.5	<2	76	0.0		0.0	0.00	9480.46
	2/3/2014	9:19	2/3/2014 9:19	52	33	33	<2	77	0.0		0.0	0.00	9480.46
	2/3/2014	10:21	2/3/2014 10:21	54	33	32.5	<2	80	0.0		0.0	0.00	9480.46
	2/3/2014	10:25	2/3/2014 10:25	54	34	33.5	4	83	8.2		16.4	1.87	9482.33
	2/3/2014	12:06	2/3/2014 12:06	52	34	33.5	3.5	86	7.1		774.7	88.63	9570.96
	2/3/2014	13:24	2/3/2014 13:24	52	34	33.5	4	84	8.2		598.0	68.41	9639.37
	2/3/2014	14:25	2/3/2014 14:25	52	34	33.5	4	83	8.2		499.5	57.15	9696.51
	2/3/2014	15:34	2/3/2014 15:34	52	34	33.5	4.3	82	8.8		586.8	67.13	9763.64
	2/3/2014	17:00	2/3/2014 17:00	52	34	33.5	5.2	80	10.7		838.4	95.91	9859.55
	2/4/2014	9:48	2/4/2014 9:48	52	32.5	33.5	7.5	61	15.4		13168.8	1506.51	11366.06
	2/4/2014	9:53	2/4/2014 9:53			27				Valve shut	77.2	8.84	11374.90
SW-42 Event 11	2/5/2014	8:32	2/5/2014 8:32	48	28.5	25	15	66	29.4				11374.90
	2/5/2014	8:34	2/5/2014 8:34	47	33	31	19.8	66	40.8		70.2	8.03	11382.93
	2/5/2014	9:03	2/5/2014 9:03	46	33	32	16	68	32.9		1068.6	122.25	11505.18
	2/5/2014	10:37	2/5/2014 10:37	44	35	33	13.9	70	29.1		2915.5	333.53	11838.71
	2/5/2014	11:36	2/5/2014 11:36	44	35	33	13.5	75	28.2		1689.8	193.32	12032.03
	2/5/2014	12:48	2/5/2014 12:48	44	35	33	13	70	27.2		1994.3	228.15	12260.18
	2/5/2014	13:46	2/5/2014 13:46	46	35	33	12.8	82	26.5		1559.0	178.35	12438.52
	2/5/2014	14:57	2/5/2014 14:57	46	35.5	3.5	12.8	83	26.6		1886.4	215.80	12654.33
	2/5/2014	15:50	2/5/2014 15:50	46	35.5	33.5	12.2	78	25.5		1381.2	158.01	12812.34
	2/5/2014	17:15	2/5/2014 17:15	50	35.5	33.5	12	80	25.0		2147.5	245.67	13058.01
	2/5/2014	21:28	2/5/2014 21:28	49	35.5	33.5	12	80	25.0		6333.0	724.49	13782.50
	2/6/2014	8:19	2/6/2014 8:19	52	35.5	33.5	13.3	48	28.6		17470.2	1998.59	15781.09
	2/6/2014	8:20	2/6/2014 8:20			28				Valve shut	28.6	3.28	15784.36
SW-42 Event 12	2/7/2014	7:45	2/7/2014 7:45	50	25	24	7.8	48	14.9				15784.36
	2/7/2014	7:47	2/7/2014 7:47	50	33.5	32	20.5	49	43.2		58.1	6.65	15791.01

SW-42 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	2/7/2014	7:55	2/7/2014 7:55	48	35	32	18	49	38.5		326.9	37.40	15828.41
	2/7/2014	9:17	2/7/2014 9:17	44	35	32.2	15.6	56	33.2		2938.7	336.19	16164.59
	2/7/2014	11:33	2/7/2014 11:33	42	35	33.5	14.5	60	30.7		4341.1	496.63	16661.22
	2/7/2014	13:21	2/7/2014 13:21	42	35.5	33.5	14	63	29.7		3260.7	373.02	17034.24
	2/7/2014	13:22	2/7/2014 13:22			29				Valve shut	29.7	3.40	17037.64
Note: a red value, i											Total CO_2 Mass (lbs):		17037.64

SW-43 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
SW-43 Event 1	11/19/2013	10:14	11/19/2013 10:14	55	28				0.0				
	11/19/2013	10:16	11/19/2013 10:16		30	30	<2	71	0.0		0.0	0.00	0.00
	11/19/2013	10:18	11/19/2013 10:18		32	31	<2	71	0.0		0.0	0.00	0.00
	11/19/2013	10:27	11/19/2013 10:27		32	31	<2	71	0.0		0.0	0.00	0.00
	11/19/2013	10:51	11/19/2013 10:51		32	31	<2	71	0.0		0.0	0.00	0.00
	11/19/2013	10:52	11/19/2013 10:52		36	35	<2	70.5	0.0		0.0	0.00	0.00
	11/19/2013	11:42	11/19/2013 11:42	55	36	35	<2	70	0.0		0.0	0.00	0.00
	11/19/2013	13:05	11/19/2013 13:05		36	35	<2	70	0.0		0.0	0.00	0.00
	11/19/2013	13:26	11/19/2013 13:26		36	35	2	69.8	4.2		44.5	5.09	5.09
	11/19/2013	13:56	11/19/2013 13:56	55	36	35	3	69.8	6.4		158.8	18.17	23.25
	11/19/2013	14:55	11/19/2013 14:55	52	36	35	3	69.5	6.4		374.8	42.88	66.14
	11/19/2013	17:13	11/19/2013 17:13		36	35	4	64.8	8.5		1025.7	117.34	183.48
	11/19/2013	17:48	11/19/2013 17:48		36	35	4	60	8.6		298.6	34.16	217.64
	11/19/2013	17:50	11/19/2013 17:50			35				Valve shut	17.1	1.96	219.60
	11/19/2013	17:52	11/19/2013 17:52		23	20							219.60
SW-43 Event 2	11/20/2013	8:14	11/20/2013 8:14	55	37								219.60
	11/20/2013	8:15	11/20/2013 8:15	60	37	36	<2	64	0.0				219.60
	11/20/2013	9:18	11/20/2013 9:18	57	36	35	4	64	8.5		268.3	30.70	250.30
	11/20/2013	9:51	11/20/2013 9:51	57	34	35	4.5	64	9.4		295.5	33.80	284.10
	11/20/2013	11:04	11/20/2013 11:04	55	34	34.5	5.5	65	11.5		761.1	87.07	371.17
	11/20/2013	12:40	11/20/2013 12:40	53	34	34	5.5	65	11.5		1100.5	125.90	497.07
	11/20/2013	14:24	11/20/2013 14:24	53	35	33.5	7.25	64	15.3		1390.9	159.12	656.19
	11/20/2013	15:03	11/20/2013 15:03	52	35	33.5	7.75	63.5	16.3		616.8	70.56	726.75
	11/20/2013	15:04	11/20/2013 15:04			33.5				Valve shut	16.3	1.87	728.62
	11/20/2013	15:05	11/20/2013 15:05			20							728.62
SW-43 Event 3	12/3/2013	8:53	12/3/2013 8:53										728.62
	12/3/2013	8:54	12/3/2013 8:54	54	28	28	<2	67	0.0				728.62
	12/3/2013	8:58	12/3/2013 8:58										728.62
	12/3/2013	8:59	12/3/2013 8:59	54	28	29.5	<2	67	0.0				728.62
	12/3/2013	9:17	12/3/2013 9:17			28	<2		0.0				728.62
	12/3/2013	9:18	12/3/2013 9:18	52	32	32	<2	70	0.0				728.62
	12/3/2013	10:15	12/3/2013 10:15	50	29	32	<2	67	0.0				728.62
	12/3/2013	11:36	12/3/2013 11:36	50	29	31.5	2	69	3.9		159.2	18.21	746.83
	12/3/2013	12:27	12/3/2013 12:27	50	29	31	3	76	5.9		249.5	28.55	775.37
	12/3/2013	13:14	12/3/2013 13:14	47.5	29	31	3	78	5.8		274.9	31.45	806.82
	12/3/2013	13:15	12/3/2013 13:15							Valve shut	5.8	0.67	807.49
	12/3/2013	13:16	12/3/2013 13:16			21							807.49
SW-43 Event 4	12/9/2013	8:26	12/9/2013 8:26	55	34	32	<2	64	0.0		0.0	0.00	807.49
	12/9/2013	8:48	12/9/2013 8:48	50	34	32	<2	64	0.0		0.0	0.00	807.49
	12/9/2013	9:12	12/9/2013 9:12	50	34	32	<2	64	0.0		0.0	0.00	807.49
	12/9/2013	9:50	12/9/2013 9:50	50	34	31	<2	70	0.0		0.0	0.00	807.49
	12/9/2013	10:10	12/9/2013 10:10	50	34	30	<2	70	0.0		0.0	0.00	807.49
	12/9/2013	11:00	12/9/2013 11:00	50	32.5	31	<2	76	0.0		0.0	0.00	807.49
	12/9/2013	11:40	12/9/2013 11:40	50	32.5	31	3.5	81	7.1		141.4	16.17	823.67
	12/9/2013	12:38	12/9/2013 12:38	50	32.5	31	4	85	8.0		438.4	50.16	873.82
	12/9/2013	13:41	12/9/2013 13:41	50	32.5	31	4	84	8.1		507.3	58.03	931.86
	12/9/2013	14:09	12/9/2013 14:09	50	32.5	31	4	84	8.1		225.6	25.81	957.66
	12/9/2013	14:36	12/9/2013 14:36	50	33	30	4	82	8.1		218.3	24.97	982.64
	12/9/2013	14:52	12/9/2013 14:52	48	32	31	4	80	8.0		129.3	14.79	997.43
	12/9/2013	16:50	12/9/2013 16:50	45	32.5	31	4	74	8.1		954.5	109.19	1106.62
	12/9/2013	17:40	12/9/2013 17:40	55	32	30.5	5	73	10.1		456.4	52.21	1158.83
	12/9/2013	22:08	12/9/2013 22:08	55	32	30	8	68	16.3		3537.3	404.66	1563.49
	12/9/2013	22:09	12/9/2013 22:09	55	32	30.5	10	68	20.3		18.3	2.09	1565.59

SW-43 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	12/10/2013	7:50	12/10/2013 7:50	50	32	30	13	70	26.4		13577.8	1553.30	3118.89
	12/10/2013	7:52	12/10/2013 7:52			20				Valve shut	52.8	6.04	3124.93
SW-43 Event 5	12/11/2013	15:50	12/11/2013 15:50	48	30	33.5	<2	64	0.0				3124.93
	12/11/2013	17:14	12/11/2013 17:14	50	30	32	2	62	4.0		168.1	19.23	3144.16
	12/11/2013	22:06	12/11/2013 22:06	55	30	30.5	6	60	12.0		2341.2	267.84	3412.00
	12/12/2013	7:53	12/12/2013 7:53	52	30	30	10	60	20.1		9417.8	1077.39	4489.39
	12/12/2013	8:20	12/12/2013 8:20							Valve shut	541.5	61.95	4551.34
	12/12/2013	8:21	12/12/2013 8:21			20							4551.34
SW-43 Event 6	12/13/2013	8:32	12/13/2013 8:32	50	32	32	<2	58	0.0				4551.34
	12/13/2013	9:20	12/13/2013 9:20	50	32	31	3.5	62	7.2		171.9	19.67	4571.00
	12/13/2013	10:14	12/13/2013 10:14	48	32	30.5	5	66	10.2		468.6	53.61	4624.61
	12/13/2013	11:58	12/13/2013 11:58	45	31	30	6	70	12.0		1156.6	132.31	4756.92
	12/13/2013	14:36	12/13/2013 14:36	45	30	30	7.5	68	14.9		2130.8	243.76	5000.68
	12/13/2013	15:28	12/13/2013 15:28	55	30	29	8	68	15.9		801.9	91.73	5092.41
	12/13/2013	15:29	12/13/2013 15:29							Valve shut	15.9	1.82	5094.24
	12/13/2013	15:30	12/13/2013 15:30			20							5094.24
SW-43 Event 7	12/16/2013	12:31	12/16/2013 12:31	47	32	32	<2	67	0.0		0.0	0.00	5094.24
	12/16/2013	13:05	12/16/2013 13:05	47	30	32	<2	68	0.0		0.0	0.00	5094.24
	12/16/2013	13:11	12/16/2013 13:11						0.0	Valve shut	0.0	0.00	5094.24
	12/16/2013	13:12	12/16/2013 13:12			23			0.0		0.0	0.00	5094.24
	12/16/2013	15:40	12/16/2013 15:40	45	31	32	<2	68	0.0	Restart	0.0	0.00	5094.24
	12/16/2013	16:39	12/16/2013 16:39	42	30	31.5	<2	66	0.0		0.0	0.00	5094.24
	12/16/2013	17:12	12/16/2013 17:12	40	30	32	3	60	6.0		99.3	11.36	5105.59
	12/16/2013	22:07	12/16/2013 22:07	50	28	30	5	48	9.9		2350.1	268.85	5374.44
	12/17/2013	8:09	12/17/2013 8:09	47	28	29.5	9	52	17.8		8335.6	953.59	6328.03
	12/17/2013	8:24	12/17/2013 8:24							Valve shut	266.7	30.51	6358.54
	12/17/2013	8:25	12/17/2013 8:25			21							6358.54
SW-43 Event 8	1/10/2014	13:05	1/10/2014 13:05	45	32.5	32.5	<2	70	0.0				6358.54
	1/10/2014	14:20	1/10/2014 14:20	50	32	31.5	3.5	70	7.1		266.5	30.49	6389.03
	1/10/2014	16:15	1/10/2014 16:15	48	31	31.5	5	70	10.0		986.0	112.80	6501.82
	1/10/2014	17:51	1/10/2014 17:51	48	31	32	6	68	12.1		1061.5	121.43	6623.26
	1/10/2014	21:54	1/10/2014 21:54	45	31	29	8	65	16.1		3428.5	392.22	7015.47
	1/10/2014	21:57	1/10/2014 21:57	45	32.5	31	11	65	22.6		58.1	6.64	7022.12
	1/11/2014	8:02	1/11/2014 8:02	40	32	30	14	65	28.6		15467.5	1769.48	8791.60
	1/11/2014	8:03	1/11/2014 8:03			21				Valve shut	28.6	3.27	8794.86
Note: a red value, i.e. 75 °F, indicates that value was interpolated from field data										Total CO_2 Mass (lbs):			8794.86

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
SW-44 Event 1	11/21/2013	10:10	11/21/2013 10:10						0.0				
	11/21/2013	10:11	11/21/2013 10:11	54	30	32	<2	68	0.0		0.0	0.00	0.00
	11/21/2013	10:53	11/21/2013 10:53	50	29	28	12.3	71	24.1		506.6	57.95	57.95
	11/21/2013	10:55	11/21/2013 10:55	50	30	30	14.1	71	28.0		52.1	5.96	63.91
	11/21/2013	11:30	11/21/2013 11:30	49	30	29.5	15.5	70.5	30.8		1027.9	117.59	181.51
	11/21/2013	11:33	11/21/2013 11:33	49	31	31	17	70.5	34.1		97.3	11.13	192.64
	11/21/2013	13:15	11/21/2013 13:15	46	31	30	18.0	72	36.1		3580.3	409.58	602.22
	11/21/2013	13:18	11/21/2013 13:18	45	33	32	19.8	73	40.5		114.9	13.14	615.37
	11/21/2013	14:16	11/21/2013 14:16	52	38	31.5	21	74	45.2		2484.7	284.25	899.62
	11/21/2013	14:19	11/21/2013 14:19							Valve shut	135.5	15.50	915.12
	11/21/2013	14:20	11/21/2013 14:20			15							915.12
SW-44 Event 2	12/3/2013	14:37	12/3/2013 14:37	50	31	34	4	76.0	8.0				915.12
	12/3/2013	14:50	12/3/2013 14:50	50	29	30.5	11.5	76.0	22.4		197.8	22.63	937.75
	12/3/2013	15:22	12/3/2013 15:22	48	29	29.5	13.5	74.0	26.4		781.5	89.41	1027.15
	12/3/2013	15:24	12/3/2013 15:24	48	30	31	15	74.0	29.7		56.1	6.41	1033.57
	12/3/2013	15:41	12/3/2013 15:41	42.5	30	31	15.25	73.0	30.2		508.9	58.21	1091.78
	12/3/2013	15:42	12/3/2013 15:42							Valve shut	30.2	3.45	1095.24
	12/3/2013	15:43	12/3/2013 15:43										1095.24
SW-44 Event 3	12/4/2013	13:21	12/4/2013 13:21										1095.24
	12/4/2013	13:22	12/4/2013 13:22	53	32	32	6	84.0	12.0		12.0	1.37	1096.61
	12/4/2013	13:26	12/4/2013 13:26	53	32	30.5	6.5	84.0	13.0		50.1	5.73	1102.34
	12/4/2013	13:43	12/4/2013 13:43	52	32	29	11	83	22.1		298.2	34.11	1136.45
	12/4/2013	14:43	12/4/2013 14:43	50	31	28	14.5	79.0	28.9		1527.7	174.77	1311.22
	12/4/2013	14:44	12/4/2013 14:44							Valve shut	28.9	3.30	1314.52
	12/4/2013	14:45	12/4/2013 14:45				17						1314.52
SW-44 Event 4	12/5/2013	13:09	12/5/2013 13:09										1314.52
	12/5/2013	13:10	12/5/2013 13:10	54	31	31.5	<2	86	0.0				1314.52
	12/5/2013	13:16	12/5/2013 13:16	54	31	29.5	3.5	86	6.9		20.8	2.38	1316.90
	12/5/2013	13:19	12/5/2013 13:19	54	31	29	4	86	7.9		22.2	2.55	1319.44
	12/5/2013	13:25	12/5/2013 13:25	52	31	29	5	85	9.9		53.4	6.11	1325.55
	12/5/2013	13:27	12/5/2013 13:27	52	32.5	31.5	7	84	14.1		24.0	2.75	1328.30
	12/5/2013	14:06	12/5/2013 14:06	50	32.5	30.5	10	85	20.1		667.3	76.34	1404.64
	12/5/2013	14:07	12/5/2013 14:07	50	33	31	11.5	85	23.3		21.7	2.48	1407.12
	12/5/2013	14:10	12/5/2013 14:10	50	33	31	11.5	85	23.3	Valve shut	69.8	7.98	1415.10
	12/5/2013	14:11	12/5/2013 14:11			18							1415.10
SW-44 Event 5	12/6/2013	14:08	12/6/2013 14:08										1415.10
	12/6/2013	14:09	12/6/2013 14:09	47	31	33	<2	83	0.0				1415.10
	12/6/2013	14:13	12/6/2013 14:13	47	31	33	<2	83	0.0				1415.10
	12/6/2013	14:33	12/6/2013 14:33	45	29	32	4	84	7.7		77.5	8.86	1423.96
	12/6/2013	15:05	12/6/2013 15:05	45	29	31.5	5.5	80	10.7		295.1	33.76	1457.72
	12/6/2013	15:45	12/6/2013 15:45	45	29	30.5	8	80	15.6		525.0	60.06	1517.78
	12/6/2013	15:47	12/6/2013 15:47							Valve shut	31.1	3.56	1521.33
	12/6/2013	15:48	12/6/2013 15:48			20							1521.33
SW-44 Event 6	12/9/2013	16:24	12/9/2013 16:24	48	35	33	<2	76	0.0		0.0	0.00	1521.33
	12/9/2013	16:34	12/9/2013 16:34	46	34	32	<2	74	0.0		0.0	0.00	1521.33
	12/9/2013	16:53	12/9/2013 16:53	46	34	31	<2	72	0.0		0.0	0.00	1521.33
	12/9/2013	17:20	12/9/2013 17:20	50	32.5	31	5	71	10.2		137.7	15.75	1537.08
	12/9/2013	17:36	12/9/2013 17:36	55	32	30	5	71	10.1		162.7	18.61	1555.70
	12/9/2013	17:37	12/9/2013 17:37							Valve shut	10.1	1.16	1556.86
	12/9/2013	17:38	12/9/2013 17:38			19							1556.86
SW-44 Event 7	12/10/2013	16:10	12/10/2013 16:10	50	30	33	<2	72	0.0		0.0	0.00	1556.86
	12/10/2013	16:15	12/10/2013 16:15	50	30	33	3	70	6.0		14.9	1.70	1558.56
	12/10/2013	16:46	12/10/2013 16:46	50	30	33	5	70	9.9		246.2	28.17	1586.73

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	12/10/2013	17:19	12/10/2013 17:19	50	30	32.5	7	67	13.9		393.9	45.06	1631.79
	12/10/2013	17:21	12/10/2013 17:21							Valve shut	27.9	3.19	1634.98
	12/10/2013	17:22	12/10/2013 17:22			22							1634.98
SW-44 Event 8	12/11/2013	13:09	12/11/2013 13:09	48	32	34	<2	67	0.0				1634.98
	12/11/2013	13:10	12/11/2013 13:10	48	30	32.5	<2	67	0.0				1634.98
	12/11/2013	13:33	12/11/2013 13:33	48	30	32.5	2.5	67	5.0		57.3	6.55	1641.53
	12/11/2013	13:34	12/11/2013 13:34	48	32	33	3.5	67	7.1		6.1	0.69	1642.22
	12/11/2013	13:41	12/11/2013 13:41	48	32	33	4	67	8.1		53.5	6.12	1648.34
	12/11/2013	14:14	12/11/2013 14:14	48	32	33	5.3	66	10.8		312.7	35.77	1684.11
	12/11/2013	14:16	12/11/2013 14:16							Valve shut			1684.11
SW-44 Event 9	12/12/2013	12:58	12/12/2013 12:58	45	34	33	<2	70	0.0				1684.11
	12/12/2013	13:44	12/12/2013 13:44	50	33	33	2.5	70	5.1		118.0	13.50	1697.61
	12/12/2013	13:52	12/12/2013 13:52	50	33	34	5	70	10.3		61.6	7.04	1704.65
	12/12/2013	14:06	12/12/2013 14:06	50	33	34	5.8	70	11.9		155.2	17.75	1722.40
	12/12/2013	14:07	12/12/2013 14:07			22				Valve shut	11.9	1.36	1723.76
SW-44 Event 10	12/16/2013	9:21	12/16/2013 9:21	45	30	33	<2	54	0.0		0.0	0.00	1723.76
	12/16/2013	9:54	12/16/2013 9:54	45	30	32	3	58	6.0		99.5	11.38	1735.14
	12/16/2013	10:24	12/16/2013 10:24	45	29	32	3.5	63	6.9		194.2	22.22	1757.36
	12/16/2013	10:25	12/16/2013 10:25							Valve shut	6.9	0.79	1758.15
	12/16/2013	10:26	12/16/2013 10:26			21.5							1758.15
SW-44 Event 11	12/18/2013	12:15	12/18/2013 12:15	50	30	30	<2	68	0.0				1758.15
	12/18/2013	13:03	12/18/2013 13:03	55	28	28	<2	68	0.0				1758.15
	12/18/2013	13:04	12/18/2013 13:04	54	31	32	4	68	8.0		4.0	0.46	1758.61
	12/18/2013	14:20	12/18/2013 14:20	47	31	31	9	68	18.1		994.0	113.71	1872.33
	12/18/2013	15:55	12/18/2013 15:55	40	29	30	10.5	68	20.7		1841.2	210.64	2082.96
	12/18/2013	16:20	12/18/2013 16:20	40	30	30	10.5	68	20.9		519.3	59.41	2142.37
	12/18/2013	16:21	12/18/2013 16:21							Valve shut	20.9	2.39	2144.76
	12/18/2013	16:22	12/18/2013 16:22										2144.76
SW-44 Event 12	12/19/2013	8:33	12/19/2013 8:33	52	26	25	<2	54	0.0				2144.76
	12/19/2013	8:35	12/19/2013 8:35	52	29	31	<2	54	0.0				2144.76
	12/19/2013	8:37	12/19/2013 8:37	52	27	25	<2	54	0.0				2144.76
	12/19/2013	9:35	12/19/2013 9:35	42	26	28.5	<2	63	0.0				2144.76
	12/19/2013	9:37	12/19/2013 9:37	42	31.5	33	4	63	8.1		8.1	0.93	2145.69
	12/19/2013	10:14	12/19/2013 10:14	40	31	33	5	66	10.1		337.0	38.55	2184.24
	12/19/2013	11:08	12/19/2013 11:08	40	31	33	6.6	70	13.3		630.0	72.08	2256.32
	12/19/2013	15:00	12/19/2013 15:00	42	30	30.5	12	74	23.7		4291.0	490.89	2747.21
	12/19/2013	15:03	12/19/2013 15:03	42	31	32	14	74	28.0		77.6	8.88	2756.09
	12/19/2013	16:14	12/19/2013 16:14	42	32	32.5	10	72	20.3		1713.6	196.04	2952.13
	12/19/2013	17:05	12/19/2013 17:05	50	32	33	10	67	20.4		1036.0	118.52	3070.65
	12/19/2013	22:12	12/19/2013 22:12	50	31	32	12	56	24.4		6876.7	786.70	3857.35
	12/20/2013	8:22	12/20/2013 8:22	45	32	31.5	16	58	32.9		17479.7	1999.67	5857.02
	12/20/2013	12:22	12/20/2013 12:22	55	31	30.5	13.5	82	26.8		7160.9	819.20	6676.23
	12/20/2013	12:23	12/20/2013 12:23							Valve shut	26.8	3.07	6679.29
SW-44 Event 13	1/20/2014	7:39	1/20/2014 7:39	60	26	28	<2	40	0.0				6679.29
	1/20/2014	7:40	1/20/2014 7:40	60	32.5	33	<2	40	0.0		0.0	0.00	6679.29
	1/20/2014	7:45	1/20/2014 7:45	58	32.5	33	<2	40	0.0		0.0	0.00	6679.29
	1/20/2014	8:20	1/20/2014 8:20	52	31	32	4	50	8.2		143.4	16.41	6695.70
	1/20/2014	9:02	1/20/2014 9:02	48	30.5	31.5	5.5	56	11.1		406.0	46.44	6742.14
	1/20/2014	10:11	1/20/2014 10:11	48	30	31	7.5	66	15.0		900.1	102.97	6845.11
	1/20/2014	10:16	1/20/2014 10:16	48	32	32	10	66	20.4		88.3	10.11	6855.22
	1/20/2014	11:18	1/20/2014 11:18	43	32	32	12	69	24.4		1388.0	158.78	7014.00
	1/20/2014	12:32	1/20/2014 12:32	44	32	32	10.5	71	21.3		1690.4	193.39	7207.38
	1/20/2014	12:34	1/20/2014 12:34							Valve shut	42.6	4.87	7212.26

SW-44 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	1/20/2014	12:35	1/20/2014 12:35			25							7212.26
SW-44 Event 14	1/21/2014	7:49	1/21/2014 7:49	58	28	29.5	<2	51	0.0				7212.26
	1/21/2014	7:50	1/21/2014 7:50	58	32	32.5	<2	51	0.0		0.0	0.00	7212.26
	1/21/2014	8:37	1/21/2014 8:37	51	32	32.5	6	57	12.3		290.0	33.18	7245.43
	1/21/2014	9:35	1/21/2014 9:35	44	31.5	32	7.5	62	15.3		800.6	91.58	7337.02
	1/21/2014	10:18	1/21/2014 10:18	39	31	31	9.2	67	18.5		726.6	83.12	7420.14
	1/21/2014	11:44	1/21/2014 11:44	37	30.5	30.8	10.2	70	20.4		1672.7	191.36	7611.50
	1/21/2014	11:59	1/21/2014 11:59	37	30.5	30.5	10.2	70	20.4		305.5	34.95	7646.45
	1/21/2014	12:00	1/21/2014 12:00			23				Valve shut	20.4	2.33	7648.78
SW-44 Event 15	1/22/2014	8:06	1/22/2014 8:06	56	27	27	<2	40	0.0				7648.78
	1/22/2014	8:08	1/22/2014 8:08	56	28	28	<2	40	0.0		0.0	0.00	7648.78
	1/22/2014	8:10	1/22/2014 8:10	56	32	32	<2	40	0.0		0.0	0.00	7648.78
	1/22/2014	8:46	1/22/2014 8:46	52	30.5	30	<2	44	0.0		0.0	0.00	7648.78
	1/22/2014	8:47	1/22/2014 8:47	52	33.5	33	<2	44	0.0		0.0	0.00	7648.78
	1/22/2014	9:45	1/22/2014 9:45	48	3.5	33	3	48	3.9		112.1	12.83	7661.61
	1/22/2014	10:53	1/22/2014 10:53	45	33.5	32	5	52	10.5		488.6	55.89	7717.50
	1/22/2014	11:57	1/22/2014 11:57	43	32	31.5	7	54	14.4		798.2	91.32	7808.82
	1/22/2014	12:30	1/22/2014 12:30	44	32	31.5	7.7	55	15.9		500.1	57.21	7866.03
	1/22/2014	13:56	1/22/2014 13:56	45	31.5	31	8.5	55	17.4		1431.5	163.76	8029.80
	1/22/2014	15:02	1/22/2014 15:02	52	30.5	29	8.8	56	17.8		1163.0	133.04	8162.84
	1/22/2014	15:03	1/22/2014 15:03	52	33.5	32	12	56	25.1		21.5	2.46	8165.30
	1/22/2014	15:57	1/22/2014 15:57	51	33.5	32	11.9	56	24.9		1350.1	154.45	8319.75
	1/22/2014	16:58	1/22/2014 16:58	56	33.5	32	11.9	56	24.9		1518.7	173.74	8493.49
	1/22/2014	16:59	1/22/2014 16:59			23				Valve shut			8493.49
SW-44 Event 16	1/23/2014	7:47	1/23/2014 7:47	56	31	30	<2	37	0.0		0.0	0.00	8493.49
	1/23/2014	7:48	1/23/2014 7:48	56	33	32	<2	37	0.0		0.0	0.00	8493.49
	1/23/2014	7:50	1/23/2014 7:50	56	33	32	7	37	14.9		14.9	1.70	8495.19
	1/23/2014	8:13	1/23/2014 8:13	52	32	31	9	38	18.9		387.9	44.38	8539.56
	1/23/2014	8:44	1/23/2014 8:44	50	29	27.5	9.7	44	19.5		595.5	68.13	8607.69
	1/23/2014	8:46	1/23/2014 8:46	50	32	30.5	13	44	27.1		46.6	5.34	8613.02
	1/23/2014	9:24	1/23/2014 9:24	47	31	30	12.2	46	25.1		991.6	113.44	8726.47
	1/23/2014	9:25	1/23/2014 9:25	47	33	31.5	15	46	31.5		28.3	3.24	8729.71
	1/23/2014	10:10	1/23/2014 10:10	45	33	31.5	15.2	48	31.9		1427.1	163.26	8892.97
	1/23/2014	11:19	1/23/2014 11:19	43	33	31	16	50	33.5		2256.0	258.09	9151.06
	1/23/2014	12:18	1/23/2014 12:18	45	33	31	16.2	54	33.8		1984.9	227.07	9378.13
	1/23/2014	12:58	1/23/2014 12:58	45	33	31	16.2	58	33.6		1348.6	154.28	9532.40
	1/23/2014	14:19	1/23/2014 14:19	48	32.2	30	17	56	35.1		2783.2	318.40	9850.81
	1/23/2014	15:53	1/23/2014 15:53	48	32.2	30	17.9	56	36.9		3384.4	387.18	10237.98
	1/23/2014	16:22	1/23/2014 16:22	48	32	29.5	17.9	55	36.9		1070.4	122.46	10360.44
	1/23/2014	16:25	1/23/2014 16:25			22				Valve shut	110.7	12.66	10373.10
SW-44 Event 17	1/27/2014	12:16	1/27/2014 12:16										10373.10
	1/27/2014	12:18	1/27/2014 12:18	55	33	33.5	<2	80	0.0		0.0	0.00	10373.10
	1/27/2014	12:47	1/27/2014 12:47	53	32.5	33	<2	80	0.0		0.0	0.00	10373.10
	1/27/2014	13:10	1/27/2014 13:10	50	32.5	33	<2	80	0.0		0.0	0.00	10373.10
	1/27/2014	14:42	1/27/2014 14:42	47	32.5	33.5	<2	80	0.0		0.0	0.00	10373.10
	1/27/2014	15:40	1/27/2014 15:40	46	32.5	33	<2	77	0.0		0.0	0.00	10373.10
	1/27/2014	16:19	1/27/2014 16:19	49	32.5	33	<2	77	0.0		0.0	0.00	10373.10
	1/27/2014	16:20	1/27/2014 16:20							Valve shut	0.0	0.00	10373.10
	1/27/2014	16:21	1/27/2014 16:21			25							10373.10
SW-44 Event 18	1/28/2014	9:41	1/28/2014 9:41										10373.10
	1/28/2014	9:42	1/28/2014 9:42	52	35	34.5	<2	56	0.0		0.0	0.00	10373.10
	1/28/2014	10:12	1/28/2014 10:12	52	35	34.5	<2	56	0.0		0.0	0.00	10373.10
	1/28/2014	10:55	1/28/2014 10:55	52	35	34	<2	56	0.0		0.0	0.00	10373.10

SW-44 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	1/28/2014	11:34	1/28/2014 11:34	52	33.5	34	<2	54	0.0		0.0	0.00	10373.10
	1/28/2014	13:15	1/28/2014 13:15	50	33.5	34	<2	51	0.0		0.0	0.00	10373.10
	1/28/2014	14:20	1/28/2014 14:20	50	33.5	33.5	<2	51	0.0		0.0	0.00	10373.10
	1/28/2014	15:40	1/28/2014 15:40	50	33.5	33.5	<2	50	0.0		0.0	0.00	10373.10
	1/28/2014	16:42	1/28/2014 16:42	58	33	33.5	<2	50	0.0		0.0	0.00	10373.10
	1/28/2014	16:44	1/28/2014 16:44							Valve shut	0.0	0.00	10373.10
SW-44 Event 19	1/29/2014	7:45	1/29/2014 7:45	45	32	33.5	2.5	40	5.2				10373.10
	1/29/2014	7:50	1/29/2014 7:50	35	29	29	<2	40	0.0		13.1	1.50	10374.60
	1/29/2014	8:00	1/29/2014 8:00	55	28.5	29.5	2	40	4.0		20.1	2.30	10376.90
	1/29/2014	9:30	1/29/2014 9:30	50	29	29.5	2	40	4.0		363.1	41.54	10418.44
	1/29/2014	10:30	1/29/2014 10:30	49	26	28	4	40	7.8		355.6	40.68	10459.12
	1/29/2014	11:40	1/29/2014 11:40	43	28	28	6	40	12.0		693.1	79.29	10538.41
	1/29/2014	13:00	1/29/2014 13:00	48	27	28	8	40	15.8		1112.1	127.23	10665.64
	1/29/2014	14:00	1/29/2014 14:00	45	27	29	8	40	15.8		948.3	108.49	10774.13
	1/29/2014	15:00	1/29/2014 15:00	46	27	29	8	40	15.8		948.3	108.49	10882.62
	1/29/2014	16:20	1/29/2014 16:20	46	28	29	8	40	16.0		1272.1	145.53	11028.15
	1/29/2014	16:25	1/29/2014 16:25			21				Valve shut	80.0	9.15	11037.30
SW-44 Event 20	1/30/2014	7:30	1/30/2014 7:30	50	32	31	<2	40	0.0				11037.30
	1/30/2014	8:30	1/30/2014 8:30	50	30	31	<2	40	0.0		0.0	0.00	11037.30
	1/30/2014	9:30	1/30/2014 9:30	50	28	30	2	41	4.0		119.9	13.71	11051.01
	1/30/2014	10:49	1/30/2014 10:49	50	31	30	2	42	4.1		321.0	36.72	11087.73
	1/30/2014	12:00	1/30/2014 12:00	50	31	30	2	44	4.1		293.0	33.52	11121.25
	1/30/2014	13:32	1/30/2014 13:32	50	30	31	2.5	44	5.1		424.0	48.51	11169.76
	1/30/2014	13:35	1/30/2014 13:35			21				Valve shut	15.3	1.75	11171.51
SW-44 Event 21	2/3/2014	8:14	2/3/2014 8:14	55	30	31.5	<2	68	0.0		0.0	0.00	11171.51
	2/3/2014	8:15	2/3/2014 8:15	55	31.5	31.5	<2	68	0.0		0.0	0.00	11171.51
	2/3/2014	8:32	2/3/2014 8:32	55	31	31.5	<2	70	0.0		0.0	0.00	11171.51
	2/3/2014	9:01	2/3/2014 9:01	54	30.5	31.2	<2	75	0.0		0.0	0.00	11171.51
	2/3/2014	10:11	2/3/2014 10:11	54	30.5	31	<2	82	0.0		0.0	0.00	11171.51
	2/3/2014	10:12	2/3/2014 10:12	54	32.5	33.2	4.5	82	9.1		4.5	0.52	11172.03
	2/3/2014	11:52	2/3/2014 11:52	54	32.5	33.2	6	87	12.0		1056.5	120.87	11292.89
	2/3/2014	13:19	2/3/2014 13:19	52	32	33	7.2	85	14.4		1151.0	131.67	11424.57
	2/3/2014	14:30	2/3/2014 14:30	51	32	32.5	9.8	84	19.6		1208.4	138.25	11562.81
	2/3/2014	15:25	2/3/2014 15:25	51	32	32	10.3	82	20.7		1108.4	126.80	11689.61
	2/3/2014	16:51	2/3/2014 16:51	50	29.5	31.5	11.8	82	23.0		1879.3	214.99	11904.60
	2/4/2014	10:13	2/4/2014 10:13		32.9		16.8	62	34.7		30086.6	3441.90	15346.50
	2/4/2014	10:14	2/4/2014 10:14			23				Valve shut	34.7	3.97	15350.47
SW-44 Event 22	2/5/2014	8:23	2/5/2014 8:23	52	31	32	<2	66	0.0				15350.47
	2/5/2014	9:07	2/5/2014 9:07	47	30	30.5	6	68	11.9		262.6	30.05	15380.52
	2/5/2014	9:08	2/5/2014 9:08	47	32	32.5	8	68	16.3		14.1	1.61	15382.13
	2/5/2014	10:18	2/5/2014 10:18	45	32	32	11.8	70	24.0		1408.2	161.10	15543.23
	2/5/2014	11:19	2/5/2014 11:19	45	32.5	30.5	13.8	72	28.1		1588.3	181.70	15724.93
	2/5/2014	12:31	2/5/2014 12:31	45	31	30	15	78	29.9		2088.3	238.90	15963.83
	2/5/2014	12:32	2/5/2014 12:32	45	33	32	17.5	78	35.6		32.8	3.75	15967.58
	2/5/2014	13:26	2/5/2014 13:26	45	33	31.5	17.9	80	36.4		1944.6	222.46	16190.04
	2/5/2014	14:40	2/5/2014 14:40	46	33	31	19	80	38.6		2775.1	317.47	16507.51
	2/5/2014	15:33	2/5/2014 15:33	46	32.5	30.5	19.3	77	39.1		2060.4	235.71	16743.22
	2/5/2014	17:06	2/5/2014 17:06	49	32.5	30.5	19.8	79	40.1		3682.9	421.32	17164.54
	2/5/2014	21:11	2/5/2014 21:11	50	32.5	30	20.5	63	42.1		10070.5	1152.06	18316.60
	2/5/2014	21:13	2/5/2014 21:13	50	34	31	23	63	48.0		90.2	10.32	18326.92
	2/6/2014	7:36	2/6/2014 7:36	45	34	29.5	25	47	53.1		31492.5	3602.74	21929.66
	2/6/2014	7:41	2/6/2014 7:41			21				Valve shut	265.3	30.35	21960.01
SW-44 Event 23	2/7/2014	7:32	2/7/2014 7:32	54	30	30.5	<2	49	0.0				21960.01

SW-44 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	2/7/2014	7:33	2/7/2014 7:33	54	32.5		<2	49	0.0		0.0	0.00	21960.01
	2/7/2014	7:40	2/7/2014 7:40	53	33	32.5	2.5	49	5.2		18.3	2.10	21962.11
	2/7/2014	8:59	2/7/2014 8:59	46	31.5	31.5	7.2	58	14.7		788.1	90.16	22052.27
	2/7/2014	9:44	2/7/2014 9:44	44	31	31	7.9	54	16.1		693.7	79.36	22131.63
	2/7/2014	11:50	2/7/2014 11:50	44	30.5	29.5	1.8	61	3.6		1244.0	142.31	22273.95
	2/7/2014	11:51	2/7/2014 11:51	44	32.2	31.2	14	61	28.7		16.2	1.85	22275.80
	2/7/2014	13:32	2/7/2014 13:32	45	32	30.2	15.7	64	32.1		3070.8	351.30	22627.10
	2/7/2014	14:42	2/7/2014 14:42	48	32	30	16.5	62	33.8		2304.2	263.60	22890.70
	2/7/2014	15:53	2/7/2014 15:53	48	32	30	16.8	60	34.4		2421.7	277.04	23167.74
	2/7/2014	16:33	2/7/2014 16:33	48	32	29.5	17	59	34.9		1386.9	158.66	23326.40
	2/7/2014	17:24	2/7/2014 17:24	48	32	29.5	17	58	34.9		1780.5	203.69	23530.09
	2/7/2014	17:25	2/7/2014 17:25			21				Valve shut	34.9	4.00	23534.08
SW-44 Event 24	2/10/2014	8:35	2/10/2014 8:35	56	28	28.5	<2	54	0.0				23534.08
	2/10/2014	8:36	2/10/2014 8:36	56	32	33	<2	54	0.0		0.0	0.00	23534.08
	2/10/2014	9:01	2/10/2014 9:01	56	30	30.5	4.4	54	8.9		111.0	12.69	23546.78
	2/10/2014	9:50	2/10/2014 9:50	50	30	30.5	5.8	66	11.6		500.8	57.29	23604.07
	2/10/2014	9:51	2/10/2014 9:51	49	32	32.5	7	66	14.3		12.9	1.48	23605.55
	2/10/2014	11:06	2/10/2014 11:06	47	32	32.5	8.2	76	16.6		1155.8	132.22	23737.77
	2/10/2014	13:07	2/10/2014 13:07	45	31	31	9.9	79	19.7		2193.8	250.97	23988.75
	2/10/2014	14:45	2/10/2014 14:45	45	31	31	11.7	79	23.3		2107.1	241.05	24229.80
	2/10/2014	16:35	2/10/2014 16:35	45	31	30.5	12.2	74	24.4		2623.4	300.12	24529.91
	2/10/2014	17:25	2/10/2014 17:25	45	31	30.5	12	70	24.1		1212.6	138.72	24668.63
	2/10/2014	17:27	2/10/2014 17:27			23				Valve shut	48.2	5.51	24674.15
Note: a red value, i.e. 75 °F, indicates that value was interpolated from field data											Total CO_2 Mass (lbs):		24674.15

SW-45 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
SW-45 Event 1	11/20/2013	9:30	11/20/2013 9:30						0.0				
	11/20/2013	9:31	11/20/2013 9:31	57	27	28.5	<2	64	0.0		0.0	0.00	0.00
	11/20/2013	9:53	11/20/2013 9:53	57	30	28	<2	64	0.0		0.0	0.00	0.00
	11/20/2013	11:02	11/20/2013 11:02	55	29	27.5	3.5	65	6.9		238.2	27.25	27.25
	11/20/2013	11:04	11/20/2013 11:04	55	29	29	4.5	65	8.9		15.8	1.81	29.06
	11/20/2013	12:39	11/20/2013 12:39	54	30	29	7.5	65	15.0		1132.6	129.57	158.63
	11/20/2013	14:22	11/20/2013 14:22	52.5	30	28.2	9.3	64	18.5		1722.4	197.04	355.67
	11/20/2013	15:00	11/20/2013 15:00	52.5	30	28.2	10.0	63.5	20.0		730.8	83.60	439.27
	11/20/2013	15:01	11/20/2013 15:01							Valve shut	20.0	2.29	441.56
	11/20/2013	15:02	11/20/2013 15:02			12							441.56
SW-45 Event 2	11/25/2013	11:08	11/25/2013 11:08	53	24			60					441.56
	11/25/2013	11:12	11/25/2013 11:12	55	26	28	<2	60.0	0.0				441.56
	11/25/2013	11:35	11/25/2013 11:35	55	32	31	8	60.0	16.4		188.7	21.58	463.14
	11/25/2013	12:30	11/25/2013 12:30	55	32	30	12	65.0	24.5		1124.5	128.64	591.78
	11/25/2013	13:50	11/25/2013 13:50	55	31	29	15	65.0	30.3		2190.3	250.57	842.34
	11/25/2013	15:00	11/25/2013 15:00	55	30	29	17	62.0	34.0		2250.4	257.45	1099.79
	11/25/2013	15:58	11/25/2013 15:58							Valve shut	1973.5	225.77	1325.56
	11/25/2013	16:00	11/25/2013 16:00			18							1325.56
SW-45 Event 3	12/3/2013	8:51	12/3/2013 8:51	54				66					1325.56
	12/3/2013	8:52	12/3/2013 8:52	54	27	30	<2	66	0.0				1325.56
	12/3/2013	8:56	12/3/2013 8:56	54	29	30.5	2	67	3.9		7.9	0.90	1326.46
	12/3/2013	9:19	12/3/2013 9:19		29	30.5	7.5	68	14.8		214.9	24.59	1351.05
	12/3/2013	10:13	12/3/2013 10:13	50	31	29	10	67	20.1		942.1	107.78	1458.83
	12/3/2013	11:33	12/3/2013 11:33	50	30	28	12.5	69	24.8		1799.5	205.87	1664.69
	12/3/2013	11:35	12/3/2013 11:35	50	31		13.25	69	26.6		51.5	5.89	1670.58
	12/3/2013	12:25	12/3/2013 12:25	50	30	28	15	76	29.6		1406.2	160.87	1831.46
	12/3/2013	13:12	12/3/2013 13:12	53	30	27	16	78	31.5		1436.9	164.38	1995.83
	12/3/2013	13:13	12/3/2013 13:13							Valve shut	31.5	3.61	1999.44
	12/3/2013	13:15	12/3/2013 13:15				17						1999.44
SW-45 Event 4	12/9/2013	8:18	12/9/2013 8:18						0.0				1999.44
	12/9/2013	8:19	12/9/2013 8:19	56	27	30	<2	63	0.0		0.0	0.00	1999.44
	12/9/2013	8:48	12/9/2013 8:48	50	27.5		5	64	9.7		140.7	16.09	2015.53
	12/9/2013	9:10	12/9/2013 9:10	50	28	28	6.5	64	12.7		246.2	28.17	2043.70
	12/9/2013	9:48	12/9/2013 9:48	50	27	27	7.5	70	14.4		514.2	58.83	2102.53
	12/9/2013	10:15	12/9/2013 10:15	50	28	27	8	70	15.5		403.7	46.18	2148.71
	12/9/2013	11:05	12/9/2013 11:05	50	27	26	9	76	17.2		816.9	93.45	2242.16
	12/9/2013	11:43	12/9/2013 11:43	50	25	26	10.5	81	19.4		695.1	79.52	2321.68
	12/9/2013	12:40	12/9/2013 12:40	58	25	25	11.5	85	21.2		1157.9	132.46	2454.14
	12/9/2013	12:49	12/9/2013 12:49							Valve Shut	190.8	21.83	2475.96
	12/9/2013	12:50	12/9/2013 12:50			18							2475.96
SW-45 Event 5	12/16/2013	12:38	12/16/2013 12:38	50	26	29	<2	67	0.0		0.0	0.00	2475.96
	12/16/2013	13:00	12/16/2013 13:00	48	25	24	<2	68	0.0		0.0	0.00	2475.96
	12/16/2013	13:01	12/16/2013 13:01	45	30	28	5	68	9.9		5.0	0.57	2476.53
	12/16/2013	13:12	12/16/2013 13:12							Valve shut	109.4	12.52	2489.05
	12/16/2013	13:13	12/16/2013 13:13			17							2489.05
	12/16/2013	15:42	12/16/2013 15:42	45	32	31	<2	68	0.0	Restart	0.0	0.00	2489.05
	12/16/2013	16:41	12/16/2013 16:41	42	30	28	11.5	66	22.9		676.3	77.37	2566.42
	12/16/2013	16:43	12/16/2013 16:43	42	31	29	13	66	26.2		49.1	5.62	2572.04
	12/16/2013	17:10	12/16/2013 17:10	40	30	28	12.5	60	25.1		692.3	79.19	2651.24
	12/16/2013	22:05	12/16/2013 22:05	50	29	25.5	20	48	40.1		9617.4	1100.23	3751.47
	12/16/2013	22:06	12/16/2013 22:06	50	30	26.5	24	48	48.7		44.4	5.08	3756.55
	12/17/2013	8:00	12/17/2013 8:00	45	30	24	26	50	52.7		30112.3	3444.85	7201.40
	12/17/2013	8:05	12/17/2013 8:05							Valve shut	263.4	30.13	7231.53

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
SW-45 Event 6	12/20/2013	9:08	12/20/2013 9:08	41	25	24	<2	68	0.0				7231.53
	12/20/2013	9:09	12/20/2013 9:09	42	34	30	3	68	6.2		3.1	0.36	7231.89
	12/20/2013	11:15	12/20/2013 11:15	40	30	27	16	81	31.4		2373.4	271.51	7503.40
	12/20/2013	12:24	12/20/2013 12:24	55	28	25	17	81	32.6		2210.6	252.89	7756.29
	12/20/2013	12:25	12/20/2013 12:25	54	32	28	22	81	44.2		38.4	4.39	7760.68
	12/20/2013	12:58	12/20/2013 12:58	51	32	27	23	82	46.2		1490.9	170.56	7931.24
	12/20/2013	13:08	12/20/2013 13:08							Valve shut	461.6	52.81	7984.05
	12/20/2013	13:09	12/20/2013 13:09			18							7984.05
SW-45 Event 7	1/7/2014	13:41	1/7/2014 13:41										7984.05
	1/7/2014	13:42	1/7/2014 13:42	55	29.5	29	<2	48	0.0				7984.05
	1/7/2014	15:30	1/7/2014 15:30	50	26.5	25	12	48	23.4		1262.0	144.37	8128.43
	1/7/2014	15:31	1/7/2014 15:31	50	30.5	28	16	48	32.7		28.0	3.21	8131.63
	1/7/2014	16:33	1/7/2014 16:33	49	30	27	18	44	36.7		2149.9	245.95	8377.58
	1/7/2014	16:34	1/7/2014 16:34	49	33	28	20.5	44	43.2		39.9	4.57	8382.15
	1/7/2014	17:33	1/7/2014 17:33	59	31	27.5	21.5	40	44.5		2586.9	295.94	8678.09
	1/7/2014	17:34	1/7/2014 17:34							Valve shut	44.5	5.09	8683.18
	1/7/2014	17:35	1/7/2014 17:35			19.5							8683.18
SW-45 Event 8	1/9/2014	12:13	1/9/2014 12:13	38	27	27	<2	64	0.0		0.0	0.00	8683.18
	1/9/2014	12:14	1/9/2014 12:14	38	28	29	<2	64	0.0		0.0	0.00	8683.18
	1/9/2014	12:15	1/9/2014 12:15	38	28	28	<2	64	0.0		0.0	0.00	8683.18
	1/9/2014	13:25	1/9/2014 13:25	37.5	26	26	6	63	11.4		400.4	45.81	8728.99
	1/9/2014	13:26	1/9/2014 13:26	37.5	28.5	28	9	63	17.7		14.6	1.67	8730.66
	1/9/2014	14:30	1/9/2014 14:30	35	28	27	11	61	21.5		1255.0	143.57	8874.23
	1/9/2014	14:31	1/9/2014 14:31	35	29	28	13.5	61	26.7		24.1	2.76	8876.99
	1/9/2014	15:20	1/9/2014 15:20	40	29	28	14	60	27.8		1335.1	152.74	9029.73
	1/9/2014	16:45	1/9/2014 16:45	40	29	28	15	59	29.8		2444.8	279.68	9309.41
	1/9/2014	16:46	1/9/2014 16:46			20				Valve shut	29.8	3.41	9312.82
SW-45 Event 9	1/13/2014	7:42	1/13/2014 7:42	57	31	29	<2	48	0.0		0.0	0.00	9312.82
	1/13/2014	8:34	1/13/2014 8:34	47	31	28.5	11	51	22.5		585.3	66.96	9379.78
	1/13/2014	9:35	1/13/2014 9:35	45	29	28	13.8	59	27.4		1521.9	174.11	9553.89
	1/13/2014	10:50	1/13/2014 10:50	45	28	26.5	15.9	70	30.9		2183.9	249.84	9803.73
	1/13/2014	10:53	1/13/2014 10:53	45	29	26.5	18	70	35.3		99.3	11.36	9815.08
	1/13/2014	11:52	1/13/2014 11:52	45	29	26.5	18	70	35.3		2084.9	238.51	10053.59
	1/13/2014	12:27	1/13/2014 12:27	45	29	26.5	18.2	71	35.7		1243.1	142.21	10195.80
	1/13/2014	12:29	1/13/2014 12:29			16				Valve shut	71.4	8.17	10203.97
SW-45 Event 10	1/14/2014	8:20	1/14/2014 8:20	46	24	22	<2	63	0.0		0.0	0.00	10203.97
	1/14/2014	8:22	1/14/2014 8:22	45	30	28	<2	63	0.0		0.0	0.00	10203.97
	1/14/2014	9:00	1/14/2014 9:00	47	28	27	7	63	13.7		259.8	29.72	10233.69
	1/14/2014	10:14	1/14/2014 10:14	44	27.5	26.5	10	64	19.4		1223.8	140.00	10373.70
	1/14/2014	11:22	1/14/2014 11:22	39	27	26	10.8	64	20.8		1367.7	156.47	10530.16
	1/14/2014	12:38	1/14/2014 12:38	44	26.5	25	10.8	66	20.7		1576.4	180.35	10710.51
	1/14/2014	12:41	1/14/2014 12:41			21				Valve shut	62.0	7.09	10717.60
SW-45 Event 11	1/15/2014	8:01	1/15/2014 8:01	55	29	29	<2	46	0.0		0.0	0.00	10717.60
	1/15/2014	8:42	1/15/2014 8:42	52	27.5	28	7.5	55	14.7		301.0	34.43	10752.03
	1/15/2014	8:43	1/15/2014 8:43	52	29	28	9.3	55	18.5		16.6	1.90	10753.93
	1/15/2014	9:50	1/15/2014 9:50	44	27.5	26	13	64	25.2		1465.7	167.67	10921.60
	1/15/2014	9:51	1/15/2014 9:51	44	29	27	15	64	29.6		27.4	3.14	10924.74
	1/15/2014	10:58	1/15/2014 10:58	40	29	26.5	17	68	33.4		2112.5	241.67	11166.41
	1/15/2014	12:03	1/15/2014 12:03	41	28.5	26	17.9	69	35.0		2223.3	254.35	11420.76
	1/15/2014	12:06	1/15/2014 12:06							Valve shut	104.9	12.00	11432.76
	1/15/2014	12:07	1/15/2014 12:07			18							11432.76
SW-45 Event 12	1/16/2014	10:12	1/16/2014 10:12	45	29	28.5	<2	55	0.0		0.0	0.00	11432.76
	1/16/2014	11:16	1/16/2014 11:16	42	28	27.5	6	56	11.8		377.7	43.21	11475.97

SW-45 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	1/16/2014	13:20	1/16/2014 13:20	45	26	25	11	58	21.1		2038.6	233.22	11709.19
	1/16/2014	13:22	1/16/2014 13:22	45	28.5	26.5	15	58	29.6		50.7	5.80	11714.99
	1/16/2014	14:30	1/16/2014 14:30	46	28	26	17	68	33.0		2130.9	243.77	11958.76
	1/16/2014	14:31	1/16/2014 14:31			17				Valve shut	33.0	3.78	11962.54
SW-45 Event 13	1/17/2014	7:10	1/17/2014 7:10	57	29	28	3	40	6.1		0.0	0.00	11962.54
	1/17/2014	7:13	1/17/2014 7:13	57	28	27.5	4.2	40	8.4		21.7	2.48	11965.03
	1/17/2014	7:57	1/17/2014 7:57	51	26.5	26	10	44	19.6		615.0	70.35	12035.38
	1/17/2014	8:39	1/17/2014 8:39	50	26	25	10.5	52	20.2		835.7	95.61	12130.99
	1/17/2014	8:40	1/17/2014 8:40							Valve shut	20.2	2.32	12133.30
Note: a red value, i.e. 75 °F, indicates that value was interpolated from field data											Total CO_2 Mass (lbs):		12133.30

SW-46 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
SW-46 Event 1	11/19/2013	8:30	11/19/2013 8:30	54	25		0		0.0				
	11/19/2013	8:32	11/19/2013 8:32		28	29.6	<2	68	0.0		0.0	0.00	0.00
	11/19/2013	8:38	11/19/2013 8:38		27	28	<2	72	0.0		0.0	0.00	0.00
	11/19/2013	8:42	11/19/2013 8:42		27	27.6	4	72	7.7		15.3	1.75	1.75
	11/19/2013	8:43	11/19/2013 8:43		29	29.2	5	72	9.8		8.7	1.00	2.75
	11/19/2013	9:05	11/19/2013 9:05		29	28	8	72	15.7		280.2	32.05	34.80
	11/19/2013	10:30	11/19/2013 10:30		28	26.4	12	76	23.1		1650.0	188.76	223.56
	11/19/2013	10:31	11/19/2013 10:31		31	28	15	76	29.9		26.5	3.04	226.60
	11/19/2013	11:25	11/19/2013 11:25	57.5			15.25	77	17.2		1272.2	145.54	372.14
	11/19/2013	12:00	11/19/2013 12:00	57.5	31	27.2	16	76	31.9		859.5	98.33	470.47
	11/19/2013	12:07	11/19/2013 12:07		32	27.6	17	77	34.3		231.8	26.52	496.99
	11/19/2013	12:08	11/19/2013 12:08		33	28.4	18	77	36.7		35.5	4.06	501.04
	11/19/2013	12:39	11/19/2013 12:39	56	33	28.4	19	78	38.7		1168.5	133.67	634.72
	11/19/2013	12:40	11/19/2013 12:40		43					Valve shut	38.7	4.43	639.15
	11/19/2013	12:41	11/19/2013 12:41		43	17.2							639.15
SW-46 Event 2	12/3/2013	13:07	12/3/2013 13:07	56	30	29	9	84	17.6		458.5	52.45	691.59
	12/3/2013	13:38	12/3/2013 13:38	52	29	24	20	85	38.7		873.2	99.89	791.49
	12/3/2013	13:39	12/3/2013 13:39	51	33	27	23.5	85	47.5		43.1	4.93	796.42
	12/3/2013	14:45	12/3/2013 14:45	50	32	24.5	25.5	80	51.3		3260.9	373.05	1169.47
	12/3/2013	16:02	12/3/2013 16:02	49	32	24	26.5	74	53.6		4037.6	461.91	1631.37
	12/3/2013	17:05	12/3/2013 17:05	54	32	24	27.5	67	56.0		3452.3	394.95	2026.32
	12/3/2013	17:07	12/3/2013 17:07							Valve shut	112.0	12.81	2039.13
	12/3/2013	17:08	12/3/2013 17:08										2039.13
SW-46 Event 3	12/9/2013	13:21	12/9/2013 13:21						0.0		0.0	0.00	2039.13
	12/9/2013	13:22	12/9/2013 13:22	55	29	31	<2		0.0		0.0	0.00	2039.13
	12/9/2013	13:24	12/9/2013 13:24	55	29	29	11	92	21.1		21.1	2.42	2041.55
	12/9/2013	13:25	12/9/2013 13:25	55	29	24	14	92	26.9		24.0	2.75	2044.30
	12/9/2013	13:28	12/9/2013 13:28	55	29	24	17	92	32.7		89.4	10.23	2054.53
	12/9/2013	13:32	12/9/2013 13:32	55	29	24	20	92.0	38.4		142.3	16.27	2070.80
	12/9/2013	13:58	12/9/2013 13:58	50	28	22.5	21	90.0	40.0		1019.5	116.63	2187.43
	12/9/2013	13:59	12/9/2013 13:59	50	29	23.5	22.5	90.0	43.3		41.7	4.77	2192.20
	12/9/2013	14:22	12/9/2013 14:22	50	29	23	24	90.0	46.2		1029.9	117.83	2310.03
	12/9/2013	15:26	12/9/2013 15:26	48	29	22	25	82.0	48.5		3031.7	346.82	2656.85
	12/9/2013	15:27	12/9/2013 15:27	48	30	22	26.5	82.0	52.0		50.3	5.75	2662.60
	12/9/2013	16:45	12/9/2013 16:45	45	31	20	27	75.0	54.0		4133.2	472.83	3135.43
	12/9/2013	17:26	12/9/2013 17:26	50	32	21	27	74.0	54.6		2225.6	254.61	3390.05
	12/9/2013	17:27	12/9/2013 17:27							Valve Shut	54.6	6.25	3396.29
	12/9/2013	17:28	12/9/2013 17:28			16.5							3396.29
SW-46 Event 4	12/16/2013	12:10	12/16/2013 12:10		25	23	19	70	35.5		0.0	0.00	3396.29
	12/16/2013	12:12	12/16/2013 12:12		28	23	23	70	44.6		80.2	9.17	3405.46
	12/16/2013	12:54	12/16/2013 12:54	50	25	20	25.5	72	47.6		1936.6	221.54	3627.01
	12/16/2013	12:55	12/16/2013 12:55	50	30	22	30	72	59.5		53.5	6.12	3633.13
	12/16/2013	13:15	12/16/2013 13:15		29		31	70	60.9		1203.2	137.64	3770.77
	12/16/2013	13:16	12/16/2013 13:16							Valve Shut	60.9	6.96	3777.73
	12/16/2013	14:36	12/16/2013 14:36		26	23	20	76	37.7	Restart	3012.4	344.61	4122.35
	12/16/2013	14:37	12/16/2013 14:37		26	23	22	76	41.4		39.5	4.52	4126.87
	12/16/2013	14:40	12/16/2013 14:40	52	30	24.5	26.5	76	52.3		140.6	16.09	4142.96
	12/16/2013	14:43	12/16/2013 14:43	52	30	24	27.3	76	53.9		159.3	18.23	4161.18
	12/16/2013	14:44	12/16/2013 14:44	52	31	24.5	29	76	57.9		55.9	6.39	4167.58
	12/16/2013	14:56	12/16/2013 14:56	46	30	23.5	24	74	47.5		632.3	72.33	4239.91
	12/16/2013	15:56	12/16/2013 15:56	45	30	23	30	70	59.6		3211.5	367.39	4607.30
	12/16/2013	16:49	12/16/2013 16:49	45	29	22	30	66	59.1		3145.6	359.85	4967.15
	12/16/2013	17:42	12/16/2013 17:42	45	30	22	30	54	60.5		3170.8	362.74	5329.90

SW-46 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	12/16/2013	17:43	12/16/2013 17:43							Valve shut	60.5	6.92	5336.82
	12/16/2013	17:44	12/16/2013 17:44			18							5336.82
SW-46 Event 5	1/9/2014	12:36	1/9/2014 12:36	43	29.5	25	<2	64	0.0		0.0	0.00	5336.82
	1/9/2014	12:37	1/9/2014 12:37	43	31	30	<2	64	0.0		0.0	0.00	5336.82
	1/9/2014	12:38	1/9/2014 12:38	43	29.5	28	<2	64	0.0		0.0	0.00	5336.82
	1/9/2014	13:35	1/9/2014 13:35	42	26.5	26	7	65	13.4		382.0	43.70	5380.52
	1/9/2014	13:37	1/9/2014 13:37	42	28	27	9.5	65	18.5		31.9	3.65	5384.17
	1/9/2014	13:38	1/9/2014 13:38	42	29.5	28	10	65	19.8		19.2	2.19	5386.37
	1/9/2014	14:24	1/9/2014 14:24	40	29	27.5	12	64	23.7		1001.4	114.56	5500.93
	1/9/2014	14:25	1/9/2014 14:25	40	30	28	14	64	28.0		25.8	2.96	5503.88
	1/9/2014	15:15	1/9/2014 15:15	45	30	27.5	14.5	63	29.0		1424.0	162.90	5666.78
	1/9/2014	17:00	1/9/2014 17:00	50	30	27	16.5	60	33.1	Valve shut	3259.4	372.87	6039.66
	1/9/2014	17:01	1/9/2014 17:01			26							6039.66
SW-46 Event 6	1/14/2014	8:35	1/14/2014 8:35			23							6039.66
	1/14/2014	8:37	1/14/2014 8:37										6039.66
	1/14/2014	10:32	1/14/2014 10:32	45	25	23	11	64	20.7		2379.4	272.20	6311.86
	1/14/2014	10:34	1/14/2014 10:34	45	29	26	17.8	64	35.2		55.8	6.39	6318.25
	1/14/2014	10:35	1/14/2014 10:35	45	30.5	27	20	64	40.2		37.7	4.31	6322.56
	1/14/2014	11:17	1/14/2014 11:17	45	29.5	25	22	65	43.7		1760.4	201.39	6523.95
	1/14/2014	11:19	1/14/2014 11:19	45	30.5	26	23.2	65	46.6		90.2	10.32	6534.27
	1/14/2014	11:44	1/14/2014 11:44	43	30.5	26	24.2	65	48.6		1189.1	136.03	6670.30
	1/14/2014	13:16	1/14/2014 13:16	49	32	26	26.5	70	53.8		4709.1	538.72	7209.02
	1/14/2014	13:17	1/14/2014 13:17							Valve shut	53.8	6.16	7215.18
	1/14/2014	13:18	1/14/2014 13:18										7215.18
SW-46 Event 7	1/16/2014	7:39	1/16/2014 7:39	60	20	20	<2	38	0.0		0.0	0.00	7215.18
	1/16/2014	7:40	1/16/2014 7:40		28.5	28.5	5	38	10.1		5.0	0.58	7215.76
	1/16/2014	7:42	1/16/2014 7:42	60	28.5	28.5	8.2	38	16.5		26.6	3.04	7218.80
	1/16/2014	8:45	1/16/2014 8:45	53	26	24.5	14.3	50	27.6		1390.7	159.10	7377.90
	1/16/2014	8:46	1/16/2014 8:46	53	30	27	21	50	42.5		35.1	4.01	7381.91
	1/16/2014	9:34	1/16/2014 9:34	49	30	26	22	56	44.3		2084.1	238.43	7620.34
	1/16/2014	9:35	1/16/2014 9:35	49	31	27	24	56	48.9		46.6	5.33	7625.67
	1/16/2014	10:39	1/16/2014 10:39	46	30.5	26	25	60	50.4		3177.4	363.49	7989.16
	1/16/2014	11:45	1/16/2014 11:45	45	30.5	25	25	62	50.3		3324.5	380.32	8369.48
	1/16/2014	11:47	1/16/2014 11:47			19				Valve shut			8369.48
SW-46 Event 8	1/23/2014	9:18	1/23/2014 9:18	52	29.2	29	3.5	48	7.0				8369.48
	1/23/2014	9:42	1/23/2014 9:42	50	17	27	8.5	48	14.5		258.4	29.56	8399.04
	1/23/2014	9:43	1/23/2014 9:43	50	28.5	28	11.2	48	22.3		18.4	2.11	8401.15
	1/23/2014	9:54	1/23/2014 9:54	50	18.5	28	11.8	48	20.6		236.2	27.02	8428.17
	1/23/2014	10:58	1/23/2014 10:58	48	27	25	16.2	50	31.7		1672.9	191.38	8619.55
	1/23/2014	11:36	1/23/2014 11:36	48	27	24	17	52	33.2		1232.3	140.97	8760.52
	1/23/2014	13:21	1/23/2014 13:21	53	26	23	18.3	62	34.9		3575.4	409.03	9169.55
	1/23/2014	13:22	1/23/2014 13:22							Valve shut	34.9	4.00	9173.55
	1/23/2014	13:23	1/23/2014 13:23			19							9173.55
	1/23/2014	14:10	1/23/2014 14:10										9173.55

Note: a red value, i.e. 75 °F, indicates that value was interpolated from field data

Total CO_2 Mass (lbs): 9173.55

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
SW-47 Event 1	11/18/2013	10:59	11/18/2013 10:59	50	26			80	0.0				
	11/18/2013	11:01	11/18/2013 11:01	64	30	30	0	80	0.0		0.0	0.00	0.00
	11/18/2013	11:13	11/18/2013 11:13	60	28	27.6	6	80	11.5		69.2	7.91	7.91
	11/18/2013	11:15	11/18/2013 11:15	60	30	29.6	7	80	13.8		25.3	2.89	10.81
	11/18/2013	11:26	11/18/2013 11:26	60	30	29.2	8	80	15.7		162.3	18.56	29.37
	11/18/2013	11:52	11/18/2013 11:52	60	30	28	12	84	23.5		510.2	58.37	87.74
	11/18/2013	11:54	11/18/2013 11:54	60	32	29.5	15	83	30.1		53.6	6.13	93.87
	11/18/2013	12:53	11/18/2013 12:53	58	32	28.8	14	83	28.1		1744.4	199.56	293.43
	11/18/2013	12:54	11/18/2013 12:54	58	34	27.6	16	83	32.8		2007.8	229.69	523.12
	11/18/2013	14:00	11/18/2013 14:00	56	34	29.6	17	80	34.9		2538.4	290.39	813.52
	11/18/2013	15:15	11/18/2013 15:15	52.5	32.5	29.2	17.5	78	35.4		527.8	60.38	873.89
	11/18/2013	15:30	11/18/2013 15:30							Valve shut	70.9	8.11	882.00
	11/18/2013	15:32	11/18/2013 15:32			20.8							882.00
SW-47 Event 2	12/3/2013	8:30	12/3/2013 8:30	60	24								882.00
	12/3/2013	8:31	12/3/2013 8:31	60	25	28	6	64	11.3		11.3	1.29	883.29
	12/3/2013	9:05	12/3/2013 9:05	55	28	25.6	17.5	68	34.0		770.2	88.11	971.41
	12/3/2013	9:07	12/3/2013 9:07	55	30	26.4	18	67.5	35.8		69.9	7.99	979.40
	12/3/2013	10:08	12/3/2013 10:08	54	30	25.2	19	67	37.8		2247.0	257.06	1236.46
	12/3/2013	10:10	12/3/2013 10:10	54	32	27.6	22	**67**	44.8		82.6	9.45	1245.91
	12/3/2013	11:17	12/3/2013 11:17	53	32.5	26.8	23	69	47.0		3075.3	351.81	1597.73
	12/3/2013	12:17	12/3/2013 12:17	51	34	26	24	76	49.5		2894.6	331.14	1928.87
	12/3/2013	12:53	12/3/2013 12:53	55	34	26	24	82	49.2	Valve shut	1776.5	203.23	2132.10
	12/3/2013	12:56	12/3/2013 12:56			16							2132.10
SW-47 Event 3	12/9/2013	8:57	12/9/2013 8:57	55	33	30.5	<2	64.0	0.0		0.0	0.00	2132.10
	12/9/2013	8:58	12/9/2013 8:58	55	28	24	16	64.0	31.2		15.6	1.79	2133.88
	12/9/2013	9:00	12/9/2013 9:00	53	28	30	22	64	42.9		74.2	8.48	2142.37
	12/9/2013	9:24	12/9/2013 9:24	51	28	21	25	67	48.6		1099.0	125.73	2268.10
	12/9/2013	10:03	12/9/2013 10:03	50	29	20	26	72	50.9		1942.0	222.17	2490.27
	12/9/2013	10:50	12/9/2013 10:50	50	28	20	26	74.0	50.3		2378.1	272.05	2762.32
	12/9/2013	11:28	12/9/2013 11:28	50	28	18	26	82.0	49.9		1902.3	217.62	2979.94
	12/9/2013	12:42	12/9/2013 12:42	50	28	18	26	90.0	49.5		3676.4	420.58	3400.51
	12/9/2013	13:15	12/9/2013 13:15	52	28	14	26.5	90.0	50.4	Valve shut	1649.0	188.64	3589.16
	12/9/2013	13:17	12/9/2013 13:17			12							3589.16
SW-47 Event 4	12/16/2013	7:59	12/16/2013 7:59	55	24	29	<2	43.0	0.0		0.0	0.00	3589.16
	12/16/2013	8:01	12/16/2013 8:01	55	22	20	<2	43.0	0.0		0.0	0.00	3589.16
	12/16/2013	8:48	12/16/2013 8:48	45	38	30	24	50.0	52.9		1242.4	142.13	3731.29
	12/16/2013	9:50	12/16/2013 9:50	45	37	29	24	58.0	51.9		3248.8	371.66	4102.95
	12/16/2013	10:40	12/16/2013 10:40	45	36	29	24	65.0	51.1		2574.7	294.55	4397.50
	12/16/2013	11:40	12/16/2013 11:40	50	35	27	24	68.0	50.4		3043.6	348.19	4745.69
	12/16/2013	11:52	12/16/2013 11:52	50	35	27	24	68.0	50.4		604.7	69.18	4814.87
	12/16/2013	11:53	12/16/2013 11:53							Valve shut	50.4	5.77	4820.63
	12/16/2013	11:54	12/16/2013 11:54			19							4820.63
SW-47 Event 5	1/9/2014	8:04	1/9/2014 8:04	55	26	24	10	54.0	19.2				4820.63
	1/9/2014	8:06	1/9/2014 8:06	55	26	24	15	54.0	28.9		48.1	5.50	4826.13
	1/9/2014	8:07	1/9/2014 8:07	55	26	22	19	54.0	36.6		32.7	3.74	4829.88
	1/9/2014	8:09	1/9/2014 8:09	55	26	22	19	54.0	36.6		73.1	8.36	4838.24
	1/9/2014	8:17	1/9/2014 8:17	55	25.5	22	19.5	54.0	37.3		295.3	33.79	4872.02
	1/9/2014	8:18	1/9/2014 8:18	55	29	24.5	23.5	54.0	46.9		42.1	4.81	4876.84
	1/9/2014	8:54	1/9/2014 8:54	53	28	22	24.5	55.0	48.2		1712.1	195.87	5072.70
	1/9/2014	10:10	1/9/2014 10:10	50	27.5	22	26	58.0	50.7		3761.6	430.33	5503.03
	1/9/2014	11:33	1/9/2014 11:33	42	27	22	26	68.0	49.9		4178.4	478.01	5981.04
	1/9/2014	12:31	1/9/2014 12:31	40	26	20	26	64.0	49.5		2884.5	329.99	6311.03
	1/9/2014	12:32	1/9/2014 12:32							Valve shut	49.5	5.67	6316.69

SW-47 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	1/9/2014	12:34	1/9/2014 12:34				14						6316.69
SW-47 Event 6	1/21/2014	9:44	1/21/2014 9:44	46	29.5	30.5	8	67.0	15.8				6316.69
	1/21/2014	9:48	1/21/2014 9:48	46	27	26.5	12	67.0	23.1		77.8	8.90	6325.60
	1/21/2014	9:49	1/21/2014 9:49	43	29.5	28	16	67.0	31.7		27.4	3.13	6328.73
	1/21/2014	10:22	1/21/2014 10:22	42	28.5	26	19	68.0	37.2		1135.9	129.94	6458.67
	1/21/2014	11:50	1/21/2014 11:50	40	27	23.5	20.5	70.0	39.3		3364.1	384.85	6843.52
	1/21/2014	13:22	1/21/2014 13:22	52	27	23.5	22.2	75.0	42.4		3756.1	429.70	7273.22
	1/21/2014	14:28	1/21/2014 14:28	50	28	23	22.5	74.0	43.5		2832.8	324.07	7597.29
	1/21/2014	15:37	1/21/2014 15:37	49	28	22.5	23	68.0	44.7		3042.9	348.11	7945.39
	1/21/2014	15:39	1/21/2014 15:39							Valve shut	89.4	10.23	7955.63
	1/21/2014	15:40	1/21/2014 15:40			18							7955.63
SW-47 Event 7	1/22/2014	9:07	1/22/2014 9:07	54	30	30	<2	50.0	0.0		0.0	0.00	7955.63
	1/22/2014	9:34	1/22/2014 9:34	53	28	28.5	3	50.0	5.9		80.2	9.17	7964.80
	1/22/2014	9:35	1/22/2014 9:35	52	30	30	5	50.0	10.1		8.0	0.92	7965.71
	1/22/2014	10:09	1/22/2014 10:09	48	30	29.5	6.8	54.0	13.7		405.4	46.38	8012.09
	1/22/2014	11:13	1/22/2014 11:13	46	29	28	9.3	56.0	18.5		1031.4	117.99	8130.09
	1/22/2014	11:13	1/22/2014 11:13	46	31	30	13.5	56.0	27.5		0.0	0.00	8130.09
	1/22/2014	12:19	1/22/2014 12:19	45	31	29.5	14	57.0	28.5		1847.0	211.30	8341.38
	1/22/2014	13:05	1/22/2014 13:05	46	30.5	19.5	15.2	60.0	30.7		1360.1	155.60	8496.98
	1/22/2014	14:29	1/22/2014 14:29	47	30	18.5	16.2	60.0	32.5		2652.1	303.40	8800.38
	1/22/2014	14:31	1/22/2014 14:31							Valve shut	65.0	7.43	8807.81
	1/22/2014	14:32	1/22/2014 14:32			21							8807.81

Note: a red value, i.e. 75 °F, indicates that value was interpolated from field data

Total CO_2 Mass (lbs): 8807.81

SW-48 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
SW-48 Event 1	11/22/2013	13:13	11/22/2013 13:13	48	25				84	0.0			
	11/22/2013	13:16	11/22/2013 13:16		29	29.5	<2		84	0.0	0.0	0.00	0.00
	11/22/2013	13:30	11/22/2013 13:30		28	28.5	<2		80	0.0	0.0	0.00	0.00
	11/22/2013	13:32	11/22/2013 13:32		30	31	3		80	5.9	5.9	0.67	0.67
	11/22/2013	14:10	11/22/2013 14:10		29	30	5.5		80	10.7	315.3	36.07	36.74
	11/22/2013	14:11	11/22/2013 14:11		30	31	7.5		80	14.8	12.7	1.46	38.20
	11/22/2013	15:26	11/22/2013 15:26		30	31	9		76	17.8	1219.5	139.51	177.71
	11/22/2013	16:39	11/22/2013 16:39	50	30	30.5	10		75	19.8	1369.9	156.71	334.42
	11/22/2013	17:26	11/22/2013 17:26	50	30	30.5	10.5		72	20.8	953.5	109.08	443.50
	11/22/2013	17:27	11/22/2013 17:27							Valve shut	20.8	2.38	445.88
	11/22/2013	17:29	11/22/2013 17:29			21							445.88
SW-48 Event 2	12/6/2013	13:27	12/6/2013 13:27	50	31	30.5	<2		86	0.0			445.88
	12/6/2013	13:42	12/6/2013 13:42	49	31	30.5	5		88	9.9	74.0	8.47	454.34
	12/6/2013	14:42	12/6/2013 14:42	49	30	29.5	7		86	13.7	706.7	80.85	535.20
	12/6/2013	14:44	12/6/2013 14:44	49	31	31.5	10		86	19.8	33.5	3.83	539.02
	12/6/2013	16:05	12/6/2013 16:05	45	31	30.5	10.75		77	21.4	1669.3	190.97	730.00
	12/6/2013	16:32	12/6/2013 16:32	45	31	30	11		77	21.9	585.7	67.00	797.00
	12/6/2013	17:34	12/6/2013 17:34	50	32	29.5	13.5		71	27.4	1529.1	174.93	971.92
	12/6/2013	17:37	12/6/2013 17:37		32	29.5	13.5		71	27.4	82.2	9.40	981.32
	12/6/2013	17:38	12/6/2013 17:38			22				Valve shut	27.4	3.13	984.46
SW-48 Event 3	12/11/2013	13:41	12/11/2013 13:41	50	30	32	<2		68	0.0			984.46
	12/11/2013	14:18	12/11/2013 14:18	50	25	24	<2		68	0.0	0.0	0.00	984.46
	12/11/2013	14:19	12/11/2013 14:19	50	30	29	7.5		68	14.9	7.5	0.85	985.31
	12/11/2013	15:12	12/11/2013 15:12	50	30	28	9		68	17.9	870.0	99.53	1084.84
	12/11/2013	15:14	12/11/2013 15:14	50	32.5	30	12.5		68	25.6	43.5	4.97	1089.81
	12/11/2013	16:38	12/11/2013 16:38	45	32.5	29	16		65	32.8	2452.4	280.56	1370.37
	12/11/2013	17:32	12/11/2013 17:32	45	32	28	19		64	38.8	1934.0	221.25	1591.62
	12/11/2013	17:41	12/11/2013 17:41							Valve shut	349.3	39.95	1631.58
	12/11/2013	17:42	12/11/2013 17:42										1631.58
SW-48 Event 4	12/18/2013	8:05	12/18/2013 8:05	48	30	30	<2		50	0.0			1631.58
	12/18/2013	9:06	12/18/2013 9:06	45	30	27	7		62	14.0	427.3	48.89	1680.46
	12/18/2013	9:08	12/18/2013 9:08	49	32	30	12		62	24.6	38.6	4.41	1684.87
	12/18/2013	9:56	12/18/2013 9:56	44	30	30	13.5		64	27.0	1236.6	141.47	1826.34
	12/18/2013	11:23	12/18/2013 11:23	50	30	28	18		67	35.8	2732.5	312.60	2138.94
	12/18/2013	11:24	12/18/2013 11:24	50	31	29	21		67	42.3	39.1	4.47	2143.41
	12/18/2013	12:22	12/18/2013 12:22	50	30	28	22		65	43.9	2499.8	285.98	2429.39
	12/18/2013	12:23	12/18/2013 12:23							Valve shut	43.9	5.02	2434.41
	12/18/2013	12:24	12/18/2013 12:24			20							2434.41
SW-48 Event 5	12/20/2013	7:47	12/20/2013 7:47	28	24	29	4		60	7.5			2434.41
	12/20/2013	8:40	12/20/2013 8:40	28	25	25	9		64	16.9	646.2	73.93	2508.33
	12/20/2013	8:42	12/20/2013 8:42	34	30	29.5	16		64	32.0	48.9	5.59	2513.93
	12/20/2013	10:08	12/20/2013 10:08	34	30	29	18		72	35.7	2908.3	332.71	2846.64
	12/20/2013	11:06	12/20/2013 11:06	34	31	27	18		72	36.1	2080.8	238.05	3084.69
	12/20/2013	12:02	12/20/2013 12:02	34	30	27	20		72	39.6	2120.1	242.54	3327.23
	12/20/2013	12:03	12/20/2013 12:03							Valve shut	39.6	4.53	3331.76
	12/20/2013	12:04	12/20/2013 12:04			21							3331.76
SW-48 Event 6	1/9/2014	10:27	1/9/2014 10:27							0.0	0.0	0.00	3331.76
	1/9/2014	10:28	1/9/2014 10:28	50	30	31	4		63	8.0	4.0	0.46	3332.22
	1/9/2014	10:34	1/9/2014 10:34	49	29	30	7.5		63	14.8	68.5	7.83	3340.05
	1/9/2014	10:36	1/9/2014 10:36	48	30.5	31	9		63	18.1	32.9	3.77	3343.82
	1/9/2014	11:08	1/9/2014 11:08	42	29.5	30.5	12		61	23.9	672.0	76.88	3420.70
	1/9/2014	12:34	1/9/2014 12:34	41	28	28	15.5		62	30.3	2331.3	266.70	3687.40
	1/9/2014	12:36	1/9/2014 12:36	41	31	30	19.5		62	39.5	69.8	7.98	3695.38

SW-48 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	1/9/2014	14:22	1/9/2014 14:22	39	29	27.5	20	60	39.7		4193.5	479.73	4175.12
	1/9/2014	14:40	1/9/2014 14:40	39	29	27.5	20	60	39.7		713.7	81.65	4256.77
	1/9/2014	14:41	1/9/2014 14:41							Valve shut	39.7	4.54	4261.30
	1/9/2014	14:42	1/9/2014 14:42			22							4261.30
SW-48 Event 7	1/11/2014	8:34	1/11/2014 8:34						0.0				4261.30
	1/11/2014	8:35	1/11/2014 8:35	46	30	30	3	66	6.0		3.0	0.34	4261.64
	1/11/2014	8:37	1/11/2014 8:37	46	32	31	5	66	10.2		16.2	1.85	4263.49
	1/11/2014	8:51	1/11/2014 8:51	46	31	30	10	66	20.2		212.5	24.31	4287.80
	1/11/2014	8:52	1/11/2014 8:52	45	33	31	14	66	28.8		24.5	2.80	4290.60
	1/11/2014	10:47	1/11/2014 10:47	42	31	27.5	18.5	70	37.2		3794.9	434.14	4724.74
	1/11/2014	10:49	1/11/2014 10:49	41	33	29	21	70	43.1		80.3	9.18	4733.92
	1/11/2014	11:13	1/11/2014 11:13	41	33.5	29	24	70	49.5		1111.4	127.15	4861.07
	1/11/2014	11:33	1/11/2014 11:33	48	38	31	28	72	60.3		1098.5	125.67	4986.74
	1/11/2014	11:35	1/11/2014 11:35							Valve shut	120.7	13.80	5000.55
	1/11/2014	11:36	1/11/2014 11:36			21							5000.55
SW-48 Event 8	1/14/2014	7:52	1/14/2014 7:52						0.0		0.0	0.00	5000.55
	1/14/2014	7:53	1/14/2014 7:53	50	31.5	31.5	7	62	14.2		7.1	0.81	5001.36
	1/14/2014	8:16	1/14/2014 8:16	42	31.5	29	12.5	64	25.4		455.8	52.15	5053.51
	1/14/2014	8:18	1/14/2014 8:18	45	33	31	16	64	33.0		58.4	6.68	5060.19
	1/14/2014	9:48	1/14/2014 9:48	45	33	30.5	18	64	37.2		3158.7	361.36	5421.55
	1/14/2014	10:52	1/14/2014 10:52	43	31.5	28	18	65	36.5		2358.0	269.76	5691.31
	1/14/2014	10:54	1/14/2014 10:54	43	33.5	29	21	65	43.5		80.1	9.16	5700.47
	1/14/2014	12:00	1/14/2014 12:00	42	34	29	23.5	65	49.0		3053.3	349.30	6049.77
	1/14/2014	12:02	1/14/2014 12:02							Valve shut	98.0	11.21	6060.98
	1/14/2014	12:03	1/14/2014 12:03			22							6060.98
SW-48 Event 9	1/16/2014	8:26	1/16/2014 8:26	53	27.5	27.5	<2	47	0.0				6060.98
	1/16/2014	8:28	1/16/2014 8:28		30	29	6	47	12.2		12.2	1.39	6062.37
	1/16/2014	8:30	1/16/2014 8:30	53	31	29.5	8.2	47	16.9		29.0	3.32	6065.70
	1/16/2014	9:23	1/16/2014 9:23	48	30	28	12.8	56	25.8		1129.5	129.22	6194.92
	1/16/2014	9:24	1/16/2014 9:24	48	32	30	16	56	32.9		29.4	3.36	6198.27
	1/16/2014	10:31	1/16/2014 10:31	45	32	29.5	18	58	37.0		2342.5	267.98	6466.26
	1/16/2014	10:33	1/16/2014 10:33	45	33	30	18	58	37.4		74.4	8.51	6474.76
	1/16/2014	11:31	1/16/2014 11:31	43	32	29	19	59	39.0		2215.2	253.41	6728.18
	1/16/2014	11:34	1/16/2014 11:34	43	33	29.5	20.5	59	42.5		122.3	13.99	6742.17
	1/16/2014	12:39	1/16/2014 12:39	45	33	29.5	23.8	58	49.4		2988.9	341.93	7084.09
	1/16/2014	12:40	1/16/2014 12:40			25				Valve shut	49.4	5.65	7089.75
SW-48 Event 10	1/20/2014	8:15	1/20/2014 8:15	52	30	30	<2	46	0.0		0.0	0.00	7089.75
	1/20/2014	8:56	1/20/2014 8:56	49	27	26.5	11.2	59	21.7		445.0	50.90	7140.65
	1/20/2014	8:58	1/20/2014 8:58	49	31	29.5	16.5	59	33.5		55.2	6.32	7146.97
	1/20/2014	10:08	1/20/2014 10:08	47	31	27.5	18.2	64	36.8		2459.2	281.34	7428.30
	1/20/2014	11:10	1/20/2014 11:10	45	30	26.5	20	66	39.9		2375.8	271.79	7700.09
	1/20/2014	11:11	1/20/2014 11:11	45	32	28	22.2	66	45.3		42.6	4.87	7704.96
	1/20/2014	12:43	1/20/2014 12:43	45	32	27.5	24	64	49.0		4336.5	496.09	8201.05
	1/20/2014	12:44	1/20/2014 12:44			21				Valve shut	49.0	5.61	8206.66
Note: a red value, i.e. 75 °F, indicates that value was interpolated from field data											Total CO_2 Mass (lbs):		8206.66

SW-49 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
SW-49 Event 1	11/22/2013	8:06	11/22/2013 8:06	50	29			66	0.0				
	11/22/2013	8:08	11/22/2013 8:08		30	30	<2	66	0.0		0.0	0.00	0.00
	11/22/2013	8:09	11/22/2013 8:09		36	36	<2	66	0.0		0.0	0.00	0.00
	11/22/2013	8:41	11/22/2013 8:41	57	35	33.5	9	68	18.9		302.4	34.59	34.59
	11/22/2013	8:42	11/22/2013 8:42		37	36	12	71	25.6		22.3	2.55	37.14
	11/22/2013	9:51	11/22/2013 9:51		37	35	14	74	29.8		1912.9	218.84	255.98
	11/22/2013	11:01	11/22/2013 11:01		37	34	15	74	31.9		2161.7	247.29	503.27
	11/22/2013	11:54	11/22/2013 11:54		36	33.5	16	76	33.7		1738.9	198.93	702.20
	11/22/2013	12:45	11/22/2013 12:45		36	33.5	18	76	37.9		1824.7	208.74	910.95
	11/22/2013	12:46	11/22/2013 12:46							Valve shut	37.9	4.33	915.28
	11/22/2013	12:47	11/22/2013 12:47			24							915.28
SW-49 Event 2	12/5/2013	8:15	12/5/2013 8:15										915.28
	12/5/2013	8:39	12/5/2013 8:39	53	30	28	<2	64	0.0				915.28
	12/5/2013	8:40	12/5/2013 8:40	53	35	35	<2	64	0.0				915.28
	12/5/2013	8:52	12/5/2013 8:52	52	33	34	6	66	12.4		74.2	8.49	923.77
	12/5/2013	9:07	12/5/2013 9:07	52	33	34	7.5	68	15.4		208.4	23.84	947.61
	12/5/2013	9:25	12/5/2013 9:25	50	33	33.5	8.5	70	17.4		295.8	33.84	981.45
	12/5/2013	9:27	12/5/2013 9:27	50	34	35	10.5	70	21.8		39.2	4.49	985.94
	12/5/2013	10:30	12/5/2013 10:30	49	34	34	12.5	76	25.8		1497.9	171.36	1157.30
	12/5/2013	11:45	12/5/2013 11:45	48	34	33.5	14	76	28.9		2049.1	234.42	1391.72
	12/5/2013	11:47	12/5/2013 11:47	48	35	34.5	16	76	33.3		62.2	7.12	1398.84
	12/5/2013	12:43	12/5/2013 12:43	49	35	34	17	75	35.5		1926.0	220.34	1619.18
	12/5/2013	12:44	12/5/2013 12:44							Valve shut	35.5	4.06	1623.23
	12/5/2013	12:45	12/5/2013 12:45										1623.23
SW-49 Event 3	12/11/2013	8:52	12/11/2013 8:52	55	35	35	<2	60	0.0				1623.23
	12/11/2013	9:31	12/11/2013 9:31	50	34	34	9	68	18.7		364.7	41.72	1664.96
	12/11/2013	10:01	12/11/2013 10:01	50	32.5	33	10.5	67	21.5		603.0	68.99	1733.94
	12/11/2013	11:21	12/11/2013 11:21	50	32	31	13	72	26.3		1913.7	218.93	1952.87
	12/11/2013	11:22	12/11/2013 11:22	50	32	32	15	72	30.4		28.4	3.25	1956.11
	12/11/2013	11:53	12/11/2013 11:53	45	32	32	15	71	30.4		942.8	107.85	2063.96
	12/11/2013	11:54	12/11/2013 11:54	45	33	33	16.5	71	33.8		32.1	3.68	2067.64
	12/11/2013	11:56	12/11/2013 11:56	45	35	34	18	71	37.7		71.5	8.18	2075.82
	12/11/2013	12:52	12/11/2013 12:52	50	35	34	19.5	70	40.9		2199.4	251.61	2327.43
	12/11/2013	12:53	12/11/2013 12:53							Valve shut	40.9	4.67	2332.10
	12/11/2013	12:54	12/11/2013 12:54										2332.10
SW-49 Event 4	12/18/2013	8:36	12/18/2013 8:36	48	32	30	<2	52	0.0		0.0	0.00	2332.10
	12/18/2013	8:40	12/18/2013 8:40	48	32	31	6	53	12.4		24.8	2.83	2334.94
	12/18/2013	8:42	12/18/2013 8:42	45	35	35	11	53	23.4		35.8	4.10	2339.04
	12/18/2013	9:16	12/18/2013 9:16	50	36	34	14	60	29.9		907.5	103.81	2442.85
	12/18/2013	11:20	12/18/2013 11:20	50	35	31	19	64	40.1		4339.2	496.40	2939.25
	12/18/2013	11:22	12/18/2013 11:22	50	37.5	33	24.5	64	53.0		93.0	10.64	2949.89
	12/18/2013	12:50	12/18/2013 12:50	50	36	32	26	64	55.4		4766.2	545.25	3495.14
	12/18/2013	12:51	12/18/2013 12:51							Valve shut	55.4	6.33	3501.48
	12/18/2013	12:52	12/18/2013 12:52			22							3501.48
SW-49 Event 5	12/20/2013	9:10	12/20/2013 9:10	42	34	36	<2	72					3501.48
	12/20/2013	10:10	12/20/2013 10:10	40	32	32	9	72	18.2		1094.3	125.19	3626.66
	12/20/2013	10:12	12/20/2013 10:12	40	33	30	10	72	20.5		38.7	4.43	3631.09
	12/20/2013	11:07	12/20/2013 11:07	40	33	31	11	72	22.5		1182.9	135.33	3766.42
	12/20/2013	12:04	12/20/2013 12:04	45	34	31	14	72	29.0		1468.1	167.95	3934.37
	12/20/2013	13:15	12/20/2013 13:15	50	33	30.5	16	75	32.7		2188.9	250.41	4184.78
	12/20/2013	13:16	12/20/2013 13:16							Valve shut	32.7	3.74	4188.52
	12/20/2013	13:17	12/20/2013 13:17			23							4188.52
SW-49 Event 6	1/8/2014	8:36	1/8/2014 8:36		34	30.5	6	38	12.9				4188.52

SW-49 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	1/8/2014	8:38	1/8/2014 8:38		35.5	32.5	12	38	26.1		39.0	4.46	4192.98
	1/8/2014	8:40	1/8/2014 8:40	50	37	34	14.5	40	32.0		58.1	6.64	4199.62
	1/8/2014	9:03	1/8/2014 9:03	57	36	32.5	16	45	34.7		767.0	87.75	4287.37
	1/8/2014	9:04	1/8/2014 9:04	57	37	33.5	18	45	39.5		37.1	4.24	4291.61
	1/8/2014	9:54	1/8/2014 9:54	46	36	32.5	19.8	50	42.8		2055.9	235.19	4526.80
	1/8/2014	10:52	1/8/2014 10:52	45	36	31.5	20.2	46	43.8		2510.7	287.22	4814.03
	1/8/2014	10:54	1/8/2014 10:54	44	37.5	33	23.8	46	52.4		96.2	11.01	4825.03
	1/8/2014	12:20	1/8/2014 12:20	45	36	32.5	24.2	58	51.8		4482.1	512.76	5337.79
	1/8/2014	12:39	1/8/2014 12:39	44	36	32	24.2	57	51.9		985.6	112.75	5450.53
	1/8/2014	12:40	1/8/2014 12:40							Valve shut	51.9	5.94	5456.47
	1/8/2014	12:42	1/8/2014 12:42			25							5456.47
SW-49 Event 7	1/10/2014	9:41	1/10/2014 9:41										5456.47
	1/10/2014	9:42	1/10/2014 9:42	45	34	32	6	64	12.5		12.5	1.43	5457.90
	1/10/2014	9:48	1/10/2014 9:48	42	38	35	21	64	45.6		174.4	19.95	5477.85
	1/10/2014	10:18	1/10/2014 10:18	42	36.5	34	22	64	47.1		1390.4	159.06	5636.91
	1/10/2014	11:48	1/10/2014 11:48	41	36	33	22	65	46.8		4225.0	483.33	6120.25
	1/10/2014	12:53	1/10/2014 12:53	40	34	31	23	64	48.0		3080.7	352.43	6472.68
	1/10/2014	13:18	1/10/2014 13:18	40	34	31	24	64	50.1		1225.8	140.23	6612.91
	1/10/2014	13:19	1/10/2014 13:19							Valve shut	50.1	5.73	6618.64
	1/10/2014	13:20	1/10/2014 13:20			24							6618.64
SW-49 Event 8	1/14/2014	8:03	1/14/2014 8:03										6618.64
	1/14/2014	8:04	1/14/2014 8:04	50	34	35	6	60	12.6		12.6	1.44	6620.08
	1/14/2014	8:21	1/14/2014 8:21	45	34	31	12	60	25.1		320.5	36.66	6656.74
	1/14/2014	8:23	1/14/2014 8:23	44	35	32.5	16	60	33.9		59.0	6.75	6663.49
	1/14/2014	10:00	1/14/2014 10:00	44	35	33	18	62	38.0		3486.4	398.85	7062.34
	1/14/2014	11:01	1/14/2014 11:01	38	32.5	31	17.5	62	36.0		2257.9	258.30	7320.64
	1/14/2014	12:35	1/14/2014 12:35	42	33.5	30	20	63	41.6		3645.3	417.02	7737.66
	1/14/2014	12:36	1/14/2014 12:36							Valve shut	41.6	4.75	7742.42
	1/14/2014	12:37	1/14/2014 12:37			24							7742.42
SW-49 Event 9	1/16/2014	8:40	1/16/2014 8:40	50	32	34.5	7	40	14.6		0.0	0.00	7742.42
	1/16/2014	9:15	1/16/2014 9:15	47	29.5	28	15.2	50	30.6		792.2	90.62	7833.04
	1/16/2014	9:17	1/16/2014 9:17	47	34.5	32	22	50	46.8		77.4	8.86	7841.90
	1/16/2014	10:28	1/16/2014 10:28	43	34	31	22.2	55	46.7		3320.4	379.86	8221.75
	1/16/2014	11:30	1/16/2014 11:30	42	33	30	23	56	47.9		2932.7	335.50	8557.26
	1/16/2014	12:53	1/16/2014 12:53	45	33	29.5	24.5	56	51.0		4102.4	469.31	9026.57
	1/16/2014	12:56	1/16/2014 12:56			24				Valve shut	153.0	17.50	9044.07
Note: a red value, i.e. 75 °F, indicates that value was interpolated from field data										Total CO_2 Mass (lbs):			9044.07

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
SW-50 Event 1	11/15/2013	12:00	11/15/2013 12:00						0.0				
	11/15/2013	12:01	11/15/2013 12:01	33	35	30	<2		0.0		0.0	0.00	0.00
	11/15/2013	12:02	11/15/2013 12:02		33	30	5	39.5	8.6		4.3	0.49	0.49
	11/15/2013	12:03	11/15/2013 12:03		34	30	9	39.5	15.6		12.1	1.38	1.87
	11/15/2013	12:04	11/15/2013 12:04		35		11	39.5	19.3		17.4	2.00	3.87
	11/15/2013	12:06	11/15/2013 12:06		35	31	11.25	41.6	19.7		38.9	4.45	8.32
	11/15/2013	12:07	11/15/2013 12:07		38	32.5	13.5	43.7	24.3		22.0	2.51	10.84
	11/15/2013	12:08	11/15/2013 12:08		39	33.5	14.5	44	26.3		25.3	2.89	13.73
	11/15/2013	12:18	11/15/2013 12:18		39	33	15.5	36.1	28.4		273.3	31.26	44.99
	11/15/2013	12:38	11/15/2013 12:38		37	30.5	17	35.5	30.5		588.7	67.35	112.34
	11/15/2013	12:42	11/15/2013 12:42		39	32	19.25	34.8	35.3		131.6	15.05	127.39
	11/15/2013	12:48	11/15/2013 12:48		41	32.5	20.5	31.5	38.4		221.0	25.28	152.67
	11/15/2013	12:52	11/15/2013 12:52		43.5	34	22	28.2	42.3		161.4	18.46	171.13
	11/15/2013	13:21	11/15/2013 13:21		43	32.5	22.75	27.3	43.6		1245.2	142.45	313.58
	11/15/2013	13:24	11/15/2013 13:24		44.5	33.5	24	27.6	46.6		135.2	15.47	329.05
	11/15/2013	14:00	11/15/2013 14:00		45	33	24.25	25.1	47.4		1691.3	193.49	522.54
	11/15/2013	14:02	11/15/2013 14:02							Valve shut	94.8	10.84	533.38
	11/15/2013	14:04	11/15/2013 14:04		24.5								533.38
SW-50 Event 2	12/4/2013	12:50	12/4/2013 12:50	**55**	**36**	37.5	7	87	14.6				533.38
	12/4/2013	13:11	12/4/2013 13:11	55	35	34	12	85	24.8		413.3	47.28	580.66
	12/4/2013	13:49	12/4/2013 13:49	51	35	33.5	13	86	26.8		980.6	112.18	692.85
	12/4/2013	14:47	12/4/2013 14:47	53	35	32.5	14	80	29.1		1620.6	185.39	878.24
	12/4/2013	15:54	12/4/2013 15:54	53	35	32	15	81	31.1		2015.2	230.54	1108.78
	12/4/2013	17:36	12/4/2013 17:36	54	35	32	16	69	33.6		3297.9	377.28	1486.06
	12/4/2013	17:37	12/4/2013 17:37							Valve shut	33.6	3.84	1489.90
	12/4/2013	17:38	12/4/2013 17:38			25							1489.90
SW-50 Event 3	12/10/2013	8:12	12/10/2013 8:12	33	34	33.5	<2	70	0.0				1489.90
	12/10/2013	8:17	12/10/2013 8:17	53	34	33	5.5	70	11.4		28.5	3.26	1493.16
	12/10/2013	8:39	12/10/2013 8:39	51	34	32	8	72	16.6		307.6	35.19	1528.35
	12/10/2013	9:18	12/10/2013 9:18	50	32.5	31	10	72	20.4		720.2	82.39	1610.75
	12/10/2013	9:53	12/10/2013 9:53	50	32	30.5	11	72	22.3		746.6	85.42	1696.16
	12/10/2013	10:26	12/10/2013 10:26	49	32	30	11	74	22.2		734.9	84.07	1780.24
	12/10/2013	10:27	12/10/2013 10:27	49	32	31	13.5	74	27.3		24.8	2.83	1783.07
	12/10/2013	10:30	12/10/2013 10:30	49	34	32.5	15.5	74	32.0		89.0	10.18	1793.25
	12/10/2013	11:32	12/10/2013 11:32	45	32.5	32.5	17	74	34.6		2064.4	236.16	2029.41
	12/10/2013	12:16	12/10/2013 12:16	50	32	32	17.5	74	35.4		1539.2	176.08	2205.50
	12/10/2013	12:18	12/10/2013 12:18							Valve shut	70.8	8.10	2213.60
	12/10/2013	12:19	12/10/2013 12:19			22							2213.60
SW-50 Event 4	12/17/2013	8:08	12/17/2013 8:08	50	34	33	<2	48	0.0		0.0	0.00	2213.60
	12/17/2013	9:09	12/17/2013 9:09	45	32.5	30	7	58	14.5		441.1	50.46	2264.05
	12/17/2013	9:10	12/17/2013 9:10	45	32	31	10	58	20.5		17.5	2.00	2266.06
	12/17/2013	9:11	12/17/2013 9:11	45	35	33	11.5	58	24.4		22.5	2.57	2268.63
	12/17/2013	10:24	12/17/2013 10:24	40	35	32	13	63	27.4		1891.5	216.38	2485.01
	12/17/2013	10:26	12/17/2013 10:26	40	36	33	16	63	34.1		61.5	7.04	2492.05
	12/17/2013	11:24	12/17/2013 11:24	40	38	32	16	70	34.5		1990.9	227.76	2719.81
	12/17/2013	12:10	12/17/2013 12:10	42	37	32	18	71	38.4		1678.8	192.06	2911.86
	12/17/2013	12:11	12/17/2013 12:11							Valve shut	38.4	4.40	2916.26
	12/17/2013	12:12	12/17/2013 12:12			21							2916.26
SW-50 Event 5	1/6/2014	13:11	1/6/2014 13:11										2916.26
	1/6/2014	13:13	1/6/2014 13:13	57	35	33	<2	57	0.0		0.0	0.00	2916.26
	1/6/2014	13:32	1/6/2014 13:32	56	34	31.5	4.5	57	9.5		89.8	10.28	2926.54
	1/6/2014	13:34	1/6/2014 13:34	55	35	33.5	6	57	12.7		22.2	2.54	2929.07
	1/6/2014	14:02	1/6/2014 14:02	55	35	33	7.5	56	15.9		401.5	45.93	2975.00

SW-50 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	1/6/2014	15:08	1/6/2014 15:08	55	35	32.5	9.5	55	20.2		1192.8	136.46	3111.46
	1/6/2014	16:07	1/6/2014 16:07	55	35	31	10.5	53	22.4		1256.4	143.73	3255.19
	1/6/2014	16:09	1/6/2014 16:09	55	35	33	13	53	27.7		50.1	5.73	3260.92
	1/6/2014	17:07	1/6/2014 17:07	54	35	32	14	49	30.0		1672.5	191.34	3452.26
	1/6/2014	17:24	1/6/2014 17:24	56	35	32	14.5	48	31.1		518.7	59.34	3511.60
	1/6/2014	17:26	1/6/2014 17:26							Valve shut	62.1	7.11	3518.71
	1/6/2014	17:27	1/6/2014 17:27										3518.71
SW-50 Event 6	1/7/2014	7:40	1/7/2014 7:40					28					3518.71
	1/7/2014	7:42	1/7/2014 7:42	16	16	14	<2	28	0.0		0	0.00	3518.71
	1/7/2014	7:53	1/7/2014 7:53	16	16	15	<2	28	0.0		0	0.00	3518.71
	1/7/2014	9:28	1/7/2014 9:28	55	38	34	16	40	35.6		1691.7	193.53	3712.24
	1/7/2014	10:27	1/7/2014 10:27	50	38	33	17	42	37.8		2164.6	247.63	3959.87
	1/7/2014	11:28	1/7/2014 11:28	49	36	32	18	44	39.1		2344.8	268.25	4228.11
	1/7/2014	11:29	1/7/2014 11:29	49	38	33.5	22	44	48.8		43.9	5.03	4233.14
	1/7/2014	12:54	1/7/2014 12:54	48	38	33.5	22	46	48.7		4140.7	473.70	4706.84
	1/7/2014	12:55	1/7/2014 12:55							Valve shut	48.7	5.57	4712.41
	1/7/2014	12:56	1/7/2014 12:56										4712.41
SW-50 Event 7	1/9/2014	8:40	1/9/2014 8:40	54	35	33.5	<2	54	0.0		0.0	0.00	4712.41
	1/9/2014	8:55	1/9/2014 8:55	52	34	32	3.5	55	7.4		55.3	6.32	4718.73
	1/9/2014	8:58	1/9/2014 8:58	52	35	33	5	55	10.6		27.0	3.09	4721.82
	1/9/2014	10:19	1/9/2014 10:19	49	34	32.5	6.5	58	13.6		983.3	112.49	4834.31
	1/9/2014	11:42	1/9/2014 11:42	42	34	32	8	67	16.6		1256.8	143.78	4978.09
	1/9/2014	11:44	1/9/2014 11:44	42	35	32.5	9.3	67	19.5		36.2	4.14	4982.23
	1/9/2014	12:52	1/9/2014 12:52	42	35	32.5	10.5	63	22.2		1417.9	162.21	5144.44
	1/9/2014	12:53	1/9/2014 12:53							Valve shut	22.2	2.53	5146.98
	1/9/2014	12:54	1/9/2014 12:54			25							5146.98
SW-50 Event 8	1/13/2014	7:58	1/13/2014 7:58	53	30	28.5	<2	48	0.0		0.0	0.00	5146.98
	1/13/2014	7:59	1/13/2014 7:59	53	34	33	<2	48	0.0		0.0	0.00	5146.98
	1/13/2014	8:39	1/13/2014 8:39	47	32	31	7	52	14.5		289.4	33.11	5180.09
	1/13/2014	8:40	1/13/2014 8:40	47	34	33	8.5	52	17.9		16.2	1.85	5181.94
	1/13/2014	9:44	1/13/2014 9:44	45	3.5	32	9.2	60	11.7		949.4	108.61	5290.55
	1/13/2014	9:46	1/13/2014 9:46	45	34.5	32.8	11	60	23.2		34.9	3.99	5294.54
	1/13/2014	9:48	1/13/2014 9:48	45	35	33	11.5	60	24.3		47.5	5.43	5299.98
	1/13/2014	11:02	1/13/2014 11:02	45	34.5	33	12	71	25.0		1825.4	208.82	5508.80
	1/13/2014	12:02	1/13/2014 12:02	47	34.5	33	13	73	27.0		1560.6	178.53	5687.33
	1/13/2014	12:04	1/13/2014 12:04			27				Valve shut	54.0	6.18	5693.51
SW-50 Event 9	1/15/2014	8:10	1/15/2014 8:10	55	30	30	<2	50	0.0		0.0	0.00	5693.51
	1/15/2014	8:12	1/15/2014 8:12	55	33	33	<2	50	0.0		0.0	0.00	5693.51
	1/15/2014	8:50	1/15/2014 8:50	52	32	31	5	46	10.4		197.6	22.60	5716.12
	1/15/2014	8:52	1/15/2014 8:52	52	33	32.2	7	46	14.7		25.1	2.87	5718.99
	1/15/2014	9:43	1/15/2014 9:43	45	33	32.2	7	64	14.5		743.8	85.09	5804.08
	1/15/2014	11:14	1/15/2014 11:14	41	32.5	31.5	8.2	69	16.8		1420.0	162.44	5966.52
	1/15/2014	11:15	1/15/2014 11:15	41	34	32.5	11	69	22.8		19.8	2.26	5968.79
	1/15/2014	12:11	1/15/2014 12:11	45	34	32.8	11	71	22.8		1277.7	146.16	6114.95
	1/15/2014	12:12	1/15/2014 12:12							Valve shut	22.8	2.61	6117.56
	1/15/2014	12:13	1/15/2014 12:13			26							6117.56
SW-50 Event 10	1/17/2014	7:20	1/17/2014 7:20	56	27.5	26	<2	40	0.0		0.0	0.00	6117.56
	1/17/2014	7:21	1/17/2014 7:21	56	32.5	32	<2	40	0.0		0.0	0.00	6117.56
	1/17/2014	8:02	1/17/2014 8:02	51	31	30	7.5	44	15.5		316.9	36.26	6153.81
	1/17/2014	8:03	1/17/2014 8:03	51	33	32	10.5	44	22.1		18.8	2.15	6155.96
	1/17/2014	9:12	1/17/2014 9:12	47	33	31.8	11	57	22.9		1552.2	177.57	6333.53
	1/17/2014	9:13	1/17/2014 9:13	47	34	32.5	13	57	27.3		25.1	2.87	6336.40
	1/17/2014	10:24	1/17/2014 10:24	47	34	32.5	13	62	27.2		1934.4	221.30	6557.70

SW-50 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	1/17/2014	11:31	1/17/2014 11:31	45	34	32	13.2	68	27.4		1829.4	209.29	6766.99
	1/17/2014	12:23	1/17/2014 12:23	45	34	32	13.9	70	28.8		1462.8	167.35	6934.33
	1/17/2014	12:55	1/17/2014 12:55	44	34	32	14	70	29.0		925.9	105.92	7040.26
	1/17/2014	12:56	1/17/2014 12:56							Valve shut	29.0	3.32	7043.58
SW-50 Event 11	1/21/2014	9:16	1/21/2014 9:16	47	32.5	34.5	<2	62	0.0		0.0	0.00	7043.58
	1/21/2014	10:14	1/21/2014 10:14	40	30.5	33	4	66	8.0		232.6	26.61	7070.18
	1/21/2014	11:41	1/21/2014 11:41	38	30	32.5	4.5	70	8.9		737.6	84.38	7154.56
	1/21/2014	12:26	1/21/2014 12:26	44	30	32.5	4.8	70	9.5		415.5	47.54	7202.10
	1/21/2014	12:28	1/21/2014 12:28			26				Valve shut	19.1	2.18	7204.28
SW-50 Event 12	1/27/2014	12:27	1/27/2014 12:27										7204.28
	1/27/2014	12:30	1/27/2014 12:30	55	33	33.5	5	78	10.2		30.5	3.49	7207.77
	1/27/2014	12:55	1/27/2014 12:55	52	33	31.5	7	78	14.3		305.5	34.95	7242.72
	1/27/2014	12:57	1/27/2014 12:57	52	36	34	10	78	21.0		35.3	4.03	7246.75
	1/27/2014	13:15	1/27/2014 13:15	50	36	34	10	78	21.0		378.1	43.25	7290.01
	1/27/2014	14:48	1/27/2014 14:48	50	35.5	34	11	79	23.0		2044.7	233.92	7523.93
	1/27/2014	15:44	1/27/2014 15:44	49	35	33.5	12	77	25.0		1342.4	153.58	7677.50
	1/27/2014	16:30	1/27/2014 16:30	52	35	33	12	77	25.0		1148.9	131.44	7808.94
	1/27/2014	16:31	1/27/2014 16:31							Valve shut	25.0	2.86	7811.80
	1/27/2014	16:32	1/27/2014 16:32			25							7811.80

Note: a red value, i.e. 75 °F, indicates that value was interpolated from field data

Total CO_2 Mass (lbs): 7811.80

SW-51 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
SW-51 Event 1	11/15/2013	14:16	11/15/2013 14:16	26	13			48.9	0.0				0
	11/15/2013	14:20	11/15/2013 14:20	30	30	27	<2	48.5	0.0		0.0	0.00	0.00
	11/15/2013	14:22	11/15/2013 14:22	36	35	30	<2	50	0.0		0.0	0.00	0.00
	11/15/2013	14:27	11/15/2013 14:27	34	33	30	4.5	55.0	7.6		19.0	2.17	2.17
	11/15/2013	14:28	11/15/2013 14:28	39	37	34	6	59.9	10.5		9.1	1.04	3.21
	11/15/2013	14:44	11/15/2013 14:44	39	36.5	33.5	7	59.1	12.2		181.7	20.78	23.99
	11/15/2013	14:46	11/15/2013 14:46	41	38.5	35	8.5	59.1	15.1		27.3	3.12	27.11
	11/15/2013	15:16	11/15/2013 15:16	41	38.5	35	9	50.7	16.1		468.7	53.62	80.73
	11/15/2013	15:38	11/15/2013 15:38	41	38	34	9.5	50.2	17.0		364.1	41.65	122.38
	11/15/2013	15:53	11/15/2013 15:53	43	39	35	10.5	49.6	18.9		269.2	30.80	153.18
	11/15/2013	16:26	11/15/2013 16:26	42	39	35	10.75	48.5	19.4		632.7	72.38	225.57
	11/15/2013	16:57	11/15/2013 16:57	42	39	35	11	47.6	19.9		609.0	69.67	295.24
	11/15/2013	17:19	11/15/2013 17:19	42	39	35	11.25	47.4	20.3		442.4	50.61	345.84
	11/15/2013	17:25	11/15/2013 17:25							Valve shut	122.0	13.96	359.80
	11/15/2013	17:26	11/15/2013 17:26	28	28	22							359.80
SW-51 Event 2	12/4/2013	8:24	12/4/2013 8:24										359.80
	12/4/2013	8:25	12/4/2013 8:25	50	36	37	<2	70	0.0		0.0	0.00	359.80
	12/4/2013	8:50	12/4/2013 8:50	50	36	36	<2	74	0.0		0.0	0.00	359.80
	12/4/2013	9:14	12/4/2013 9:14	50	36	36	<2	76	0.0		0.0	0.00	359.80
	12/4/2013	10:05	12/4/2013 10:05	49	36	35.5	4	78	8.4		214.3	24.51	384.31
	12/4/2013	10:10	12/4/2013 10:10	49	36	37	6	78	12.6		52.5	6.01	390.32
	12/4/2013	11:10	12/4/2013 11:10	47	36	37	7	83	14.6		817.1	93.48	483.79
	12/4/2013	12:42	12/4/2013 12:42	55	36	37	8	87	16.7		1439.5	164.68	648.47
	12/4/2013	12:43	12/4/2013 12:43							Valve shut	16.7	1.91	650.38
	12/4/2013	12:44	12/4/2013 12:44										650.38
SW-51 Event 3	12/9/2013	8:40	12/9/2013 8:40	55	35	35.5	<2	62	0.0		0.0	0.00	650.38
	12/9/2013	9:20	12/9/2013 9:20	50	35	35	<2	64	0.0		0.0	0.00	650.38
	12/9/2013	9:58	12/9/2013 9:58	50	35	35	<2	70	0.0		0.0	0.00	650.38
	12/9/2013	11:09	12/9/2013 11:09	50	35	35	<2	77	0.0		0.0	0.00	650.38
	12/9/2013	11:38	12/9/2013 11:38	50	35	35	3.5	82	7.2		105.1	12.03	662.40
	12/9/2013	12:36	12/9/2013 12:36	50	34	35	4	86	8.2		447.2	51.16	713.56
	12/9/2013	13:55	12/9/2013 13:55	50	35	35	5.5	84	11.4		771.8	88.30	801.86
	12/9/2013	14:20	12/9/2013 14:20	50	35	35	5.5	84	11.4		284.3	32.52	834.38
	12/9/2013	15:10	12/9/2013 15:10	50	34	34	5.8	80	11.9		582.1	66.59	900.97
	12/9/2013	15:33	12/9/2013 15:33	47	34	34	6	80	12.3		278.7	31.89	932.86
	12/9/2013	15:49	12/9/2013 15:49	45	34	34	6	80	12.3		197.2	22.56	955.42
	12/9/2013	16:34	12/9/2013 16:34	46	34	34	6	74	12.4		556.2	63.63	1019.05
	12/9/2013	16:55	12/9/2013 16:55	49	34	34	6	72	12.4		260.6	29.81	1048.86
	12/9/2013	17:37	12/9/2013 17:37	55	33	34	6.3	72	12.9		531.8	60.84	1109.70
	12/9/2013	22:13	12/9/2013 22:13	55	35	34	7.5	68	15.7		3954.1	452.35	1562.05
	12/10/2013	8:04	12/10/2013 8:04	53	34	34	9.5	70	19.7		10476.1	1198.47	2760.52
	12/10/2013	8:05	12/10/2013 8:05							Valve shut	19.7	2.25	2762.77
	12/10/2013	8:06	12/10/2013 8:06			28							2762.77
SW-51 Event 4	12/16/2013	8:22	12/16/2013 8:22	50	37	35	<2	48	0.0		0.0	0.00	2762.77
	12/16/2013	8:48	12/16/2013 8:48	45	36	33.5	3.5	50	7.6		98.3	11.24	2774.02
	12/16/2013	8:49	12/16/2013 8:49	45	37	35	4	50	8.7		8.1	0.93	2774.95
	12/16/2013	10:06	12/16/2013 10:06	45	38	35	4	48	8.8		675.9	77.32	2852.27
	12/16/2013	11:02	12/16/2013 11:02	40	37	35	4	66	8.6		487.6	55.79	2908.06
	12/16/2013	13:10	12/16/2013 13:10	45	37	34	5	67	10.7		1235.7	141.37	3049.42
	12/16/2013	13:11	12/16/2013 13:11							Valve shut	10.7	1.23	3050.65
	12/16/2013	13:12	12/16/2013 13:12			29							3050.65
	12/16/2013	14:41	12/16/2013 14:41	50	35	32	11	68	23.1	Restart	2055.7	235.17	3285.82
	12/16/2013	15:34	12/16/2013 15:34	45	35	34	8	68	16.8		1057.2	120.95	3406.76

SW-51 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	12/16/2013	16:31	12/16/2013 16:31	40	35	34	7.5	64	15.8		929.3	106.32	3513.08
	12/16/2013	17:20	12/16/2013 17:20	40	36	34	7.5	60	16.0		780.2	89.26	3602.34
	12/16/2013	22:12	12/16/2013 22:12	50	38	32.5	10	46	22.1		5570.7	637.29	4239.63
	12/17/2013	7:52	12/17/2013 7:52	45	36	33	12	46	26.0		13962.1	1597.27	5836.89
	12/17/2013	7:54	12/17/2013 7:54							Valve shut	52.1	5.95	5842.85
	12/17/2013	7:55	12/17/2013 7:55			26							5842.85
SW-51 Event 5	1/10/2014	12:44	1/10/2014 12:44	42	34	35	<2	72	0.0				5842.85
	1/10/2014	14:30	1/10/2014 14:30	50	33	35	<2	70	0.0				5842.85
	1/10/2014	16:27	1/10/2014 16:27	46	32	35	2	71	4.1		237.3	27.15	5870.00
	1/10/2014	16:28	1/10/2014 16:28	46	33.5	36	4	71	8.2		6.2	0.70	5870.70
	1/10/2014	17:46	1/10/2014 17:46	47	33.5	36	3.5	68	7.2		603.7	69.07	5939.77
	1/10/2014	22:06	1/10/2014 22:06	45	33.5	36	4.2	66	8.7		2071.6	236.99	6176.76
	1/11/2014	11:44	1/11/2014 11:44	40	33	36	7	74	14.3		9411.3	1076.65	7253.42
	1/11/2014	11:45	1/11/2014 11:45							Valve shut	14.3	1.64	7255.06
	1/11/2014	11:47	1/11/2014 11:47			30							7255.06
SW-51 Event 6	1/14/2014	8:04	1/14/2014 8:04	49	34	34	<2	62	0.0		0.0	0.00	7255.06
	1/14/2014	8:56	1/14/2014 8:56	47	33	34.5	<2	62	0.0		0.0	0.00	7255.06
	1/14/2014	10:02	1/14/2014 10:02	45	33	34.2	3.5	64	7.2		238.5	27.28	7282.33
	1/14/2014	11:28	1/14/2014 11:28	40	32.5	34.2	3.9	64	8.0		655.1	74.94	7357.28
	1/14/2014	13:13	1/14/2014 13:13	47	32	34	5	69	10.2		954.0	109.13	7466.41
	1/14/2014	15:43	1/14/2014 15:43	47	31.5	33.5	6	72	12.1		1669.1	190.94	7657.35
	1/14/2014	16:30	1/14/2014 16:30	55	31.5	33.5	6.2	72	12.5		577.8	66.10	7723.46
	1/14/2014	16:31	1/14/2014 16:31			29				Valve shut	12.5	1.43	7724.89
SW-51 Event 7	1/16/2014	8:12	1/16/2014 8:12	55	33	34.5	<2	46	0.0		0.0	0.00	7724.89
	1/16/2014	8:16	1/16/2014 8:16	55	33	34.5	<2	48	0.0		0.0	0.00	7724.89
	1/16/2014	9:08	1/16/2014 9:08	50	31	33	2	50	4.1		106.5	12.19	7737.07
	1/16/2014	9:09	1/16/2014 9:09	50	33	34.5	4	50	8.4		6.2	0.71	7737.79
	1/16/2014	10:22	1/16/2014 10:22	45	33	34.5	5	55	10.4		685.9	78.47	7816.25
	1/16/2014	11:23	1/16/2014 11:23	43	33	34.5	5	57	10.4		634.7	72.61	7888.87
	1/16/2014	13:11	1/16/2014 13:11	49	32	34	5.9	58	12.1		1216.0	139.11	8027.97
	1/16/2014	14:50	1/16/2014 14:50	49	31.5	33.5	7	58	14.3		1308.1	149.65	8177.62
	1/16/2014	15:52	1/16/2014 15:52	50	31.5	33.5	7.2	58	14.7		899.5	102.91	8280.53
	1/16/2014	16:13	1/16/2014 16:13	52	31	33	7.5	58	15.2		314.5	35.98	8316.51
	1/16/2014	16:15	1/16/2014 16:15							Valve shut	30.5	3.49	8320.00
SW-51 Event 8	1/28/2014	7:31	1/28/2014 7:31										8320.00
	1/28/2014	7:32	1/28/2014 7:32	55	36	34.5	<2	57	0.0		0.0	0.00	8320.00
	1/28/2014	7:36	1/28/2014 7:36	55	36	34.5	<2	57	0.0		0.0	0.00	8320.00
	1/28/2014	8:09	1/28/2014 8:09	55	35	34	<2	57	0.0		0.0	0.00	8320.00
	1/28/2014	8:31	1/28/2014 8:31	55	35	34	<2	57	0.0		0.0	0.00	8320.00
	1/28/2014	10:05	1/28/2014 10:05	53	35	34	2	57	4.2		199.6	22.83	8342.83
	1/28/2014	11:10	1/28/2014 11:10	53	34	33	3	55	6.3		343.3	39.27	8382.09
	1/28/2014	11:11	1/28/2014 11:11	53	36	35	4	55	8.6		7.5	0.85	8382.95
	1/28/2014	11:42	1/28/2014 11:42	51	36	35	4	54	8.6		266.6	30.50	8413.45
	1/28/2014	13:02	1/28/2014 13:02	50	36	35	4	54	8.6		688.3	78.75	8492.19
	1/28/2014	14:03	1/28/2014 14:03	50	36	35	4.5	53	9.7		558.0	63.83	8556.02
	1/28/2014	14:58	1/28/2014 14:58	50	36	35	5	52	10.8		562.8	64.39	8620.41
	1/28/2014	15:36	1/28/2014 15:36	50	36	35	5	50	10.8		410.0	46.90	8667.31
	1/28/2014	15:37	1/28/2014 15:37							Valve shut	10.8	1.24	8668.55
	1/28/2014	15:38	1/28/2014 15:38			28							8668.55
SW-51 Event 9	1/29/2014	7:50	1/29/2014 7:50										8668.55
	1/29/2014	8:01	1/29/2014 8:01										8668.55
	1/29/2014	8:02	1/29/2014 8:02	55	36	35.5	<2	42	0.0		0.0	0.00	8668.55
	1/29/2014	8:57	1/29/2014 8:57	50	36	35	4	42	8.7		239.6	27.41	8695.95

SW-51 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	1/29/2014	10:22	1/29/2014 10:22	50	34.5	34	4.5	42	9.7		780.4	89.28	8785.23
	1/29/2014	11:49	1/29/2014 11:49	50	34.5	34	4.5	42	9.7		839.7	96.06	8881.29
	1/29/2014	12:12	1/29/2014 12:12	50	34.5	34	4.5	42	9.7		222.0	25.39	8906.68
	1/29/2014	12:13	1/29/2014 12:13							Valve shut	9.7	1.10	8907.79
	1/29/2014	12:14	1/29/2014 12:14			25.5							8907.79
SW-51 Event 10	2/3/2014	8:25	2/3/2014 8:25	52	34	36	<2	68	0.0		0.0	0.00	8907.79
	2/3/2014	8:56	2/3/2014 8:56	53	33	35	<2	74	0.0		0.0	0.00	8907.79
	2/3/2014	9:20	2/3/2014 9:20	52	33	35	<2	77	0.0		0.0	0.00	8907.79
	2/3/2014	10:23	2/3/2014 10:23	54	32.5	35	<2	83	0.0		0.0	0.00	8907.79
	2/3/2014	10:27	2/3/2014 10:27	54	34	35.5	2	83	4.1		8.2	0.94	8908.72
	2/3/2014	12:09	2/3/2014 12:09	52	34	35.5	3	86	6.1		521.4	59.65	8968.37
	2/3/2014	13:26	2/3/2014 13:26	52	34	35.5	3.8	84	7.8		535.3	61.23	9029.60
	2/3/2014	14:26	2/3/2014 14:26	52	34	35.5	4.2	83	8.6		491.3	56.21	9085.81
	2/3/2014	15:32	2/3/2014 15:32	52	34	35.5	4.8	82	9.8		608.6	69.63	9155.44
	2/3/2014	17:01	2/3/2014 17:01	52	34		6	80	12.3		986.4	112.84	9268.28
	2/4/2014	9:50	2/4/2014 9:50	52	32.5	35	9	61	18.5		15569.5	1781.16	11049.44
	2/4/2014	9:53	2/4/2014 9:53			30				Valve shut	55.6	6.36	11055.80
SW-51 Event 11	2/5/2014	8:28	2/5/2014 8:28	50	30.5	29.5	15.5	66	31.1				11055.80
	2/5/2014	8:29	2/5/2014 8:29	50	33	33	17.2	66	35.4		33.3	3.80	11059.60
	2/5/2014	8:30	2/5/2014 8:30	50	34	33.5	18	66	37.5		36.5	4.17	11063.77
	2/5/2014	9:01	2/5/2014 9:01	46	35	35	16.2	67	34.0		1108.7	126.84	11190.61
	2/5/2014	10:35	2/5/2014 10:35	44	35	35	14.5	70	30.4		3028.5	346.46	11537.07
	2/5/2014	11:37	2/5/2014 11:37	44	36	35.5	14.2	75	29.9		1869.3	213.85	11750.92
	2/5/2014	12:47	2/5/2014 12:47	44	36	35.5	14	77	29.4		2077.3	237.64	11988.56
	2/5/2014	13:45	2/5/2014 13:45	46	36	35.5	13.8	82	28.9		1691.0	193.45	12182.02
	2/5/2014	14:56	2/5/2014 14:56	46	36	35.5	13.8	83	28.8		2049.2	234.43	12416.45
	2/5/2014	15:49	2/5/2014 15:49	46	36	35.5	13.8	78	29.0		1532.6	175.33	12591.78
	2/5/2014	17:14	2/5/2014 17:14	50	36	35.5	13.5	80	28.3		2434.8	278.54	12870.32
	2/5/2014	21:26	2/5/2014 21:26	49	36	35.5	14	63	29.8		7326.4	838.14	13708.46
	2/6/2014	8:17	2/6/2014 8:17	52	36	35.5	15.8	48	34.2		20844.8	2384.65	16093.11
	2/6/2014	8:19	2/6/2014 8:19			32				Valve shut	68.4	7.82	16100.93
SW-51 Event 12	2/7/2014	7:52	2/7/2014 7:52	48	29	28	17.8	49	35.7				16100.93
	2/7/2014	7:54	2/7/2014 7:54	48	33	32.5	22	49	46.1		81.8	9.36	16110.29
	2/7/2014	9:15	2/7/2014 9:15	44	34	33.5	18	56	37.9		3400.7	389.04	16499.33
	2/7/2014	11:32	2/7/2014 11:32	42	34.5	34	16.3	60	34.3		4944.3	565.63	17064.96
	2/7/2014	13:19	2/7/2014 13:19	42	34.5	34.5	15.3	63	32.1		3554.7	406.65	17471.61
	2/7/2014	13:20	2/7/2014 13:20			34.5				Valve shut	32.1	3.67	17475.29
Note: a red value, i.e. 75 °F, indicates that value was interpolated from field data											Total CO_2 Mass (lbs):		17475.29

SW-52 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
SW-52 Event 1	11/18/2013	10:20	11/18/2013 10:20	32	13.5			37.4	0.0				
	11/18/2013	10:23	11/18/2013 10:23	32	32	30	<2		0.0		0.0	0.00	0.00
	11/18/2013	10:25	11/18/2013 10:25	37	37	31.5	<2	37.4	0.0		0.0	0.00	0.00
	11/18/2013	10:31	11/18/2013 10:31	24	31	31.5	<2	50.5	0.0		0.0	0.00	0.00
	11/18/2013	10:39	11/18/2013 10:39	38	35	34.5	4	52.3	6.9		27.7	3.16	3.16
	11/18/2013	11:34	11/18/2013 11:34	38	36	33.5	5.25	60.4	9.1		440.3	50.37	53.54
	11/18/2013	11:35	11/18/2013 11:35	40	38	35.5	6.5	60.4	11.5		10.3	1.18	54.71
	11/18/2013	12:07	11/18/2013 12:07	40	38	35.5	6.5	59.5	11.5		367.7	42.06	96.77
	11/18/2013	12:57	11/18/2013 12:57	40	38	35	6.75	58.8	11.9		586.0	67.04	163.81
	11/18/2013	13:21	11/18/2013 13:21	40	38	35	7	55	12.4		292.6	33.47	197.28
	11/18/2013	13:23	11/18/2013 13:23	42	39.5	37	8.25	53.3	14.9		27.3	3.13	200.41
	11/18/2013	14:36	11/18/2013 14:36	43	40	37	8.25	51.6	15.0		1090.7	124.78	325.18
	11/18/2013	14:38	11/18/2013 14:38							Valve shut	30.0	3.43	328.61
	11/18/2013	14:39	11/18/2013 14:39	38	29	24							328.61
	11/18/2013	14:40	11/18/2013 14:40										328.61
SW-52 Event 2	12/4/2013	12:39	12/4/2013 12:39	55	36	36.5	<2	87	0.0				328.61
	12/4/2013	13:09	12/4/2013 13:09	55	36	35.5	<2	85	0.0		0.0	0.00	328.61
	12/4/2013	13:48	12/4/2013 13:48	51	36	35	<2	86	0.0		0.0	0.00	328.61
	12/4/2013	14:46	12/4/2013 14:46	53	36	35	2.5	80	5.2		152.0	17.39	346.00
	12/4/2013	15:53	12/4/2013 15:53	53	36	34.5	3.5	81	7.3		421.2	48.18	394.18
	12/4/2013	17:32	12/4/2013 17:32	54	35	34.5	4	69	8.4		778.2	89.03	483.21
	12/4/2013	17:34	12/4/2013 17:34							Valve shut	16.8	1.92	485.13
	12/4/2013	17:35	12/4/2013 17:35			27.5							485.13
SW-52 Event 3	12/5/2013	7:54	12/5/2013 7:54	57	37	36.5	<2	66	0.0				485.13
	12/5/2013	8:19	12/5/2013 8:19	55	36	35.5	<2	68	0.0				485.13
	12/5/2013	8:25	12/5/2013 8:25							Valve shut			485.13
	12/5/2013	8:27	12/5/2013 8:27							Restart			485.13
	12/5/2013	8:30	12/5/2013 8:30	55	36	35	<2	70	0.0				485.13
	12/5/2013	9:08	12/5/2013 9:08	53	36	35	<2	73	0.0				485.13
	12/5/2013	10:12	12/5/2013 10:12	51	36	35	<2	80	0.0				485.13
	12/5/2013	11:27	12/5/2013 11:27	50	36	35	2	85	4.2		156.5	17.90	503.03
	12/5/2013	14:13	12/5/2013 14:13	51	36	34.5	3.5	87	7.3		951.3	108.83	611.86
	12/5/2013	15:18	12/5/2013 15:18	49	35	34.5	4	86	8.3		505.1	57.79	669.65
	12/5/2013	16:28	12/5/2013 16:28	50	35	34.5	4	82	8.3		578.9	66.23	735.87
	12/5/2013	17:50	12/5/2013 17:50	55	35	34.5	4	70	8.4		683.4	78.18	814.05
	12/5/2013	21:59	12/5/2013 21:59	55	35	34.5	5	68	10.5		2350.7	268.92	1082.98
	12/6/2013	7:03	12/6/2013 7:03	54	35	33	6	66	12.6		6289.2	719.49	1802.47
	12/6/2013	9:26	12/6/2013 9:26	45	35	33	6	77	12.5		1795.5	205.40	2007.87
	12/6/2013	9:27	12/6/2013 9:27	45	36	34.5	8.5	77	17.9		15.2	1.74	2009.61
	12/6/2013	10:36	12/6/2013 10:36	41	36	34.5	7.5	84	15.7		1157.0	132.36	2141.97
	12/6/2013	11:31	12/6/2013 11:31	40	36	34.5	7.5	86	15.6		860.7	98.46	2240.43
	12/6/2013	13:46	12/6/2013 13:46	45	36	35	8	88	16.6		2178.8	249.25	2489.68
	12/6/2013	14:27	12/6/2013 14:27	45	36	35	8	86	16.7		683.1	78.14	2567.82
	12/6/2013	15:25	12/6/2013 15:25	45	36	35	8	80	16.8		970.0	110.97	2678.78
	12/6/2013	17:17	12/6/2013 17:17	46	38	35	8	74	17.2		1902.7	217.67	2896.45
	12/6/2013	17:19	12/6/2013 17:19							Valve shut	34.4	3.94	2900.39
	12/6/2013	17:20	12/6/2013 17:20			29							2900.39
SW-52 Event 4	12/10/2013	13:01	12/10/2013 13:01	53	35	34	<2	80	0.0				2900.39
	12/10/2013	13:57	12/10/2013 13:57	52	34	34	<2	70	0.0				2900.39
	12/10/2013	14:25	12/10/2013 14:25	50	34	34	<2	72	0.0				2900.39
	12/10/2013	15:01	12/10/2013 15:01	50	34	32	<2	72	0.0				2900.39
	12/10/2013	15:02	12/10/2013 15:02	50	34	33	<2	72	0.0				2900.39
	12/10/2013	15:36	12/10/2013 15:36	50	35	33.5	<2	74	0.0				2900.39

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	12/10/2013	16:15	12/10/2013 16:15	50	35	33	<2	72	0.0				2900.39
	12/10/2013	17:22	12/10/2013 17:22	45	35	33	<2	66	0.0				2900.39
	12/10/2013	22:27	12/10/2013 22:27	52	34	32	5.5	54	11.6		1767.6	202.22	3102.60
	12/11/2013	7:45	12/11/2013 7:45	50	34	32	4	50	8.5		5595.4	640.11	3742.71
	12/11/2013	12:25	12/11/2013 12:25	48	34	32	4.5	70	9.3		2491.7	285.05	4027.76
	12/11/2013	14:40	12/11/2013 14:40	50	34	32	5	66	10.4		1332.8	152.47	4180.23
	12/11/2013	17:47	12/11/2013 17:47	55	34	32	5.5	60	11.5		2050.7	234.60	4414.83
	12/11/2013	22:10	12/11/2013 22:10	55	34	32	7	60	14.7		3443.2	393.91	4808.74
	12/12/2013	7:45	12/12/2013 7:45	53	33	31	9	50	18.8		9633.4	1102.07	5910.81
	12/12/2013	8:56	12/12/2013 8:56			24				Valve shut	1338.0	153.06	6063.87
SW-52 Event 5	12/17/2013	12:23	12/17/2013 12:23	48	32	33.5	<2	71	0.0		0.0	0.00	6063.87
	12/17/2013	13:15	12/17/2013 13:15	50	30	28	<2	73	0.0		0.0	0.00	6063.87
	12/17/2013	13:16	12/17/2013 13:16	50	31	33	<2	73	0.0		0.0	0.00	6063.87
	12/17/2013	14:18	12/17/2013 14:18	45	31	33	<2	74	0.0		0.0	0.00	6063.87
	12/17/2013	14:20	12/17/2013 14:20	45	33	34	<2	74	0.0		0.0	0.00	6063.87
	12/17/2013	15:32	12/17/2013 15:32	45	32	34	<2	72	0.0		0.0	0.00	6063.87
	12/17/2013	16:43	12/17/2013 16:43	45	34	34	<2	69	0.0		0.0	0.00	6063.87
	12/17/2013	22:16	12/17/2013 22:16	45	34	34	<2	54	0.0		0.0	0.00	6063.87
	12/18/2013	9:05	12/18/2013 9:05	50	32	34	3	59	6.2		1998.2	228.60	6292.46
	12/18/2013	12:49	12/18/2013 12:49	52	32	34	4	59	8.2		1609.3	184.10	6476.56
	12/18/2013	14:28	12/18/2013 14:28	50	32	33	5	68	10.2		909.9	104.10	6580.66
	12/18/2013	16:48	12/18/2013 16:48	48	32	33.5	5.5	64	11.2		1498.4	171.41	6752.07
	12/18/2013	18:01	12/18/2013 18:01	55	32	33	6	53	12.4		862.3	98.64	6850.72
	12/18/2013	18:02	12/18/2013 18:02			28				Valve shut	12.4	1.42	6852.14
SW-52 Event 6	1/8/2014	8:18	1/8/2014 8:18	58	35	34.5	<2	39	0.0		0.0	0.00	6852.14
	1/8/2014	9:00	1/8/2014 9:00	51	35	34	<2	39	0.0		0.0	0.00	6852.14
	1/8/2014	9:55	1/8/2014 9:55	47	35	34	<2	48	0.0		0.0	0.00	6852.14
	1/8/2014	10:48	1/8/2014 10:48	46	35	33.5	<2	52	0.0		0.0	0.00	6852.14
	1/8/2014	12:03	1/8/2014 12:03	45	34	33	<2	60	0.0		0.0	0.00	6852.14
	1/8/2014	13:20	1/8/2014 13:20	52	34	33	<2	58	0.0		0.0	0.00	6852.14
	1/8/2014	14:25	1/8/2014 14:25	50	34	33	<2	56	0.0		0.0	0.00	6852.14
	1/8/2014	16:25	1/8/2014 16:25	50	34	33	<2	53	0.0		0.0	0.00	6852.14
	1/8/2014	21:10	1/8/2014 21:10	55	32.5	32	<2	50	0.0		0.0	0.00	6852.14
	1/8/2014	21:11	1/8/2014 21:11	55	34	33.5	4.5	50	9.5		4.8	0.54	6852.68
	1/9/2014	7:09	1/9/2014 7:09	54	34	34	5	54	10.5		5997.8	686.15	7538.83
	1/9/2014	8:24	1/9/2014 8:24	52	33	34.5	5	54	10.4		786.1	89.93	7628.76
	1/9/2014	8:25	1/9/2014 8:25							Valve shut	10.4	1.19	7629.95
	1/9/2014	8:27	1/9/2014 8:27			29.5							7629.95
SW-52 Event 7	1/13/2014	7:50	1/13/2014 7:50	55	31	32.5	4.5	48	9.2		0.0	0.00	7629.95
	1/13/2014	7:51	1/13/2014 7:51	55	33	32	5.8	48	12.2		10.7	1.22	7631.18
	1/13/2014	7:52	1/13/2014 7:52	55	32	34	5	48	10.4		11.3	1.29	7632.47
	1/13/2014	8:42	1/13/2014 8:42	47	32	34.2	5	52	10.3		517.8	59.24	7691.71
	1/13/2014	9:43	1/13/2014 9:43	45	32	34.2	5	60	10.3		628.0	71.84	7763.55
	1/13/2014	11:04	1/13/2014 11:04	45	32	34.2	5	71	10.1		826.0	94.49	7858.04
	1/13/2014	12:05	1/13/2014 12:05	48	32	34.2	5	72	10.1		618.4	70.74	7928.78
	1/13/2014	13:07	1/13/2014 13:07	45	32	34	5	74	10.1		627.6	71.80	8000.58
	1/13/2014	14:34	1/13/2014 14:34	42	32.5	34	5	72	10.2		883.0	101.02	8101.60
	1/13/2014	15:51	1/13/2014 15:51	40	32	34	5	70	10.2		783.1	89.58	8191.18
	1/13/2014	16:37	1/13/2014 16:37	40	32	33.8	5	70	10.2		467.0	53.42	8244.61
	1/13/2014	17:08	1/13/2014 17:08	50	32	33.5	5.2	70	10.6		321.0	36.72	8281.33
	1/13/2014	21:47	1/13/2014 21:47	50	32	33.5	5.9	63	12.1		3155.6	361.00	8642.32
	1/14/2014	7:58	1/14/2014 7:58	50	33	33.5	6.5	62	13.4	Valve shut	7792.8	891.50	9533.83
	1/14/2014	8:01	1/14/2014 8:01			28							9533.83

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
SW-52 Event 8	1/20/2014	7:51	1/20/2014 7:51	55	32	34	<2	40	0.0		0.0	0.00	9533.83
	1/20/2014	8:25	1/20/2014 8:25	52	30	32.5	<2	50	0.0		0.0	0.00	9533.83
	1/20/2014	8:26	1/20/2014 8:26	52	32	33.5	3	50	6.2		3.1	0.36	9534.18
	1/20/2014	9:08	1/20/2014 9:08	50	32	33.5	3.5	60	7.2		281.2	32.17	9566.35
	1/20/2014	10:20	1/20/2014 10:20	49	32	33.5	3.5	66	7.1		515.2	58.94	9625.29
	1/20/2014	11:22	1/20/2014 11:22	49	32	33.5	3.5	70	7.1		441.5	50.50	9675.80
	1/20/2014	13:05	1/20/2014 13:05	50	32	33.5	3.5	72	7.1		731.3	83.66	9759.45
	1/20/2014	14:10	1/20/2014 14:10	51	31.5	33.2	3.7	72	7.5		472.9	54.10	9813.55
	1/20/2014	15:21	1/20/2014 15:21	53	31.5	33.2	3.8	73	7.7		536.3	61.36	9874.90
	1/20/2014	16:40	1/20/2014 16:40	55	31.5	33.2	3.9	74	7.8	Valve shut	612.1	70.02	9944.93
	1/20/2014	16:41	1/20/2014 16:41			28							9944.93
SW-52 Event 9	1/22/2014	7:57	1/22/2014 7:57	58	32	33.2	5.5	38	11.5				9944.93
	1/22/2014	8:41	1/22/2014 8:41	53	31.5	33.2	5.5	44	11.4		504.6	57.72	10002.65
	1/22/2014	9:42	1/22/2014 9:42	47	31.5	33.2	4.5	47	9.3		631.3	72.22	10074.87
	1/22/2014	10:50	1/22/2014 10:50	45	31.5	33.2	4.5	50	9.3		631.3	72.23	10147.10
	1/22/2014	11:53	1/22/2014 11:53	43	31.5	33.2	4.5	54	9.2		582.8	66.68	10213.78
	1/22/2014	12:25	1/22/2014 12:25	42	31.5	33.2	4.5	55	9.2		295.3	33.78	10247.56
	1/22/2014	12:26	1/22/2014 12:26							Valve shut	9.2	1.06	10248.61
	1/22/2014	12:27	1/22/2014 12:27			29							10248.61
	1/22/2014	12:27	1/22/2014 12:27	42	31.5	33.2	4.5	55	9.2	Restart	0.0	0.00	10248.61
	1/22/2014	13:11	1/22/2014 13:11	47	31.5	33.2	4.5	55	9.2		405.8	46.43	10295.04
	1/22/2014	14:06	1/22/2014 14:06	46	31.5	33.2	4.5	54	9.2		507.5	58.06	10353.10
	1/22/2014	15:13	1/22/2014 15:13	53	31.5	33.2	4.5	55	9.2		618.3	70.73	10423.84
	1/22/2014	16:10	1/22/2014 16:10	51	31.5	33.2	4.5	56	9.2		525.5	60.11	10483.95
	1/22/2014	16:11	1/22/2014 16:11							Valve shut	9.2	1.05	10485.00
SW-52 Event 10	1/28/2014	7:34	1/28/2014 7:34										10485.00
	1/28/2014	7:35	1/28/2014 7:35	55	34	35	<2	57	0.0		0.0	0.00	10485.00
	1/28/2014	7:37	1/28/2014 7:37	55	33	35	<2	57	0.0		0.0	0.00	10485.00
	1/28/2014	8:08	1/28/2014 8:08	55	32.5	34.5	<2	57	0.0		0.0	0.00	10485.00
	1/28/2014	8:30	1/28/2014 8:30	55	32.5	34.5	3	57	6.2		68.2	7.81	10492.81
	1/28/2014	10:04	1/28/2014 10:04	53	32.5	34.5	3	57	6.2		583.2	66.71	10559.52
	1/28/2014	11:09	1/28/2014 11:09	53	32.5	34.5	3	55	6.2		403.6	46.18	10605.70
	1/28/2014	11:40	1/28/2014 11:40	51	32.5	34.5	3	54	6.2		192.8	22.06	10627.76
	1/28/2014	13:00	1/28/2014 13:00	50	32.5	34.5	3	54	6.2		497.8	56.95	10684.70
	1/28/2014	14:02	1/28/2014 14:02	50	32.5	34.5	3	53	6.2		386.0	44.16	10728.86
	1/28/2014	14:57	1/28/2014 14:57	50	32.5	34.5	3	52	6.2		342.8	39.21	10768.07
	1/28/2014	16:48	1/28/2014 16:48	55	32.5	34.5	3	50	6.2		692.8	79.26	10847.33
	1/28/2014	16:49	1/28/2014 16:49							Valve shut	6.2	0.71	10848.05
	1/28/2014	16:50	1/28/2014 16:50			29							10848.05
SW-52 Event 11	1/29/2014	8:03	1/29/2014 8:03										10848.05
	1/29/2014	8:04	1/29/2014 8:04	55	32	32	6	42	12.5		12.5	1.43	10849.48
	1/29/2014	8:59	1/29/2014 8:59	50	32	32	5.5	42	11.5		660.5	75.56	10925.04
	1/29/2014	9:00	1/29/2014 9:00	50	35	35	7.5	42	16.2		13.8	1.58	10926.62
	1/29/2014	10:24	1/29/2014 10:24	50	34.5	35	6	42	12.9		1219.5	139.52	11066.14
	1/29/2014	11:50	1/29/2014 11:50	50	35	35	6	42	12.9		1109.5	126.93	11193.07
	1/29/2014	12:22	1/29/2014 12:22	50	35	35	6	42	12.9		413.9	47.35	11240.42
	1/29/2014	13:50	1/29/2014 13:50	50	35	35.5	6	42	12.9		1138.3	130.22	11370.64
	1/29/2014	14:59	1/29/2014 14:59	49	35	35.5	6	42	12.9		892.5	102.10	11472.74
	1/29/2014	16:34	1/29/2014 16:34	56	35	35.5	6	42	12.9		1228.8	140.58	11613.32
	1/29/2014	16:35	1/29/2014 16:35							Valve shut	12.9	1.48	11614.80
	1/29/2014	16:36	1/29/2014 16:36			29.5							11614.80
SW-52 Event 12	1/30/2014	7:32	1/30/2014 7:32	56	34	34	10	40	21.4				11614.80
	1/30/2014	7:33	1/30/2014 7:33	53	34.5	34.5	10	40	21.5		21.4	2.45	11617.25

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	1/30/2014	7:53	1/30/2014 7:53	52	35	35	9	42	19.4		408.9	46.78	11664.03
	1/30/2014	8:56	1/30/2014 8:56	50	35	35	8.5	42	18.3		1188.4	135.95	11799.98
	1/30/2014	10:02	1/30/2014 10:02	50	35	35	8.5	44	18.3		1208.2	138.21	11938.20
	1/30/2014	10:56	1/30/2014 10:56	50	35	35	8	48	17.1		956.5	109.42	12047.62
	1/30/2014	12:59	1/30/2014 12:59	55	35	35	8	48	17.1		2108.2	241.18	12288.79
	1/30/2014	13:38	1/30/2014 13:38							Valve shut	668.4	76.47	12365.26
	1/30/2014	13:40	1/30/2014 13:40			27							12365.26
SW-52 Event 13	2/4/2014	9:54	2/4/2014 9:54	55	34	35	<2	61	0.0				12365.26
	2/4/2014	9:58	2/4/2014 9:58	55	34	35	<2	61	0.0		0.0	0.00	12365.26
	2/4/2014	10:23	2/4/2014 10:23	54	33.2	35	<2	63	0.0		0.0	0.00	12365.26
	2/4/2014	11:39	2/4/2014 11:39	52	33	35	<2	66	0.0		0.0	0.00	12365.26
	2/4/2014	12:46	2/4/2014 12:46	50	32.5	34.2	<2	67	0.0		0.0	0.00	12365.26
	2/4/2014	12:48	2/4/2014 12:48	50	33.5	35.2	2	67	4.1		4.1	0.47	12365.74
	2/4/2014	13:26	2/4/2014 13:26	50	33.5	35.2	2	67	4.1		157.3	17.99	12383.73
	2/4/2014	14:33	2/4/2014 14:33	48	33.5	35.2	2.8	64	5.8		333.3	38.13	12421.86
	2/4/2014	15:32	2/4/2014 15:32	50	33.5	35.2	3	62	6.2		355.5	40.67	12462.53
	2/4/2014	16:27	2/4/2014 16:27	50	33.5	35.2	3.5	60	7.3		372.1	42.57	12505.10
	2/4/2014	17:51	2/4/2014 17:51	55	33.5	35.2	3.8	59	7.9		639.2	73.13	12578.23
	2/4/2014	17:52	2/4/2014 17:52			28				Valve shut	7.9	0.91	12579.14
SW-52 Event 14	2/6/2014	8:20	2/6/2014 8:20	55	31	32.5	<2	50	0.0				12579.14
	2/6/2014	8:21	2/6/2014 8:21	55	32.5	34	<2	50	0.0		0.0	0.00	12579.14
	2/6/2014	8:50	2/6/2014 8:50	53	32	34	<2	55	0.0		0.0	0.00	12579.14
	2/6/2014	10:53	2/6/2014 10:53	49	32	34	<2	62	0.0		0.0	0.00	12579.14
	2/6/2014	10:55	2/6/2014 10:55	49	33	35	2.5	62	5.2		5.2	0.59	12579.73
	2/6/2014	11:16	2/6/2014 11:16	48	33	35	3	64	6.2		119.3	13.65	12593.38
	2/6/2014	12:17	2/6/2014 12:17	47	33	35	3.7	66	7.6		421.4	48.21	12641.59
	2/6/2014	14:14	2/6/2014 14:14	46	33	35	4	65	8.2		928.6	106.23	12747.82
	2/6/2014	15:25	2/6/2014 15:25	47	33	34.8	4.2	60	8.7		601.9	68.86	12816.68
	2/6/2014	16:42	2/6/2014 16:42	46	33	34.8	4.5	56	9.4		695.7	79.59	12896.27
	2/6/2014	17:25	2/6/2014 17:25	55	33	35	4.5	55	9.4		402.9	46.09	12942.37
	2/7/2014	7:50	2/7/2014 7:50	50	32	34	7.8	48	16.2		11056.5	1264.87	14207.23
	2/7/2014	7:53	2/7/2014 7:53			28				Valve shut	48.6	5.56	14212.79
SW-52 Event 15	2/7/2014	10:35	2/7/2014 10:35	43	32	30	7	58	14.4				14212.79
	2/7/2014	10:37	2/7/2014 10:37		35	34.2	11	58	23.3		37.7	4.31	14217.10
	2/7/2014	11:35	2/7/2014 11:35	42	35.5	35	8	62	17.0		1169.1	133.74	14350.85
	2/7/2014	13:24	2/7/2014 13:24	45	35.5	35	7.5	64	15.9		1791.7	204.97	14555.82
	2/7/2014	14:35	2/7/2014 14:35	47	35.5	35	8	62	17.0		1167.1	133.52	14689.34
	2/7/2014	15:49	2/7/2014 15:49		35.5	35	8.2	60	17.4		1273.9	145.73	14835.06
	2/7/2014	16:47	2/7/2014 16:47		35.5	34.5	8.8	58	18.8		1049.9	120.10	14955.17
	2/7/2014	17:39	2/7/2014 17:39	55	35.5	34.5	9	56	19.2		987.5	112.97	15068.14
	2/7/2014	17:42	2/7/2014 17:42			27				Valve shut	57.7	6.60	15074.74
SW-52 Event 16	2/10/2014	8:46	2/10/2014 8:46	53	28	28	6	53	11.8				15074.74
	2/10/2014	8:48	2/10/2014 8:48	53	33	32.5	11	53	23.0		34.8	3.98	15078.72
	2/10/2014	9:37	2/10/2014 9:37	47	33.5	33.5	9.5	63	19.7		1046.1	119.68	15198.39
	2/10/2014	11:00	2/10/2014 11:00	46	33.5	33.5	8.2	78	16.8		1515.8	173.40	15371.80
	2/10/2014	13:36	2/10/2014 13:36	45	33.5	33.5	8	84	16.3		2579.6	295.11	15666.91
	2/10/2014	15:08	2/10/2014 15:08	44	33.5	33	8	84	16.3		1498.2	171.39	15838.30
	2/10/2014	16:58	2/10/2014 16:58	44	33.5	33	8	73	16.5		1800.8	206.02	16044.32
	2/10/2014	17:33	2/10/2014 17:33	48	33.5	33	7.7	70	15.9		566.0	64.75	16109.07
	2/10/2014	17:36	2/10/2014 17:36							Valve shut	47.7	5.45	16114.52
SW-52 Event 17	2/11/2014	8:00	2/11/2014 8:00	55	34	34	<2	54	0.0				16114.52
	2/11/2014	8:02	2/11/2014 8:02	53	34	34	10	54	21.1		21.1	2.41	16116.93
	2/11/2014	8:40	2/11/2014 8:40	53	34	34	8.5	56	17.9		740.1	84.67	16201.60

SW-52 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	2/11/2014	9:28	2/11/2014 9:28	49	34.2	34	8	61	16.8		831.7	95.14	16296.74
	2/11/2014	10:45	2/11/2014 10:45	50	34.2	34	7.2	67	15.0		1223.7	139.99	16436.74
	2/11/2014	11:57	2/11/2014 11:57	50	34.2	34	7.2	66	15.0		1081.2	123.69	16560.42
	2/11/2014	12:58	2/11/2014 12:58	45	34.2	34	6.8	65	14.2		891.4	101.98	16662.40
	2/11/2014	14:02	2/11/2014 14:02	45	34.2	34	6.8	63	14.2		909.9	104.09	16766.49
	2/11/2014	16:55	2/11/2014 16:55	44	34.2	34	6.8	53	14.4		2474.5	283.08	17049.57
	2/11/2014	17:44	2/11/2014 17:44	55	34.2	34	6.8	51	14.4		705.1	80.66	17130.24
	2/12/2014	8:37	2/12/2014 8:37	45	34	33	10	47	21.2		15908.9	1819.98	18950.21
	2/12/2014	11:42	2/12/2014 11:42	45	33.5	32.5	11	48	23.2		4109.6	470.13	19420.35
	2/12/2014	14:03	2/12/2014 14:03	48	33.5	32.5	11	49	23.2		3269.8	374.07	19794.41
	2/12/2014	14:58	2/12/2014 14:58	48	33.5	32.5	10.5	46	22.2		1247.7	142.74	19937.15
	2/12/2014	15:58	2/12/2014 15:58	48	33.5	32.5	10.2	45	21.6		1313.2	150.23	20087.39
	2/12/2014	16:57	2/12/2014 16:57	48	33.5	32.5	10.2	45	21.6		1273.3	145.66	20233.05
	2/12/2014	17:57	2/12/2014 17:57	48	33.5	32.5	10.4	47	22.0		1306.2	149.43	20382.48
	2/13/2014	7:16	2/13/2014 7:16	50	34	32.5	10.4	43	22.2		17628.1	2016.65	22399.13
	2/13/2014	8:03	2/13/2014 8:03	47	33.8	32.5	10.4	43	22.1		1040.7	119.06	22518.19
	2/13/2014	9:08	2/13/2014 9:08	49	33.8	32.5	10.6	44	22.5		1450.9	165.98	22684.17
	2/13/2014	9:57	2/13/2014 9:57	49	33.8	32.5	10.8	44	22.9		1114.0	127.44	22811.61
	2/13/2014	10:37	2/13/2014 10:37	49	33.8	32.5	10.9	44	23.2		922.1	105.49	22917.10
	2/13/2014	11:07	2/13/2014 11:07	49	33.8	32.5	10.9	45	23.1		694.4	79.44	22996.54
	2/13/2014	11:38	2/13/2014 11:38	49	33.8	32.5	11	46	23.3		720.1	82.38	23078.92
	2/13/2014	12:08	2/13/2014 12:08	49	33.8	32.5	11	50	23.2		698.3	79.88	23158.80
	2/13/2014	12:38	2/13/2014 12:38	49	33.8	32.5	11	51	23.2		696.5	79.68	23238.48
	2/13/2014	13:08	2/13/2014 13:08	49	33.8	32.5	11	52	23.2		695.8	79.60	23318.07
	2/13/2014	14:10	2/13/2014 14:10	49	33.5	32.5	11	58	23.0		1430.6	163.66	23481.73
	2/13/2014	15:08	2/13/2014 15:08	49	33.5	32.5	11	60	22.9		1330.8	152.24	23633.98
	2/13/2014	15:21	2/13/2014 15:21	49	33.5	32.5	11	60	22.9	Valve shut	298.0	34.09	23668.07
	2/13/2014	15:22	2/13/2014 15:22			26							23668.07
Note: a red value, i.e. 75 °F, indicates that value was interpolated from field data											Total CO_2 Mass (lbs):		23668.07

SW-53 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
SW-53 Event 1	11/21/2013	9:47	11/21/2013 9:47	54	27			66	0.0				
	11/21/2013	9:49	11/21/2013 9:49		31	30	<2		0.0		0.0	0.00	0.00
	11/21/2013	9:50	11/21/2013 9:50		32	33	<2		0.0		0.0	0.00	0.00
	11/21/2013	10:02	11/21/2013 10:02	55	34	33	<2	68	0.0		0.0	0.00	0.00
	11/21/2013	10:34	11/21/2013 10:34	52.5	33	32.5	<2	68	0.0		0.0	0.00	0.00
	11/21/2013	13:30	11/21/2013 13:30	50	32.5	32.5	<2	74	0.0		0.0	0.00	0.00
	11/21/2013	13:31	11/21/2013 13:31	51	35	35	<2	74	0.0		0.0	0.00	0.00
	11/21/2013	17:17	11/21/2013 17:17		36		<2		0.0		0.0	0.00	0.00
	11/21/2013	17:18	11/21/2013 17:18		37	35.5	<2		0.0		0.0	0.00	0.00
	11/21/2013	17:19	11/21/2013 17:19							Valve shut			0.00
	11/21/2013	17:20	11/21/2013 17:20			18							0.00
SW-53 Event 2	11/25/2013	8:42	11/25/2013 8:42	55	27			52					0.00
	11/25/2013	8:43	11/25/2013 8:43		32	32	<2	52	0.0				0.00
	11/25/2013	8:45	11/25/2013 8:45		36	36	<2	52	0.0		0.0	0.00	0.00
	11/25/2013	9:18	11/25/2013 9:18		35	35	<2	56	0.0		0.0	0.00	0.00
	11/25/2013	10:18	11/25/2013 10:18		35	34.5	<2	63	0.0		0.0	0.00	0.00
	11/25/2013	10:19	11/25/2013 10:19		36	36	<2	63	0.0		0.0	0.00	0.00
	11/25/2013	11:19	11/25/2013 11:19	55	36	36	<2	60	0.0		0.0	0.00	0.00
	11/25/2013	12:02	11/25/2013 12:02		36	36	<2	62	0.0		0.0	0.00	0.00
	11/25/2013	12:03	11/25/2013 12:03							Valve shut	0.0	0.00	0.00
	11/25/2013	12:04	11/25/2013 12:04			24.5					0.0	0.00	0.00
	11/25/2013	12:38	11/25/2013 12:38	48	30			64			0.0	0.00	0.00
	11/25/2013	12:39	11/25/2013 12:39		34	35	<2	64	0.0	Restart	0.0	0.00	0.00
	11/25/2013	13:48	11/25/2013 13:48		34	34	<2	64	0.0		0.0	0.00	0.00
	11/25/2013	13:51	11/25/2013 13:51							Valve shut	0.0	0.00	0.00
	11/25/2013	13:52	11/25/2013 13:52			29							0.00
SW-53 Event 3	12/4/2013	8:27	12/4/2013 8:27										0.00
	12/4/2013	8:28	12/4/2013 8:28	50	36	36	<2	71	0.0		0.0	0.00	0.00
	12/4/2013	8:30	12/4/2013 8:30	50	35	34	<2	71	0.0		0.0	0.00	0.00
	12/4/2013	8:51	12/4/2013 8:51	50	35	33.5	<2	74	0.0		0.0	0.00	0.00
	12/4/2013	9:15	12/4/2013 9:15	50	35	33	<2	76	0.0		0.0	0.00	0.00
	12/4/2013	10:07	12/4/2013 10:07	49	34	32.5	<2	78	0.0		0.0	0.00	0.00
	12/4/2013	10:08	12/4/2013 10:08	49	36	35	<2	78	0.0		0.0	0.00	0.00
	12/4/2013	11:08	12/4/2013 11:08	47	36	35	<2	83	0.0		0.0	0.00	0.00
	12/4/2013	12:34	12/4/2013 12:34	52	36	35	<2	87	0.0		0.0	0.00	0.00
	12/4/2013	12:35	12/4/2013 12:35							Valve shut	0.0	0.00	0.00
	12/4/2013	12:36	12/4/2013 12:36										0.00
SW-53 Event 4	12/11/2013	14:49	12/11/2013 14:49		34		<2	66	0.0				0.00
	12/11/2013	17:17	12/11/2013 17:17			35	<2		0.0				0.00
	12/11/2013	22:12	12/11/2013 22:12	55	34		<2	60	0.0				0.00
	12/12/2013	7:50	12/12/2013 7:50	52	34	34	3	50	6.3		1834.6	209.88	209.88
	12/12/2013	11:26	12/12/2013 11:26	45	34	34	3.5	68	7.3		1471.2	168.30	378.18
	12/12/2013	14:40	12/12/2013 14:40	48	35	34	4	70	8.4		1518.6	173.73	551.91
	12/12/2013	15:14	12/12/2013 15:14	45	34	34	4	70	8.3		283.5	32.44	584.35
	12/12/2013	16:34	12/12/2013 16:34	46	34	34	4	66	8.3		665.0	76.08	660.43
	12/12/2013	17:38	12/12/2013 17:38	55	34	34	4	56	8.4		535.7	61.29	721.72
	12/12/2013	22:12	12/12/2013 22:12		34	34	5	46	10.6		2608.0	298.36	1020.07
	12/13/2013	9:33	12/13/2013 9:33		33	33	6.5	63	13.4		8191.3	937.08	1957.16
	12/13/2013	12:00	12/13/2013 12:00	45	32	33	6	70	12.2		1882.7	215.38	2172.54
	12/13/2013	14:29	12/13/2013 14:29	45	32	33	6.5	68	13.2		1892.8	216.53	2389.07
	12/13/2013	14:30	12/13/2013 14:30							Valve shut	13.2	1.51	2390.58
	12/13/2013	14:31	12/13/2013 14:31			25							2390.58
SW-53 Event 5	12/16/2013	17:27	12/16/2013 17:27	45	34	33	<2	58	0.0		0.0	0.00	2390.58

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	12/16/2013	17:46	12/16/2013 17:46	50	34	32	<2	54	0.0		0.0	0.00	2390.58
	12/16/2013	22:10	12/16/2013 22:10	50	32	30.5	<2	44	0.0		0.0	0.00	2390.58
	12/17/2013	7:54	12/17/2013 7:54	45	32	31	<2	46	0.0		0.0	0.00	2390.58
	12/17/2013	7:56	12/17/2013 7:56							Valve shut	0.0	0.00	2390.58
	12/17/2013	7:57	12/17/2013 7:57			24							2390.58
SW-53 Event 6	12/17/2013	11:33	12/17/2013 11:33	37	35	33.5	6	73	12.5				2390.58
	12/17/2013	13:01	12/17/2013 13:01	50	34	34	10	75	20.6		1459.8	167.00	2557.58
	12/17/2013	13:02	12/17/2013 13:02	50	32	33.5	8	75	16.2		18.4	2.11	2559.69
	12/17/2013	14:15	12/17/2013 14:15	42	35	34.5	4	76	8.3		894.2	102.29	2661.98
	12/17/2013	15:08	12/17/2013 15:08	45	34	34	5	75	10.3		494.3	56.55	2718.53
	12/17/2013	16:22	12/17/2013 16:22	45	34	34	5	74	10.3		764.1	87.41	2805.94
	12/17/2013	22:05	12/17/2013 22:05	45	34	35	6	54	12.6		3940.2	450.76	3256.70
	12/18/2013	12:35	12/18/2013 12:35	50	34	33.5	7.5	69	15.6		12273.9	1404.13	4660.83
	12/18/2013	14:25	12/18/2013 14:25	47	34	33.5	8	76	16.5		1763.7	201.77	4862.60
	12/18/2013	16:42	12/18/2013 16:42	45	34	33	8	70	16.6		2266.6	259.30	5121.89
	12/18/2013	18:08	12/18/2013 18:08	55	33	33	9	30	19.2		1540.9	176.28	5298.17
	12/18/2013	18:09	12/18/2013 18:09			24				Valve shut	19.2	2.20	5300.38
SW-53 Event 7	1/10/2014	9:35	1/10/2014 9:35		30	30	<2	66	0.0				5300.38
	1/10/2014	9:37	1/10/2014 9:37		32.5	32.5	<2	66	0.0				5300.38
	1/10/2014	9:45	1/10/2014 9:45	45	32.5	32.5	<2	66	0.0				5300.38
	1/10/2014	10:40	1/10/2014 10:40	42	32	32.5	<2	70	0.0				5300.38
	1/10/2014	12:20	1/10/2014 12:20	40	30.5	31	<2	72	0.0				5300.38
	1/10/2014	13:15	1/10/2014 13:15	45	30	31	<2	69	0.0				5300.38
	1/10/2014	14:13	1/10/2014 14:13	42.5	30	30	<2	70	0.0				5300.38
	1/10/2014	16:10	1/10/2014 16:10	45	30	30	<2	70	0.0				5300.38
	1/10/2014	16:17	1/10/2014 16:17	45	33	32.5	4	70	8.2		28.7	3.29	5303.66
	1/10/2014	17:47	1/10/2014 17:47	45	33	33	3.5	67	7.2		693.6	79.35	5383.01
	1/10/2014	21:50	1/10/2014 21:50	44	33	33	4	66	8.2		1876.7	214.70	5597.71
	1/11/2014	8:50	1/11/2014 8:50	42	33	33	5	66	10.3		6119.6	700.08	6297.79
	1/11/2014	10:50	1/11/2014 10:50	38	33	33	5.8	73	11.9		1330.3	152.18	6449.97
	1/11/2014	11:30	1/11/2014 11:30	38	33	33	6	75	12.3		482.5	55.19	6505.16
	1/11/2014	11:32	1/11/2014 11:32							Valve shut	24.5	2.80	6507.97
	1/11/2014	11:46	1/11/2014 11:46			22							6507.97
SW-53 Event 8	1/13/2014	12:10	1/13/2014 12:10	48	26	26	<2	73	0.0		0.0	0.00	6507.97
	1/13/2014	12:11	1/13/2014 12:11	48	32	31.5	<2	73	0.0		0.0	0.00	6507.97
	1/13/2014	13:08	1/13/2014 13:08	45	30.5	30.5	<2	74	0.0		0.0	0.00	6507.97
	1/13/2014	13:09	1/13/2014 13:09	45	32.5	32	<2	74	0.0		0.0	0.00	6507.97
	1/13/2014	14:33	1/13/2014 14:33	42	32.5	32	<2	72	0.0		0.0	0.00	6507.97
	1/13/2014	14:36	1/13/2014 14:36	42	35	33.5	3	72	6.3		9.4	1.08	6509.05
	1/13/2014	15:52	1/13/2014 15:52	40	35	33.5	3.5	70	7.3		517.2	59.16	6568.21
	1/13/2014	16:38	1/13/2014 16:38	40	34.5	33.5	3.7	70	7.7		346.1	39.60	6607.80
	1/13/2014	17:09	1/13/2014 17:09	50	34.5	33.5	3.7	70	7.7		239.1	27.36	6635.16
	1/13/2014	21:49	1/13/2014 21:49	50	34	33	5	63	10.4		2541.9	290.80	6925.96
	1/14/2014	8:00	1/14/2014 8:00	50	32	32.5	6.5	62	13.3		7254.0	829.86	7755.81
	1/14/2014	8:02	1/14/2014 8:02			24				Valve shut	26.6	3.04	7758.86
SW-53 Event 9	1/15/2014	8:06	1/15/2014 8:06	55	32.5	33	5	48	10.4		0.0	0.00	7758.86
	1/15/2014	8:48	1/15/2014 8:48	52	32.5	33	4	56	8.3		393.0	44.96	7803.82
	1/15/2014	9:45	1/15/2014 9:45	45	33	35	3.8	64	7.8		459.6	52.57	7856.39
	1/15/2014	11:12	1/15/2014 11:12	42	33	35	4.5	69	9.2		743.4	85.05	7941.44
	1/15/2014	11:58	1/15/2014 11:58	42	32	34	4.5	70	9.1		422.8	48.37	7989.80
	1/15/2014	14:00	1/15/2014 14:00	49	32	34	5	69	10.2		1177.2	134.68	8124.48
	1/15/2014	14:28	1/15/2014 14:28	48	32	34	5.5	70	11.2		298.6	34.16	8158.64
	1/15/2014	16:25	1/15/2014 16:25	50	32	34	5.9	68	12.0		1355.5	155.06	8313.70

SW-53 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	1/15/2014	16:26	1/15/2014 16:26			26				Valve shut	12.0	1.37	8315.08
SW-53 Event 10	1/17/2014	7:18	1/17/2014 7:18	57	31	33	<2	40	0.0				8315.08
	1/17/2014	8:00	1/17/2014 8:00	51	30	32.5	<2	44	0.0				8315.08
	1/17/2014	9:14	1/17/2014 9:14	47	30	32.5	<2	57	0.0				8315.08
	1/17/2014	10:25	1/17/2014 10:25	47	30	32.5	<2	62	0.0		0	0.00	8315.08
	1/17/2014	11:33	1/17/2014 11:33	45	30	32.5	2	68	4.0		135.3	15.48	8330.56
	1/17/2014	12:24	1/17/2014 12:24	45	30	32.5	2.5	70	5.0		228.1	26.09	8356.65
	1/17/2014	12:57	1/17/2014 12:57	45	30	32.5	2.5	70	5.0		163.8	18.74	8375.39
	1/17/2014	14:09	1/17/2014 14:09	45	30	32.5	3	70	6.0		393.2	44.98	8420.37
	1/17/2014	15:19	1/17/2014 15:19	47	30	32.5	3	70	6.0	Valve shut	417.0	47.71	8468.08
	1/17/2014	15:54	1/17/2014 15:54			22							8468.08
SW-53 Event 11	1/23/2014	7:39	1/23/2014 7:39	58	31.5	31.5	<2	33	0.0				8468.08
	1/23/2014	8:29	1/23/2014 8:29	52	31	30.5	<2	37	0.0		0.0	0.00	8468.08
	1/23/2014	9:12	1/23/2014 9:12	48	31	30.5	<2	45	0.0		0.0	0.00	8468.08
	1/23/2014	9:13	1/23/2014 9:13	48	33	33	<2	45	0.0		0.0	0.00	8468.08
	1/23/2014	9:59	1/23/2014 9:59	47	33	33	<2	48	0.0		0.0	0.00	8468.08
	1/23/2014	11:01	1/23/2014 11:01	42.5	33	33	<2	52	0.0		0.0	0.00	8468.08
	1/23/2014	11:02	1/23/2014 11:02	42.5	34	33.8	3	52	6.3		3.2	0.36	8468.44
	1/23/2014	11:52	1/23/2014 11:52	40	34	33.8	3	54	6.3		316.4	36.20	8504.64
	1/23/2014	12:38	1/23/2014 12:38	44	34	33.8	3	60	6.3		290.0	33.17	8537.81
	1/23/2014	14:12	1/23/2014 14:12	50	33.5	33.8	3.2	58	6.7		609.4	69.71	8607.52
	1/23/2014	15:44	1/23/2014 15:44	49	33.5	33.5	3.8	57	7.9		672.7	76.96	8684.48
	1/23/2014	16:19	1/23/2014 16:19	50	33.5	33.2	3.9	56	8.2		281.8	32.24	8716.72
	1/23/2014	16:20	1/23/2014 16:20							Valve shut	8.2	0.93	8717.65
SW-53 Event 12	2/11/2014	9:49	2/11/2014 9:49	53	33	33.5	<2	63	0.0				8717.65
	2/11/2014	10:20	2/11/2014 10:20	53	32.2	33	<2	66	0.0		0.0	0.00	8717.65
	2/11/2014	11:42	2/11/2014 11:42	53	31.5	33	<2	66	0.0		0.0	0.00	8717.65
	2/11/2014	12:39	2/11/2014 12:39	48	32	33	<2	66	0.0		0.0	0.00	8717.65
	2/11/2014	12:40	2/11/2014 12:40	48	33	34	2	66	4.1				8717.65
	2/11/2014	13:58	2/11/2014 13:58	46	33	34	2	64	4.1		321.7	36.81	8754.46
	2/11/2014	16:42	2/11/2014 16:42	46	33	34	3	56	6.2		850.5	97.30	8851.76
	2/11/2014	17:37	2/11/2014 17:37	57	33	34	3	54	6.3	Valve shut	343.7	39.32	8891.08
	2/11/2014	17:38	2/11/2014 17:38			26							8891.08
SW-53 Event 13	2/12/2014	8:04	2/12/2014 8:04	55	31	32	<2	49	0.0				8891.08
	2/12/2014	8:44	2/12/2014 8:44	47	30.5	31.5	<2	49	0.0		0.0	0.00	8891.08
	2/12/2014	8:45	2/12/2014 8:45	47	32	33	<2	49	0.0		0.0	0.00	8891.08
	2/12/2014	10:21	2/12/2014 10:21	47	32	33	<2	51	0.0		0.0	0.00	8891.08
	2/12/2014	10:22	2/12/2014 10:22	47	33.5	34	2.5	51	5.3		2.6	0.30	8891.38
	2/12/2014	11:50	2/12/2014 11:50	45	33.5	34	3.7	50	7.8		574.0	65.67	8957.05
	2/12/2014	13:56	2/12/2014 13:56	50	33.5	34	4	49	8.4		1021.7	116.88	9073.93
	2/12/2014	14:51	2/12/2014 14:51	50	33.5	34	4	49	8.4		463.6	53.03	9126.96
	2/12/2014	15:51	2/12/2014 15:51	50	33.5	34	4.2	47	8.9		518.9	59.36	9186.32
	2/12/2014	16:51	2/12/2014 16:51	50	33.5	34	4.2	47	8.9		532.1	60.87	9247.19
	2/12/2014	17:51	2/12/2014 17:51	50	33.5	34	4.3	48	9.1		538.1	61.56	9308.75
	2/13/2014	7:09	2/13/2014 7:09	49	33.5	34	6	45	12.7		8684.1	993.46	10302.22
	2/13/2014	7:57	2/13/2014 7:57	51	33.5	34	6	44	12.7		609.7	69.75	10371.96
	2/13/2014	9:03	2/13/2014 9:03	52	33.5	34	6	45	12.7		838.3	95.90	10467.86
	2/13/2014	9:51	2/13/2014 9:51	51	33.5	34	6.1	45	12.9		614.4	70.29	10538.16
	2/13/2014	10:31	2/13/2014 10:31	51	33.5	34	6.1	46	12.9		516.0	59.03	10597.18
	2/13/2014	11:01	2/13/2014 11:01	51	33.5	34	6.2	46	13.1		390.0	44.61	10641.80
	2/13/2014	11:31	2/13/2014 11:31	51	33.5	34	6.2	47	13.1		392.9	44.95	10686.75
	2/13/2014	12:01	2/13/2014 12:01	51	33.5	34	6.2	50	13.1		392.1	44.86	10731.61
	2/13/2014	12:31	2/13/2014 12:31	51	33.5	34	6.3	53	13.2		394.1	45.08	10776.69

SW-53 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	2/13/2014	13:01	2/13/2014 13:01	51	33.5	34	6.3	55	13.2		396.2	45.33	10822.02
	2/13/2014	14:02	2/13/2014 14:02	52	33.5	34	6.5	56	13.6		817.2	93.49	10915.50
	2/13/2014	15:01	2/13/2014 15:01	51	33.5	34	6.8	58	14.2		820.0	93.81	11009.31
	2/13/2014	15:18	2/13/2014 15:18			23				Valve shut	241.4	27.61	11036.93
Note: a red value, i.e. 75 °F, indicates that value was interpolated from field data											Total CO_2 Mass (lbs):		11036.93

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
SW-54 Event 1	11/18/2013	14:24	11/18/2013 14:24	52.5	30			79	0.0				
	11/18/2013	14:25	11/18/2013 14:25	55	32	32	<2	79	0.0		0.0	0.00	0.00
	11/18/2013	14:32	11/18/2013 14:32	55	30	30	4	80	7.9		27.5	3.15	3.15
	11/18/2013	14:38	11/18/2013 14:38		29.5	29	7	79.5	13.7		64.7	7.40	10.55
	11/18/2013	14:40	11/18/2013 14:40	55	29.5	29	8	78	15.7		29.4	3.36	13.91
	11/18/2013	14:52	11/18/2013 14:52	55	29.5	28.5	9	79	17.6		199.7	22.85	36.76
	11/18/2013	15:06	11/18/2013 15:06	55	29.5	28	9.5	78	18.6		253.6	29.01	65.77
	11/18/2013	15:54	11/18/2013 15:54	55	29.5	27	11	75	21.6		965.5	110.45	176.22
	11/18/2013	15:55	11/18/2013 15:55	55	31	28	12	75	24.0		22.8	2.61	178.83
	11/18/2013	17:13	11/18/2013 17:13	56	31	28	13.5	71	27.1		1991.6	227.84	406.67
	11/18/2013	17:15	11/18/2013 17:15							Valve shut	54.2	6.20	412.87
	11/18/2013	17:16	11/18/2013 17:16	22	22	15							412.87
SW-54 Event 2	12/3/2013	13:26	12/3/2013 13:26										412.87
	12/3/2013	13:27	12/3/2013 13:27	55	24	27	<2	77	0.0		0.0	0.00	412.87
	12/3/2013	13:28	12/3/2013 13:28		27	28	<2	77	0.0		0.0	0.00	412.87
	12/3/2013	13:36	12/3/2013 13:36	50	25	24	15	77	27.9		111.4	12.75	425.62
	12/3/2013	13:41	12/3/2013 13:41		27.5	25	17	77	32.6		151.1	17.28	442.90
	12/3/2013	14:02	12/3/2013 14:02	49	26	25.5	19	77	35.7		717.2	82.05	524.95
	12/3/2013	14:05	12/3/2013 14:05	48	25	25	20	78	37.1		109.3	12.50	537.45
	12/3/2013	14:26	12/3/2013 14:26	48	29	26.5	22	78	42.9		839.7	96.06	633.51
	12/3/2013	14:30	12/3/2013 14:30	47	29	25.5	22.5	76	43.9	Valve shut	173.5	19.85	653.36
	12/3/2013	14:31	12/3/2013 14:31										653.36
SW-54 Event 3	12/4/2013	12:20	12/4/2013 12:20										653.36
	12/4/2013	12:21	12/4/2013 12:21	50	25	30	10	84	18.5		18.5	2.11	655.47
	12/4/2013	12:23	12/4/2013 12:23	50	25	30	13	84	24.0		42.4	4.85	660.33
	12/4/2013	12:24	12/4/2013 12:24	50	25	25	15	84	27.7		25.8	2.96	663.28
	12/4/2013	12:45	12/4/2013 12:45	55	25	23	18	84	33.2		639.3	73.14	736.42
	12/4/2013	12:46	12/4/2013 12:46	55	25	25.5	20.5	84	37.8		35.5	4.06	740.48
	12/4/2013	13:16	12/4/2013 13:16	54	25	23	22	84	40.6		1176.2	134.56	875.04
	12/4/2013	13:20	12/4/2013 13:20	54	25	23	22.5	84	41.5		164.2	18.79	893.83
	12/4/2013	13:21	12/4/2013 13:21							Valve shut	41.5	4.75	898.58
	12/4/2013	13:22	12/4/2013 13:22			15							898.58
SW-54 Event 4	12/5/2013	14:15	12/5/2013 14:15										898.58
	12/5/2013	14:16	12/5/2013 14:16	50	28	27	<2	85	0.0				898.58
	12/5/2013	14:21	12/5/2013 14:21	52.5	27	26	2	85	3.8		9.4	1.08	899.66
	12/5/2013	14:22	12/5/2013 14:22	52.5	28	27	5	85	9.6		6.7	0.76	900.42
	12/5/2013	14:24	12/5/2013 14:24	52.5	30	28.5	8	85	15.7		25.2	2.89	903.31
	12/5/2013	14:38	12/5/2013 14:38	50	30	27.5	13	85	25.4		287.7	32.92	936.23
	12/5/2013	14:40	12/5/2013 14:40	50	31	28	14	85	27.7		53.2	6.08	942.31
	12/5/2013	14:42	12/5/2013 14:42	50	32	28.5	15	85	30.0		57.7	6.60	948.91
	12/5/2013	15:39	12/5/2013 15:39	48	31	26	20	82	39.7		1987.1	227.32	1176.23
	12/5/2013	15:40	12/5/2013 15:40	48	31	26	20	82	39.7	Valve shut	39.7	4.54	1180.78
	12/5/2013	15:41	12/5/2013 15:41			17.5							1180.78
SW-54 Event 5	12/6/2013	12:47	12/6/2013 12:47	45	26	30.5	8.5	84	15.9				1180.78
	12/6/2013	12:48	12/6/2013 12:48	45	26	25	15.5	84	29.0		22.4	2.57	1183.34
	12/6/2013	12:49	12/6/2013 12:49	45	26	252	17	84	31.8		30.4	3.47	1186.81
	12/6/2013	12:50	12/6/2013 12:50	45	26	28	19	84	35.5		33.6	3.85	1190.66
	12/6/2013	13:08	12/6/2013 13:08	45	26.5	23	21	82	39.6		675.5	77.28	1267.94
	12/6/2013	13:10	12/6/2013 13:10	45	27	25	24	82	45.5		85.0	9.73	1277.67
	12/6/2013	13:20	12/6/2013 13:20	45	38	25	24	84	51.1		483.0	55.26	1332.92
	12/6/2013	14:00	12/6/2013 14:00	45	38	24	25.5	83	54.4		2109.6	241.34	1574.26
	12/6/2013	14:02	12/6/2013 14:02			18				Valve shut	108.7	12.44	1586.70
SW-54 Event 6	12/9/2013	15:13	12/9/2013 15:13	50	33	32	<2	80	0.0		0.0	0.00	1586.70

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	12/9/2013	15:31	12/9/2013 15:31	47	32	29	7.5	80	15.1		135.7	15.53	1602.23
	12/9/2013	15:50	12/9/2013 15:50	45	30	27	10	80	19.7		330.1	37.76	1639.99
	12/9/2013	16:19	12/9/2013 16:19	45	32	27	12	75	24.2		636.8	72.84	1712.84
	12/9/2013	16:22	12/9/2013 16:22							Valve shut	72.7	8.32	1721.16
	12/9/2013	16:23	12/9/2013 16:23			20							1721.16
SW-54 Event 7	12/10/2013	16:25	12/10/2013 16:25	50	30	32	<2	73	0.0		0.0	0.00	1721.16
	12/10/2013	16:28	12/10/2013 16:28	50	30	30	5.5	73	10.9		16.3	1.87	1723.03
	12/10/2013	16:42	12/10/2013 16:42	50	30	28	5.5	70	10.9		152.7	17.47	1740.50
	12/10/2013	16:55	12/10/2013 16:55	50	30	28	9	68	17.9		187.4	21.44	1761.93
	12/10/2013	17:23	12/10/2013 17:23	50	30	26.5	12.5	63	25.0		600.6	68.71	1830.64
	12/10/2013	17:27	12/10/2013 17:27		30	26.5	12.5	63	25.0		100.0	11.44	1842.08
	12/10/2013	17:28	12/10/2013 17:28			26				Valve shut	25.0	2.86	1844.94
SW-54 Event 8	12/11/2013	13:15	12/11/2013 13:15	48	30	32	8	67	15.9				1844.94
	12/11/2013	13:16	12/11/2013 13:16	48	28	27	11	67	21.4		18.7	2.14	1847.08
	12/11/2013	13:36	12/11/2013 13:36	48	28	26	14.3	66	27.9		492.6	56.35	1903.43
	12/11/2013	13:38	12/11/2013 13:38	48	28	27.5	17	66	33.1		61.0	6.97	1910.41
	12/11/2013	14:40	12/11/2013 14:40	48	27.5	25.5	18	65	34.9		2108.0	241.16	2151.56
	12/11/2013	14:43	12/11/2013 14:43							Valve shut	104.7	11.97	2163.54
SW-54 Event 9	12/12/2013	14:11	12/12/2013 14:11	50	28	26	14	70	27.2				2163.54
	12/12/2013	14:17	12/12/2013 14:17	45	28	24	16.5	70	32.0		177.5	20.31	2183.85
	12/12/2013	14:18	12/12/2013 14:18	45	28	25	20	70	38.8		35.4	4.05	2187.90
	12/12/2013	14:56	12/12/2013 14:56	47	28	24	22	70	42.7		1548.3	177.13	2365.02
	12/12/2013	14:57	12/12/2013 14:57	45	30	25	24.5	70	48.7		45.7	5.22	2370.25
	12/12/2013	15:17	12/12/2013 15:17	45	30	24	25.5	69	50.7		993.4	113.65	2483.89
	12/12/2013	15:18	12/12/2013 15:18							Valve shut	50.7	5.80	2489.69
	12/12/2013	15:19	12/12/2013 15:19			20							2489.69
SW-54 Event 10	12/16/2013	10:32	12/16/2013 10:32	42.5	30	30	<2	64	0.0		0.0	0.00	2489.69
	12/16/2013	10:55	12/16/2013 10:55	42	25	26	<2	66	0.0		0.0	0.00	2489.69
	12/16/2013	10:56	12/16/2013 10:56	40	25	29	3	66	5.6		2.8	0.32	2490.02
	12/16/2013	11:27	12/16/2013 11:27	40	25	29	4	67	7.5		203.6	23.29	2513.30
	12/16/2013	11:32	12/16/2013 11:32							Valve shut	37.5	4.29	2517.59
	12/16/2013	11:33	12/16/2013 11:33			22							2517.59
SW-54 Event 11	12/19/2013	9:16	12/19/2013 9:16	42	29	31	11.5	66	22.7				2517.59
	12/19/2013	9:17	12/19/2013 9:17	42	28	26	12	66	23.4		23.0	2.63	2520.23
	12/19/2013	9:51	12/19/2013 9:51	40	26	24	17	68	32.3		945.7	108.19	2628.42
	12/19/2013	11:06	12/19/2013 11:06	40	26	24	17	73	32.1		2413.3	276.08	2904.49
	12/19/2013	15:00	12/19/2013 15:00	41	26	24	17	78	31.9		7493.1	857.22	3761.71
	12/19/2013	16:15	12/19/2013 16:15	41	26	24	17	74	32.1		2400.5	274.62	4036.33
	12/19/2013	16:50	12/19/2013 16:50	49	27	23.5	16	69	30.7		1098.5	125.67	4161.99
	12/19/2013	16:53	12/19/2013 16:53	49	28	25	20.5	69	39.8		105.8	12.10	4174.09
	12/19/2013	22:10	12/19/2013 22:10	50	28	25	22	55	43.3		13177.3	1507.48	5681.58
	12/20/2013	8:19	12/20/2013 8:19	41	28	24	23.5	62	46.0		27185.4	3110.01	8791.58
	12/20/2013	8:22	12/20/2013 8:22	40	35	27.5	31	62	65.5		167.2	19.12	8810.71
	12/20/2013	10:26	12/20/2013 10:26	39	34	27	30	76	61.9		7895.2	903.21	9713.92
	12/20/2013	12:18	12/20/2013 12:18	45	38	30	33	80	70.6		7415.4	848.32	10562.23
	12/20/2013	12:19	12/20/2013 12:19							Valve shut	70.6	8.07	10570.30
	12/20/2013	12:20	12/20/2013 12:20										10570.30
SW-54 Event 12	1/21/2014	12:10	1/21/2014 12:10	41	29.5	29	<2	71	0.0		0.0	0.00	10570.30
	1/21/2014	12:14	1/21/2014 12:14	41	29	27.8	6	71	11.8		23.5	2.69	10573.00
	1/21/2014	13:24	1/21/2014 13:24	50	26	25	13	74	24.5		1270.2	145.31	10718.30
	1/21/2014	13:27	1/21/2014 13:27	50	29	27	18	74	35.2		89.6	10.25	10728.55
	1/21/2014	14:37	1/21/2014 14:37	48	29	26	18.1	74	35.4		2470.8	282.66	11011.22
	1/21/2014	15:45	1/21/2014 15:45	53	29	26	18.2	68	35.8		2420.6	276.92	11288.14

SW-54 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	1/21/2014	16:40	1/21/2014 16:40	51	29	26	19.2	68	37.8		2023.1	231.44	11519.57
	1/21/2014	16:41	1/21/2014 16:41							Valve shut	37.8	4.32	11523.89
	1/21/2014	16:46	1/21/2014 16:46			20							11523.89
SW-54 Event 13	1/29/2014	7:45	1/29/2014 7:45	45	31	31.5	10	40	20.7				11523.89
	1/29/2014	7:50	1/29/2014 7:50	38	27.5	25	10	40	19.9		101.4	11.60	11535.50
	1/29/2014	7:58	1/29/2014 7:58			25					159.0	18.19	11553.69
	1/29/2014	8:00	1/29/2014 8:00	55	27	25	12	40	23.7		47.4	5.42	11559.11
	1/29/2014	9:30	1/29/2014 9:30	50	28	26	14.5	40	29.0		2371.6	271.31	11830.43
	1/29/2014	10:30	1/29/2014 10:30	49	26	25	16	40	31.2		1806.5	206.67	12037.10
	1/29/2014	11:40	1/29/2014 11:40	43	26	25	18.5	40	36.1		2356.4	269.57	12306.67
	1/29/2014	11:42	1/29/2014 11:42			20				Valve shut	72.2	8.26	12314.93
SW-54 Event 14	2/4/2014	10:16	2/4/2014 10:16	55	30	30.5	<2	62	0.0				12314.93
	2/4/2014	10:20	2/4/2014 10:20	55	28.9	30.5	3.5	62	6.9		13.8	1.58	12316.51
	2/4/2014	10:30	2/4/2014 10:30	53	27.8	28.5	7.7	63	15.0		109.6	12.54	12329.05
	2/4/2014	11:34	2/4/2014 11:34	52	26	26	13.3	65	25.3		1290.1	147.59	12476.64
	2/4/2014	11:35	2/4/2014 11:35	52	28	27.5	16.2	65	31.6		28.4	3.25	12479.89
	2/4/2014	12:35	2/4/2014 12:35	50	27.5	26.3	18	66	34.9		1993.2	228.02	12707.91
	2/4/2014	13:17	2/4/2014 13:17	48	27	25.5	19.2	67	36.9		1507.1	172.42	12880.33
	2/4/2014	13:19	2/4/2014 13:19	48	28.5	26.8	21.8	67	42.7		79.6	9.10	12889.43
	2/4/2014	14:43	2/4/2014 14:43	48	28.5	26.8	21.8	64	42.8		3589.8	410.67	13300.11
	2/4/2014	14:44	2/4/2014 14:44			21				Valve shut	42.8	4.90	13305.00
SW-54 Event 15	2/6/2014	7:49	2/6/2014 7:49	52	25.5	26.5	<2	47	0.0				13305.00
	2/6/2014	7:51	2/6/2014 7:51	51	28	28	7.8	47	15.5		15.5	1.77	13306.78
	2/6/2014	8:35	2/6/2014 8:35	55	26	26	14	53	27.0		933.8	106.83	13413.60
	2/6/2014	8:37	2/6/2014 8:37	55	28.5	27.5	18	53	35.7		62.7	7.17	13420.77
	2/6/2014	9:09	2/6/2014 9:09	50	28	26.5	19	56	37.4		1169.7	133.81	13554.59
	2/6/2014	9:12	2/6/2014 9:12	50	29	27.5	20.8	56	41.4		118.2	13.52	13568.11
	2/6/2014	10:25	2/6/2014 10:25	47	28.2	26	21.9	60	43.0		3081.2	352.49	13920.60
	2/6/2014	10:28	2/6/2014 10:28	47	30	27	24.5	60	49.1		138.2	15.81	13936.41
	2/6/2014	11:05	2/6/2014 11:05	46	30	27	25	62	50.0		1834.7	209.89	14146.30
	2/6/2014	12:07	2/6/2014 12:07	45	30	26.5	25.5	66	50.8		3127.1	357.74	14504.04
	2/6/2014	14:04	2/6/2014 14:04	45	30	26.5	25.8	64	51.5		5988.9	685.13	15189.17
	2/6/2014	15:17	2/6/2014 15:17	44	30	26.5	25.7	61	51.5		3760.5	430.20	15619.36
	2/6/2014	16:32	2/6/2014 16:32	44	30	26.5	25.8	58	51.8		3875.1	443.31	16062.67
	2/6/2014	17:14	2/6/2014 17:14	44	30	26.5	25.8	57	51.9	Valve shut	2178.6	249.23	16311.90
	2/6/2014	17:15	2/6/2014 17:15										16311.90
SW-54 Event 16	2/10/2014	13:10	2/10/2014 13:10	45	28.5	27.5	7.9	79	15.3				16311.90
	2/10/2014	13:15	2/10/2014 13:15	45	30	27.5	11.7	79	23.0		95.8	10.96	16322.86
	2/10/2014	14:47	2/10/2014 14:47	45	29	25	15.8	79	30.7		2474.0	283.02	16605.88
	2/10/2014	14:49	2/10/2014 14:49	45	30	25.5	19	79	37.4		68.2	7.80	16613.68
	2/10/2014	16:36	2/10/2014 16:36	45	30.5	25.5	18.7	74	37.2		3991.3	456.60	17070.29
	2/10/2014	17:26	2/10/2014 17:26	45	30.5	25.5	19	70	37.9		1878.6	214.91	17285.20
	2/10/2014	17:27	2/10/2014 17:27			20				Valve shut	37.9	4.34	17289.54
Note: a red value, i.e. 75 °F, indicates that value was interpolated from field d										Total CO_2 Mass (lbs):			17289.54

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
SW-55 Event 1	11/19/2013	13:32	11/19/2013 13:32	50	23			74	0.0				
	11/19/2013	13:35	11/19/2013 13:35	55	25	25	<2	74	0.0		0.0	0.00	0.00
	11/19/2013	13:50	11/19/2013 13:50		24	23.5	4	74	7.4		55.2	6.31	6.31
	11/19/2013	13:52	11/19/2013 13:52	52	30	28	8.5	67	16.9		24.3	2.78	9.09
	11/19/2013	17:52	11/19/2013 17:52		29	24	18	60	35.7		6313.9	722.31	731.40
	11/19/2013	17:54	11/19/2013 17:54	52	35	27	21	60	44.4		80.1	9.17	740.56
	11/19/2013	17:57	11/19/2013 17:57		34	27	21	60	44.0		132.7	15.18	755.74
	11/19/2013	17:58	11/19/2013 17:58							Valve shut	44.0	5.03	760.77
	11/19/2013	17:59	11/19/2013 17:59		18	17							760.77
SW-55 Event 2	12/3/2013	13:30	12/3/2013 13:30										760.77
	12/3/2013	13:31	12/3/2013 13:31	52	30	30	5.25	77	10.4		10.4	1.18	761.96
	12/3/2013	13:37	12/3/2013 13:37	50	30	27	10	77	19.7		90.2	10.32	772.28
	12/3/2013	13:42	12/3/2013 13:42	45	30	27	12	77	23.7		108.5	12.41	784.69
	12/3/2013	14:42	12/3/2013 14:42	50	29	24.5	16	76	31.2		1646.9	188.41	973.10
	12/3/2013	15:18	12/3/2013 15:18	49	28	24.5	16	74	30.9		1118.7	127.98	1101.08
	12/3/2013	15:20	12/3/2013 15:20	49	30	24.25	19	74	37.6		68.5	7.84	1108.92
	12/3/2013	16:52	12/3/2013 16:52	49	30	24	21	67	41.8		3652.8	417.88	1526.80
	12/3/2013	17:29	12/3/2013 17:29	55	29	23.5	21.5	66	42.4		1557.7	178.20	1705.00
	12/3/2013	17:30	12/3/2013 17:30							Valve shut	42.4	4.85	1709.85
	12/3/2013	17:31	12/3/2013 17:31			18							1709.85
SW-55 Event 3	12/9/2013	13:12	12/9/2013 13:12	50	25	25	<2	84	0.0				1709.85
	12/9/2013	13:38	12/9/2013 13:38	50	25	25	5.5	84	10.1		131.9	15.09	1724.94
	12/9/2013	14:07	12/9/2013 14:07	50	24	25	7	84	12.7		332.0	37.98	1762.92
	12/9/2013	14:34	12/9/2013 14:34	50	25	25	7.5	82.0	13.9		359.3	41.10	1804.02
	12/9/2013	14:47	12/9/2013 14:47	48	25	27	13	81.0	24.1		246.5	28.20	1832.22
	12/9/2013	15:08	12/9/2013 15:08	50	25	27	13	80	24.1		505.4	57.82	1890.04
	12/9/2013	15:56	12/9/2013 15:56	45	25	26	15	77	27.9		1246.5	142.60	2032.64
	12/9/2013	16:48	12/9/2013 16:48	45	25	26	16	74	29.8		1499.3	171.52	2204.15
	12/9/2013	17:14	12/9/2013 17:14	45	25	25	16	72.0	29.9		775.6	88.73	2292.89
	12/9/2013	17:15	12/9/2013 17:15							Valve shut	29.9	3.42	2296.30
	12/9/2013	17:16	12/9/2013 17:16			20							2296.30
SW-55 Event 4	12/16/2013	8:14	12/16/2013 8:14	50	27	27.5	<2		0.0				2296.30
	12/16/2013	8:16	12/16/2013 8:16	52	27	27	6	48	11.8		11.8	1.35	2297.65
	12/16/2013	8:18	12/16/2013 8:18	50	26.5	25	7.5	48	14.6		26.4	3.02	2300.67
	12/16/2013	8:20	12/16/2013 8:20	50	29.5	27	12.5	49	25.2		39.8	4.55	2305.22
	12/16/2013	8:58	12/16/2013 8:58	45	29.5	25	16.5	50	33.2		1110.3	127.02	2432.24
	12/16/2013	9:14	12/16/2013 9:14	44	28	25	17.5	52	34.6		542.4	62.05	2494.29
	12/16/2013	9:53	12/16/2013 9:53	45	28	24	18	58	35.3		1363.2	155.95	2650.24
	12/16/2013	9:54	12/16/2013 9:54							Valve shut	35.3	4.04	2654.28
	12/16/2013	9:55	12/16/2013 9:55			19							2654.28
	12/16/2013	10:31	12/16/2013 10:31	42	28	23	21	64	41.0	Restart	1475.5	168.79	2823.08
	12/16/2013	10:56	12/16/2013 10:56	48	28	24	19.5	66	38.0		987.1	112.93	2936.00
	12/16/2013	11:25	12/16/2013 11:25	40	28	24	20	67	38.9		1115.1	127.57	3063.57
	12/16/2013	11:26	12/16/2013 11:26	40	30	24	23.5	67	46.8		42.9	4.90	3068.47
	12/16/2013	12:33	12/16/2013 12:33		30	24	25	67	49.8		3235.9	370.19	3438.66
	12/16/2013	12:34	12/16/2013 12:34							Valve shut	49.8	5.70	3444.36
	12/16/2013	12:35	12/16/2013 12:35			20							3444.36
SW-55 Event 5	1/8/2014	7:53	1/8/2014 7:53						0.0				3444.36
	1/8/2014	7:57	1/8/2014 7:57	35	27.5	28	10	38	19.9		0.0	0.00	3444.36
	1/8/2014	8:09	1/8/2014 8:09	59	29	28	16	37	32.5		314.4	35.96	3480.32
	1/8/2014	8:25	1/8/2014 8:25	51	28	26	16	38	32.1		516.3	59.06	3539.38
	1/8/2014	9:05	1/8/2014 9:05	49	25	23.5	16.5	40	31.8		1277.1	146.10	3685.48
	1/8/2014	9:08	1/8/2014 9:08	48	27	24.5	20	40	39.5		107.0	12.24	3697.72

SW-55 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	1/8/2014	10:02	1/8/2014 10:02	46	26	23.5	20	48	38.7		2112.0	241.62	3939.34
	1/8/2014	10:44	1/8/2014 10:44	45	26	23.5	20.5	52	39.5		1642.8	187.93	4127.27
	1/8/2014	12:05	1/8/2014 12:05	43	26	23.5	20.5	60	39.2		3188.2	364.73	4492.00
	1/8/2014	12:07	1/8/2014 12:07	43	27	23.5	22.5	60	43.6		82.8	9.47	4501.47
	1/8/2014	13:07	1/8/2014 13:07	50	27.5	23	23	60	44.8	Valve shut	2650.8	303.25	4804.72
	1/8/2014	13:09	1/8/2014 13:09			18							4804.72
SW-55 Event 6	1/10/2014	8:48	1/10/2014 8:48		30	30	11	66	21.9				4804.72
	1/10/2014	8:49	1/10/2014 8:49	55	28	28	12	66	23.4		22.7	2.59	4807.31
	1/10/2014	9:47	1/10/2014 9:47	45	26	28	16	66	30.4		1559.9	178.46	4985.77
	1/10/2014	10:44	1/10/2014 10:44	45	26	23	18	70	34.1		1838.3	210.31	5196.07
	1/10/2014	10:46	1/10/2014 10:46	45	28	24	22	70	42.7		76.8	8.78	5204.85
	1/10/2014	12:30	1/10/2014 12:30	42	28	23	22	71	42.6		4437.2	507.61	5712.46
	1/10/2014	13:00	1/10/2014 13:00	40	28	23	22	70	42.7		1279.9	146.43	5858.89
	1/10/2014	13:01	1/10/2014 13:01							Valve shut	42.7	4.88	5863.77
	1/10/2014	13:03	1/10/2014 13:03			19							5863.77
SW-55 Event 7	1/14/2014	8:17	1/14/2014 8:17	46	27	29	6	63	11.6				5863.77
	1/14/2014	8:22	1/14/2014 8:22	45	27	28	9	63	17.4		72.4	8.28	5872.05
	1/14/2014	9:02	1/14/2014 9:02	47	25	25	12.2	63	23.0		806.8	92.30	5964.36
	1/14/2014	9:07	1/14/2014 9:07	47	27	27	16.2	63	31.3		135.6	15.51	5979.87
	1/14/2014	10:12	1/14/2014 10:12	44	27	25	18.5	64	35.7		2175.7	248.90	6228.77
	1/14/2014	11:24	1/14/2014 11:24	39	26	25	19.5	64	37.1		2621.5	299.90	6528.67
	1/14/2014	12:40	1/14/2014 12:40	44	26	25	19.5	66	37.1	Valve shut	2820.1	322.62	6851.29
	1/14/2014	12:41	1/14/2014 12:41			27							6851.29
SW-55 Event 8	1/16/2014	7:54	1/16/2014 7:54	55	27	27	7	42	13.8				6851.29
	1/16/2014	7:55	1/16/2014 7:55	55	29	28	13	42	26.2		20.0	2.29	6853.59
	1/16/2014	8:51	1/16/2014 8:51	48	27.5	25.5	18	50	35.4		1726.5	197.52	7051.10
	1/16/2014	8:56	1/16/2014 8:56	48	27.5	25.5	18.2	50	35.8		178.1	20.37	7071.47
	1/16/2014	10:10	1/16/2014 10:10	45	26.5	24.5	18.2	55	35.2		2627.1	300.54	7372.01
	1/16/2014	10:12	1/16/2014 10:12	45	28	25	22	55	43.3		78.5	8.98	7380.99
	1/16/2014	11:15	1/16/2014 11:15	42	28	25	22	56	43.3		2728.0	312.08	7693.07
	1/16/2014	12:00	1/16/2014 12:00	42	28	25	22.1	57	43.4		1951.0	223.20	7916.27
	1/16/2014	12:01	1/16/2014 12:01							Valve shut	43.4	4.97	7921.24
SW-55 Event 9	1/20/2014	7:43	1/20/2014 7:43	60	23.5	24	5	40	9.4				7921.24
	1/20/2014	7:44	1/20/2014 7:44	58	28	25.5	10.2	40	20.4		14.9	1.71	7922.95
	1/20/2014	7:45	1/20/2014 7:45	55	28	26.5	13	40	26.0		23.2	2.65	7925.60
	1/20/2014	8:21	1/20/2014 8:21	52	27	25	16.2	50	31.7		1038.1	118.76	8044.37
	1/20/2014	8:23	1/20/2014 8:23	52	29	26	20	50	40.1		71.7	8.21	8052.57
	1/20/2014	9:03	1/20/2014 9:03	48	29	25.5	21	56	41.8		1637.1	187.28	8239.85
	1/20/2014	10:13	1/20/2014 10:13	48	28	23.5	22	66	42.9		2962.9	338.95	8578.81
	1/20/2014	10:15	1/20/2014 10:15	48	29	24.2	24.2	66	47.7		90.5	10.36	8589.17
	1/20/2014	11:19	1/20/2014 11:19	43	29	24.5	24.5	67	48.2		3069.9	351.19	8940.36
	1/20/2014	12:30	1/20/2014 12:30	43	29	24	24.5	71	48.1		3418.3	391.05	9331.41
	1/20/2014	12:33	1/20/2014 12:33							Valve shut	144.2	16.49	9347.90
	1/20/2014	12:35	1/20/2014 12:35			20							9347.90
SW-55 Event 10	1/21/2014	7:52	1/21/2014 7:52	57	28	27.5	7	52	13.8				9347.90
	1/21/2014	8:38	1/21/2014 8:38	51	25	24	15.5	57	29.4		993.2	113.62	9461.53
	1/21/2014	8:40	1/21/2014 8:40	50	28	25	21	58	41.2		70.6	8.08	9469.60
	1/21/2014	9:36	1/21/2014 9:36	44	28	25	21.8	62	42.6		2348.1	268.62	9738.23
	1/21/2014	10:19	1/21/2014 10:19	30	28	24	22	67	42.8		1837.0	210.15	9948.38
	1/21/2014	11:45	1/21/2014 11:45	37	27.5	23	22.3	70	43.0		3690.3	422.17	10370.55
	1/21/2014	12:01	1/21/2014 12:01	37	27.5	23	22.3	70	43.0	Valve shut	688.2	78.73	10449.28
	1/21/2014	12:02	1/21/2014 12:02			20							10449.28

SW-55 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)	Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
Note: a red value, i.e. 75 °F, indicates that value was interpolated from field data										Total CO_2 Mass (lbs):		10449.28

SW-56 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
SW-56 Event 1	11/21/2013	10:06	11/21/2013 10:06						0.0				
	11/21/2013	10:07	11/21/2013 10:07	55	30	29.5	<2	68	0.0		0.0	0.00	0.00
	11/21/2013	10:09	11/21/2013 10:09		32	31	<2	68	0.0		0.0	0.00	0.00
	11/21/2013	10:53	11/21/2013 10:53	50	31	29.5	6	69.3	12.1		265.3	30.35	30.35
	11/21/2013	10:55	11/21/2013 10:55	50	32.5	31.4	7	69.3	14.3		26.4	3.02	33.36
	11/21/2013	11:29	11/21/2013 11:29	49	32.5	31	9	70.5	18.4		555.3	63.53	96.89
	11/21/2013	13:10	11/21/2013 13:10	46	32.5	30.5	10.5	72	21.4		2007.7	229.68	326.57
	11/21/2013	13:12	11/21/2013 13:12		32.5	31.2	11.0	72	22.4		43.8	5.01	331.58
	11/21/2013	14:19	11/21/2013 14:19	55	32.5	31.2	11	74.0	22.4		1500.1	171.62	503.20
	11/21/2013	14:23	11/21/2013 14:23		32.5		11	74.0	22.4	Valve shut	89.5	10.24	513.43
	11/21/2013	14:24	11/21/2013 14:24			16							513.43
SW-56 Event 2	11/23/2013	7:52	11/23/2013 7:52	60	25			66	0.0		0.0	0.00	513.43
	11/23/2013	7:56	11/23/2013 7:56	60	30	28	<2	66	0.0		0.0	0.00	513.43
	11/23/2013	8:31	11/23/2013 8:31	59	28	25.5	7	72	13.6		237.2	27.14	540.57
	11/23/2013	8:33	11/23/2013 8:33	57	35	31	12.5	72	26.1		39.7	4.54	545.11
	11/23/2013	9:08	11/23/2013 9:08	54	34	30	14	76	28.9		962.7	110.14	655.25
	11/23/2013	9:42	11/23/2013 9:42	52	34	30	15	80	30.8		1014.6	116.06	771.31
	11/23/2013	9:45	11/23/2013 9:45	51	39	34	20	80	43.2		111.0	12.70	784.01
	11/23/2013	10:56	11/23/2013 10:56	49	39	32	21.5	86	46.1		3170.7	362.73	1146.74
	11/23/2013	12:20	11/23/2013 12:20	49	39	32	22	90	47.0		3913.6	447.72	1594.45
	11/23/2013	12:33	11/23/2013 12:33	49	39	32	22	90	47.0		611.5	69.95	1664.41
	11/23/2013	12:35	11/23/2013 12:35							Valve shut	94.1	10.76	1675.17
	11/23/2013	12:36	11/23/2013 12:36										1675.17
SW-56 Event 3	11/26/2013	7:28	11/26/2013 7:28	58	27			68					1675.17
	11/26/2013	7:30	11/26/2013 7:30		33	31.6	<2	68	0.0				1675.17
	11/26/2013	7:48	11/26/2013 7:48	58	31	30.4	<2	68	0.0				1675.17
	11/26/2013	7:49	11/26/2013 7:49		35	32.8	3	68	6.3		3.1	0.36	1675.53
	11/26/2013	8:27	11/26/2013 8:27		36	32.4	6	68	12.7		361.5	41.35	1716.89
	11/26/2013	9:18	11/26/2013 9:18	55	35	32	7	68	14.7		699.3	80.00	1796.89
	11/26/2013	10:52	11/26/2013 10:52		32	31.6	9	68	18.3		1551.4	177.48	1974.37
	11/26/2013	12:20	11/26/2013 12:20		32	31.6	9.5	70	19.3		1654.3	189.26	2163.62
	11/26/2013	12:21	11/26/2013 12:21							Valve shut	19.3	2.21	2165.83
	11/26/2013	12:24	11/26/2013 12:24			18							2165.83
SW-56 Event 4	12/3/2013	8:43	12/3/2013 8:43	55	26			66					2165.83
	12/3/2013	8:44	12/3/2013 8:44	55	28	29	<2	66	0.0				2165.83
	12/3/2013	8:47	12/3/2013 8:47	54	31	29.5	<2	66	0.0				2165.83
	12/3/2013	9:13	12/3/2013 9:13	50	30	30	4.5	66	9.0		116.6	13.34	2179.17
	12/3/2013	9:14	12/3/2013 9:14	50	32	31	5	66	10.2		9.6	1.10	2180.27
	12/3/2013	9:58	12/3/2013 9:58	50	32	30.5	6.5	66	13.2		515.7	59.00	2239.26
	12/3/2013	11:23	12/3/2013 11:23	48	31	30	9	68	18.1		1332.8	152.47	2391.73
	12/3/2013	11:25	12/3/2013 11:25	48	32	30.5	10	68	20.3		38.5	4.40	2396.13
	12/3/2013	12:23	12/3/2013 12:23	46	34	30.5	10.5	73	21.7		1219.7	139.53	2535.66
	12/3/2013	13:16	12/3/2013 13:16	54	34	30.5	10	82	20.5	Valve shut	1118.7	127.98	2663.65
	12/3/2013	13:18	12/3/2013 13:18			19							2663.65
SW-56 Event 5	12/6/2013	13:00	12/6/2013 13:00	45	32	32	<2	88	0.0		0	0.00	2663.65
	12/6/2013	13:55	12/6/2013 13:55	44	32	32	<2	88	0.0		0	0.00	2663.65
	12/6/2013	14:20	12/6/2013 14:20	44	32	31.5	<2	83	0.0		0	0.00	2663.65
	12/6/2013	15:20	12/6/2013 15:20	42	32	31.5	<2	78	0.0		0	0.00	2663.65
	12/6/2013	17:46	12/6/2013 17:46	42	32	31.5	<2	69	0.0	Valve shut	0	0.00	2663.65
SW-56 Event 6	12/9/2013	8:07	12/9/2013 8:07								0	0.00	2663.65
	12/9/2013	8:08	12/9/2013 8:08	54	32.5	31	<2	61	0.0		0	0.00	2663.65
	12/9/2013	8:28	12/9/2013 8:28	54	32.0	31	<2	62	0.0		0	0.00	2663.65
	12/9/2013	9:07	12/9/2013 9:07	50	32.5	31	<2	64	0.0		0	0.00	2663.65

SW-56 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	12/9/2013	9:30	12/9/2013 9:30	48	32.5	31	<2	67	0.0		0	0.00	2663.65
	12/9/2013	10:00	12/9/2013 10:00	48	32.5	31	<2	70	0.0		0	0.00	2663.65
	12/9/2013	10:57	12/9/2013 10:57	48	32.0	31	<2	74	0.0		0	0.00	2663.65
	12/9/2013	11:31	12/9/2013 11:31	48	32.0	31	<2	80	0.0		0	0.00	2663.65
	12/9/2013	12:21	12/9/2013 12:21	48	32.0	31	<2	83	0.0		0	0.00	2663.65
	12/9/2013	13:30	12/9/2013 13:30	48	32.0	31	<2	87	0.0		0	0.00	2663.65
	12/9/2013	22:03	12/9/2013 22:03	55	30	31	<2	68	0.0		0	0.00	2663.65
	12/10/2013	7:48	12/10/2013 7:48	50	30	31	5	70	9.9		2904.3	332.25	2995.89
	12/10/2013	7:51	12/10/2013 7:51							Valve shut	29.8	3.41	2999.30
SW-56 Event 7	12/11/2013	12:15	12/11/2013 12:15	45	34		<2	71					2999.30
	12/11/2013	15:30	12/11/2013 15:30	45	34		<2	64	0.0				2999.30
	12/11/2013	17:05	12/11/2013 17:05	50	35		2.5	60	5.3		251.3	28.75	3028.05
	12/11/2013	22:02	12/11/2013 22:02	55	35		5	58	10.6		2360.4	270.03	3298.09
	12/12/2013	8:16	12/12/2013 8:16	50	35		7.5	58	15.9		8138.4	931.04	4229.13
	12/12/2013	8:17	12/12/2013 8:17							Valve shut	15.9	1.82	4230.95
SW-56 Event 8	12/12/2013	12:55	12/12/2013 12:55	45	35	32	<2	70	0.0				4230.95
	12/12/2013	13:59	12/12/2013 13:59	47	33	32	<2	75	0.0				4230.95
	12/12/2013	14:27	12/12/2013 14:27	45	34	31	<2	72	0.0				4230.95
	12/12/2013	14:58	12/12/2013 14:58	45	34	31	<2	74	0.0				4230.95
	12/12/2013	15:06	12/12/2013 15:06	45	35	32	3.5	74	7.3		29.2	3.34	4234.29
	12/12/2013	15:51	12/12/2013 15:51	45	36	32	4	72	8.5		354.5	40.56	4274.85
	12/12/2013	16:56	12/12/2013 16:56	45	36	34	4.5	72	9.5		583.7	66.77	4341.62
	12/13/2013	11:50	12/13/2013 11:50	42	36	32	11.5	70	24.3		19194.4	2195.84	6537.46
	12/13/2013	14:44	12/13/2013 14:44	42	36	32	12	72	25.4		4323.8	494.64	7032.10
	12/13/2013	14:45	12/13/2013 14:45							Valve shut	25.4	2.90	7035.00
	12/13/2013	14:46	12/13/2013 14:46										7035.00
SW-56 Event 9	12/16/2013	12:20	12/16/2013 12:20	45	34	32	<2	68	0.0		0.0	0.00	7035.00
	12/16/2013	12:43	12/16/2013 12:43	48	34	31	<2	68	0.0		0.0	0.00	7035.00
	12/16/2013	13:18	12/16/2013 13:18		34		<2	70	0.0		0.0	0.00	7035.00
	12/16/2013	13:19	12/16/2013 13:19							Valve Shut	0.0	0.00	7035.00
	12/16/2013	14:44	12/16/2013 14:44	45	33	32	<2	75	0.0	Restart	0.0	0.00	7035.00
	12/16/2013	15:50	12/16/2013 15:50	42	34	31.5	<2	69	0.0		0.0	0.00	7035.00
	12/16/2013	16:46	12/16/2013 16:46	40	34	31	3	64	6.3		175.3	20.05	7055.05
	12/16/2013	22:04	12/16/2013 22:04	50	34	30.5	6	42	12.8		3030.7	346.71	7401.76
	12/17/2013	7:45	12/17/2013 7:45	46	34	30	8	42	17.1		8677.3	992.68	8394.44
	12/17/2013	7:48	12/17/2013 7:48	46	34	31	10	42	21.3		57.6	6.59	8401.03
	12/17/2013	11:30	12/17/2013 11:30	46	34	31	10	73	20.7	Valve shut	4663.8	533.54	8934.57
Note: a red value, i.e. 75 °F, indicates that value was interpolated from field data											Total CO_2 Mass (lbs):		8934.57

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
SW-57 Event 1	11/19/2013	13:17	11/19/2013 13:17	57	26			80	0.0				
	11/19/2013	13:18	11/19/2013 13:18		30	30	<2	80.0	0.0		0.0	0.00	0.00
	11/19/2013	13:23	11/19/2013 13:23		28	28	4	80.0	7.7		19.2	2.20	2.20
	11/19/2013	13:24	11/19/2013 13:24		32	31.5	6	80.0	12.1		9.9	1.13	3.33
	11/19/2013	13:38	11/19/2013 13:38		32	29	12	80.0	24.1		253.4	28.99	32.31
	11/19/2013	13:39	11/19/2013 13:39	57	34	30	14	78.0	28.8		26.5	3.03	35.34
	11/19/2013	13:40	11/19/2013 13:40		35	31	15	78.0	31.2		30.0	3.43	38.77
	11/19/2013	15:19	11/19/2013 15:19	50	34	27.5	19.5	76	40.2		3534.3	404.33	443.10
	11/19/2013	15:22	11/19/2013 15:22	50	36	28	21	76.0	44.2		126.6	14.48	457.58
	11/19/2013	15:25	11/19/2013 15:25	50	40	30	22	75.0	48.2		138.5	15.85	473.43
	11/19/2013	17:28	11/19/2013 17:28	49	40	27	24	60	53.3		6242.6	714.16	1187.59
	11/19/2013	17:58	11/19/2013 17:58		40	27	25	68.0	55.1		1626.8	186.11	1373.70
	11/19/2013	17:59	11/19/2013 17:59							Valve shut	55.1	6.31	1380.00
	11/19/2013	18:01	11/19/2013 18:01			13.5							1380.00
SW-57 Event 2	12/4/2013	7:42	12/4/2013 7:42	60	29	29	<2	64	0.0				1380.00
	12/4/2013	7:51	12/4/2013 7:51	57	27.5	24	15	64	29.1		131.0	14.98	1394.98
	12/4/2013	7:54	12/4/2013 7:54	57	28	25	17	64	33.2		93.4	10.69	1405.67
	12/4/2013	8:13	12/4/2013 8:13	53	28	23.5	19.25	66	37.5		671.4	76.81	1482.48
	12/4/2013	8:14	12/4/2013 8:14	53	28	24	**20**	66	39.0		38.2	4.37	1486.85
	12/4/2013	9:01	12/4/2013 9:01	50	28	23	21	70	40.7		1873.0	214.27	1701.13
	12/4/2013	9:03	12/4/2013 9:03	50	28	24	22	70	42.7		83.4	9.54	1710.67
	12/4/2013	10:03	12/4/2013 10:03	48	28	23.5	22.5	75	43.4		2583.9	295.60	2006.27
	12/4/2013	10:04	12/4/2013 10:04	48	30	24	24	75	47.4		45.4	5.20	2011.47
	12/4/2013	11:07	12/4/2013 11:07	47.5	30	23.5	24	82	47.1		2978.0	340.69	2352.15
	12/4/2013	12:39	12/4/2013 12:39	55	30	23	24.25	88	47.3		4344.4	497.01	2849.16
	12/4/2013	12:40	12/4/2013 12:40							Valve shut	47.3	5.41	2854.57
	12/4/2013	12:41	12/4/2013 12:41			14							2854.57
SW-57 Event 3	12/10/2013	7:30	12/10/2013 7:30	56	29	30	14	70	27.5				2854.57
	12/10/2013	7:36	12/10/2013 7:36	53	28	24	20	70	38.8		198.9	22.75	2877.33
	12/10/2013	7:40	12/10/2013 7:40		28	22	21	70	40.7		159.1	18.20	2895.53
	12/10/2013	8:26	12/10/2013 8:26	51	27	20	22.5	72	43.1		1927.3	220.49	3116.01
	12/10/2013	9:03	12/10/2013 9:03	51	26	20	23	72	43.5		1600.6	183.11	3299.12
	12/10/2013	9:37	12/10/2013 9:37	50	26	20	23	72	43.5		1478.0	169.08	3468.20
	12/10/2013	10:09	12/10/2013 10:09	50	26	19.5	23	72	43.5		1391.0	159.13	3627.34
	12/10/2013	10:10	12/10/2013 10:10	50	30	23.5	25.5	72	50.5		47.0	5.38	3632.72
	12/10/2013	11:01	12/10/2013 11:01	48	30	22	25.5	74	50.4		2575.0	294.58	3927.30
	12/10/2013	11:08	12/10/2013 11:08	45	30	22.5	27.5	74	54.4		366.9	41.98	3969.28
	12/10/2013	11:47	12/10/2013 11:47	45	30	22.5	26.5	74	52.4		2083.0	238.29	4207.57
	12/10/2013	11:48	12/10/2013 11:48							Valve shut	52.4	6.00	4213.57
	12/10/2013	11:49	12/10/2013 11:49			15							4213.57
SW-57 Event 4	12/17/2013	7:55	12/17/2013 7:55	50	29	30	10	44	20.1				4213.57
	12/17/2013	7:56	12/17/2013 7:56	50	25	26	13	44	24.9		22.5	2.58	4216.15
	12/17/2013	7:57	12/17/2013 7:57	50	30	25	21.5	44	43.8		34.4	3.93	4220.08
	12/17/2013	8:39	12/17/2013 8:39	47	28	22	23	55	45.3		1871.4	214.09	4434.17
	12/17/2013	8:50	12/17/2013 8:50	47	29	23	24	55	47.8		512.1	58.59	4492.76
	12/17/2013	9:33	12/17/2013 9:33	45	30	22	24	60	48.1		2063.0	236.00	4728.76
	12/17/2013	10:38	12/17/2013 10:38	40	27	21	24	68	46.1		3062.5	350.35	5079.11
	12/17/2013	11:35	12/17/2013 11:35	39	28	20	24.5	72	47.4		2666.0	304.99	5384.11
	12/17/2013	11:55	12/17/2013 11:55							Valve shut	948.9	108.55	5492.66
	12/17/2013	11:56	12/17/2013 11:56			14							5492.66
SW-57 Event 5	1/11/2014	7:52	1/11/2014 7:52	46	28	32	7	66	13.6				5492.66
	1/11/2014	7:53	1/11/2014 7:53	46	28	28	9	66	17.5		15.6	1.78	5494.44
	1/11/2014	7:55	1/11/2014 7:55	45	31.5	30	15	66	30.4		47.9	5.48	5499.92

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	1/11/2014	8:39	1/11/2014 8:39	46	30	25	19	66	37.9		1502.3	171.87	5671.79
	1/11/2014	8:40	1/11/2014 8:40	46	31	27	20	66	40.3		39.1	4.47	5676.27
	1/11/2014	8:42	1/11/2014 8:42	46	32	27.5	20.2	66	41.2		81.5	9.32	5685.59
	1/11/2014	9:18	1/11/2014 9:18	45	31.5	27	21	69	42.4		1505.2	172.20	5857.79
	1/11/2014	9:19	1/11/2014 9:19	45	32	27	21.5	69	43.7		43.1	4.93	5862.71
	1/11/2014	10:29	1/11/2014 10:29	43	31	26	22	72	44.1		3072.7	351.52	6214.23
	1/11/2014	11:25	1/11/2014 11:25	41	30	25.5	22	74	43.5		2453.2	280.64	6494.88
	1/11/2014	12:05	1/11/2014 12:05	44	31	26	23	76	45.9		1788.8	204.64	6699.51
	1/11/2014	12:06	1/11/2014 12:06							Valve shut	45.9	5.25	6704.77
	1/11/2014	12:07	1/11/2014 12:07			17							6704.77
SW-57 Event 6	1/21/2014	9:47	1/21/2014 9:47	46	32.5	31.8	<2	66	0.0				6704.77
	1/21/2014	9:49	1/21/2014 9:49	43	30	28.5	6	66	12.0		12.0	1.37	6706.14
	1/21/2014	9:50	1/21/2014 9:50	43	31.5	30.5	9.8	66	19.9		15.9	1.82	6707.96
	1/21/2014	10:21	1/21/2014 10:21	42	30	29	13	68	25.9		708.9	81.09	6789.05
	1/21/2014	10:51	1/21/2014 10:51	40	29	27	14.8	70	29.1		823.8	94.24	6883.30
	1/21/2014	13:20	1/21/2014 13:20	52	28.5	26.5	16	75	31.1		4479.8	512.49	7395.79
	1/21/2014	14:29	1/21/2014 14:29	50	28.5	26	16.5	74	32.1		2178.9	249.26	7645.05
	1/21/2014	14:31	1/21/2014 14:31	49	31.5	28.2	20	74	40.2		72.3	8.27	7653.32
	1/21/2014	15:36	1/21/2014 15:36	49	31.5	28.2	20	68	40.5		2622.6	300.03	7953.35
	1/21/2014	15:37	1/21/2014 15:37							Valve shut	40.5	4.63	7957.98
	1/21/2014	15:40	1/21/2014 15:40			17							7957.98
SW-57 Event 7	1/22/2014	9:10	1/22/2014 9:10	55	31	31	<2	50	0.0				7957.98
	1/22/2014	9:33	1/22/2014 9:33	53	26	24	16	50	30.9		355.4	40.66	7998.64
	1/22/2014	9:36	1/22/2014 9:36	50	31	26.5	22	50	45.1		114.0	13.04	8011.68
	1/22/2014	10:08	1/22/2014 10:08	48	30.5	26	22.1	54	44.8		1438.6	164.58	8176.25
	1/22/2014	11:12	1/22/2014 11:12	16	29	24	23.2	56	46.2		2912.7	333.21	8509.47
	1/22/2014	12:17	1/22/2014 12:17	45	28.5	23.5	23.5	57	46.5		3010.8	344.43	8853.90
	1/22/2014	13:03	1/22/2014 13:03	46	28.5	23.5	24	60	47.3		2156.6	246.71	9100.61
	1/22/2014	14:28	1/22/2014 14:28	47	28.5	23.5	24	60	47.3		4020.9	459.99	9560.60
	1/22/2014	14:31	1/22/2014 14:31							Valve shut	141.9	16.24	9576.83
	1/22/2014	14:32	1/22/2014 14:32			17							9576.83
Note: a red value, i.e. 75 °F, indicates that value was interpolated from field data										Total CO_2 Mass (lbs):			9576.83

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)	Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
SW-58 Event 1	11/12/2013	13:47	11/12/2013 13:47	30	10			69.6				
	11/12/2013	13:49	11/12/2013 13:49	36	34	32	<2	69.6	0.0	0.0	0.00	0.00
	11/12/2013	13:51	11/12/2013 13:51	32	31	31	<2	65.8	0.0	0.0	0.00	0.00
	11/12/2013	13:52	11/12/2013 13:52	30	28	26	5	66.7	7.9	3.9	0.45	0.45
	11/12/2013	13:54	11/12/2013 13:54	30	26	29	8.5	67.1	13.1	21.0	2.40	2.85
	11/12/2013	13:55	11/12/2013 13:55	34	28	25	14.75	67.4	23.3	18.2	2.08	4.93
	11/12/2013	13:57	11/12/2013 13:57	34	26	23	15	64.9	23.1	46.4	5.31	10.24
	11/12/2013	14:00	11/12/2013 14:00	34	26	22.5	15.5	60.2	24.0	70.7	8.09	18.33
	11/12/2013	14:02	11/12/2013 14:02	38	29	25	17.5	58.6	28.2	52.2	5.97	24.30
	11/12/2013	14:04	11/12/2013 14:04	42	31	26	19.5	56.8	32.2	60.3	6.90	31.20
	11/12/2013	14:06	11/12/2013 14:06	45	32	28	20.5	53.0	34.3	66.5	7.60	38.81
	11/12/2013	14:07	11/12/2013 14:07	46	32	26	21	47.3	35.4	34.8	3.99	42.79
	11/12/2013	14:11	11/12/2013 14:11	48	33	26	22.5	45.8	38.4	147.4	16.86	59.65
	11/12/2013	14:15	11/12/2013 14:15	48	32.5	25.5	22.75	43.8	38.7	154.0	17.62	77.27
	11/12/2013	14:19	11/12/2013 14:19	48	32	25	23	42.2	38.9	155.2	17.75	95.02
	11/12/2013	14:30	11/12/2013 14:30	48	31.5	24	23.5	39.3	39.7	432.3	49.46	144.48
	11/12/2013	14:40	11/12/2013 14:40	48	31	24	23.5	37.9	39.5	396.0	45.30	189.78
	11/12/2013	15:06	11/12/2013 15:06	48	30	23	24	36.5	40.0	1033.2	118.20	307.98
	11/12/2013	15:23	11/12/2013 15:23	49	31	22.5	25	39.5	42.0	696.4	79.67	387.65
	11/12/2013	15:25	11/12/2013 15:25	52	32	23.5	25.5	33.9	43.5	85.5	9.78	397.43
	11/12/2013	15:27	11/12/2013 15:27	54	33	24	26.5	32.9	45.8	89.3	10.22	407.65
	11/12/2013	15:30	11/12/2013 15:30	56	34	24.25	27	33.4	47.1	139.4	15.94	423.59
	11/12/2013	15:32	11/12/2013 15:32	59	35	24.75	27.5	33.1	48.5	95.6	10.94	434.53
	11/12/2013	15:34	11/12/2013 15:34	61	37.5	25.5	28.25	32.7	51.1	99.6	11.40	445.93
	11/12/2013	15:36	11/12/2013 15:36	63	37.5	26	28.75	31.1	52.1	103.2	11.81	457.73
	11/12/2013	16:18	11/12/2013 16:18	63	37	24.5	29.25	21.5	53.3	2213.8	253.26	710.99
	11/12/2013	16:52	11/12/2013 16:52	63	36.5	24.5	29.5	19.5	53.6	1817.7	207.94	918.93
	11/12/2013	17:35	11/12/2013 17:35	63	37	23.5	29.5	1.0	55.0	2335.6	267.19	1186.12
	11/12/2013	17:36	11/12/2013 17:36						Valve shut	55.0	6.29	1192.42
	11/12/2013	17:38	11/12/2013 17:38									1192.42
SW-58 Event 2	11/19/2013	8:21	11/19/2013 8:21	29	14			55.9		0.0	0.00	1192.42
	11/19/2013	8:24	11/19/2013 8:24	32	32.5	31	<2	49.6	0.0	0.0	0.00	1192.42
	11/19/2013	8:49	11/19/2013 8:49	28	27	24	7	49.6	11.1	138.8	15.87	1208.29
	11/19/2013	8:51	11/19/2013 8:51	34	31	27	10.5	49.6	17.4	28.5	3.27	1211.56
	11/19/2013	8:56	11/19/2013 8:56	38	34	28.5	13.75	40.6	23.8	103.1	11.80	1223.36
	11/19/2013	10:37	11/19/2013 10:37	38	31	25	15.5	38.6	26.0	2517.9	288.04	1511.40
	11/19/2013	10:39	11/19/2013 10:39	44	35	27.5	19.75	36.6	34.7	60.8	6.95	1518.35
	11/19/2013	12:17	11/19/2013 12:17	46	34.5	26.5	19.5	31.4	34.3	3380.4	386.72	1905.07
	11/19/2013	12:21	11/19/2013 12:21	52	37.5		22	31.6	39.9	148.3	16.96	1922.03
	11/19/2013	12:22	11/19/2013 12:22	55	40	29	23	31.2	42.7	41.3	4.72	1926.76
	11/19/2013	15:30	11/19/2013 15:30	56	39	28.5	24.75	31	45.5	8292.0	948.60	2875.36
	11/19/2013	15:37	11/19/2013 15:37	62	42	30	26	31	49.2	331.4	37.91	2913.27
	11/19/2013	17:00	11/19/2013 17:00	64	45	31.5	25.75	13.2	51.0	4156.7	475.53	3388.79
	11/19/2013	17:28	11/19/2013 17:28	64	46		25.5	11.3	51.0	1428.5	163.42	3552.22
	11/19/2013	17:29	11/19/2013 17:29						Valve shut	51.0	5.84	3558.05
	11/19/2013	17:32	11/19/2013 17:32	22	23							3558.05
	11/19/2013	17:38	11/19/2013 17:38			18						3558.05
SW-58 Event 3	11/25/2013	7:59	11/25/2013 7:59	38	27			50		0	0.00	3558.05
	11/25/2013	8:01	11/25/2013 8:01	32	32		<2	50	0.0	0	0.00	3558.05
	11/25/2013	8:05	11/25/2013 8:05							0	0.00	3558.05
	11/25/2013	8:40	11/25/2013 8:40	57	29			52		0	0.00	3558.05
	11/25/2013	8:41	11/25/2013 8:41		33	34	<2	52	0.0	0	0.00	3558.05
	11/25/2013	8:47	11/25/2013 8:47		32	32	8	52	16.5	49.6	5.68	3563.73

SW-58 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	11/25/2013	8:48	11/25/2013 8:48		34	34	10	52	21.1		18.8	2.15	3565.88
	11/25/2013	9:18	11/25/2013 9:18		34	33	13.5	56	28.4		742.7	84.96	3650.84
	11/25/2013	10:19	11/25/2013 10:19		34	31.5	15	63	31.3		1821.5	208.38	3859.22
	11/25/2013	10:21	11/25/2013 10:21		35	32.5	16	63	33.8		65.1	7.45	3866.67
	11/25/2013	11:18	11/25/2013 11:18	55	35	32	16.5	60	34.9		1957.5	223.94	4090.61
	11/25/2013	12:01	11/25/2013 12:01		35	31.5	17	62	35.9		1522.9	174.22	4264.83
	11/25/2013	12:43	11/25/2013 12:43		33	31.5	18	64	37.2		1534.5	175.54	4440.37
	11/25/2013	13:49	11/25/2013 13:49		33	31	18	64	37.2		2452.7	280.59	4720.95
	11/25/2013	14:22	11/25/2013 14:22							Valve shut	1226.3	140.29	4861.25
	11/25/2013	14:23	11/25/2013 14:23			24							4861.25
	11/25/2013	14:33	11/25/2013 14:33		29								4861.25
	11/25/2013	14:34	11/25/2013 14:34		31	27	18	62	36.4	Restart	36.4	4.17	4865.42
	11/25/2013	14:35	11/25/2013 14:35		34	29	20	62	41.8		39.1	4.48	4869.89
	11/25/2013	15:20	11/25/2013 15:20	55	33	30	18	60	37.3		1780.2	203.66	5073.55
	11/25/2013	16:10	11/25/2013 16:10	57	34	30	16	60	33.5		1770.6	202.56	5276.11
	11/25/2013	16:11	11/25/2013 16:11							Valve shut	33.5	3.83	5279.95
	11/25/2013	16:12	11/25/2013 16:12			25							5279.95
SW-58 Event 4	11/26/2013	8:01	11/26/2013 8:01	48	29			68					5279.95
	11/26/2013	8:02	11/26/2013 8:02		33	34.5	<2	68	0.0				5279.95
	11/26/2013	8:08	11/26/2013 8:08	55	32	32.5	6	68	12.2		36.6	4.19	5284.13
	11/26/2013	9:15	11/26/2013 9:15	52	32	32	8	68	16.3		954.1	109.15	5393.29
	11/26/2013	11:00	11/26/2013 11:00	50	30	32	10	68	19.9		1899.0	217.25	5610.54
	11/26/2013	12:25	11/26/2013 12:25	50	30	31	10	68	19.9		1691.2	193.48	5804.02
	11/26/2013	12:26	11/26/2013 12:26							Valve shut	19.9	2.28	5806.29
	11/26/2013	12:27	11/26/2013 12:27										5806.29
SW-58 Event 5	12/6/2013	13:18	12/6/2013 13:18	47	37.5	35	<2	84	0.0				5806.29
	12/6/2013	14:04	12/6/2013 14:04	47	34	33	9	83	18.4		424.0	48.50	5854.80
	12/6/2013	14:35	12/6/2013 14:35	45	34	32	10	84	20.5		602.9	68.97	5923.77
	12/6/2013	15:05	12/6/2013 15:05	45	34	32.5	11	80	22.6		645.9	73.89	5997.65
	12/6/2013	15:53	12/6/2013 15:53	45	34	33	11	79	22.6		1085.1	124.13	6121.79
	12/6/2013	16:10	12/6/2013 16:10	43	34	32.5	11.5	78	23.7		393.4	45.01	6166.79
	12/6/2013	17:07	12/6/2013 17:07	43	35	32.5	12	76	25.0		1387.1	158.68	6325.47
	12/6/2013	17:22	12/6/2013 17:22	40	34	32	12	79	24.7		372.6	42.62	6368.09
	12/6/2013	17:23	12/6/2013 17:23							Valve shut	24.7	2.82	6370.91
SW-58 Event 6	12/10/2013	8:54	12/10/2013 8:54	50	34	32	<2	72	0.0				6370.91
	12/10/2013	9:20	12/10/2013 9:20	50	32	30	5.5	72	11.1		144.9	16.58	6387.49
	12/10/2013	9:55	12/10/2013 9:55	50	32	30	6.5	72	13.2		425.6	48.68	6436.17
	12/10/2013	10:35	12/10/2013 10:35	49	32	29	7	74	14.2		546.6	62.53	6498.70
	12/10/2013	10:36	12/10/2013 10:36	47.4	34	31	10	74	20.7		17.4	1.99	6500.69
	12/10/2013	10:38	12/10/2013 10:38	46	35	33	12.5	74	26.1		46.8	5.35	6506.04
	12/10/2013	11:34	12/10/2013 11:34	45	35	33	12	74	25.0		1432.0	163.82	6669.86
	12/10/2013	12:50	12/10/2013 12:50	50	35	32	13	80	27.0		1977.1	226.18	6896.05
	12/10/2013	12:54	12/10/2013 12:54							Valve shut	107.9	12.35	6908.39
	12/10/2013	12:55	12/10/2013 12:55			22.5							6908.39
SW-58 Event 7	12/12/2013	13:40	12/12/2013 13:40	51	34	33.5	<2	70	0.0				6908.39
	12/12/2013	14:34	12/12/2013 14:34	47	34	30	9	70	18.7		504.0	57.66	6966.05
	12/12/2013	14:35	12/12/2013 14:35	48	34	32	11.5	70	23.9		21.3	2.43	6968.48
	12/12/2013	15:12	12/12/2013 15:12	45	34	31	11.5	70	23.9		882.5	100.96	7069.45
	12/12/2013	15:13	12/12/2013 15:13	45	35	32.5	13.5	70	28.3		26.1	2.98	7072.43
	12/12/2013	16:30	12/12/2013 16:30	47	35	32	14.5	66	30.5		2263.7	258.97	7331.40
	12/12/2013	16:32	12/12/2013 16:32	47	36	33	16.5	66	35.1		65.6	7.50	7338.90
	12/12/2013	17:30	12/12/2013 17:30	50	36	32.5	16.5	66	35.1		2033.9	232.68	7571.58
	12/12/2013	17:35	12/12/2013 17:35							Valve shut	175.3	20.06	7591.64

SW-58 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	12/12/2013	17:36	12/12/2013 17:36			22							7591.64
SW-58 Event 8	12/17/2013	8:12	12/17/2013 8:12	49	35	35	<2	48	0.0		0.0	0.00	7591.64
	12/17/2013	9:10	12/17/2013 9:10	45	35	34	8.5	58	18.0		522.8	59.80	7651.44
	12/17/2013	10:26	12/17/2013 10:26	40	35	33	9.5	63	20.0		1446.8	165.51	7816.96
	12/17/2013	11:26	12/17/2013 11:26	40	35	32	10	70	21.0		1230.1	140.72	7957.68
	12/17/2013	11:27	12/17/2013 11:27	40	35	34	14	70	29.3		25.1	2.88	7960.56
	12/17/2013	12:12	12/17/2013 12:12	42	38	34	15.5	71	33.4		1412.3	161.57	8122.13
	12/17/2013	12:13	12/17/2013 12:13							Valve shut	33.4	3.82	8125.95
	12/17/2013	12:14	12/17/2013 12:14			27							8125.95
SW-58 Event 9	1/14/2014	12:55	1/14/2014 12:55	47	31	33.5	<2	66	0.0				8125.95
	1/14/2014	14:10	1/14/2014 14:10	47	31	33	5	70	10.0		376.5	43.08	8169.03
	1/14/2014	15:47	1/14/2014 15:47	47	30.5	32	5	73	10.0		969.9	110.95	8279.98
	1/14/2014	17:07	1/14/2014 17:07	55	30.5	32	6.5	75	12.9		915.0	104.67	8384.65
	1/14/2014	17:08	1/14/2014 17:08			25				Valve shut			8384.65
SW-58 Event 10	1/23/2014	8:27	1/23/2014 8:27	52	32	33	<2	40	0.0		0.0	0.00	8384.65
	1/23/2014	8:28	1/23/2014 8:28	52	32	33	3	40	6.3		3.1	0.36	8385.01
	1/23/2014	8:31	1/23/2014 8:31	52	32	31.5	3.7	40	7.7		21.0	2.41	8387.42
	1/23/2014	8:32	1/23/2014 8:32	52	33	32.5	5	40	10.6		9.2	1.05	8388.47
	1/23/2014	8:50	1/23/2014 8:50	51	33	32.3	5.2	44	11.0		193.8	22.17	8410.64
	1/23/2014	8:51	1/23/2014 8:51	51	34	33.2	7	44	14.9		12.9	1.48	8412.12
	1/23/2014	9:30	1/23/2014 9:30	48	34	33.2	6.8	46	14.4		572.4	65.48	8477.60
	1/23/2014	10:03	1/23/2014 10:03	47	34	33	6.5	48	13.8		465.8	53.29	8530.88
	1/23/2014	11:09	1/23/2014 11:09	45	33.5	32.8	6.5	50	13.7		906.3	103.69	8634.57
	1/23/2014	11:59	1/23/2014 11:59	44	33.5	32.8	6.8	54	14.3		698.4	79.90	8714.47
	1/23/2014	12:45	1/23/2014 12:45	47	33.5	32.8	7	58	14.6		664.0	75.97	8790.44
	1/23/2014	12:46	1/23/2014 12:46			29				Valve shut	14.6	1.67	8792.11
SW-58 Event 11	1/29/2014	12:18	1/29/2014 12:18										8792.11
	1/29/2014	12:19	1/29/2014 12:19	50	34	32.5	3.5	42	7.5		7.5	0.85	8792.96
	1/29/2014	12:20	1/29/2014 12:20	50	35	34	6	42	12.9		10.2	1.17	8794.13
	1/29/2014	13:52	1/29/2014 13:52	50	34	32.5	9.5	42	20.3		1527.4	174.73	8968.86
	1/29/2014	13:54	1/29/2014 13:54	50	36	34	12	42	26.1		46.4	5.31	8974.17
	1/29/2014	15:00	1/29/2014 15:00	49	36	34	12	42	26.1		1724.8	197.32	9171.49
	1/29/2014	16:40	1/29/2014 16:40	56	36	34	12	42	26.1		2613.4	298.97	9470.46
	1/29/2014	16:41	1/29/2014 16:41							Valve shut	26.1	2.99	9473.45
	1/29/2014	16:42	1/29/2014 16:42			27							9473.45
SW-58 Event 12	2/4/2014	9:57	2/4/2014 9:57	55	34.5	32.5	<2	61	0.0				9473.45
	2/4/2014	10:24	2/4/2014 10:24	54	32	30.5	6.3	63	12.9		173.9	19.89	9493.34
	2/4/2014	10:25	2/4/2014 10:25	54	34	32.5	9.7	63	20.3		16.6	1.90	9495.24
	2/4/2014	11:38	2/4/2014 11:38	52	33.5	31.5	11.8	66	24.4		1631.6	186.65	9681.89
	2/4/2014	12:47	2/4/2014 12:47	50	33	31	12.8	67	26.3		1752.3	200.46	9882.35
	2/4/2014	12:50	2/4/2014 12:50	50	34	32	15	67	31.2		86.3	9.88	9892.23
	2/4/2014	13:28	2/4/2014 13:28	50	34	32	15	67	31.2		1185.7	135.65	10027.88
	2/4/2014	14:32	2/4/2014 14:32	48	34	32	15	64	31.3		2000.0	228.80	10256.67
	2/4/2014	15:34	2/4/2014 15:34	50	34	31.5	15.7	62	32.8		1987.7	227.39	10484.06
	2/4/2014	16:28	2/4/2014 16:28	50	34	31.5	15.9	60	33.3		1785.5	204.26	10688.32
	2/4/2014	17:53	2/4/2014 17:53	56	34	31	16	59	33.5		2841.4	325.05	11013.37
	2/4/2014	17:54	2/4/2014 17:54			24				Valve shut	33.5	3.84	11017.21
SW-58 Event 13	2/6/2014	8:24	2/6/2014 8:24	55	29	24	<2	50	0.0				11017.21
	2/6/2014	8:25	2/6/2014 8:25	55	33	32	6.2	50	13.0		6.5	0.74	11017.96
	2/6/2014	8:49	2/6/2014 8:49	52	32.5	31.5	9	55	18.6		379.6	43.42	11061.38
	2/6/2014	8:52	2/6/2014 8:52	52	33.5	32.5	11.7	55	24.5		64.7	7.40	11068.78
	2/6/2014	10:52	2/6/2014 10:52	49	33.5	31	13.9	62	28.9		3204.6	366.61	11435.39
	2/6/2014	10:56	2/6/2014 10:56	49	34.5	32.5	16.3	62	34.3		126.3	14.45	11449.84

SW-58 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	2/6/2014	11:15	2/6/2014 11:15	48	34.5	32	16.2	64	34.0		648.2	74.15	11523.99
	2/6/2014	12:16	2/6/2014 12:16	47	34.5	32	16.2	66	33.9		2070.5	236.86	11760.85
	2/6/2014	14:14	2/6/2014 14:14	46	34.5	32	16.7	65	35.0		4065.0	465.04	12225.89
	2/6/2014	15:24	2/6/2014 15:24	47	34	31.8	17	60	35.6		2471.0	282.68	12508.58
	2/6/2014	16:41	2/6/2014 16:41	46	34	31.5	17	56	35.8		2747.5	314.32	12822.90
	2/6/2014	17:23	2/6/2014 17:23	53	34	31.5	17.3	55	36.4		1515.7	173.40	12996.29
	2/6/2014	17:24	2/6/2014 17:24			24				Valve shut	36.4	4.17	13000.46
SW-58 Event 14	2/11/2014	7:52	2/11/2014 7:52	57	28	27	<2	56	0.0				13000.46
	2/11/2014	7:53	2/11/2014 7:53	57	3.5	32	10	56	12.8		6.4	0.73	13001.19
	2/11/2014	9:17	2/11/2014 9:17	54	32	31	12.3	60	25.2		1596.4	182.63	13183.82
	2/11/2014	9:20	2/11/2014 9:20	54	33.5	32	14.5	60	30.2		83.2	9.51	13193.33
	2/11/2014	10:30	2/11/2014 10:30	53	33.5	32	14.2	66	29.4		2087.0	238.75	13432.09
	2/11/2014	11:50	2/11/2014 11:50	53	33.5	32	14.3	66	29.6		2361.4	270.14	13702.23
	2/11/2014	12:45	2/11/2014 12:45	47	33.5	32	14.3	66	29.6		1629.2	186.38	13888.61
	2/11/2014	14:02	2/11/2014 14:02	47	33.5	32	14.8	64	30.7		2323.0	265.75	14154.36
	2/11/2014	16:50	2/11/2014 16:50	47	33.5	32	15	54	31.4		5221.7	597.37	14751.73
	2/11/2014	17:27	2/11/2014 17:27	54	33.5	32	14.8	54	31.0		1155.8	132.22	14883.95
	2/11/2014	17:28	2/11/2014 17:28			28				Valve shut	31.0	3.55	14887.50
Note: a red value, i.e. 75 °F, indicates that value was interpolated from field data										Total CO_2 Mass (lbs):			14887.50

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
SW-59 Event 1	2/5/2014	16:17	2/5/2014 16:17	50	27	27	<2	86.0					
	2/5/2014	16:18	2/5/2014 16:18	50	33.5	33.5	<2	86.0	0.0		0.0	0.00	0.00
	2/5/2014	16:23	2/5/2014 16:23	50	33.5	33.5	<2	86.0	0.0		0.0	0.00	0.00
	2/5/2014	17:03	2/5/2014 17:03	50	33.5	34	<2	84.0	0.0		0.0	0.00	0.00
	2/5/2014	17:14	2/5/2014 17:14	50	33.5	34	<2	82.0	0.0		0.0	0.00	0.00
	2/5/2014	21:27	2/5/2014 21:27	50	33.5	34	<2	62.0	0.0		0.0	0.00	0.00
	2/6/2014	7:30	2/6/2014 7:30	47	33.5	32.5	<2	41.0	0.0		0.0	0.00	0.00
	2/6/2014	8:58	2/6/2014 8:58	50	32.5	32.5	<2	58.0	0.0		0.0	0.00	0.00
	2/6/2014	9:00	2/6/2014 9:00	50	34	34	<2	58.0	0.0		0.0	0.00	0.00
	2/6/2014	10:20	2/6/2014 10:20	48	34	34	<2	64.0	0.0		0.0	0.00	0.00
	2/6/2014	11:00	2/6/2014 11:00	48	34	34	<2	65.0	0.0		0.0	0.00	0.00
	2/6/2014	11:10	2/6/2014 11:10	48	34	34	<2	66.0	0.0		0.0	0.00	0.00
	2/6/2014	12:20	2/6/2014 12:20	46	34	34	<2	66.0	0.0		0.0	0.00	0.00
	2/6/2014	14:18	2/6/2014 14:18	46	34	34	<2	65.0	0.0		0.0	0.00	0.00
	2/6/2014	14:20	2/6/2014 14:20	46	35	35.5	4	66.0	8.4		8.4	0.96	0.96
	2/6/2014	15:28	2/6/2014 15:28	45	35.5	36	3.9	59.0	8.3		568.5	65.04	66.00
	2/6/2014	16:45	2/6/2014 16:45	45	35	36	3.9	54.0	8.3		639.5	73.15	139.15
	2/6/2014	17:29	2/6/2014 17:29	52	35	36	4	53.0	8.5		370.3	42.36	181.51
	2/7/2014	9:08	2/7/2014 9:08	44	35	34	7	60.0	14.8		10958.9	1253.70	1435.21
	2/7/2014	9:46	2/7/2014 9:46	43	36	34	7.2	54.0	15.5		575.8	65.87	1501.08
	2/7/2014	10:39	2/7/2014 10:39		36	35	7	58.0	15.0		807.8	92.42	1593.50
	2/7/2014	11:34	2/7/2014 11:34		36	35.5	6.2	62.0	13.2		776.2	88.80	1682.30
	2/7/2014	13:25	2/7/2014 13:25		36	36	5.8	62.0	12.4		1421.1	162.57	1844.87
	2/7/2014	14:36	2/7/2014 14:36	47	36	35.5	6.1	62.0	13.0		901.4	103.12	1947.99
	2/7/2014	15:48	2/7/2014 15:48	46	36	35.5	6.3	60.0	13.5		953.5	109.08	2057.07
	2/7/2014	16:48	2/7/2014 16:48	46	36	35.5	6.5	58.0	13.9		821.9	94.02	2151.09
	2/7/2014	17:40	2/7/2014 17:40	55	36	35	7	56.0	15.0		752.8	86.12	2237.21
	2/7/2014	17:43	2/7/2014 17:43			30				Valve shut	45.1	5.16	2242.37
SW-59 Event 2	2/10/2014	8:47	2/10/2014 8:47	53	27	27	4	53.0	7.8				2242.37
	2/10/2014	8:52	2/10/2014 8:52	53	33	32.5	10.4	53.0	21.7		73.8	8.44	2250.81
	2/10/2014	9:38	2/10/2014 9:38	47	33.5	33.5	9	63.0	18.7		929.4	106.32	2357.13
	2/10/2014	11:01	2/10/2014 11:01	46	33.5	34	7.7	78.0	15.8		1430.2	163.61	2520.74
	2/10/2014	13:37	2/10/2014 13:37	45	33.5	34	7	84.0	14.2		2341.0	267.81	2788.55
	2/10/2014	15:09	2/10/2014 15:09	44	33.5	33.5	6.8	84.0	13.8		1292.2	147.83	2936.38
	2/10/2014	17:00	2/10/2014 17:00	44	33.5	33.5	6.8	73.0	14.0		1544.6	176.70	3113.08
	2/10/2014	17:34	2/10/2014 17:34	49	34	34	6.5	70	13.5		467.0	53.43	3166.51
	2/11/2014	7:35	2/11/2014 7:35	55	33.5	33	9.3	53.0	19.5		13875.7	1587.38	4753.89
	2/11/2014	8:42	2/11/2014 8:42	45	33.5	33.5	8.2	56.0	17.2		1228.5	140.54	4894.43
	2/11/2014	9:27	2/11/2014 9:27	51	33.5	33.5	7.7	61.0	16.0		746.7	85.42	4979.85
	2/11/2014	10:44	2/11/2014 10:44	50	33.5	34	6.8	67.0	14.1		1158.9	132.58	5112.43
	2/11/2014	11:55	2/11/2014 11:55	50	34	34	6.2	66.0	12.9		957.9	109.58	5222.00
	2/11/2014	12:56	2/11/2014 12:56	45	34	34	6.1	65.0	12.7		781.6	89.41	5311.41
	2/11/2014	14:00	2/11/2014 14:00	45	34	34	6.1	63.0	12.7		814.5	93.18	5404.60
	2/11/2014	16:54	2/11/2014 16:54	44	34.5	34	6	53.0	12.7		2215.3	253.43	5658.03
	2/11/2014	17:43	2/11/2014 17:43	55	34.5	34	6	51.0	12.7		624.1	71.40	5729.42
	2/12/2014	8:38	2/12/2014 8:38	45	33	32.5	10	47.0	21.0		15104.1	1727.91	7457.33
	2/12/2014	9:00	2/12/2014 9:00	45	33	32.5	10	47.0	21.0	Valve shut	462.1	52.86	7510.19
SW-59 Event 3	2/12/2014	11:44	2/12/2014 11:44	43	32.5	33	14	48.0	29.2				7510.19
	2/12/2014	14:02	2/12/2014 14:02	48	32.5	33	10	49.0	20.8		3454.4	395.19	7905.38
	2/12/2014	14:57	2/12/2014 14:57	48	32	33	10	46.0	20.8		1145.3	131.02	8036.39
	2/12/2014	16:56	2/12/2014 16:56	48	32	33	9.8	45.0	20.4		2451.6	280.46	8316.85
	2/12/2014	17:56	2/12/2014 17:56	48	32	33	9.8	45.0	20.4		1224.2	140.05	8456.90
	2/13/2014	7:17	2/13/2014 7:17	50	33	33	9.7	47.0	20.4		16331.0	1868.26	10325.17

SW-59 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	2/13/2014	8:02	2/13/2014 8:02	49	33	33	9.7	43.0	20.5		918.7	105.10	10430.26
	2/13/2014	9:07	2/13/2014 9:07	49	33	33	9.7	43.0	20.5		1329.7	152.12	10582.38
	2/13/2014	9:58	2/13/2014 9:58	49	33	33	9.7	44.0	20.4		1042.8	119.29	10701.67
	2/13/2014	10:36	2/13/2014 10:36	49	33	33	9.7	44.0	20.4		776.6	88.84	10790.51
	2/13/2014	11:06	2/13/2014 11:06	49	33	33	9.7	45.0	20.4		612.8	70.10	10860.61
	2/13/2014	11:37	2/13/2014 11:37	49	33	33	9.7	46.0	20.4		632.5	72.36	10932.97
	2/13/2014	12:07	2/13/2014 12:07	49	33	33	9.8	50.0	20.5		613.7	70.21	11003.18
	2/13/2014	12:37	2/13/2014 12:37	49	33	33	9.8	51.0	20.5		615.3	70.39	11073.56
	2/13/2014	13:07	2/13/2014 13:07	49	33	33	9.8	52.0	20.5		614.6	70.32	11143.88
	2/13/2014	14:11	2/13/2014 14:11	49	33	33	9.8	58.0	20.4		1306.6	149.48	11293.36
	2/13/2014	15:09	2/13/2014 15:09	49	33	33	9.8	60.0	20.3		1179.3	134.92	11428.27
	2/13/2014	15:21	2/13/2014 15:21			27				Valve shut	243.8	27.89	11456.16
Note: a red value, i.e. 75 °F, indicates that value was interpolated from field data											Total CO_2 Mass (lbs):		11456.16

SW-60 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
SW-60 Event 1	11/20/2013	9:10	11/20/2013 9:10			10			0.0				
	11/20/2013	9:11	11/20/2013 9:11	55	32	30	<2	64	0.0		0.0	0.00	0.00
	11/20/2013	9:16	11/20/2013 9:16						0.0		0.0	0.00	0.00
	11/20/2013	9:45	11/20/2013 9:45	55	32	30	<2	64	0.0		0.0	0.00	0.00
	11/20/2013	10:48	11/20/2013 10:48	53	33	29.5	<2	66	0.0		0.0	0.00	0.00
	11/20/2013	10:51	11/20/2013 10:51	53	34	31.5	<2	66	0.0		0.0	0.00	0.00
	11/20/2013	12:36	11/20/2013 12:36	52	34	31	4	65	8.3		437.7	50.07	50.07
	11/20/2013	14:37	11/20/2013 14:37	50	33	30.5	6.5	64	13.4		1316.3	150.58	200.66
	11/20/2013	14:41	11/20/2013 14:41	50	34	31.5	7.25	63.0	15.1		57.1	6.53	207.19
	11/20/2013	15:23	11/20/2013 15:23	57.5	34	31	9	62.0	18.8		713.1	81.58	288.77
	11/20/2013	15:24	11/20/2013 15:24							Valve shut	18.8	2.15	290.92
	11/20/2013	15:24	11/20/2013 15:24			17							290.92
SW-60 Event 2	11/23/2013	8:10	11/23/2013 8:10	54	27			70	0.0		0.0	0.00	290.92
	11/23/2013	8:13	11/23/2013 8:13	55	31	30	<2	70	0.0		0.0	0.00	290.92
	11/23/2013	8:43	11/23/2013 8:43	52	30	29	<2	76	0.0		0.0	0.00	290.92
	11/23/2013	8:45	11/23/2013 8:45	52	33	31.5	4	76	8.2		8.2	0.93	291.86
	11/23/2013	9:18	11/23/2013 9:18	50	33	31.5	5.5	78	11.2		319.5	36.55	328.40
	11/23/2013	9:20	11/23/2013 9:20	50	36	35	8	78	16.8		28.0	3.20	331.61
	11/23/2013	9:49	11/23/2013 9:49	49	36	34	10	80	21.0		547.6	62.65	394.26
	11/23/2013	11:07	11/23/2013 11:07	46	36	32.5	14	82	29.3		1960.1	224.24	618.50
	11/23/2013	12:27	11/23/2013 12:27	45	34	31	17	82	34.9		2565.9	293.54	912.03
	11/23/2013	12:49	11/23/2013 12:49	53	34	30	18	84	36.8		788.5	90.21	1002.24
	11/23/2013	12:50	11/23/2013 12:50							Valve shut	36.8	4.21	1006.46
	11/23/2013	12:51	11/23/2013 12:51										1006.46
SW-60 Event 3	11/26/2013	7:42	11/26/2013 7:42	50	27			68					1006.46
	11/26/2013	7:44	11/26/2013 7:44		31	30	<2	68	0.0				1006.46
	11/26/2013	7:55	11/26/2013 7:55		31	29	4	68	8.0		44.3	5.06	1011.52
	11/26/2013	7:56	11/26/2013 7:56		36	33	6.5	68	13.8		10.9	1.25	1012.77
	11/26/2013	8:19	11/26/2013 8:19	52	35	32	9	68	18.9		375.9	43.00	1055.77
	11/26/2013	9:23	11/26/2013 9:23		35	31	13	68	27.3		1478.2	169.11	1224.88
	11/26/2013	10:55	11/26/2013 10:55	50	33	30	16	68	32.9		2769.2	316.79	1541.67
	11/26/2013	12:28	11/26/2013 12:28		33	29	18	68	37.0		3251.2	371.93	1913.60
	11/26/2013	12:29	11/26/2013 12:29							Valve shut	37.0	4.23	1917.84
	11/26/2013	12:30	11/26/2013 12:30			20							1917.84
SW-60 Event 4	12/3/2013	13:25	12/3/2013 13:25	54	34	32.5	<2	84	0.0				1917.84
	12/3/2013	13:42	12/3/2013 13:42	47	32	30.5	6.5	82	13.0		110.9	12.69	1930.52
	12/3/2013	14:47	12/3/2013 14:47	46	31	28.5	12.5	77	24.9		1234.3	141.20	2071.73
	12/3/2013	15:28	12/3/2013 15:28	45	31	28	13.75	73	27.5		1075.5	123.04	2194.77
	12/3/2013	15:30	12/3/2013 15:30	44	32.5	29.5	16	73	32.6		60.1	6.88	2201.65
	12/3/2013	15:33	12/3/2013 15:33	44	35	30.5	17.5	73	36.6		103.7	11.86	2213.51
	12/3/2013	16:56	12/3/2013 16:56	45	35	29.5	20	66	42.1		3263.7	373.37	2586.88
	12/3/2013	17:21	12/3/2013 17:21	49	35	29	20	65	42.1		1052.5	120.40	2707.29
	12/3/2013	17:23	12/3/2013 17:23							Valve shut	84.2	9.64	2716.92
	12/3/2013	17:24	12/3/2013 17:24			19							2716.92
SW-60 Event 5	12/6/2013	8:08	12/6/2013 8:08	52	28	27.5	<2	70	0.0				2716.92
	12/6/2013	8:09	12/6/2013 8:09		33	32	<2	70	0.0				2716.92
	12/6/2013	9:10	12/6/2013 9:10	42	32.0	29.5	12	76	24.2		738.8	84.52	2801.44
	12/6/2013	9:12	12/6/2013 9:12	42	32.5	30.5	14	76	28.4		52.6	6.02	2807.46
	12/6/2013	10:00	12/6/2013 10:00	40	32.5	29.5	16	78	32.4		1459.8	167.00	2974.46
	12/6/2013	10:02	12/6/2013 10:02	40	34.0	31	17	78	35.0		67.4	7.71	2982.17
	12/6/2013	11:06	12/6/2013 11:06	37.5	33.0	30	18.5	80	37.6		2322.9	265.74	3247.91
	12/6/2013	11:08	12/6/2013 11:08	37.5	34	30.5	20	80	41.1		78.7	9.00	3256.91
	12/6/2013	12:15	12/6/2013 12:15	40	35	30.5	22.5	79	46.7		2942.1	336.57	3593.48

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	12/6/2013	12:16	12/6/2013 12:16	40	35	30.5	22.5	79	46.7	Valve shut	46.7	5.35	3598.83
	12/6/2013	12:17	12/6/2013 12:17			20							3598.83
SW-60 Event 6	12/9/2013	12:30	12/9/2013 12:30	50	32	33	<2	84	0.0		0.0	0.00	3598.83
	12/9/2013	12:58	12/9/2013 12:58	50	32	30	6	88	12.0		167.6	19.18	3618.01
	12/9/2013	13:29	12/9/2013 13:29	57.5	30	30	10.5	87	20.5		503.6	57.61	3675.61
	12/9/2013	14:00	12/9/2013 14:00	45	30	30	12	85	23.5		682.0	78.03	3753.64
	12/9/2013	14:27	12/9/2013 14:27	45	30	29	13	82	25.5		661.6	75.69	3829.33
	12/9/2013	15:15	12/9/2013 15:15	46	29	29.5	13.5	77	26.3		1244.2	142.34	3971.67
	12/9/2013	15:17	12/9/2013 15:17	46	32	30.5	15.5	77	31.3		57.6	6.59	3978.25
	12/9/2013	16:04	12/9/2013 16:04	42	32	30	15.5	72	31.4		1472.7	168.48	4146.73
	12/9/2013	16:05	12/9/2013 16:05	42	34	31	15.5	72	32.1		31.7	3.63	4150.36
	12/9/2013	16:40	12/9/2013 16:40	44	34	32	15.5	70	32.1		1124.1	128.60	4278.96
	12/9/2013	17:21	12/9/2013 17:21	45	32.5	32	16	68	32.7		1329.9	152.15	4431.11
	12/9/2013	17:22	12/9/2013 17:22							Valve shut	32.7	3.74	4434.85
	12/9/2013	17:23	12/9/2013 17:23			19							4434.85
SW-60 Event 7	12/12/2013	8:19	12/12/2013 8:19	50	35	32	7.5	58	15.9				4434.85
	12/12/2013	9:31	12/12/2013 9:31	50	34	29	10	67	20.8		1321.5	151.18	4586.03
	12/12/2013	9:32	12/12/2013 9:32	50	35	30	12	67	25.2		23.0	2.63	4588.66
	12/12/2013	10:20	12/12/2013 10:20	45	30	30	13.5	68	26.9		1250.0	143.00	4731.66
	12/12/2013	11:07	12/12/2013 11:07	41	30	29.5	13.5	70	26.8		1261.2	144.29	4875.95
	12/12/2013	11:08	12/12/2013 11:08	42	30	30.5	16	70	31.8		29.3	3.35	4879.30
	12/12/2013	12:10	12/12/2013 12:10	40	30	30.5	15.5	70	30.8		1939.2	221.84	5101.14
	12/12/2013	12:19	12/12/2013 12:19							Valve shut	277.0	31.69	5132.83
	12/12/2013	12:20	12/12/2013 12:20			19							5132.83
SW-60 Event 8	12/16/2013	12:13	12/16/2013 12:13	47	26	31	<2	68	0.0		0.0	0.00	5132.83
	12/16/2013	12:45	12/16/2013 12:45	47.5	25	26	<2	68	0.0		0.0	0.00	5132.83
	12/16/2013	12:47	12/16/2013 12:47	47	29	30	4.5	68	8.9		8.9	1.01	5133.84
	12/16/2013	13:19	12/16/2013 13:19		29		8	70	15.7		392.9	44.95	5178.79
	12/16/2013	13:20	12/16/2013 13:20							Valve Shut	15.7	1.80	5180.58
	12/16/2013	14:51	12/16/2013 14:51	43	31	32	5	75	10.0	Restart	909.3	104.03	5284.61
	12/16/2013	15:48	12/16/2013 15:48	42	34	27	15.5	69	32.2		1201.9	137.50	5422.11
	12/16/2013	15:50	12/16/2013 15:50	42	35	28.5	18	69	37.8		69.9	8.00	5430.11
	12/16/2013	16:48	12/16/2013 16:48	40	30	28	17.5	64	35.0		2108.8	241.24	5671.35
	12/16/2013	17:35	12/16/2013 17:35	42	30	28	18	56	36.2		1673.2	191.42	5862.77
	12/16/2013	17:36	12/16/2013 17:36							Valve Shut	36.2	4.15	5866.91
	12/16/2013	17:37	12/16/2013 17:37		20								5866.91
SW-60 Event 9	1/10/2014	8:40	1/10/2014 8:40	55	25	23	<2	66	0.0				5866.91
	1/10/2014	8:41	1/10/2014 8:41	55	32	31.5	<2	66	0.0				5866.91
	1/10/2014	9:30	1/10/2014 9:30	50	31	28	8	66	16.1		395.2	45.21	5912.12
	1/10/2014	9:41	1/10/2014 9:41	45	33	31	11	66	22.7		213.4	24.41	5936.53
	1/10/2014	10:35	1/10/2014 10:35	42	33	31	12	70	24.6		1276.9	146.08	6082.61
	1/10/2014	12:24	1/10/2014 12:24	40	33	31	13	72	26.6		2793.5	319.58	6402.19
	1/10/2014	13:12	1/10/2014 13:12	44	32	30	14	68	28.5		1322.6	151.31	6553.50
	1/10/2014	13:14	1/10/2014 13:14							Valve shut	57.0	6.52	6560.02
	1/10/2014	13:16	1/10/2014 13:16			19							6560.02
SW-60 Event 10	1/22/2014	9:20	1/22/2014 9:20	49	28	27	<2	48	0.0				6560.02
	1/22/2014	9:21	1/22/2014 9:21	49	34	32	<2	48	0.0		0.0	0.00	6560.02
	1/22/2014	9:27	1/22/2014 9:27	48	33	31	2	48	4.2		12.6	1.44	6561.46
	1/22/2014	9:30	1/22/2014 9:30	48	33	31	3.5	48	7.3		17.3	1.98	6563.44
	1/22/2014	10:00	1/22/2014 10:00	45	32	30	7.2	51	14.9		333.6	38.17	6601.60
	1/22/2014	11:09	1/22/2014 11:09	43	33	30	13.8	54	28.8		1506.8	172.38	6773.98
	1/22/2014	12:14	1/22/2014 12:14	39	33	30	14	56	29.1		1882.2	215.32	6989.31
	1/22/2014	13:00	1/22/2014 13:00	43	33	30	14	59	29.0		1338.2	153.09	7142.40

SW-60 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	1/22/2014	14:20	1/22/2014 14:20	41	31	30	17.3	60	35.1		2565.4	293.48	7435.88
	1/22/2014	14:21	1/22/2014 14:21			20				Valve shut	35.1	4.01	7439.89
SW-60 Event 11	1/23/2014	8:36	1/23/2014 8:36	50	32	30	<2	39	0.0		0.0	0.00	7439.89
	1/23/2014	8:38	1/23/2014 8:38	50	33	31	<2	39	0.0		0.0	0.00	7439.89
	1/23/2014	9:08	1/23/2014 9:08	48	32	29	4.5	45	9.4		140.5	16.08	7455.97
	1/23/2014	9:09	1/23/2014 9:09	48	34	31.5	7	45	14.9		12.1	1.39	7457.36
	1/23/2014	9:56	1/23/2014 9:56	47	34	30	11.5	48	24.4		922.9	105.58	7562.94
	1/23/2014	11:00	1/23/2014 11:00	42.5	33	29	14	52	29.3		1716.4	196.36	7759.30
	1/23/2014	11:04	1/23/2014 11:04	42.5	35	31.2	16.5	52	35.2		128.9	14.75	7774.05
	1/23/2014	11:51	1/23/2014 11:51	40	35	31	17.7	54	37.7		1713.0	195.97	7970.02
	1/23/2014	12:39	1/23/2014 12:39	44	35	31.5	17.2	60	36.4		1778.2	203.43	8173.45
	1/23/2014	13:18	1/23/2014 13:18	47	35	31.5	17.2	60	36.4		1419.8	162.42	8335.87
	1/23/2014	13:19	1/23/2014 13:19			20				Valve shut	36.4	4.16	8340.04
SW-60 Event 12	1/24/2014	7:32	1/24/2014 7:32	60	30	27	<2	37	0.0				8340.04
	1/24/2014	7:33	1/24/2014 7:33	60	33	31	<2	37	0.0		0.0	0.00	8340.04
	1/24/2014	8:04	1/24/2014 8:04	50	31	28.2	4.5	40	9.3		144.4	16.52	8356.55
	1/24/2014	8:05	1/24/2014 8:05	50	32	30.8	7	40	14.6		12.0	1.37	8357.92
	1/24/2014	8:21	1/24/2014 8:21	50	32	30.2	9.5	42	19.8		275.9	31.57	8389.49
	1/24/2014	8:39	1/24/2014 8:39	49	32	29.5	11.2	45	23.3		388.4	44.44	8433.93
	1/24/2014	8:41	1/24/2014 8:41	49	34.0	31	13.5	45	28.7		52.0	5.95	8439.88
	1/24/2014	9:03	1/24/2014 9:03	48	33.5	30.5	14.2	47	30.0		645.7	73.86	8513.74
	1/24/2014	9:37	1/24/2014 9:37	49	33.5	30	16	48	33.7		1083.4	123.94	8637.69
	1/24/2014	10:36	1/24/2014 10:36	48	33.5	30	15.5	54	32.5		1954.2	223.56	8861.24
	1/24/2014	11:41	1/24/2014 11:41	48	33.5	30	15.8	57	33.0		2129.3	243.59	9104.84
	1/24/2014	12:05	1/24/2014 12:05	55	32.5	29.5	16	58	33.1		792.9	90.71	9195.55
	1/24/2014	12:06	1/24/2014 12:06			18				Valve shut	33.1	3.78	9199.33
Note: a red value, i.e. 75 °F, indicates that value was interpolated from field data										Total CO_2 Mass (lbs):			9199.33

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
SW-61 Event 1	11/21/2013	9:58	11/21/2013 9:58	50	28				0.0				
	11/21/2013	10:00	11/21/2013 10:00	54	32	33.2	<2	72	0.0		0.0	0.00	0.00
	11/21/2013	10:45	11/21/2013 10:45	50	28	27.5	13	72	25.2		566.4	64.80	64.80
	11/21/2013	10:46	11/21/2013 10:46	49	30	30	16	72	31.7		28.4	3.25	68.05
	11/21/2013	11:45	11/21/2013 11:45	47.5	30	28.4	17.9	72	35.5		1982.1	226.75	294.80
	11/21/2013	11:48	11/21/2013 11:48	47.5	32	29.2	19.2	72	38.9		111.6	12.76	307.56
	11/21/2013	13:05	11/21/2013 13:05	45	32	28.4	20.0	74	40.5		3055.3	349.53	657.09
	11/21/2013	13:06	11/21/2013 13:06	45	34	30.4	23.0	74	47.5		44.0	5.03	662.12
	11/21/2013	14:25	11/21/2013 14:25	55	34	29.8	24	74	49.6		3835.6	438.79	1100.91
	11/21/2013	14:28	11/21/2013 14:28		36	30.6	25.8	74	54.4		156.0	17.84	1118.76
	11/21/2013	14:38	11/21/2013 14:38		36		26	74	54.8	Valve shut	546.2	62.48	1181.24
	11/21/2013	14:39	11/21/2013 14:39			19.6							1181.24
SW-61 Event 2	11/23/2013	8:16	11/23/2013 8:16	53	27			70			0.0	0.00	1181.24
	11/23/2013	8:17	11/23/2013 8:17	54	30	31.5	<2	70	0.0		0.0	0.00	1181.24
	11/23/2013	8:47	11/23/2013 8:47	52	28	27.5	14	77	27.0		404.7	46.30	1227.53
	11/23/2013	8:48	11/23/2013 8:48	51	31	30	18	77	35.9		31.4	3.60	1231.13
	11/23/2013	9:22	11/23/2013 9:22	50	30	29.5	19.5	78	38.4		1263.6	144.55	1375.69
	11/23/2013	9:50	11/23/2013 9:50	49	30	29	20	80	39.3		1088.6	124.54	1500.23
	11/23/2013	11:08	11/23/2013 11:08	46	30	28	21	82	41.2		3141.7	359.41	1859.64
	11/23/2013	12:29	11/23/2013 12:29	45	29	27	22	82	42.7		3398.6	388.80	2248.44
	11/23/2013	12:53	11/23/2013 12:53	55	29	26	23	85	44.5		1046.4	119.71	2368.15
	11/23/2013	12:54	11/23/2013 12:54							Valve shut	44.5	5.09	2373.24
	11/23/2013	12:55	11/23/2013 12:55										2373.24
SW-61 Event 3	11/26/2013	7:40	11/26/2013 7:40	54	28			68					2373.24
	11/26/2013	7:43	11/26/2013 7:43	55	31	32	4.0	68	8.0		24.1	2.76	2376.00
	11/26/2013	7:45	11/26/2013 7:45		30	28.5	12.0	68	23.9		31.9	3.65	2379.66
	11/26/2013	7:46	11/26/2013 7:46		31	30	15.0	68	30.2		27.0	3.09	2382.75
	11/26/2013	7:54	11/26/2013 7:54		30	29.5	16.0	68	31.8		248.1	28.38	2411.13
	11/26/2013	8:22	11/26/2013 8:22		30	28.5	18.0	68	35.8		947.1	108.35	2519.48
	11/26/2013	9:21	11/26/2013 9:21		32	27.5	19.5	68	39.7		2226.8	254.75	2774.22
	11/26/2013	10:54	11/26/2013 10:54		32	27	20.5	68	41.7		3784.0	432.89	3207.11
	11/26/2013	12:27	11/26/2013 12:27		32	26	22.0	70	44.7		4016.4	459.48	3666.59
	11/26/2013	12:28	11/26/2013 12:28							Valve shut	44.7	5.11	3671.70
	11/26/2013	12:29	11/26/2013 12:29										3671.70
SW-61 Event 4	12/3/2013	8:37	12/3/2013 8:37										3671.70
	12/3/2013	8:38	12/3/2013 8:38	55	26	27	<2	64	0.0				3671.70
	12/3/2013	8:40	12/3/2013 8:40	55	30	28	6	64	12.0		12.0	1.37	3673.07
	12/3/2013	8:45	12/3/2013 8:45	54	28	27	12	65	23.4		88.5	10.12	3683.19
	12/3/2013	9:10	12/3/2013 9:10	50	28	26	14	68	27.2		632.7	72.38	3755.57
	12/3/2013	9:12	12/3/2013 9:12	50	32	28.5	18	68	36.6		63.8	7.30	3762.87
	12/3/2013	9:56	12/3/2013 9:56	50	32	27.5	20	66	40.8		1702.5	194.77	3957.64
	12/3/2013	9:57	12/3/2013 9:57	50	34	28.5	21.5	66	44.8		42.8	4.89	3962.53
	12/3/2013	11:25	12/3/2013 11:25	48	32	26	25	68	50.9		4207.7	481.36	4443.89
	12/3/2013	11:27	12/3/2013 11:27	48	32.5	27	26.25	68	53.7		104.6	11.96	4455.85
	12/3/2013	12:19	12/3/2013 12:19	46	33	26	28	73	57.3		2885.8	330.13	4785.98
	12/3/2013	12:45	12/3/2013 12:45	46	33	26	28.5	76	58.2		1500.9	171.70	4957.68
	12/3/2013	12:46	12/3/2013 12:46			18				Valve shut	58.2	6.65	4964.33
SW-61 Event 5	12/6/2013	13:02	12/6/2013 13:02	45	31	32.5	11	88	20.7				4964.33
	12/6/2013	13:57	12/6/2013 13:57	44	30	29	18	88	35.1		1536.1	175.73	5140.06
	12/6/2013	13:58	12/6/2013 13:58	44	33	31	21	88	42.4		38.7	4.43	5144.50
	12/6/2013	14:22	12/6/2013 14:22	44	32	29	23	83	46.1		1061.7	121.46	5265.96
	12/6/2013	14:23	12/6/2013 14:23	44	35	31	26	83	53.8		50.0	5.72	5271.68
	12/6/2013	15:22	12/6/2013 15:22	42	34	28	29	78	59.7		3347.9	383.00	5654.68

SW-61 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	12/6/2013	17:44	12/6/2013 17:44	50	35	27	32	69	67.1		9003.5	1030.00	6684.67
	12/6/2013	17:45	12/6/2013 17:45							Valve shut	67.1	7.68	6692.35
	12/6/2013	17:46	12/6/2013 17:46			19							6692.35
SW-61 Event 6	12/9/2013	8:04	12/9/2013 8:04						0.0		0.0	0.00	6692.35
	12/9/2013	8:05	12/9/2013 8:05	54	32.5	34	<2	62	0.0		0.0	0.00	6692.35
	12/9/2013	8:11	12/9/2013 8:11	54	32.5	32	5	62	10.3		30.9	3.53	6695.88
	12/9/2013	8:30	12/9/2013 8:30	54	32	31.5	8	62	16.4		253.3	28.97	6724.86
	12/9/2013	9:05	12/9/2013 9:05	50	32	31	10	64	20.4		643.9	73.67	6798.52
	12/9/2013	9:35	12/9/2013 9:35	48	31	30	11	67	22.2		638.7	73.07	6871.59
	12/9/2013	9:59	12/9/2013 9:59	48	30	30	13.5	70	26.8		587.6	67.22	6938.81
	12/9/2013	10:55	12/9/2013 10:55	48	29	28	14.5	74	28.4		1544.6	176.70	7115.51
	12/9/2013	11:33	12/9/2013 11:33	48	29	27.5	15	80	29.2		1092.9	125.03	7240.54
	12/9/2013	12:22	12/9/2013 12:22	48	29	28	16	83	31.0		1474.5	168.69	7409.22
	12/9/2013	12:23	12/9/2013 12:23							Valve shut	31.0	3.55	7412.77
	12/9/2013	12:24	12/9/2013 12:24			20							7412.77
SW-61 Event 7	12/12/2013	12:25	12/12/2013 12:25	42	30	32	<2	68	0.0				7412.77
	12/12/2013	12:47	12/12/2013 12:47	42	26	28	<2	70	0.0				7412.77
	12/12/2013	12:48	12/12/2013 12:48	42	30	32	4	70	7.9		4.0	0.45	7413.23
	12/12/2013	13:55	12/12/2013 13:55	47	30	30.5	8.3	74	16.4		816.1	93.36	7506.59
	12/12/2013	13:57	12/12/2013 13:57	47	31	31.5	11	74	22.0		38.4	4.40	7510.99
	12/12/2013	14:28	12/12/2013 14:28	45	30	31	12	72	23.8		709.7	81.19	7592.18
	12/12/2013	15:04	12/12/2013 15:04	45	30	30.5	13.5	74	26.7		908.8	103.96	7696.14
	12/12/2013	15:05	12/12/2013 15:05	45	32	32	16	74	32.4		29.5	3.38	7699.52
	12/12/2013	15:56	12/12/2013 15:56	45	37.5	32	17	72	36.5		1754.8	200.75	7900.27
	12/12/2013	16:44	12/12/2013 16:44	45	32	30	19.5	72	39.5		1823.3	208.58	8108.85
	12/12/2013	16:45	12/12/2013 16:45							Valve shut	39.5	4.52	8113.37
	12/12/2013	16:46	12/12/2013 16:46			20							8113.37
SW-61 Event 8	12/16/2013	8:10	12/16/2013 8:10	50	34	33	<2	46	0.0		0.0	0.00	8113.37
	12/16/2013	8:59	12/16/2013 8:59	48	30	30	10	56	20.1		493.3	56.44	8169.80
	12/16/2013	9:00	12/16/2013 9:00		32	31	12	52	24.8		22.5	2.57	8172.37
	12/16/2013	9:01	12/16/2013 9:01	42.5	33	32	13	52	27.2		26.0	2.97	8175.35
	12/16/2013	9:43	12/16/2013 9:43	40	32	30	16	62	32.7		1258.1	143.92	8319.27
	12/16/2013	9:45	12/16/2013 9:45	40	33	31.5	18	62	37.2		70.0	8.01	8327.28
	12/16/2013	10:40	12/16/2013 10:40	40	32	30	20	66	40.8		2145.1	245.40	8572.68
	12/16/2013	10:48	12/16/2013 10:48	40	35	31	22	66	46.3		348.2	39.84	8612.51
	12/16/2013	12:05	12/16/2013 12:05	42	35	31	24	66	50.5		3726.0	426.26	9038.77
	12/16/2013	12:06	12/16/2013 12:06							Valve shut	50.5	5.78	9044.54
	12/16/2013	12:07	12/16/2013 12:07			22							9044.54
	Note: a red value, i.e. 75 °F, indicates that value was interpolated from field data										Total CO_2 Mass (lbs):		9044.54

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
SW-62 Event 1	11/20/2013	8:56	11/20/2013 8:56			6			0.0				
	11/20/2013	8:57	11/20/2013 8:57		25.5	28	<2	64	0.0		0.0	0.00	0.00
	11/20/2013	8:58	11/20/2013 8:58		29	31.2	<2	64	0.0		0.0	0.00	0.00
	11/20/2013	9:07	11/20/2013 9:07		28.5	29.7	<2	64	0.0		0.0	0.00	0.00
	11/20/2013	9:14	11/20/2013 9:14	55	28.5	29.2	3.5	64	6.9		24.0	2.75	2.75
	11/20/2013	9:47	11/20/2013 9:47	54	28	28.4	5	64	9.8		274.4	31.39	34.14
	11/20/2013	10:47	11/20/2013 10:47	53	27.5	27.5	6	66	11.6		641.3	73.36	107.50
	11/20/2013	10:53	11/20/2013 10:53	52.5	30	30.5	9	66	17.9		88.7	10.15	117.65
	11/20/2013	12:35	11/20/2013 12:35	52	31	30.5	9	65.0	18.2		1841.4	210.65	328.30
	11/20/2013	14:35	11/20/2013 14:35	50	31	29.6	11	64.0	22.2		2423.1	277.20	605.50
	11/20/2013	14:43	11/20/2013 14:43	50	32	30.5	12.2	63	24.9		188.7	21.58	627.08
	11/20/2013	15:16	11/20/2013 15:16	55	31	30	12.5	63.0	25.3		828.6	94.79	721.88
	11/20/2013	15:18	11/20/2013 15:18							Valve shut	50.6	5.78	727.66
	11/20/2013	15:22	11/20/2013 15:22			17.2							727.66
SW-62 Event 2	11/23/2013	7:59	11/23/2013 7:59	60	26			66			0.0	0.00	727.66
	11/23/2013	8:02	11/23/2013 8:02	60	30	31.5	9.5	67	18.9		56.8	6.49	734.15
	11/23/2013	8:35	11/23/2013 8:35	57	28	25	15	72	29.0		624.4	71.43	805.58
	11/23/2013	8:38	11/23/2013 8:38	56	31	27.5	20	73	40.0		87.1	9.97	815.55
	11/23/2013	8:41	11/23/2013 8:41	55	34	28.5	22	73	45.5		120.1	13.74	829.30
	11/23/2013	9:12	11/23/2013 9:12	54	34	27.5	23	76	47.4		1410.4	161.35	990.65
	11/23/2013	9:15	11/23/2013 9:15	54	35	29	24.5	76	51.0		142.3	16.28	1006.92
	11/23/2013	9:47	11/23/2013 9:47	51	34	28	25	80	51.4		1633.4	186.86	1193.78
	11/23/2013	11:03	11/23/2013 11:03	49	34	26.5	26	86	53.1		3902.8	446.48	1640.26
	11/23/2013	12:24	11/23/2013 12:24	49	34	25.5	27	90	54.9		4301.2	492.06	2132.32
	11/23/2013	12:39	11/23/2013 12:39	53	34	25.5	27	90	54.9		824.0	94.27	2226.59
	11/23/2013	12:42	11/23/2013 12:42							Valve shut	164.8	18.85	2245.44
	11/23/2013	12:43	11/23/2013 12:43			18.5							2245.44
SW-62 Event 3	11/26/2013	7:31	11/26/2013 7:31	58	27			68					2245.44
	11/26/2013	7:33	11/26/2013 7:33		32	32	<2	68	0.0				2245.44
	11/26/2013	7:34	11/26/2013 7:34		30	27	12	68	23.9		11.9	1.37	2246.81
	11/26/2013	7:35	11/26/2013 7:35		31	28	16	68	32.2		28.0	3.21	2250.02
	11/26/2013	7:48	11/26/2013 7:48		30	25.5	19	68	37.8		455.0	52.05	2302.07
	11/26/2013	8:26	11/26/2013 8:26		30	25	20	68	39.8		1474.4	168.67	2470.73
	11/26/2013	9:17	11/26/2013 9:17	55	30	24.5	20.5	68	40.8		2054.9	235.08	2705.81
	11/26/2013	10:50	11/26/2013 10:50		30	24	21.5	68	42.8		3885.9	444.55	3150.36
	11/26/2013	12:19	11/26/2013 12:19		30	23	22	70	43.7		3847.8	440.18	3590.54
	11/26/2013	12:23	11/26/2013 12:23							Valve shut	174.8	19.99	3610.53
	11/26/2013	12:26	11/26/2013 12:26			17.5							3610.53
SW-62 Event 4	12/3/2013	13:28	12/3/2013 13:28	50	30	27.5	19	84	37.2				3610.53
	12/3/2013	13:44	12/3/2013 13:44	46	30	25	24	82	47.1		674.7	77.19	3687.72
	12/3/2013	14:49	12/3/2013 14:49	46	30	22.5	27.5	77	54.2		3294.0	376.83	4064.55
	12/3/2013	15:36	12/3/2013 15:36	44	30	22	27.5	72	54.5		2555.5	292.35	4356.90
	12/3/2013	16:58	12/3/2013 16:58	45	29	21.5	29	66	57.2		4578.0	523.72	4880.62
	12/3/2013	17:25	12/3/2013 17:25	52	29	21	29.5	66	58.1		1556.5	178.06	5058.68
	12/3/2013	17:26	12/3/2013 17:26			16				Valve shut	58.1	6.65	5065.34
	12/3/2013	17:27	12/3/2013 17:27										5065.34
SW-62 Event 5	12/6/2013	8:04	12/6/2013 8:04										5065.34
	12/6/2013	8:06	12/6/2013 8:06	52	29	31	<2	70	0.0				5065.34
	12/6/2013	8:10	12/6/2013 8:10		29	31	<2	70	0.0				5065.34
	12/6/2013	9:07	12/6/2013 9:07	42	30	31	10	76	19.7		562.7	64.37	5129.71
	12/6/2013	9:55	12/6/2013 9:55	40	30	29	13.5	78	26.6		1112.3	127.24	5256.95
	12/6/2013	9:58	12/6/2013 9:58	40	32	31	16	78	32.2		88.3	10.10	5267.05
	12/6/2013	11:03	12/6/2013 11:03	37.5	31	29.5	18.5	80	36.8		2243.5	256.66	5523.70

SW-62 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	12/6/2013	11:05	12/6/2013 11:05	37.5	32.5	30	20.5	80	41.4		78.2	8.95	5532.65
	12/6/2013	12:11	12/6/2013 12:11	37.5	32.5	30	21.8	79	44.1		2823.6	323.01	5855.67
	12/6/2013	12:13	12/6/2013 12:13							Valve shut	88.2	10.09	5865.76
	12/6/2013	12:14	12/6/2013 12:14			20							5865.76
SW-62 Event 6	12/9/2013	13:09	12/9/2013 13:09						0.0		0.0	0.00	5865.76
	12/9/2013	13:10	12/9/2013 13:10	50	30	30	<2	88	0.0		0.0	0.00	5865.76
	12/9/2013	13:34	12/9/2013 13:34	48	28	27	11	88	21.0		251.7	28.80	5894.56
	12/9/2013	14:05	12/9/2013 14:05	45	28	26	13	85	24.9		710.6	81.29	5975.85
	12/9/2013	14:25	12/9/2013 14:25	45	28	25	14	82	26.9		517.2	59.16	6035.01
	12/9/2013	15:18	12/9/2013 15:18	45	27	25.5	15	78	28.5		1467.8	167.91	6202.92
	12/9/2013	15:19	12/9/2013 15:19	45	30	27.5	20	78	39.4		34.0	3.89	6206.81
	12/9/2013	16:00	12/9/2013 16:00	43	31	26	21	72	42.1		1670.8	191.14	6397.94
	12/9/2013	16:09	12/9/2013 16:09	43	32	27	23	72	46.6		399.1	45.66	6443.61
	12/9/2013	16:41	12/9/2013 16:41	44	32.5	29	20.5	70	41.8		1415.3	161.91	6605.52
	12/9/2013	17:19	12/9/2013 17:19	45	32.5	29	21	68	43.0		1611.3	184.33	6789.85
	12/9/2013	17:20	12/9/2013 17:20							Valve shut	43.0	4.91	6794.76
	12/9/2013	17:21	12/9/2013 17:21			21							6794.76
SW-62 Event 7	12/12/2013	8:53	12/12/2013 8:53	52	32.5	32	<2	64	0.0				6794.76
	12/12/2013	9:30	12/12/2013 9:30	50	32.5	30	8	67	16.4		303.0	34.67	6829.43
	12/12/2013	10:22	12/12/2013 10:22	45	31	29	13	68	26.2		1106.0	126.52	6955.95
	12/12/2013	10:23	12/12/2013 10:23	45	32	29	15	68	30.5		28.3	3.24	6959.19
	12/12/2013	11:04	12/12/2013 11:04	42.5	32	27	18	70	36.5		1374.8	157.28	7116.47
	12/12/2013	11:05	12/12/2013 11:05	41	34	29	21.5	70	44.6		40.6	4.64	7121.11
	12/12/2013	12:08	12/12/2013 12:08	40	34	27	23	70	47.7		2907.4	332.60	7453.71
	12/12/2013	12:53	12/12/2013 12:53							Valve shut	2146.7	245.58	7699.30
	12/12/2013	12:54	12/12/2013 12:54			19							7699.30
SW-62 Event 8	12/16/2013	8:08	12/16/2013 8:08	50	35	33	<2	46	0.0				7699.30
	12/16/2013	8:57	12/16/2013 8:57	48.5	31	28	15	55	30.6		749.1	85.70	7784.99
	12/16/2013	8:58	12/16/2013 8:58	47.5	32	28.5	17	55	35.0		32.8	3.75	7788.75
	12/16/2013	9:03	12/16/2013 9:03	40	34	30	19	56	40.0		187.5	21.45	7810.20
	12/16/2013	9:42	12/16/2013 9:42	40	34	29.5	20	62	41.8		1594.6	182.42	7992.61
	12/16/2013	9:44	12/16/2013 9:44	40	35	30	22	62	46.5		88.3	10.10	8002.71
	12/16/2013	10:47	12/16/2013 10:47	40	35	29	23	66	48.4		2988.1	341.84	8344.55
	12/16/2013	12:03	12/16/2013 12:03	42	35	29	24	66	50.5		3757.6	429.87	8774.42
	12/16/2013	12:05	12/16/2013 12:05							Valve shut	101.0	11.55	8785.97
	12/16/2013	12:06	12/16/2013 12:06			20							8785.97
SW-62 Event 9	1/22/2014	9:24	1/22/2014 9:24	48	26	26.5	<2	48	0.0		0.0	0.00	8785.97
	1/22/2014	9:25	1/22/2014 9:25	48	31	32	<2	48	0.0		0.0	0.00	8785.97
	1/22/2014	9:30	1/22/2014 9:30	48	31	31	<2	48	0.0		0.0	0.00	8785.97
	1/22/2014	9:59	1/22/2014 9:59	45	29.5	30	6	51	12.1		175.1	20.03	8806.00
	1/22/2014	10:01	1/22/2014 10:01	45	34	31.2	10	51	21.1		33.2	3.80	8809.80
	1/22/2014	11:06	1/22/2014 11:06	43	28	27.5	10	54	19.7		1327.7	151.88	8961.68
	1/22/2014	11:08	1/22/2014 11:08	43	32	31	14.2	54	29.3		49.0	5.61	8967.29
	1/22/2014	12:12	1/22/2014 12:12	39	31.5	30.5	15.8	56	32.4		1972.7	225.67	9192.96
	1/22/2014	12:58	1/22/2014 12:58	43	31	29.5	16.2	59	32.9		1500.5	171.66	9364.62
	1/22/2014	14:22	1/22/2014 14:22	45	33	20.5	14.5	59	30.1		2644.9	302.58	9667.20
	1/22/2014	14:23	1/22/2014 14:23			20				Valve shut	30.1	3.44	9670.64
Note: a red value, i.e. 75 °F, indicates that value was interpolated from field data											Total CO_2 Mass (lbs):		9670.64

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
SW-63 Event 1	11/18/2013	13:14	11/18/2013 13:14	54	28				0.0				
	11/18/2013	13:17	11/18/2013 13:17	58	31	32	<2	80	0.0		0.0	0.00	0.00
	11/18/2013	13:28	11/18/2013 13:28	58	29	30	5	80	9.7		53.5	6.12	6.12
	11/18/2013	13:29	11/18/2013 13:29	58	32	32	6	80	12.1		10.9	1.25	7.36
	11/18/2013	13:59	11/18/2013 13:59	56	32	31	9	80	18.1		452.4	51.76	59.12
	11/18/2013	14:02	11/18/2013 14:02		33	32	10	80	20.3		57.6	6.59	65.72
	11/18/2013	15:12	11/18/2013 15:12	52.5	32	31.25	11.5	78	23.2		1522.3	174.15	239.87
	11/18/2013	15:15	11/18/2013 15:15	52.5	35	32	12.2	78	25.4		970.8	111.05	350.93
	11/18/2013	15:52	11/18/2013 15:52		34	32	13	76	26.8		2034.8	232.78	583.71
	11/18/2013	17:10	11/18/2013 17:10		34	31.5	13.5	74	27.9		27.3	3.13	586.84
	11/18/2013	17:11	11/18/2013 17:11							Valve shut	27.9	3.19	590.03
	11/18/2013	17:12	11/18/2013 17:12			22							590.03
SW-63 Event 2	12/3/2013	13:00	12/3/2013 13:00										590.03
	12/3/2013	13:01	12/3/2013 13:01	58	34	32	<2	83	0.0				590.03
	12/3/2013	13:34	12/3/2013 13:34	54	32	29.5	6	85	12.0		198.1	22.67	612.69
	12/3/2013	13:36	12/3/2013 13:36	53	35	33.5	9	85	18.6		30.6	3.50	616.19
	12/3/2013	14:44	12/3/2013 14:44	51	35	32	12	80	24.9		1478.8	169.17	785.37
	12/3/2013	16:00	12/3/2013 16:00	49	35	32	13	74	27.1		1977.6	226.24	1011.60
	12/3/2013	17:01	12/3/2013 17:01	51	35	30.5	13.5	67	28.4		1693.1	193.69	1205.29
	12/3/2013	17:03	12/3/2013 17:03							Valve shut	56.7	6.49	1211.79
	12/3/2013	17:04	12/3/2013 17:04			21							1211.79
SW-63 Event 3	12/9/2013	13:22	12/9/2013 13:22						0.0		0.0	0.00	1211.79
	12/9/2013	13:24	12/9/2013 13:24		30	31	4	92	7.8		7.8	0.89	1212.68
	12/9/2013	13:25	12/9/2013 13:25	55	30	28	9	92.0	17.5		12.6	1.45	1214.12
	12/9/2013	13:27	12/9/2013 13:27	55	30	26	12	92.0	23.3		40.8	4.67	1218.79
	12/9/2013	13:30	12/9/2013 13:30	55	30	27	16	92	31.1		81.7	9.34	1228.14
	12/9/2013	13:55	12/9/2013 13:55	50	30	27	18.5	90	36.0		839.4	96.03	1324.17
	12/9/2013	13:56	12/9/2013 13:56	50	31		20	90	39.4		37.7	4.32	1328.48
	12/9/2013	14:23	12/9/2013 14:23	50	31	27	20	90.0	39.4		1063.9	121.71	1450.19
	12/9/2013	15:22	12/9/2013 15:22	48	32	27	21	82.0	42.1		2405.7	275.22	1725.41
	12/9/2013	15:23	12/9/2013 15:23	48	33	28.5	22	82.0	44.6		43.4	4.96	1730.37
	12/9/2013	16:43	12/9/2013 16:43	45	32.5	28	22	75.0	44.7		3573.0	408.75	2139.12
	12/9/2013	17:30	12/9/2013 17:30	55	32.4	28	22.5	73.0	45.7		2125.4	243.14	2382.27
	12/9/2013	17:31	12/9/2013 17:31		34					Valve Shut	45.7	5.23	2387.50
	12/9/2013	17:32	12/9/2013 17:32			18							2387.50
SW-63 Event 4	12/16/2013	12:01	12/16/2013 12:01	50	32	33	<2	70	0.0		0.0	0.00	2387.50
	12/16/2013	12:53	12/16/2013 12:53	50	30	29	5	72	9.9		257.7	29.48	2416.98
	12/16/2013	12:54	12/16/2013 12:54	50	32	31	9	72	18.2		14.1	1.61	2418.59
	12/16/2013	13:16	12/16/2013 13:16		32		9	70	18.3		401.6	45.95	2464.53
	12/16/2013	13:17	12/16/2013 13:17							Valve Shut	18.3	2.09	2466.62
	12/16/2013	14:41	12/16/2013 14:41	52	33.5	30.5	12	76	24.6	Restart	2067.7	236.54	2703.16
	12/16/2013	14:52	12/16/2013 14:52	46	34	32	11	74	22.7		260.4	29.79	2732.95
	12/16/2013	15:58	12/16/2013 15:58	45	32	31	12	70	24.4		1554.0	177.78	2910.73
	12/16/2013	16:51	12/16/2013 16:51	45	31	30	12.5	66	25.2		1313.5	150.27	3061.00
	12/16/2013	16:52	12/16/2013 16:52	42	32	31	14	66	28.5		26.9	3.07	3064.07
	12/16/2013	16:54	12/16/2013 16:54	42	34	32	15.5	66	32.3		60.8	6.96	3071.03
	12/16/2013	17:40	12/16/2013 17:40	45	36	33	17.5	54	37.6		1608.1	183.97	3255.00
	12/16/2013	17:41	12/16/2013 17:41							Valve Shut	37.6	4.31	3259.30
	12/16/2013	17:42	12/16/2013 17:42			22							3259.30
SW-63 Event 5	1/6/2014	12:52	1/6/2014 12:52					66					3259.30
	1/6/2014	12:54	1/6/2014 12:54	60	33	32	<2	66	0.0				3259.30
	1/6/2014	13:18	1/6/2014 13:18	60	32	31	<2	68	0.0				3259.30
	1/6/2014	13:20	1/6/2014 13:20	59	34	32.5	3.5	68	7.3		7.3	0.83	3260.14

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	1/6/2014	13:52	1/6/2014 13:52	59	34	32.5	4.5	63	9.4		266.7	30.52	3290.65
	1/6/2014	14:57	1/6/2014 14:57	59	33.5	31.5	6.5	60	13.5		745.6	85.30	3375.95
	1/6/2014	14:59	1/6/2014 14:59	59	35	33	8.5	60	18.0		31.5	3.61	3379.56
	1/6/2014	15:58	1/6/2014 15:58	59	35	32.5	9.5	56	20.2		1126.3	128.84	3508.41
	1/6/2014	16:58	1/6/2014 16:58	57	35	31.5	11	49	23.5		1311.9	150.08	3658.49
	1/6/2014	17:10	1/6/2014 17:10	57	35	31.5	11.5	48	24.6		289.1	33.07	3691.56
	1/6/2014	17:11	1/6/2014 17:11							Valve shut	24.6	2.82	3694.38
	1/6/2014	17:12	1/6/2014 17:12			22.5							3694.38
SW-63 Event 6	1/7/2014	7:20	1/7/2014 7:20					27					3694.38
	1/7/2014	7:22	1/7/2014 7:22	39	33.5	31.5	<2	27	0.0				3694.38
	1/7/2014	7:46	1/7/2014 7:46	20	17	16.5	<2	27	0.0		0.0	0.00	3694.38
	1/7/2014	8:42	1/7/2014 8:42	59	36	35	6.5	38	14.2		398.0	45.53	3739.91
	1/7/2014	10:16	1/7/2014 10:16	55	35.5	35	10	50	21.5		1678.1	191.98	3931.89
	1/7/2014	11:18	1/7/2014 11:18	53	35	32.5	11.5	53	24.5		1426.1	163.14	4095.04
	1/7/2014	12:30	1/7/2014 12:30	51	34.5	31.5	12.5	54	26.5		1835.7	210.01	4305.05
	1/7/2014	12:32	1/7/2014 12:32							Valve shut	53.0	6.06	4311.10
	1/7/2014	12:33	1/7/2014 12:33			22							4311.10
SW-63 Event 7	1/9/2014	8:15	1/9/2014 8:15	55	34	34	<2	54	0.0		0.0	0.00	4311.10
	1/9/2014	8:55	1/9/2014 8:55	52	32	32.5	2	55	4.1		82.4	9.43	4320.53
	1/9/2014	10:12	1/9/2014 10:12	50	32	32	4.5	59	9.2		514.3	58.84	4379.37
	1/9/2014	10:14	1/9/2014 10:14	50	33	32.7	6	59	12.4		21.7	2.48	4381.85
	1/9/2014	11:30	1/9/2014 11:30	42	33	32.5	6.5	68	13.4		981.0	112.23	4494.08
	1/9/2014	12:33	1/9/2014 12:33	41	33	32	7.5	64	15.5		908.8	103.97	4598.04
	1/9/2014	12:34	1/9/2014 12:34							Valve shut	15.5	1.77	4599.82
	1/9/2014	12:38	1/9/2014 12:38			21							4599.82
SW-63 Event 8	1/13/2014	11:17	1/13/2014 11:17	46	31.8	31	<2	74	0.0		0.0	0.00	4599.82
	1/13/2014	11:19	1/13/2014 11:19	46	33	32	<2	74	0.0		0.0	0.00	4599.82
	1/13/2014	12:42	1/13/2014 12:42	50	32.5	32	2	76	4.1		168.5	19.27	4619.09
	1/13/2014	14:12	1/13/2014 14:12	45	32	32	4	76	8.1		546.0	62.46	4681.55
	1/13/2014	15:29	1/13/2014 15:29	43	32	32	5	74	10.1		700.2	80.10	4761.65
	1/13/2014	16:30	1/13/2014 16:30	43	31.5	31.5	5.2	71	10.5		628.4	71.89	4833.54
	1/13/2014	17:19	1/13/2014 17:19	52	30.5	30.5	5.5	67	11.0		526.9	60.28	4893.82
	1/13/2014	21:38	1/13/2014 21:38	51	30.5	30	7.2	63	14.5		3301.5	377.69	5271.51
	1/13/2014	21:39	1/13/2014 21:39	51	32.5	32	11	63	22.6		18.5	2.12	5273.63
	1/14/2014	8:25	1/14/2014 8:25	45	32	30.5	14.2	64	29.0		16671.2	1907.19	7180.82
	1/14/2014	8:29	1/14/2014 8:29			23				Valve shut	116.0	13.27	7194.09
SW-63 Event 9	1/15/2014	7:49	1/15/2014 7:49	60	26	25	6	44	11.7				7194.09
	1/15/2014	7:50	1/15/2014 7:50	60	32	30.5	12	44	25.0		18.3	2.10	7196.19
	1/15/2014	8:27	1/15/2014 8:27	55	32	30	8	57	16.5		767.1	87.75	7283.94
	1/15/2014	8:30	1/15/2014 8:30	55	33	32.5	10	57	20.8		55.9	6.39	7290.33
	1/15/2014	10:00	1/15/2014 10:00	45	33	32	11	66	22.7		1955.5	223.71	7514.04
	1/15/2014	11:02	1/15/2014 11:02	44	33	32	11.8	70	24.2		1453.4	166.27	7680.31
	1/15/2014	11:53	1/15/2014 11:53	45	33	32	12.8	72	26.2		1286.1	147.13	7827.44
	1/15/2014	13:40	1/15/2014 13:40	52	33	31	14	68	28.8		2943.0	336.67	8164.12
	1/15/2014	15:20	1/15/2014 15:20	52	32.5	30	15	74	30.5		2964.6	339.15	8503.26
	1/15/2014	16:14	1/15/2014 16:14	50	32.5	30	15.2	70	31.0		1661.4	190.06	8693.32
	1/15/2014	16:16	1/15/2014 16:16			25				Valve shut	62.1	7.10	8700.42
SW-63 Event 10	1/17/2014	7:02	1/17/2014 7:02	60	33	30	4	40	8.5				8700.42
	1/17/2014	7:04	1/17/2014 7:04	60	34	32.2	6.2	40	13.3		21.7	2.48	8702.91
	1/17/2014	7:55	1/17/2014 7:55	55	34	32.2	7.5	42	16.0		746.1	85.35	8788.26
	1/17/2014	10:10	1/17/2014 10:10	50	33	32	9.2	62	19.0		2364.8	270.53	9058.79
	1/17/2014	11:03	1/17/2014 11:03	50	32.5	31.5	10	70	20.4		1045.3	119.58	9178.37
	1/17/2014	11:07	1/17/2014 11:07							Valve shut	81.7	9.34	9187.71

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Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	1/17/2014	11:09	1/17/2014 11:09	50	33	32	13.2	70	27.1	Restart			9187.71
	1/17/2014	12:00	1/17/2014 12:00	48	33	32	12.8	74	26.2		1358.1	155.37	9343.08
	1/17/2014	12:01	1/17/2014 12:01							Valve shut	26.2	2.99	9346.07
Note: a red value, i.e. 75 °F, indicates that value was interpolated from field data											Total CO_2 Mass (lbs):		9346.07

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Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
SW-64 Event 1	11/19/2013	8:39	11/19/2013 8:39	50	26				0.0				
	11/19/2013	8:40	11/19/2013 8:40		30	31.5	<2	69.0	0.0		0.0	0.00	0.00
	11/19/2013	8:41	11/19/2013 8:41		34	34.5	<2	70.5	0.0		0.0	0.00	0.00
	11/19/2013	8:45	11/19/2013 8:45		34	33.5	<2	72.0	0.0		0.0	0.00	0.00
	11/19/2013	9:02	11/19/2013 9:02		33	32.5	4	74.0	8.2		69.5	7.95	7.95
	11/19/2013	9:04	11/19/2013 9:04		35	34.5	5	76.0	10.4		18.6	2.13	10.08
	11/19/2013	10:32	11/19/2013 10:32		35	33.5	7	76.5	14.6		1099.7	125.81	135.89
	11/19/2013	10:35	11/19/2013 10:35		36	35	8	77	16.8		47.1	5.39	141.28
	11/19/2013	11:21	11/19/2013 11:21	57.5	37	34.5	9	77	19.1		826.4	94.54	235.82
	11/19/2013	12:12	11/19/2013 12:12		36	34.5	9	77	18.9		969.9	110.95	346.78
	11/19/2013	12:44	11/19/2013 12:44		36	34	9	77	18.9		605.5	69.27	416.05
	11/19/2013	12:45	11/19/2013 12:45							Valve shut	18.9	2.16	418.21
	11/19/2013	12:47	11/19/2013 12:47			17							418.21
SW-64 Event 2	12/3/2013	8:24	12/3/2013 8:24										418.21
	12/3/2013	8:26	12/3/2013 8:26	60	20	22	<2	63	0.0		0.0	0.00	418.21
	12/3/2013	8:28	12/3/2013 8:28	60	28		3	65.5	5.8		5.8	0.67	418.88
	12/3/2013	9:01	12/3/2013 9:01	57	24	28	3.5	68	6.5		203.3	23.25	442.14
	12/3/2013	9:04	12/3/2013 9:04	55	28		3.5	68	6.8		19.9	2.28	444.42
	12/3/2013	10:02	12/3/2013 10:02	55	32	29	4	67	8.1		433.5	49.60	494.01
	12/3/2013	10:05	12/3/2013 10:05	55	36	33.5	6	67	12.7		31.3	3.58	497.60
	12/3/2013	11:15	12/3/2013 11:15	53	35	33.5	7	69	14.7		959.8	109.80	607.40
	12/3/2013	11:21	12/3/2013 11:21	53	36	34	7.5	69	15.9		91.7	10.49	617.89
	12/3/2013	12:14	12/3/2013 12:14	51	36	33.5	8	76	16.8		867.3	99.22	717.12
	12/3/2013	12:49	12/3/2013 12:49	55	36	33.5	8	82	16.7		587.6	67.22	784.34
	12/3/2013	12:51	12/3/2013 12:51			20.5				Valve shut	33.5	3.83	788.17
SW-64 Event 3	12/9/2013	8:54	12/9/2013 8:54	55	36	34.5	<2	64	0.0		0.0	0.00	788.17
	12/9/2013	8:58	12/9/2013 8:58	55	34	30.2	10	64	20.9		41.7	4.77	792.94
	12/9/2013	9:28	12/9/2013 9:28	51	32	30	12	67	24.4		679.5	77.74	870.68
	12/9/2013	10:05	12/9/2013 10:05	50	32	39	12.5	72	25.3		920.7	105.33	976.00
	12/9/2013	10:53	12/9/2013 10:53	50	32	28.5	12.5	74	25.3		1214.7	138.96	1114.96
	12/9/2013	11:26	12/9/2013 11:26	50	32	28	13	82	26.1		847.7	96.97	1211.94
	12/9/2013	12:44	12/9/2013 12:44	50	30	28	13	90	25.3		2005.3	229.41	1441.34
	12/9/2013	13:14	12/9/2013 13:14	53	30	28	13.5	90	26.3	Valve shut	774.4	88.59	1529.93
	12/9/2013	13:15	12/9/2013 13:15			12							1529.93
SW-64 Event 4	12/13/2013	9:13	12/13/2013 9:13	52	31	34.5	12	66	24.2				1529.93
	12/13/2013	9:15	12/13/2013 9:15	52	31		14	66	28.2		52.4	6.00	1535.93
	12/13/2013	9:16	12/13/2013 9:16	52	31		18	66	36.3		32.3	3.69	1539.62
	12/13/2013	9:18	12/13/2013 9:18	52	31	27	19	66	38.3		74.6	8.53	1548.16
	12/13/2013	10:08	12/13/2013 10:08	50	28	25	20	68	38.9		1929.7	220.76	1768.91
	12/13/2013	11:47	12/13/2013 11:47	50	28	24	21	76	40.5		3929.8	449.57	2218.48
	12/13/2013	11:48	12/13/2013 11:48	50	31	26	22	76	43.9		42.2	4.83	2223.31
	12/13/2013	14:40	12/13/2013 14:40	45	30	25	22	74	43.5		7520.1	860.30	3083.61
	12/13/2013	15:32	12/13/2013 15:32	58	30	25	23.5	76	46.4		2337.8	267.44	3351.06
	12/13/2013	15:33	12/13/2013 15:33							Valve shut	46.4	5.31	3356.36
	12/13/2013	15:34	12/13/2013 15:34			13							3356.36
SW-64 Event 5	12/16/2013	7:52	12/16/2013 7:52	55	32	29	10	42	20.9				3356.36
	12/16/2013	7:54	12/16/2013 7:54	50	35	30	19.5	42	42.0		62.9	7.20	3363.56
	12/16/2013	7:58	12/16/2013 7:58	55	26	30	20	42	38.9		162.0	18.53	3382.09
	12/16/2013	8:50	12/16/2013 8:50	45	34	36.5	26	50	55.0		2443.1	279.49	3661.58
	12/16/2013	8:52	12/16/2013 8:52	45	32	35	24	50	49.7		104.7	11.98	3673.57
	12/16/2013	9:48	12/16/2013 9:48	45	35	25	24	58	50.9		2817.1	322.28	3995.84
	12/16/2013	10:39	12/16/2013 10:39	45	34	24	24	65	50.0		2573.5	294.41	4290.26
	12/16/2013	11:38	12/16/2013 11:38	40	28	24	24	68	46.7		2852.1	326.28	4616.54

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Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	12/16/2013	11:53	12/16/2013 11:53	40	28	24	24	68	46.7		699.9	80.06	4696.60
	12/16/2013	11:54	12/16/2013 11:54							Valve shut	46.7	5.34	4701.94
	12/16/2013	11:55	12/16/2013 11:55			15							4701.94
SW-64 Event 6	1/7/2014	12:37	1/7/2014 12:37					53					4701.94
	1/7/2014	12:38	1/7/2014 12:38	53	36.5	35	<2	53	0.0				4701.94
	1/7/2014	13:50	1/7/2014 13:50	56	33.5	31.5	8	54	16.8		603.8	69.07	4771.01
	1/7/2014	13:53	1/7/2014 13:53	56	37	34	12	54	26.1		64.3	7.35	4778.36
	1/7/2014	15:09	1/7/2014 15:09	54	35	31	16.5	55	35.1		2324.4	265.92	5044.28
	1/7/2014	15:12	1/7/2014 15:12	54	37	32.5	18	55	39.1		111.2	12.73	5057.00
	1/7/2014	15:13	1/7/2014 15:13	54	40	35	20	55	44.7		41.9	4.79	5061.79
	1/7/2014	16:20	1/7/2014 16:20	51	37.5	32	22	48	48.3		3115.5	356.42	5418.21
	1/7/2014	17:03	1/7/2014 17:03	51	37	31.5	22.5	42	49.5		2103.1	240.60	5658.80
	1/7/2014	17:04	1/7/2014 17:04							Valve shut	49.5	5.66	5664.47
	1/7/2014	17:05	1/7/2014 17:05			19							5664.47
SW-64 Event 7	1/9/2014	12:42	1/9/2014 12:42	42	37	36	<2	64	0.0		0.0	0.00	5664.47
	1/9/2014	12:43	1/9/2014 12:43	42	35	33.5	<2	64	0.0		0.0	0.00	5664.47
	1/9/2014	13:30	1/9/2014 13:30	42	30	31	<2	65	0.0		0.0	0.00	5664.47
	1/9/2014	13:32	1/9/2014 13:32	42	33.5	34	3.5	65	7.3		7.3	0.83	5665.30
	1/9/2014	14:21	1/9/2014 14:21	40	33.5	33.5	5	64	10.4		432.0	49.43	5714.72
	1/9/2014	14:23	1/9/2014 14:23	40	34.5	34.4	6.3	64	13.2		23.6	2.70	5717.42
	1/9/2014	15:17	1/9/2014 15:17	45	35	34.5	8	62	16.9		813.0	93.01	5810.43
	1/9/2014	16:58	1/9/2014 16:58	44	35	34	9.3	60	19.7		1847.4	211.34	6021.77
	1/9/2014	16:59	1/9/2014 16:59							Valve shut	19.7	2.25	6024.02
	1/9/2014	17:04	1/9/2014 17:04			19							6024.02
SW-64 Event 8	1/13/2014	11:22	1/13/2014 11:22	47	35	34.2	<2	73	0.0		0.0	0.00	6024.02
	1/13/2014	12:43	1/13/2014 12:43	50	32	30.5	11	76	22.2		899.3	102.88	6126.90
	1/13/2014	12:46	1/13/2014 12:46	48	34	32.5	13.8	76	28.5		76.0	8.69	6135.59
	1/13/2014	12:48	1/13/2014 12:48	48	34.5	33.5	14	76	29.0		57.5	6.58	6142.17
	1/13/2014	14:11	1/13/2014 14:11	45	33.5	31	17	76	34.9		2651.4	303.32	6445.49
	1/13/2014	14:13	1/13/2014 14:13	45	34	31.5	18	76	37.1		72.0	8.24	6453.73
	1/13/2014	15:30	1/13/2014 15:30	42	33	29.5	19	74	38.8		2924.4	334.56	6788.28
	1/13/2014	15:34	1/13/2014 15:34	42	34	30.5	20	74	41.3		160.3	18.34	6806.63
	1/13/2014	16:32	1/13/2014 16:32	44	33	29.5	20.2	71	41.4		2399.4	274.49	7081.12
	1/13/2014	17:11	1/13/2014 17:11	44	38	34	24	67	52.0		1821.1	208.33	7289.44
	1/13/2014	21:42	1/13/2014 21:42	51	35	33.5	25	63	52.8		14190.2	1623.35	8912.80
	1/14/2014	8:26	1/14/2014 8:26	45	36	32.8	21.5	64	45.8		31729.8	3629.89	12542.69
	1/14/2014	8:30	1/14/2014 8:30							Valve shut	183.1	20.95	12563.64
SW-64 Event 9	1/15/2014	7:53	1/15/2014 7:53	60	35	35	<2	44	0.0		0.0	0.00	12563.64
	1/15/2014	8:28	1/15/2014 8:28	55	31	30	11	51	22.5		394.0	45.07	12608.71
	1/15/2014	8:33	1/15/2014 8:33	55	34.5	32.5	14	51	29.7		130.7	14.95	12623.66
	1/15/2014	10:02	1/15/2014 10:02	45	32.5	30	16.2	66	33.2		2801.3	320.47	12944.12
	1/15/2014	10:04	1/15/2014 10:04	45	33	30.5	18	66	37.1		70.3	8.04	12952.16
	1/15/2014	11:03	1/15/2014 11:03	43	33	28.5	19	70	39.0		2244.5	256.77	13208.93
	1/15/2014	11:50	1/15/2014 11:50	42	30.5	27.5	19.5	72	38.9		1829.8	209.32	13418.25
	1/15/2014	11:51	1/15/2014 11:51							Valve shut	38.9	4.45	13422.70
	1/15/2014	11:52	1/15/2014 11:52										13422.70
Note: a red value, i.e. 75 °F, indicates that value was interpolated from field data											Total CO_2 Mass (lbs):		13422.70

SW-65 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
SW-65 Event 1	11/21/2013	9:24	11/21/2013 9:24	57	28			64	0.0				
	11/21/2013	9:26	11/21/2013 9:26		32	31.5	<2	66	0.0		0.0	0.00	0.00
	11/21/2013	9:31	11/21/2013 9:31		29	28	10	66	19.7		49.3	5.64	5.64
	11/21/2013	9:37	11/21/2013 9:37		35	32	14	67	29.4		147.4	16.86	22.50
	11/21/2013	10:16	11/21/2013 10:16		34	30	19	68	39.5		1343.8	153.73	176.23
	11/21/2013	10:18	11/21/2013 10:18		39	33	22	69	48.0		87.5	10.01	186.23
	11/21/2013	10:55	11/21/2013 10:55		39	32.5	22	70	48.0		1775.2	203.08	389.32
	11/21/2013	12:00	11/21/2013 12:00		38	32	23	72	49.6		3169.2	362.56	751.87
	11/21/2013	12:01	11/21/2013 12:01	48	40	33	24	72	52.7		51.1	5.85	757.72
	11/21/2013	13:18	11/21/2013 13:18	45	40	32.5	29.5	73	64.7		4520.7	517.17	1274.89
	11/21/2013	13:35	11/21/2013 13:35		41	33	26	73	57.6		1039.4	118.91	1393.80
	11/21/2013	13:38	11/21/2013 13:38							Valve shut	172.7	19.76	1413.56
	11/21/2013	13:39	11/21/2013 13:39			22							1413.56
SW-65 Event 2	12/12/2013	13:31	12/12/2013 13:31	50	35	33	<2	70	0.0				1413.56
	12/12/2013	14:40	12/12/2013 14:40	50	26	22	23	70	43.6		1502.6	171.90	1585.46
	12/12/2013	14:41	12/12/2013 14:41	46	25	25	26	70	48.6		46.1	5.27	1590.73
	12/12/2013	15:28	12/12/2013 15:28	44	30	24.5	26.5	70	52.6		2379.2	272.18	1862.91
	12/12/2013	15:29	12/12/2013 15:29	44	34	27	29	70	60.1		56.4	6.45	1869.37
	12/12/2013	16:34	12/12/2013 16:34	45	34	27	29	70	60.1		3909.7	447.27	2316.63
	12/12/2013	17:07	12/12/2013 17:07	50	35	28	28.5	62	60.2		1985.8	227.17	2543.81
	12/12/2013	17:20	12/12/2013 17:20							Valve shut	782.6	89.53	2633.34
	12/12/2013	17:21	12/12/2013 17:21			17							2633.34
SW-65 Event 3	12/18/2013	8:49	12/18/2013 8:49	50	33	33	<2	62	0.0		0.0	0.00	2633.34
	12/18/2013	9:47	12/18/2013 9:47	50	29	24	22	64	43.4		1259.9	144.13	2777.47
	12/18/2013	9:48	12/18/2013 9:48	50	34	27	27.5	64	57.4		50.4	5.77	2783.23
	12/18/2013	9:55	12/18/2013 9:55							Valve shut	401.6	45.95	2829.18
SW-65 Event 4	12/19/2013	8:07	12/19/2013 8:07	58	30	23	14	48	28.4				2829.18
	12/19/2013	8:38	12/19/2013 8:38	52	30	26	19	60	38.1		1031.1	117.96	2947.14
	12/19/2013	8:40	12/19/2013 8:40	50	34	29	25.5	60	53.4		91.5	10.47	2957.61
	12/19/2013	8:41	12/19/2013 8:41	50	38	31.5	28	60	61.1		57.2	6.55	2964.16
	12/19/2013	9:34	12/19/2013 9:34	41	34	28	27	63	56.4		3112.3	356.05	3320.21
	12/19/2013	11:33	12/19/2013 11:33	40	33	26	26	67	53.5		6539.5	748.12	4068.33
	12/19/2013	12:01	12/19/2013 12:01	39	32	27	26	68	52.9		1489.8	170.43	4238.76
	12/19/2013	12:07	12/19/2013 12:07							Valve shut	317.4	36.31	4275.07
	12/19/2013	12:08	12/19/2013 12:08										4275.07
SW-65 Event 5	1/8/2014	8:22	1/8/2014 8:22					40	0.0		0.0	0.00	4275.07
	1/8/2014	8:23	1/8/2014 8:23	56	30	22	28	40	57.3		28.7	3.28	4278.35
	1/8/2014	8:35	1/8/2014 8:35	50	30	20	31.5	45	64.1		728.7	83.36	4361.71
	1/8/2014	8:55	1/8/2014 8:55	50	29	20	32	48	64.2		1283.5	146.84	4508.54
	1/8/2014	9:51	1/8/2014 9:51	47	29	20	32	50	64.1		3592.4	410.97	4919.51
	1/8/2014	10:42	1/8/2014 10:42	46	28	20	32	54	63.1		3242.7	370.96	5290.47
	1/8/2014	11:21	1/8/2014 11:21	45	28	20	32	56	63.0		2457.6	281.15	5571.62
	1/8/2014	12:58	1/8/2014 12:58	48	28	20	31.5	56	62.0		6058.7	693.12	6264.74
	1/8/2014	12:59	1/8/2014 12:59					56		Valve shut	62.0	7.09	6271.83
	1/8/2014	13:00	1/8/2014 13:00			14		56					6271.83
SW-65 Event 6	1/11/2014	8:20	1/11/2014 8:20	45	27	27	<2	65	0.0				6271.83
	1/11/2014	8:22	1/11/2014 8:22	45	33	30	<2	65	0.0				6271.83
	1/11/2014	8:24	1/11/2014 8:24	45	30	30	12	65	23.9		23.9	2.74	6274.57
	1/11/2014	8:25	1/11/2014 8:25	45	32	30	18	65	36.7		30.3	3.47	6278.04
	1/11/2014	8:57	1/11/2014 8:57	45	31	27	24	65	48.4		1362.6	155.88	6433.92
	1/11/2014	10:41	1/11/2014 10:41	50	30	25	26	70	51.6		5203.4	595.27	7029.19
	1/11/2014	11:50	1/11/2014 11:50	42	30	27	24.5	70	48.7		3459.8	395.80	7424.99
	1/11/2014	12:24	1/11/2014 12:24	48	30	25	28	70	55.6		1772.3	202.76	7627.75

SW-65 Sparge Log

Back to Master	Date	Time	Date + Time	P at Reducer (psig)	P at Panel (psig)	P at Well (psi)	Rotameter Reading (scfm)	Temp (°F)	Flow (scfm)		Volume of CO_2 (scf)	Mass of CO_2 (lb)	Cumulative Mass (lb)
	1/11/2014	12:25	1/11/2014 12:25							Valve shut	55.6	6.36	7634.11
	1/11/2014	12:26	1/11/2014 12:26			20							7634.11
SW-65 Event 7	1/23/2014	8:20	1/23/2014 8:20	54	32.5	32.3	<2	41	0.0				7634.11
	1/23/2014	9:00	1/23/2014 9:00	52	30	29.5	9	50	18.2		364.6	41.71	7675.82
	1/23/2014	9:01	1/23/2014 9:01	52	33	32	13	50	27.2		22.7	2.60	7678.42
	1/23/2014	9:47	1/23/2014 9:47	48	33	31.5	15	52	31.3		1347.0	154.09	7832.51
	1/23/2014	10:52	1/23/2014 10:52	45	32	30	16.7	54	34.5		2138.3	244.63	8077.14
	1/23/2014	10:53	1/23/2014 10:53	45	33.5	31	20	54	41.9		38.2	4.37	8081.51
	1/23/2014	11:45	1/23/2014 11:45	44	33.5	31	20.3	54	42.6		2196.6	251.29	8332.80
	1/23/2014	13:01	1/23/2014 13:01	46	33.5	30.5	22.1	58	46.1		3370.6	385.60	8718.40
	1/23/2014	13:02	1/23/2014 13:02			22				Valve shut	46.1	5.28	8723.68
Note: a red value, i.e. 75 °F, indicates that value was interpolated from field data											Total CO_2 Mass (lbs):		8723.68

Appendix F:

Air Quality Data

LCP BRUNSWICK - CARBON DIOXIDE SPARGING
AMBIENT AIR MONITORING DATA

Date	Sparge Well	Wind Direction	Test Location	Time	Hg (ppm)	O2 (%)	CO2 (ppm)	H2S (ppm)	Comments
3-Dec-13	47	S	Start	8:31					
			N	9:32	0.000	20.9	430	0	
			S	9:32	0.000	20.9	430	0	
			E	9:35	0.000	20.9	430	0	
			W	9:34	0.000	20.9	430	0	
			Well Head						
			N	12:41	0.000	20.9	900	0	
			S	12:40	0.000	20.9	930	0	
			E	12:43	0.000	20.9	790	0	
			W	12:41	0.000	20.9	770	0	
			Well Head						
			Finish	12:53					
3-Dec-13	64	S	Start	8:26					
			N	9:28	0.000	20.9	410	0	
			S	9:29	0.000	20.9	410	0	upwind
			E	9:30	0.000	20.9	410	0	
			W	9:31	0.000	20.9	410	0	
			Well Head						
			N	12:22	0.000	20.7	830	0	
			S	12:20	0.000	20.7	800	0	
			E	12:21	0.000	20.7	800	0	
			W	12:23	0.000	20.9	790	0	
			Well Head						
			Finish	12:51					
3-Dec-13	56	S	Start	8:44					
			N	9:39	0.000	20.9	450	0	
			S	9:37	0.000	20.9	430	0	upwind
			E	9:40	0.000	20.9	450	0	
			W	9:38	0.000	20.9	460	0	
			Well Head						
			N	12:25	0.000	20.9	790	0	
			S	12:36	0.000	20.9	770	0	
			E	12:38	0.000	20.9	740	0	
			W	12:37	0.000	20.9	750	0	
			Well Head						
			Finish	13:18					
3-Dec-13	61	S	Start	8:38					
			N	9:52	0.000	20.9	480	0	
			S	9:51	0.000	20.9	530	0	
			E	9:53	0.000	20.9	480	0	
			W	9:54	0.000	20.9	480	0	
			Well Head						
			N	12:46	0.000	20.9	740	0	
			S	12:49	0.000	20.9	740	0	
			E	12:48	0.000	20.9	750	0	
			W	12:47	0.000	20.9	750	0	
			Well Head						
			Finish	12:46					
3-Dec-13	45	S	Start	8:52					
			N	9:42	0.000	20.9	450	0	
			S	9:43	0.000	20.9	450	0	
			E	9:44	0.000	20.9	450	0	
			W	9:45	0.000	20.9	450	0	
			Well Head						
			N	12:34	0.000	20.9	750	0	
			S	12:32	0.000	20.9	750	0	
			E	12:33	0.000	20.9	790	0	
			W	12:35	0.000	20.9	790	0	
			Well Head						
			Finish	13:13					

LCP BRUNSWICK - CARBON DIOXIDE SPARGING
AMBIENT AIR MONITORING DATA

Date	Sparge Well	Wind Direction	Test Location	Time	Hg (ppm)	O2 (%)	CO2 (ppm)	H2S (ppm)	Comments
3-Dec-13	43	S	Start	8:54					
			N	9:46	0.000	20.9	450	0	
			S	9:47	0.000	20.9	450	0	
			E	9:48	0.000	20.9	460	0	
			W	9:49	0.000	20.9	450	0	
			Well Head						
			N	12:28	0.000	20.9	770	0	
			S	12:27	0.000	20.9	770	0	
			E	12:30	0.000	20.9	750	0	
			W	12:29	0.000	20.9	770	0	
			Well Head						
			Finish	13:15					
3-Dec-13	46	S	Start	13:07					
			N	14:55	0.000	20.9	900	0	
			S	14:56	0.000	20.9	740	0	
			E	14:57	0.000	20.9	750	0	
			W	14:58	0.000	20.9	740	0	
			Well Head						
			N						
			S						
			E						
			W						
			Well Head						
			Finish	17:07					
3-Dec-13	63	E	Start	13:01					
			N	15:00	0.000	20.9	740	0	
			S	15:02	0.000	20.9	720	0	
			E	15:01	0.000	20.9	740	0	
			W	14:59	0.000	20.9	720	0	
			Well Head						
			N						
			S						
			E						
			W						
			Well Head						
			Finish	17:03					
3-Dec-13	62	SE	Start	13:28					
			N	15:03	0.000	20.9	740	0	
			S	15:06	0.000	20.9	740	0	
			E	15:04	0.000	20.9	740	0	
			W	15:05	0.000	20.9	740	0	
			Well Head						
		S	N	17:10	0.000	20.9	690	0	
			S	17:11	0.000	20.9	690	0	
			E	17:12	0.000	20.9	690	0	
			W	17:13	0.000	20.9	670	0	
			Well Head						
			Finish	17:26					
3-Dec-13	55	E	Start	13:31					
			N	14:52	0.000	20.9	800	0	
			S	14:50	0.000	20.9	720	0	
			E	14:51	0.000	20.9	720	0	
			W	14:53	0.000	20.9	750	0	
			Well Head						
			N						
			S						
			E						
			W						
			Well Head						
			Finish	17:30					

LCP BRUNSWICK - CARBON DIOXIDE SPARGING
AMBIENT AIR MONITORING DATA

Date	Sparge Well	Wind Direction	Test Location	Time	Hg (ppm)	O2 (%)	CO2 (ppm)	H2S (ppm)	Comments
3-Dec-13	60		Start	13:42					
		SE	N	15:08	0.000	20.9	720	0	
			S	15:09	0.000	20.9	720	0	
			E	15:10	0.000	20.9	720	0	
			W	15:11	0.000	20.9	720	0	
			Well Head						
		S	N	17:14	0.000	20.9	690	0	
			S	17:15	0.000	20.9	690	0	
			E	17:16	0.000	20.9	690	0	
			W	17:17	0.000	20.9	690	0	
			Well Head						
			Finish	17:23					
			Start						
			Well Head						
			N						
			S						
			E						
			W						
			Well Head						
			Finish						
			Start						
			N						
			S						
			E						
			W						
			Well Head						
			N						
			S						
			E						
			W						
			Well Head						
			Finish						
			Start						
			N						
			S						
			E						
			W						
			Well Head						
			N						
			S						
			E						
			W						
			Well Head						
			Finish						
			Start						
			N						
			S						
			E						
			W						
			Well Head						
			N						
			S						
			E						
			W						
			Well Head						
			Finish						

LCP BRUNSWICK - CARBON DIOXIDE SPARGING
AMBIENT AIR MONITORING DATA

Date	Sparge Well	Wind Direction	Test Location	Time	Hg (ppm)	O2 (%)	CO2 (ppm)	H2S (ppm)	Comments
4-Dec-13	35	S	Start	7:45					
			N	9:14	0.000	20.9	540	0	
			S	9:13	0.000	20.9	540	0	
			E	9:16	0.000	20.9	590	0	
			W	9:15	0.000	20.9	590	0	
			Well Head				580		
		SW	N	11:33	0.000	20.9	620	0	
			S	11:34	0.000	20.9	590	0	
			E	11:34	0.000	20.9	610	0	
			W	11:36	0.000	20.9	590	0	
			Well Head				600		
			Finish	12:37					
4-Dec-13	57	S	Start	7:42					
			N	9:07	0.000	20.9	640	0	
			S	9:06	0.000	20.9	590	0	
			E	9:08	0.000	20.9	590	0	
			W	9:09	0.000	20.9	540	0	
			Well Head				590		
		SW	N	11:25	0.000	20.9	440	0	
			S	11:27	0.003	20.9	440	0	
			E	11:24	0.000	20.9	610	0	
			W	11:26	0.000	20.9	690	0	
			Well Head				640		
			Finish	12:40					
4-Dec-13	34	S	Start	7:49					
			N	9:19	0.000	20.9	560	0	
			S	9:20	0.000	20.9	590	0	
			E	9:21	0.000	20.9	580	0	
			W	9:22	0.000	20.9	560	0	
			Well Head						
		SW	N	11:38	0.000	20.9	660	0	
			S	11:40	0.000	20.9	690	0	
			E	11:41	0.000	20.9	640	0	
			W	11:39	0.000	20.9	660	0	
			Well Head				600		
			Finish	12:11					
4-Dec-13	42	S	Start						
			N	9:43	0.000	20.9	690	0	No CO2 Flow to well
			S						
			E						
			W						
			Well Head						
			N	11:45	0.000	20.9	690	0	No CO2 Flow to well
			S						
			E						
			W						
			Well Head						
			Finish						
4-Dec-13	53	S	Start	8:28					
			N	9:41	0.000	20.9	660	0	
			S	9:39	0.000	20.9	670	0	
			E	9:42	0.000	20.9	660	0	
			W	9:40	0.000	20.9	690	0	
			Well Head		0.000		640		
			N						
			S						
			E						
			W						
			Well Head						
			Finish	12:35					

LCP BRUNSWICK - CARBON DIOXIDE SPARGING
AMBIENT AIR MONITORING DATA

Date	Sparge Well	Wind Direction	Test Location	Time	Hg (ppm)	O2 (%)	CO2 (ppm)	H2S (ppm)	Comments
4-Dec-13	51	S	Start	8:25					
			N	9:46	0.000	20.9	640	0	
			S	9:47	0.000	20.9	640	0	
			E	9:48	0.000	20.9	660	0	
			W	9:49	0.000	20.9	620	0	
			Well Head						
			N	11:55	0.000	20.9	740	0	
			S	11:56	0.000	20.9	720	0	
			E	11:57	0.000	20.9	740	0	
			W	11:58	0.000	20.9	720	0	
			Well Head				680		
			Finish	12:43					
4-Dec-13	31		Start	8:13					
			N	9:53	0.000	20.9	640	0	
			S	9:52	0.000	20.9	660	0	
			E	9:54	0.000	20.9	690	0	
			W	9:53	0.000	20.9	640	0	
			Well Head				620		
			N	11:52	0.000	20.9	640	0	
			S	11:54	0.000	20.9	750	0	
			E	11:53	0.000	20.9	750	0	
			W	11:55	0.000	20.9	790	0	
			Well Head				740		
			Finish	12:18					
4-Dec-13	12	S	Start	8:07					
			N	9:34	0.000	20.9	660	0	
			S	9:35	0.000	20.9	660	0	
			E	9:36	0.000	20.9	640	0	
			W	9:33	0.000	20.9	640	0	
			Well Head				610		
		SW	N	11:51	0.000	20.9	690	0	
			S	11:49	0.000	20.9	690	0	
			E	11:50	0.000	20.9	670	0	
			W	11:48	0.000	20.9	650	0	
			Well Head				670		
			Finish	12:07					
4-Dec-13	52	E	Start	9:54					
			N	15:44	0.000	20.9	640	0	
			S	15:42	0.000	20.9	660	0	
			E	15:43	0.000	20.9	690	0	
			W	15:45	0.000	20.9	670	0	
		E	Well Head				640		
			N	17:07	0.000	20.9	610	0	
			S	17:05	0.000	20.9	540	0	
			E	17:06	0.000	20.9	670	0	
			W	17:08	0.000	20.9	560	0	
			Well Head						
			Finish	17:51					
4-Dec-13	50	E	Start	13:11					
			N	15:47	0.000	20.9	660	0	
			S	15:48	0.000	20.9	660	0	
			E	15:49	0.000	20.9	660	0	
			W	15:50	0.000	20.9	640	0	
			Well Head				670		
		E	N	17:00	0.000	20.9	560	0	
			S	17:01	0.000	20.9	590	0	
			E	17:02	0.000	20.9	610	0	
			W	17:03	0.000	20.9	580	0	
			Well Head				580		
			Finish	17:37					

LCP BRUNSWICK - CARBON DIOXIDE SPARGING
AMBIENT AIR MONITORING DATA

Date	Sparge Well	Wind Direction	Test Location	Time	Hg (ppm)	O2 (%)	CO2 (ppm)	H2S (ppm)	Comments
4-Dec-13	30	E	Start	12:25					
			N	15:38	0.000	20.9	610	0	
			S	15:36	0.000	20.9	660	0	
			E	15:37	0.000	20.9	610	0	
			W	15:35	0.000	20.9	660	0	
			Well Head				610		
		E	N	16:57	0.000	20.9	610	0	
			S	16:50	0.000	20.9	530	0	
			E	16:52	0.000	20.9	560	0	
			W	16:53	0.000	20.9	530	0	
			Well Head				540		
			Finish	17:20					
4-Dec-13	20	S	Start	12:12					
			N	15:31	0.000	20.9	620	0	
			S	15:30	0.000	20.9	660	0	
			E	15:32	0.000	20.9	640	0	
			W	15:33	0.000	20.5	620	0	
			Well Head				640		
		S	N	17:22	0.000	20.9	590	0	
			S	17:25	0.000	20.9	560	0	
			E	17:23	0.000	20.9	610	0	
			W	17:24	0.000	20.9	530	0	
			Well Head				550		
			Finish	17:14					
4-Dec-13	39	S	Start	13:23					
			N	15:22	0.000	20.9	620	0	
			S	15:20	0.000	20.9	660	0	
			E	15:21	0.000	20.9	590	0	
			W	15:23	0.000	20.5	640	0	
			Well Head				740		
		S	N	17:17	0.000	20.9	670	0	
			S	17:15	0.000	20.9	770	0	
			E	17:16	0.000	20.9	830	0	
			W	17:18	0.000	20.9	670	0	
			Well Head				850		Fitting loose
			Finish	17:46					
4-Dec-13	38	S	Start	13:22					
			N	15:24	0.000	20.9	610	0	
			S	15:25	0.000	20.9	610	0	
			E	15:27	0.000	20.9	620	0	
			W	15:26	0.000	20.9	610	0	
			Well Head				670		
		S	N	17:12	0.000	20.9	670	0	
			S	17:16	0.000	20.9	580	0	
			E	17:11	0.000	20.9	590	0	
			W	17:13	0.000	20.9	740	0	
			Well Head				640		
			Finish	17:43					
4-Dec-13			Start						
			N						
			S						
			E						
			W						
			Well Head						
			N						
			S						
			E						
			W						
			Well Head						
			Finish						

LCP BRUNSWICK - CARBON DIOXIDE SPARGING
AMBIENT AIR MONITORING DATA

Date	Sparge Well	Wind Direction	Test Location	Time	Hg (ppm)	O2 (%)	CO2 (ppm)	H2S (ppm)	Comments
5-Dec-13	52	SW	Start	7:54					
			N	11:29	0.000	20.9	690	0	
			S	11:31	0.000	20.9	720	0	
			E	11:30	0.000	20.9	690	0	
			W	11:32	0.000	20.9	690	0	
			Well Head	11:33	0.000	20.9	690	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	17:19					
5-Dec-13	40	SW	Start	7:58					
			N	11:25	0.000	20.9	690	0	
			S	11:23	0.000	20.9	690	0	
			E	11:24	0.000	20.9	690	0	
			W	11:20	0.000	20.9	690	0	
			Well Head	11:27	0.000	20.9	670	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	17:17					
5-Dec-13	29	SW	Start	8:04					
			N	11:18	0.000	20.9	690	0	
			S	11:16	0.000	20.9	670	0	
			E	11:17	0.000	20.9	670	0	
			W	11:19	0.000	20.9	670	0	
			Well Head	11:20	0.000	20.9	690	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	12:09					
5-Dec-13	11	SW	Start	8:09					
			N	11:38	0.000	20.9	720	0	
			S	11:37	0.000	20.9	720	0	
			E	11:36	0.000	20.9	700	0	
			W	11:37	0.000	20.9	700	0	
			Well Head						
			N						
			S						
			E						
			W						
			Well Head						
			Finish	12:19					
5-Dec-13	27	SW	Start	8:12					
			N	10:53	0.003	20.9	610	0	
			S	10:52	0.003	20.9	610	0	
			E	10:51	0.003	20.9	610	0	
			W	10:50	0.003	20.9	610	0	
			Well Head	10:54	0.000	20.9	610	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	12:41					

LCP BRUNSWICK - CARBON DIOXIDE SPARGING
AMBIENT AIR MONITORING DATA

Date	Sparge Well	Wind Direction	Test Location	Time	Hg (ppm)	O2 (%)	CO2 (ppm)	H2S (ppm)	Comments
5-Dec-13	49	S	Start	8:39					
			N	10:59	0.000	20.9	640	0	
			S	10:57	0.000	20.9	740	0	
			E	10:58	0.000	20.9	620	0	
			W	10:50	0.000	20.9	640	0	
			Well Head	10:56	0.000	20.9	620		
			N						
			S						
			E						
			W						
			Well Head						
			Finish	12:44					
5-Dec-13	2	S	Start	8:31					
			N	11:12	0.000	20.9	660	0	
			S	11:10	0.000	20.9	640	0	
			E	11:09	0.000	20.9	640	0	
			W	11:11	0.000	20.9	660	0	
			Well Head	11:13	0.000	20.9	670	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	13:01					
5-Dec-13	9	S	Start	8:28					
			N	11:05	0.000	20.9	640	0	
			S	11:04	0.000	20.9	700	0	
			E	11:03	0.000	20.9	670	0	
			W	11:06	0.000	20.9	670	0	
			Well Head	11:07	0.000	20.9	670	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	13:10					
5-Dec-13	21	SW	Start	12:12					
			N	16:44	0.000	20.9	530	0	
			S	16:41	0.000	20.9	560	0	
			E	16:40	0.000	20.9	530	0	
			W	16:42	0.000	20.9	510	0	
			Well Head	16:43	0.000	20.9	530	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	16:54					
5-Dec-13	4	S	Start	12:22					
			N	17:00	0.000	20.9	590	0	
			S	16:58	0.000	20.9	640	0	
			E	17:01	0.000	20.9	590	0	
			W	16:59	0.000	20.9	590	0	
			Well Head	17:02	0.000	20.9	590	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	17:26					

LCP BRUNSWICK - CARBON DIOXIDE SPARGING
AMBIENT AIR MONITORING DATA

Date	Sparge Well	Wind Direction	Test Location	Time	Hg (ppm)	O2 (%)	CO2 (ppm)	H2S (ppm)	Comments
5-Dec-13	28	S	Start	12:47					
			N	16:54	0.000	20.9	560	0	
			S	16:52	0.000	20.9	590	0	
			E	16:55	0.000	20.9	580	0	
			W	16:53	0.000	20.9	580	0	
			Well Head	16:55	0.000	20.9	690	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	17:09					
5-Dec-13	26	S	Start	12:51					
			N	16:51			540		
			S	16:48	0.000	20.9	580	0	
			E	16:47	0.000	20.9	560	0	
			W	16:49	0.000	20.9	560	0	
			Well Head	16:50			540		
			N						
			S						
			E						
			W						
			Well Head						
			Finish	17:13					
5-Dec-13	3	S	Start	13:07					
			N	17:04	0.000	20.9	600	0	
			S	17:06	0.000	20.9	670	0	
			E	17:08	0.000	20.9	610	0	
			W	17:05	0.000	20.9	590	0	
			Well Head	17:07	0.000	20.9	620	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	17:27					
5-Dec-13	17	S	Start	14:02					
			N	17:12	0.000	20.9	640	0	
			S	17:10	0.000	20.9	590	0	
			E	17:11	0.000	20.9	610	0	
			W	17:13	0.000	20.9	590	0	
			Well Head	17:14	0.000	20.9	640	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	17:32					
			Start						
			N						
			S						
			E						
			W						
			Well Head						
			N						
			S						
			E						
			W						
			Well Head						
			Finish						

LCP BRUNSWICK - CARBON DIOXIDE SPARGING
AMBIENT AIR MONITORING DATA

Date	Sparge Well	Wind Direction	Test Location	Time	Hg (ppm)	O2 (%)	CO2 (ppm)	H2S (ppm)	Comments
6-Dec-12	62	S	Start	8:06					
			N	10:04	0.000	20.9	580	0	
			S	10:05	0.000	20.9	580	0	
			E	10:06	0.000	20.9	590	0	
			W	10:07	0.000	20.9	580	0	
			Well Head	10:08	0.000	20.9	590	0	
		S	N	11:56	0.000	20.9	590	0	
			S	11:52	0.000	20.9	610	0	
			E	11:53	0.000	20.9	590	0	
			W	11:54	0.000	20.9	590	0	
			Well Head	11:55	0.000	20.9	590	0	
			Finish	12:13					
6-Dec-13	60	S	Start	8:08					
			N	10:10	0.000	20.9	590	0	
			S	10:12	0.000	20.9	580	0	
			E	10:13	0.000	20.9	580	0	
			W	10:11	0.000	20.9	590	0	
			Well Head	10:14	0.000	20.9	570	0	
		S	N	11:57	0.000	20.9	560	0	
			S	11:59	0.000	20.9	580	0	
			E	12:00	0.000	20.9	610	0	
			W	11:58	0.000	20.9	580	0	
			Well Head	12:01	0.000	20.9	590	0	
			Finish	12:16					
6-Dec-13	32	S	Start	8:20					
			N	10:17	0.000	20.9	640	0	
			S	10:19	0.000	20.9	620	0	
			E	10:20	0.000	20.9	620	0	
			W	10:18	0.000	20.9	620	0	
			Well Head	10:21	0.000	20.9	610	0	
		S	N	12:06	0.000	20.9	620	0	
			S	12:04	0.000	20.9	620	0	
			E	12:05	0.000	20.9	620	0	
			W	12:03	0.000	20.9	610	0	
			Well Head	12:07	0.000	20.9	620	0	
			Finish	12:43					
6-Dec-13	41	S	Start	8:53					
			N	10:25	0.000	20.9	700	0	
			S	10:23	0.000	20.9	660	0	
			E	10:24	0.000	20.9	640	0	
			W	10:26	0.000	20.9	670	0	
			Well Head	10:27	0.000	20.9	640	0	
		S	N	12:32	0.000	20.9	670	0	
			S	12:31	0.000	20.9	690	0	
			E	12:31	0.000	20.9	690	0	
			W	12:32	0.000	20.9	690	0	
			Well Head	12:33	0.000	20.9	690	0	
			Finish	13:08					
6-Dec-13	7	S	Start	12:42					
			N	14:47	0.000	20.9	690	0	
			S	14:46	0.000	20.9	690	0	
			E	14:46	0.000	20.9	700	0	
			W	14:47	0.000	20.9	690	0	
			Well Head	14:48	0.000	20.9	690	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	16:49					

LCP BRUNSWICK - CARBON DIOXIDE SPARGING
AMBIENT AIR MONITORING DATA

Date	Sparge Well	Wind Direction	Test Location	Time	Hg (ppm)	O2 (%)	CO2 (ppm)	H2S (ppm)	Comments
6-Dec-13	48	S	Start	13:27					
			N	14:57	0.000	20.9	690	0	
			S	14:50	0.000	20.9	690	0	
			E	14:50	0.000	20.9	700	0	
			W	14:51	0.000	20.9	700	0	
			Well Head	14:52	0.000	20.9	700	0	
			N	16:59		20.9	610		
			S	16:58	0.000	20.9	590		
			E	16:59		20.9	670		
			W	16:59		20.9	670		
			Well Head	17:00		20.9	610		
			Finish	17:37					
6-Dec-13	24	SE	Start	13:31					
			N	14:49	0.000	20.9	690	0	
			S	14:50	0.000	20.9	700	0	
			E	14:49	0.000	20.9	700	0	
			W	14:50	0.000	20.9	700	0	
			Well Head	14:51	0.000	20.9	750	0	
			N	16:55	0.000	20.9	620	0	
			S	16:54	0.000	20.9	590	0	
			E	16:55	0.000	20.9	610	0	
			W	16:54	0.000	20.9	590	0	
			Well Head	16:56	0.000	20.9	610	0	
			Finish	17:34					
6-Dec-13	56	S	Start	13:00					
			N	14:24	0.000	20.9	660	0	
			S	14:25	0.000	20.9	690	0	
			E	14:25	0.000	20.9	670	0	
			W	14:24	0.000	20.9	660	0	
			Well Head	14:26	0.000	20.9	670	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	17:46					
6-Dec-13	61	S	Start	13:02					
			N	14:19	0.000	20.9	660	0	
			S	14:20	0.000	20.9	670	0	
			E	14:20	0.000	20.9	660	0	
			W	14:19	0.000	20.9	660	0	
			Well Head	14:21	0.000	20.9	670	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	17:45					
6-Dec-13	58	S	Start	8:24					
			N	14:36	0.000	20.9	690	0	
			S	14:37	0.000	20.9	690	0	
			E	14:36	0.000	20.9	720	0	
			W	14:37	0.000	20.9	720	0	
			Well Head	14:38	0.000	20.9	740	0	
		S	N	17:10	0.000	20.9	620	0	
			S	17:09	0.000	20.9	640	0	
			E	17:09	0.000	20.9	610	0	
			W	17:09	0.000	20.9	610	0	
			Well Head	17:10	0.000	20.9	660	0	
			Finish	17:24					

LCP BRUNSWICK - CARBON DIOXIDE SPARGING
AMBIENT AIR MONITORING DATA

Date	Sparge Well	Wind Direction	Test Location	Time	Hg (ppm)	O2 (%)	CO2 (ppm)	H2S (ppm)	Comments
6-Dec-13	18	S	Start	12:39					
			N	14:41	0.000	20.9	700	0	
			S	14:42	0.000	20.9	700	0	
			E	14:42	0.000	20.9	700	0	
			W	14:41	0.000	20.9	700	0	
			Well Head	14:43	0.000	20.9	720	0	
		S	N	16:35	0.000	20.9	560	0	
			S	16:36	0.000	20.9	560	0	
			E	16:35	0.000	20.9	560	0	
			W	16:36	0.000	20.9	540	0	
			Well Head	16:37	0.000	20.9	560	0	
			Finish	16:47					
6-Dec-13	19	S	Start	8:28					
			N	10:48	0.000	20.9	670	0	
			S	10:50	0.000	20.9	660	0	
			E	10:51	0.000	20.9	670	0	
			W	10:49	0.000	20.9	670	0	
			Well Head	10:52	0.000	20.7	660	0	
		S	N	12:21	0.000	20.9	670	0	
			S	12:22	0.000	20.9	690	0	
			E	12:22	0.000	20.9	660	0	
			W	12:21	0.000	20.9	670	0	
			Well Head	12:23	0.000	20.9	670	0	
			Finish	12:26					
6-Dec-13	8	S	Start	8:32					
			N	10:34	0.000	20.9	660	0	
			S	10:31	0.000	20.9	670	0	
			E	10:32	0.000	20.9	670	0	
			W	10:33	0.000	20.9	660	0	
			Well Head	10:35	0.000	20.9	640	0	
		S	N	12:28	0.000	20.9	690	0	
			S	12:27	0.000	20.9	700	0	
			E	12:27	0.000	20.9	690	0	
			W	12:28	0.000	20.9	690	0	
			Well Head	12:29	0.000	20.9	700	0	
			Finish	12:32					
6-Dec-13	37	S	Start	8:37					
			N	10:46	0.000	20.9	660	0	
			S	10:44	0.000	20.9	660	0	
			E	10:45	0.000	20.9	640	0	
			W	10:43	0.000	20.9	670	0	
			Well Head	10:47	0.000	20.9	670	0	
		S	N	13:00	0.000	20.9	690	0	
			S	12:59	0.000	20.9	690	0	
			E	13:00	0.000	20.9	700	0	
			W	12:59	0.000	20.9	670	0	
			Well Head	13:01	0.000	20.9	690	0	
			Finish	13:16					
6-Dec-13	16	S	Start	8:42					
			N	10:40	0.000	20.9	640	0	
			S	10:39	0.000	20.9	640	0	
			E	10:39	0.000	20.9	640	0	
			W	10:37	0.000	20.9	640	0	
			Well Head	10:41	0.000	20.9	640	0	
		S	N	12:57	0.000	20.9	700	0	
			S	12:56	0.000	20.9	690	0	
			E	12:56	0.000	20.9	690	0	
			W	12:57	0.000	20.9	700	0	
			Well Head	12:58	0.000	20.9	690	0	
			Finish	13:12					

LCP BRUNSWICK - CARBON DIOXIDE SPARGING
AMBIENT AIR MONITORING DATA

Date	Sparge Well	Wind Direction	Test Location	Time	Hg (ppm)	O2 (%)	CO2 (ppm)	H2S (ppm)	Comments
9-Dec-13	46	SE	Start	13:22					
			N	13:41	0.000	20.9	770	0	
			S	13:40	0.000	20.9	670	0	
			E	13:40	0.000	20.9	690	0	
			W	13:20	0.000	20.9	770	0	
			Well Head	13:20	0.000	20.9	660	0	
		SE	N	14:46	0.000	20.9	620	0	
			S	14:45	0.000	20.9	590	0	
			E	14:45	0.000	20.9	590	0	
			W	14:46	0.000	20.9	640	0	
			Well Head	14:47	0.000	20.9	610	0	
			Finish	17:27					
9-Dec-13	63	SE	Start	13:24					
			N	13:44	0.000	20.9	690	0	
			S	13:43	0.000	20.9	700	0	
			E	13:43	0.000	20.9	690	0	
			W	13:42	0.000	20.9	830	0	
			Well Head	13:44	0.000	20.9	690	0	
		SE	N	14:48	0.000	20.9	660	0	
			S	14:49	0.000	20.9	670	0	
			E	14:48	0.000	20.9	690	0	
			W	14:49	0.000	20.9	790	0	
			Well Head	14:50	0.000	20.9	620	0	
			Finish	17:31					
9-Dec-13	62	SE	Start	8:06					
			N	13:45	0.000	20.9	670	0	
			S	13:45	0.000	20.9	690	0	
			E	13:45	0.000	20.9	670	0	
			W	13:46	0.000	20.9	690	0	
			Well Head	13:46	0.000	20.9	690	0	
		SE	N	14:52	0.000	20.9	580	0	
			S	14:53	0.000	20.9	620	0	
			E	14:53	0.000	20.9	610	0	
			W	14:52	0.000	20.9	610	0	
			Well Head	14:54	0.000	20.9	610	0	
			Finish	12:13					
9-Dec-13	60	SE	Start	8:08					
			N	13:48	0.000	20.9	660	0	
			S	13:49	0.000	20.9	670	0	
			E	13:48	0.000	20.9	670	0	
			W	13:49	0.000	20.9	690	0	
			Well Head	13:49	0.000	20.9	670	0	
		SE	N	14:54	0.000	20.9	670	0	
			S	14:54	0.000	20.9	590	0	
			E	14:55	0.000	20.9	620	0	
			W	14:55	0.000	20.9	620	0	
			Well Head	14:52	0.000	20.9	620	0	
			Finish	12:16					
9-Dec-13	47	S	Start	8:57					
			N	9:44	0.000	20.9	450	0	
			S	9:43	0.000	20.9	430	0	
			E	9:43	0.000	20.9	500	0	
			W	9:44	0.000	20.9	460	0	
			Well Head	9:45	0.000	20.9	500	0	
		S	N	11:38	0.000	20.9	610	0	
			S	11:37	0.003	20.9	460	0	
			E	11:37	0.000	20.9	460	0	
			W	11:39	0.000	20.9	500	0	
			Well Head	11:39	0.000	20.9	480	0	
			Finish	13:15					

LCP BRUNSWICK - CARBON DIOXIDE SPARGING
AMBIENT AIR MONITORING DATA

Date	Sparge Well	Wind Direction	Test Location	Time	Hg (ppm)	O2 (%)	CO2 (ppm)	H2S (ppm)	Comments
9-Dec-13	64	S	Start	8:54					
			N	9:48	0.000	20.9	620	0	
			S	9:47	0.000	20.9	500	0	
			E	9:47	0.000	20.9	480	0	
			W	9:49	0.000	20.9	510	0	
			Well Head	9:48	0.000	20.9	610	0	
		S	N	11:42	0.000	20.9	610	0	
			S	11:41	0.000	20.9	540	0	
			E	11:42	0.000	20.9	480	0	
			W	11:43	0.000	20.9	560	0	
			Well Head	11:44	0.000	20.9	510	0	
			Finish	13:14					
9-Dec-13	61	S	Start	8:04					
			N	9:57	0.000	20.9	480	0	
			S	9:58	0.000	20.9	460	0	
			E	9:57	0.000	20.9	480	0	
			W	9:58	0.000	20.9	460	0	
			Well Head	9:59	0.000	20.9	480	0	
		S	N	11:46	0.000	20.9	460	0	
			S	11:47	0.000	20.9	460	0	
			E	11:47	0.000	20.9	480	0	
			W	11:48	0.000	20.9	500	0	
			Well Head	11:48	0.000	20.9	480	0	
			Finish	12:23					
9-Dec-13	45	S	Start	8:19					
			N	9:51	0.000	20.9	450	0	
			S	9:52	0.000	20.9	450	0	
			E	9:52	0.000	20.9	450	0	
			W	9:51	0.000	20.9	450	0	
			Well Head	9:53	0.000	20.9	450	0	
		S	N	12:01	0.000	20.9	560	0	
			S	12:01	0.000	20.9	610	0	
			E	12:01	0.000	20.9	560	0	
			W	12:02	0.000	20.9	580	0	
			Well Head	12:03	0.000	20.9	580	0	
			Finish	12:49					
9-Dec-13	43		Start	8:26					
			N	10:08	0.000	20.9	480	0	
			S	10:07	0.000	20.9	460	0	
			E	10:07	0.000	20.9	500	0	
			W	10:08	0.000	20.9	480	0	
			Well Head	10:09	0.000	20.9	480	0	
			N	11:59	0.000	20.9	540	0	
			S	11:58	0.000	20.9	560	0	
			E	11:58	0.000	20.9	560	0	
			W	11:59	0.000	20.9	540	0	
			Well Head	12:00	0.000	20.9	530	0	
			Finish	7:50 (12/10/13)					
9-Dec-13	41		Start	8:36					
			N	10:00	0.000	20.9	510	0	
			S	10:01	0.000	20.9	460	0	
			E	10:01	0.000	20.9	460	0	
			W	10:00	0.000	20.9	460	0	
			Well Head	10:02	0.000	20.9	480	0	
			N	11:57	0.000	20.9	570	0	
			S	11:52	0.000	20.9	500	0	
			E	11:52	0.000	20.9	530	0	
			W	11:53	0.000	20.9	510	0	
			Well Head	11:54	0.000	20.9	510	0	
			Finish	12:55					

LCP BRUNSWICK - CARBON DIOXIDE SPARGING
AMBIENT AIR MONITORING DATA

Date	Sparge Well	Wind Direction	Test Location	Time	Hg (ppm)	O2 (%)	CO2 (ppm)	H2S (ppm)	Comments
9-Dec-13	51		Start	8:40					
			N	10:06	0.000	20.9	500	0	
			S	10:05	0.000	20.9	460	0	
			E	10:05	0.000	20.9	480	0	
			W	10:04	0.000	20.9	460	0	
			Well Head	10:06	0.000	20.9	480	0	
			N	11:55	0.000	20.9	540	0	
			S	11:55	0.000	20.9	560	0	
			E	11:55	0.000	20.9	540	0	
			W	11:54	0.000	20.9	510	0	
			Well Head	11:56	0.000	20.9	530	0	
			Finish	8:05 (12/10/13)					
9-Dec-13	55		Start	13:12					
			N	15:55	0.000	20.9	670	0	
			S	15:54	0.000	20.9	670	0	
			E	15:55	0.000	20.9	690	0	
			W	15:56	0.000	20.9	670	0	
			Well Head		0.000	20.9	660	0	
			N	17:07	0.000	20.9	670	0	
			S	17:07	0.000	20.9	660	0	
			E	17:07	0.000	20.9	640	0	
			W	17:07	0.000	20.9	690	0	
			Well Head	17:08	0.000	20.9	590	0	
			Finish	17:15					
9-Dec-13	56		Start	8:07					
			N	15:46	0.000	20.9	650	0	
			S	15:46	0.000	20.9	690	0	
			E	15:46	0.000	20.9	670	0	
			W	15:47	0.000	20.9	670	0	
			Well Head	15:47	0.000	20.9	670	0	
			N	17:02	0.000	20.9	610	0	
			S	17:01	0.000	20.9	610	0	
			E	17:02	0.000	20.9	590	0	
			W	17:01	0.000	20.9	610	0	
			Well Head	17:02	0.000	20.9	590	0	
			Finish	7:51 (12/10/13)					
9-Dec-13	43		Start	8:26					
			N	15:51	0.000	20.9	690	0	
			S	15:52	0.000	20.9	690	0	
			E	15:51	0.000	20.9	690	0	
			W	15:52	0.000	20.9	670	0	
			Well Head	15:52	0.000	20.9	670	0	
			N	17:04	0.000	20.9	620	0	
			S	17:04	0.000	20.9	620	0	
			E	17:05	0.000	20.9	610	0	
			W	17:04	0.000	20.9	620	0	
			Well Head	17:05	0.000	20.9	620	0	
			Finish	7:50 (12/10/13)					
9-Dec-13			Start						
			N						
			S						
			E						
			W						
			Well Head						
			N						
			S						
			E						
			W						
			Well Head						
			Finish						

LCP BRUNSWICK - CARBON DIOXIDE SPARGING
AMBIENT AIR MONITORING DATA

Date	Sparge Well	Wind Direction	Test Location	Time	Hg (ppm)	O2 (%)	CO2 (ppm)	H2S (ppm)	Comments
10-Dec-13	35	S	Start	7:33					
			N	10:15	0.000	20.9	850	0	
			S	10:15	0.000	20.9	850	0	
			E	10:14	0.000	20.9	850	0	
			W	10:15	0.000	20.9	850	0	
			Well Head	10:16	0.000	20.9	850	0	
			N	11:45	0.000	20.9	800	0	
			S	11:46	0.000	20.9	800	0	
			E	11:46	0.000	20.9	820	0	
			W	11:45	0.000	20.9	800	0	
			Well Head	11:47	0.000	20.9	800	0	
			Finish	12:02					
10-Dec-13	57	S	Start	7:30					
			N	10:13	0.000	20.9	870	0	
			S	10:12	0.000	20.9	880	0	
			E	10:12	0.000	20.9	880	0	
			W	10:13	0.000	20.9	870	0	
			Well Head	10:14	0.000	20.9	870	0	
		S	N	11:42	0.000	20.9	790	0	
			S	11:42	0.000	20.9	790	0	
			E	11:42	0.000	20.9	880	0	
			W	11:43	0.000	20.9	880	0	
			Well Head	11:43	0.000	20.9	790	0	
			Finish	11:48					
10-Dec-13	42		Start	8:00					
			N	10:19	0.000	20.9	870	0	
			S	10:19	0.000	20.9	850	0	
			E	10:19	0.000	20.9	870	0	
			W	10:18	0.000	20.9	870	0	
			Well Head	10:20	0.000	20.9	850	0	
			N	12:23	0.000	20.9	790	0	
			S	12:22	0.000	20.9	820	0	
			E	12:23	0.000	20.9	800	0	
			W	12:24	0.000	20.9	800	0	
			Well Head	12:25	0.000	20.9	800	0	
			Finish	7:38 (12/11/13)					
10-Dec-13	58	S	Start	8:54					
			N	10:24	0.000	20.9	850	0	
			S	10:23	0.000	20.9	850	0	
			E	10:23	0.000	20.9	870	0	
			W	10:22	0.000	20.9	830	0	
			Well Head	10:23	0.000	20.9	850	0	
			N	12:20	0.000	20.9	790	0	
			S	12:19	0.000	20.9	820	0	
			E	12:19	0.000	20.9	800	0	
			W	12:20	0.000	20.9	790	0	
			Well Head	12:21	0.000	20.9	800	0	
			Finish	12:54					
10-Dec-13	50	S	Start	8:12					
			N	10:27	0.000	20.9	870	0	
			S	10:26	0.000	20.9	870	0	
			E	10:26	0.000	20.9	870	0	
			W	10:25	0.000	20.9	830	0	
			Well Head	10:27	0.000	20.9	850	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	12:18					

LCP BRUNSWICK - CARBON DIOXIDE SPARGING
AMBIENT AIR MONITORING DATA

Date	Sparge Well	Wind Direction	Test Location	Time	Hg (ppm)	O2 (%)	CO2 (ppm)	H2S (ppm)	Comments
10-Dec-13	23	S	Start	8:37					
			N	10:30	0.000	20.9	830	0	
			S	10:31	0.000	20.9	820	0	
			E	10:31	0.000	20.9	850	0	
			W	10:30	0.000	20.9	870	0	
			Well Head	10:32	0.000	20.9	870	0	
		S	N	12:27	0.000	20.9	820	0	
			S	12:28	0.000	20.9	830	0	
			E	12:29	0.000	20.9	820	0	
			W	12:28	0.000	20.9	820	0	
			Well Head	12:29	0.000	20.9	820	0	
			Finish	12:37					
10-Dec-13	6	S	Start	8:57					
			N	10:35	0.000	20.9	830	0	
			S	10:36	0.000	20.9	820	0	
			E	10:37	0.000	20.9	850	0	
			W	10:36	0.000	20.9	870	0	
			Well Head	10:37	0.000	20.9	870	0	
			N	12:36	0.000	20.9	820	0	
			S	12:37	0.000	20.9	830	0	
			E	12:36	0.000	20.9	820	0	
			W	12:37	0.000	20.9	820	0	
			Well Head	12:38	0.000	20.9	820	0	
			Finish	17:42					
10-Dec-13	52		Start	13:01					
			N	15:32	0.000	20.9	830	0	
			S	15:31	0.000	20.9	820	0	
			E	15:31	0.000	20.9	800	0	
			W	15:32	0.000	20.9	830	0	
			Well Head	15:33	0.000	20.9	850	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	8:56 (12/11)					
10-Dec-13	40		Start	12:26					
			N	15:28	0.000	20.9	830	0	
			S	15:27	0.000	20.9	830	0	
			E	15:27	0.000	20.9	830	0	
			W	15:28	0.000	20.9	830	0	
			Well Head	15:29	0.000	20.9	830	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	7:44 (12/11/13)					
10-Dec-13	22		Start	12:43					
			N	15:41	0.000	20.9	870	0	
			S	15:40	0.000	20.9	850	0	
			E	15:41	0.000	20.9	840	0	
			W	15:40	0.000	20.9	930	0	
			Well Head	15:41	0.000	20.9	960	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	16:58					

LCP BRUNSWICK - CARBON DIOXIDE SPARGING
AMBIENT AIR MONITORING DATA

Date	Sparge Well	Wind Direction	Test Location	Time	Hg (ppm)	O2 (%)	CO2 (ppm)	H2S (ppm)	Comments
10-Dec-13	13		Start	13:09					
			N	15:43	0.000	20.9	880	0	
			S	15:44	0.000	20.9	850	0	
			E	15:44	0.000	20.9	850	0	
			W	15:43	0.000	20.9	830	0	
			Well Head	15:45	0.000	20.9	870	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	17:03					
10-Dec-13	39	NW	Start	13:36					
			N	15:17	0.000	20.9	800	0	
			S	15:15	0.000	20.9	790	0	
			E	15:15	0.000	20.9	790	0	
			W	15:16	0.000	20.9	790	0	
			Well Head	15:16	0.000	20.9	790	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	7:58 (12/11/13)					
10-Dec-13	38	NW	Start	13:38					
			N	15:24	0.000	20.9	820	0	
			S	15:23	0.000	20.9	820	0	
			E	15:23	0.000	20.9	830	0	
			W	15:24	0.000	20.9	830	0	
			Well Head	15:25	0.000	20.9	830	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	7:56 (12/11/13)					
10-Dec-13	2	NW	Start	13:17					
			N	15:48	0.000	20.9	820	0	
			S	15:49	0.000	20.9	820	0	
			E	15:48	0.000	20.9	820	0	
			W	15:49	0.000	20.9	850	0	
			Well Head	15:50	0.000	20.9	830	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	7:49 (12/11/13)					
10-Dec-13	24	NW	Start	13:22					
			N	15:18	0.000	20.9	830	0	
			S	15:19	0.000	20.9	820	0	
			E	15:19	0.000	20.9	820	0	
			W	15:18	0.000	20.9	850	0	
			Well Head	15:20	0.000	20.9	800	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	7:53 (12/11/13)					

LCP BRUNSWICK - CARBON DIOXIDE SPARGING
AMBIENT AIR MONITORING DATA

Date	Sparge Well	Wind Direction	Test Location	Time	Hg (ppm)	O2 (%)	CO2 (ppm)	H2S (ppm)	Comments
11-Dec-13	14	N	Start	19:19					
			N	10:20	0.000	20.9	610	0	
			S	10:21	0.000	20.9	610	0	
			E	10:20	0.000	20.9	620	0	
			W	10:21	0.000	20.9	620	0	
			Well Head	10:22	0.000	20.9	610	0	
			N	12:30	0.000	20.9	700	0	
			S	12:31	0.000	20.9	700	0	
			E	12:30	0.000	20.9	700	0	
			W	12:31	0.000	20.9	700	0	
			Well Head	12:32	0.000	20.9	720	0	
			Finish	13:54					
11-Dec-13	56		Start	12:15					
			N	15:56	0.000	20.9	850	0	
			S	15:57	0.000	20.9	850	0	
			E	15:58	0.000	21.6	780	0	
			W	15:56	0.000	20.9	780	0	
			Well Head	15:57	0.000	20.9	800	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	8:17 (12/12/13)					
11-Dec-13	27		Start	8:58					
			N	11:01	0.000	20.9	670	0	
			S	11:01	0.000	20.9	670	0	
			E	11:02	0.000	20.9	670	0	
			W	11:02	0.000	20.9	670	0	
			Well Head	11:02	0.000	20.9	670	0	
			N	12:58	0.000	20.9	750	0	
			S	12:58	0.000	20.9	740	0	
			E	12:59	0.000	20.9	740	0	
			W	12:59	0.000	20.9	750	0	
			Well Head	12:59	0.000	20.9	750	0	
			Finish	12:59					
11-Dec-13	49		Start	8:52					
			N	10:59	0.000	20.9	660	0	
			S	10:59	0.000	20.9	670	0	
			E	10:59	0.000	20.9	660	0	
			W	11:00	0.000	20.9	660	0	
			Well Head	11:00	0.000	20.9	660	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	12:54					
11-Dec-13	9		Start	9:03					
			N	10:36	0.000	20.9	720	0	
			S	10:36	0.000	20.9	750	0	
			E	10:37	0.000	20.9	740	0	
			W	10:37	0.000	20.9	740	0	
			Well Head	10:37	0.000	20.9	740	0	
			N	12:39	0.000	20.9	660	0	
			S	12:40	0.000	20.9	640	0	
			E	12:39	0.000	20.9	660	0	
			W	12:40	0.000	20.9	660	0	
			Well Head	12:41	0.000	20.9	640	0	
			Finish	13:14					

LCP BRUNSWICK - CARBON DIOXIDE SPARGING
AMBIENT AIR MONITORING DATA

Date	Sparge Well	Wind Direction	Test Location	Time	Hg (ppm)	O2 (%)	CO2 (ppm)	H2S (ppm)	Comments
11-Dec-13	3	N	Start	9:10					
			N	10:40	0.000	20.9	640	0	
			S	10:41	0.000	20.9	640	0	
			E	10:40	0.000	20.9	660	0	
			W	10:40	0.000	20.9	640	0	
			Well Head	10:41	0.000	20.9	640	0	
		N	N	12:43	0.000	20.9	750	0	
			S	12:42	0.000	20.9	740	0	
			E	12:42	0.000	20.9	740	0	
			W	12:43	0.000	20.9	740	0	
			Well Head	12:44	0.000	20.9	740	0	
			Finish	13:22					
11-Dec-13	37	N	Start	9:08					
			N		0.000	20.9	640	0	
			S		0.000	20.9	640	0	
			E		0.000	20.9	660	0	
			W		0.000	20.9	640	0	
			Well Head		0.000	20.9	640	0	
		N	N		0.000	20.9	750	0	
			S		0.000	20.9	740	0	
			E		0.000	20.9	740	0	
			W		0.000	20.9	740	0	
			Well Head		0.000	20.9	740	0	
			Finish	13:39					
11-Dec-13	16		Start	9:04					
			N	10:49	0.000	20.9	670	0	
			S	10:49	0.000	20.9	680	0	
			E	10:49	0.000	20.9	690	0	
			W	10:50	0.000	20.9	670	0	
			Well Head	10:50	0.000	20.9	660	0	
			N	12:42	0.000	20.9	740	0	
			S	12:46	0.000	20.9	740	0	
			E	12:46	0.000	20.9	740	0	
			W	12:47	0.000	20.9	740	0	
			Well Head	12:48	0.000	20.9	740	0	
			Finish	13:37					
11-Dec-13	26		Start	12:55					
			N	14:36	0.000	20.9	700	0	
			S	14:37	0.000	20.9	700	0	
			E	14:38	0.000	20.9	740	0	
			W	14:39	0.000	20.9	700	0	
			Well Head	14:40	0.000	20.9	670	0	
			N	16:36	0.000	20.9	660	0	
			S	16:37	0.000	20.9	660	0	
			E	16:38	0.000	20.9	850	0	
			W	16:39	0.000	20.9	690	0	
			Well Head	16:40	0.000	20.9	660	0	
			Finish	16:56					
11-Dec-13	28		Start	13:04					
			N	14:44	0.000	20.9	690	0	
			S	14:45	0.000	20.9	690	0	
			E	14:46	0.000	20.9	670	0	
			W	14:47	0.000	20.9	670	0	
			Well Head	14:48	0.000	20.9	670	0	
			N	16:42	0.000	20.9	660	0	
			S	16:43	0.000	20.9	640	0	
			E	16:44	0.000	20.9	640	0	
			W	16:45	0.000	20.9	640	0	
			Well Head	16:46	0.000	20.9	640	0	
			Finish	17:05					

LCP BRUNSWICK - CARBON DIOXIDE SPARGING
AMBIENT AIR MONITORING DATA

Date	Sparge Well	Wind Direction	Test Location	Time	Hg (ppm)	O2 (%)	CO2 (ppm)	H2S (ppm)	Comments
11-Dec-13	19		Start	13:19					
			N	14:07	0.000	20.9	690	0	
			S	14:08	0.000	20.9	670	0	
			E	14:08	0.000	20.9	700	0	
			W	14:07	0.000	20.9	690	0	
			Well Head	14:09	0.000	20.9	690	0	
			N	16:05	0.000	20.9	620	0	
			S	16:06	0.000	20.9	610	0	
			E	16:07	0.000	20.9	610	0	
			W	16:08	0.000	20.9	610	0	
			Well Head	16:09	0.000	20.9	610	0	
			Finish	17:20					
11-Dec-13	17		Start	13:30					
			N	14:15	0.000	20.9	670	0	
			S	14:16	0.000	20.9	690	0	
			E	14:17	0.000	20.9	670	0	
			W	14:18	0.000	20.9	690	0	
			Well Head	14:19	0.000	20.9	670	0	
			N	16:11	0.000	20.9	660	0	
			S	16:12	0.000	20.9	640	0	
			E	16:13	0.000	20.9	610	0	
			W	16:14	0.000	20.9	620	0	
			Well Head	16:05	0.000	20.9	620	0	
			Finish	17:59					
11-Dec-13	48		Start	13:41					
			N	14:30	0.000	20.9	770	0	
			S	14:31	0.000	20.9	690	0	
			E	14:32	0.000	20.9	690	0	
			W	14:33	0.000	20.9	700	0	
			Well Head	14:34	0.000	20.9	690	0	
			N	16:25	0.000	20.9	670	0	
			S	16:26	0.000	20.9	660	0	
			E	16:27	0.000	20.9	660	0	
			W	16:28	0.000	20.9	660	0	
			Well Head	16:29	0.000	20.9	640	0	
			Finish	17:42					
11-Dec-13	7		Start	13:53					
			N	14:22	0.000	20.9	700	0	
			S	14:23	0.000	20.9	690	0	
			E	14:24	0.000	20.9	690	0	
			W	14:25	0.000	20.9	720	0	
			Well Head	14:27	0.000	20.9	700	0	
			N	16:19	0.000	20.9	670	0	
			S	16:20	0.000	20.9	610	0	
			E	16:21	0.000	20.9	610	0	
			W	16:22	0.000	20.9	620	0	
			Well Head	16:23	0.000	20.9	620	0	
			Finish	9:03 (12/12/13)					

LCP BRUNSWICK - CARBON DIOXIDE SPARGING
AMBIENT AIR MONITORING DATA

Date	Sparge Well	Wind Direction	Test Location	Time	Hg (ppm)	O2 (%)	CO2 (ppm)	H2S (ppm)	Comments
12-Dec-13	10		Start	9:20					
			N	10:53	0.000	20.9	830	0	
			S	10:54	0.000	20.9	830	0	
			E	10:55	0.000	20.9	800	0	
			W	10:56	0.000	20.9	800	0	
			Well Head	10:57	0.000	20.9	800	0	
		NW	N	12:36	0.000	20.9	800	0	
			S	12:37	0.000	20.9	800	0	
			E	12:36	0.000	20.9	800	0	
			W	12:37	0.000	20.9	800	0	
			Well Head	12:38	0.000	20.9	800	0	
			Finish	13:30					
12-Dec-13	36		Start	9:09					
			N	11:05	0.000	20.9	920	0	
			S	11:06	0.000	20.9	900	0	
			E	11:07	0.000	20.9	830	0	
			W	11:08	0.000	20.9	920	0	
			Well Head	11:09	0.000	20.9	900	0	
			N	12:46	0.000	20.9	830	0	
			S	12:45	0.000	20.9	830	0	
			E	12:45	0.000	20.9	830	0	
			W	12:47	0.000	20.9		0	
			Well Head	12:48	0.000	20.9	850	0	
			Finish	13:12					
12-Dec-13	15		Start	9:05					
			N	10:59	0.000	20.9	850	0	
			S	11:00	0.000	20.9	800	0	
			E	11:01	0.000	20.9	850	0	
			W	11:02	0.000	20.9	830	0	
			Well Head	11:03	0.000	20.9	830	0	
			N	12:41	0.000	20.9	850	0	
			S	12:42	0.000	20.9	830	0	
			E	12:43	0.000	20.9	830	0	
			W	12:41	0.000	20.9	900	0	
			Well Head	12:43	0.000	20.9	850	0	
			Finish	13:10					
12-Dec-13	62		Start	8:53					
			N	10:22	0.000	20.9	880	0	
			S	10:23	0.000	20.9	880	0	
			E	10:24	0.000	20.9	850	0	
			W	10:25	0.000	20.9	850	0	
			Well Head	10:26	0.000	20.9	850	0	
		NW	N	12:14	0.000	20.9	760	0	
			S	12:15	0.000	20.9	880	0	
			E	12:15	0.000	20.9	760	0	
			W	12:14	0.000	20.9	730	0	
			Well Head	12:16	0.000	20.9	760	0	
			Finish	12:54					
12-Dec-13	60		Start	8:19					
			N	10:28	0.000	20.9	850	0	
			S	10:29	0.000	20.9	830	0	
			E	10:30	0.000	20.9	830	0	
			W	10:31	0.000	20.9	800	0	
			Well Head	10:32	0.000	20.9	800	0	
			N	12:17	0.000	20.9	760	0	
			S	12:18	0.000	20.9	780	0	
			E	12:17	0.000	20.9	760	0	
			W	12:18	0.000	20.9	730	0	
			Well Head	12:19	0.000	20.9	760	0	
			Finish	12:20					

LCP BRUNSWICK - CARBON DIOXIDE SPARGING
AMBIENT AIR MONITORING DATA

Date	Sparge Well	Wind Direction	Test Location	Time	Hg (ppm)	O2 (%)	CO2 (ppm)	H2S (ppm)	Comments
12-Dec-13	32		Start	8:07					
			N	10:35	0.000	20.9	800	0	
			S	10:36	0.000	20.9	800	0	
			E	10:37	0.000	20.9	830	0	
			W	10:38	0.000	20.9	830	0	
			Well Head	10:39	0.000	20.9	780	0	
			N	12:24	0.000	20.9	780	0	
			S	12:23	0.000	20.9	780	0	
			E	12:24	0.000	20.9	780	0	
			W	12:25	0.000	20.9	780	0	
			Well Head	12:26	0.000	20.9	780	0	
			Finish	15:18 (12/13/12)					
12-Dec-13	41		Start	8:58					
			N	10:41	0.000	20.9	880	0	
			S	10:42	0.000	20.9	830	0	
			E	10:43	0.000	20.9	850	0	
			W	10:44	0.000	20.9	1080	0	
			Well Head	10:45	0.000	20.9	880	0	
			N	12:28	0.000	20.9	780	0	
			S	12:27	0.000	20.9	780	0	
			E	12:28	0.000	20.9	780	0	
			W	12:27	0.000	20.9	780	0	
			Well Head	12:29	0.000	20.9	780	0	
			Finish	13:37					
12-Dec-13	5		Start	11:50					
			N	10:24	0.000	20.9	590	0	
			S	10:23	0.000	20.9	590	0	
			E	10:23	0.000	20.9	610	0	
			W	10:24	0.000	20.9	610	0	
			Well Head	10:25	0.000	20.9	610	0	
			N	12:34	0.000	20.9	720	0	
			S	12:35	0.000	20.9	720	0	
			E	12:34	0.000	20.9	700	0	
			W	12:35	0.000	20.9	700	0	
			Well Head	12:36	0.000	20.9	700	0	
			Finish	16:14					
12-Dec-13	61	N	Start	12:25					
			N	15:53	0.000	20.9	780	0	
			S	15:54	0.000	20.9	780	0	
			E	15:54	0.000	20.9	760	0	
			W	15:53	0.000	20.9	800	0	
			Well Head	15:55	0.000	20.9	760	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	16:45					
12-Dec-13	58	N	Start	13:40					
			N	16:00	0.000	20.9	800	0	
			S	15:59	0.000	20.9	780	0	
			E	15:59	0.000	20.9	800	0	
			W	16:00	0.000	20.9	800	0	
			Well Head	16:01	0.000	20.9	800	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	17:36					

LCP BRUNSWICK - CARBON DIOXIDE SPARGING
AMBIENT AIR MONITORING DATA

Date	Sparge Well	Wind Direction	Test Location	Time	Hg (ppm)	O2 (%)	CO2 (ppm)	H2S (ppm)	Comments
12-Dec-13	8	N	Start	13:27					
			N	16:04	0.000	20.9	850	0	
			S	16:05	0.000	20.9	800	0	
			E	16:06	0.000	20.9	780	0	
			W	16:04	0.000	20.9	830	0	
			Well Head	16:06	0.000	20.9	800	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	15:11 (12/12/13)					
12-Dec-13	65		Start	13:31					
			N	16:13	0.000	20.9	830	0	
			S	16:12	0.000	20.9	830	0	
			E	16:14	0.000	20.9	840	0	
			W	16:12	0.000	20.9	1040	0	
			Well Head	16:13	0.000	20.9	890	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	17:21					
12-Dec-13	25	N	Start	13:13					
			N	16:20	0.000	20.9	800	0	
			S	16:19	0.000	20.9	850	0	
			E	16:19	0.000	20.9	780	0	
			W	16:18	0.000	20.9	880	0	
			Well Head	16:20	0.000	20.9	800	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	8:51 (12/13/13)					
12-Dec-13	18		Start	9:15					
			N	10:48	0.000	20.9	900	0	
			S	10:49	0.000	20.9	1000	0	
			E	10:50	0.000	20.9	920	0	
			W	10:51	0.000	20.9	880	0	
			Well Head	10:52	0.000	20.9	900	0	
		NW	N	12:32	0.000	20.9	850	0	
			S	12:33	0.000	20.9	830	0	
			E	12:34	0.000	20.9	850	0	
			W	12:32	0.000	20.9	880	0	
			Well Head	12:35	0.000	20.9	760	0	
			Finish	13:19					
12-Dec-13			Start						
			N						
			S						
			E						
			W						
			Well Head						
			N						
			S						
			E						
			W						
			Well Head						
			Finish						

LCP BRUNSWICK - CARBON DIOXIDE SPARGING
AMBIENT AIR MONITORING DATA

Date	Sparge Well	Wind Direction	Test Location	Time	Hg (ppm)	O2 (%)	CO2 (ppm)	H2S (ppm)	Comments
16-Dec-13	47		Start	7:59					
			N	10:06	0.000	20.9	780	0	
			S	10:05	0.000	20.9	570	0	
			E	10:06	0.000	20.9	610	0	
			W	10:07	0.000	20.9	800	0	
			Well Head	10:08	0.000	20.9	610	0	
			N	11:17	0.000	20.9	680	0	
			S	11:16	0.000	20.9	760	0	
			E	11:17	0.000	20.9	700	0	
			W	11:18	0.000	20.9	610	0	
			Well Head	11:19	0.000	20.9	680	0	
			Finish	11:53					
16-Dec-13	64		Start	9:13					
			N	9:50	0.000	20.9	630	0	
			S	9:49	0.000	20.9	630	0	
			E	9:49	0.000	20.9	1030	0	
			W	9:50	0.000	20.9	1150	0	
			Well Head	9:51	0.000	20.9	1350	0	
			N	11:03	0.000	20.9	680	0	
			S	11:02	0.000	20.9	670	0	
			E	11:02	0.000	20.9	870	0	
			W	11:03	0.000	20.9	760	0	
			Well Head	11:04	0.000	20.9	1500	0	
			Finish	15:34					
16-Dec-13	62	NW	Start	8:08					
			N	9:42	0.000	20.9	480	0	
			S	9:43	0.000	20.9	480	0	
			E	9:43	0.000	20.9	530	0	
			W	9:42	0.000	20.9	480	0	
			Well Head	9:44	0.000	20.9	480	0	
			N	11:06	0.000	20.9	610	0	
			S	11:07	0.000	20.9	650	0	
			E	11:08	0.000	20.9	650	0	
			W	11:07	0.000	20.9	610	0	
			Well Head	11:09	0.000	20.9	630	0	
			Finish	12:05					
16-Dec-13	61		Start	8:10					
			N	9:45	0.000	20.9	510	0	
			S	9:44	0.000	20.9	570	0	
			E	9:46	0.000	20.9	480	0	
			W	9:45	0.000	20.9	510	0	
			Well Head	9:47	0.000	20.9	570	0	
		NW	N	11:10	0.000	20.9	590	0	
			S	11:11	0.000	20.9	590	0	
			E	11:11	0.000	20.9	610	0	
			W	11:12	0.000	20.9	630	0	
			Well Head	11:13	0.000	20.9	630	0	
			Finish	12:06					
16-Dec-13	55	NW	Start	8:14					
			N	10:03	0.000	20.9	630	0	
			S	10:04	0.000	20.9	630	0	
			E	10:03	0.000	20.9	630	0	
			W	10:02	0.000	20.9	630	0	
			Well Head	10:00	0.000	20.9	910	0	
		NW	N	11:27	0.000	20.9	630	0	
			S	11:25	0.000	20.9	610	0	
			E	11:26	0.000	20.9	630	0	
			W	11:27	0.000	20.9	630	0	
			Well Head	11:28	0.000	20.9	800	0	
			Finish	12:35					

LCP BRUNSWICK - CARBON DIOXIDE SPARGING
AMBIENT AIR MONITORING DATA

Date	Sparge Well	Wind Direction	Test Location	Time	Hg (ppm)	O2 (%)	CO2 (ppm)	H2S (ppm)	Comments
16-Dec-13	10	NW	Start	8:34					
			N	11:42	0.000	20.9	780	0	
			S	11:44	0.000	20.9	570	0	
			E	11:42	0.000	20.9	610	0	
			W	11:43	0.000	20.9	800	0	
			Well Head	11:44	0.000	20.9	610	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	8:37 (12/17/13)					
16-Dec-13	41		Start	8:24					
			N	10:11	0.000	20.9	570	0	
			S	10:10	0.000	20.9	590	0	
			E	10:11	0.000	20.9	550	0	
			W	10:12	0.000	20.9	570	0	
			Well Head	10:13	0.000	20.9	560	0	
			N	11:32	0.000	20.9	630	0	
			S	11:31	0.000	20.9	630	0	
			E	11:31	0.000	20.9	650	0	
			W	11:33	0.000	20.9	650	0	
			Well Head	11:34	0.000	20.9	680	0	
			Finish	17:19					
16-Dec-13	51		Start	8:22					
			N	10:19	0.000	20.9	600	0	
			S	10:18	0.000	20.9	610	0	
			E	10:19	0.000	20.9	590	0	
			W	10:18	0.000	20.9	590	0	
			Well Head	10:20	0.000	20.9	590	0	
			N	11:37	0.000	20.9	650	0	
			S	11:36	0.000	20.9	650	0	
			E	11:37	0.000	20.9	630	0	
			W	11:39	0.000	20.9	630	0	
			Well Head	11:39	0.000	20.9	650	0	
			Finish	7:55 (12/17/13)					
16-Dec-13	46		Start	12:10					
			N	16:32	0.000	20.9	650	0	
			S	16:33	0.000	20.9	680	0	
			E	16:31	0.000	20.9	700	0	
			W	16:32	0.000	20.9	650	0	
			Well Head	16:34	0.000	20.9	890	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	17:44					
16-Dec-13	63		Start	12:01					
			N	16:28	0.000	20.9	650	0	
			S	16:27	0.000	20.9	680	0	
			E	16:28	0.000	20.9	680	0	
			W	16:29	0.000	20.9	700	0	
			Well Head	16:30	0.000	20.9	760	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	17:42					

LCP BRUNSWICK - CARBON DIOXIDE SPARGING
AMBIENT AIR MONITORING DATA

Date	Sparge Well	Wind Direction	Test Location	Time	Hg (ppm)	O2 (%)	CO2 (ppm)	H2S (ppm)	Comments
16-Dec-13	56		Start	12:20					
			N	16:36	0.000	20.9	680	0	
			S	16:37	0.000	20.9	650	0	
			E	16:38	0.000	20.9	650	0	
			W	16:38	0.000	20.9	680	0	
			Well Head	16:39	0.000	20.9	650	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	7:45 (12/17/13)					
16-Dec-13	60		Start	12:13					
			N	16:45	0.000	20.9	610	0	
			S	16:44	0.000	20.9	630	0	
			E	16:43	0.000	20.9	650	0	
			W	16:44	0.000	20.9	630	0	
			Well Head	16:45	0.000	20.9	610	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	17:37					
16-Dec-13	45		Start	12:38					
			N	16:35	0.000	20.9	630	0	
			S	16:36	0.000	20.9	680	0	
			E	16:37	0.000	20.9	680	0	
			W	16:36	0.000	20.9	650	0	
			Well Head	16:37	0.000	20.9	630	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	8:00 (12/17/13)					
16-Dec-13	10		Start	8:34					
			N	16:51	0.000	20.9	630	0	
			S	16:50	0.000	20.9	650	0	
			E	16:51	0.000	20.9	650	0	
			W	16:52	0.000	20.9	650	0	
			Well Head	16:53	0.000	20.9	630	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	8:36 (12/17/13)					
16-Dec-13	9		Start	8:20					
			N	16:54	0.000	20.9	650	0	
			S	16:55	0.000	20.9	650	0	
			E	16:56	0.000	20.9	630	0	
			W	16:55	0.000	20.9	630	0	
			Well Head	16:57	0.000	20.9	630	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	15:12					

LCP BRUNSWICK - CARBON DIOXIDE SPARGING
AMBIENT AIR MONITORING DATA

Date	Sparge Well	Wind Direction	Test Location	Time	Hg (ppm)	O2 (%)	CO2 (ppm)	H2S (ppm)	Comments
16-Dec-13	15		Start	8:41					
			N	17:00	0.000	20.9	680	0	
			S	17:02	0.000	20.9	630	0	
			E	17:03	0.000	20.9	630	0	
			W	17:01	0.000	20.9	700	0	
			Well Head	17:04	0.000	20.9	650	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	16:11 (12/17/13)					
16-Dec-13			Start						
			N						
			S						
			E						
			W						
			Well Head						
			N						
			S						
			E						
			W						
			Well Head						
			Finish						
16-Dec-13			Start						
			N						
			S						
			E						
			W						
			Well Head						
			N						
			S						
			E						
			W						
			Well Head						
			Finish						
16-Dec-13			Start						
			N						
			S						
			E						
			W						
			Well Head						
			N						
			S						
			E						
			W						
			Well Head						
			Finish						
16-Dec-13			Start						
			N						
			S						
			E						
			W						
			Well Head						
			N						
			S						
			E						
			W						
			Well Head						
			Finish						

LCP BRUNSWICK - CARBON DIOXIDE SPARGING
AMBIENT AIR MONITORING DATA

Date	Sparge Well	Wind Direction	Test Location	Time	Hg (ppm)	O2 (%)	CO2 (ppm)	H2S (ppm)	Comments
19-Dec-13	23	NE	Start	8:44					
			N	11:46	0.000	20.9	760	0	
			S	11:46	0.000	20.9	740	0	
			E	11:46	0.000	20.9	740	0	
			W	11:47	0.000	20.9	760	0	
			Well Head	11:47	0.000	20.9	760	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	12:41					
19-Dec-13	21	NE	Start	8:58					
			N	11:42	0.000	20.9	760	0	
			S	11:43	0.000	20.9	760	0	
			E	11:44	0.000	20.9	760	0	
			W	11:43	0.000	20.9	760	0	
			Well Head	11:44	0.000	20.9	780	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	12:59					
19-Dec-13	5	NE	Start	9:00					
			N	11:38	0.000	20.9	820	0	
			S	11:39	0.000	20.9	780	0	
			E	11:39	0.000	20.9	780	0	
			W	11:38	0.000	20.9	820	0	
			Well Head	11:40	0.000	20.9	800	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	13:00					
19-Dec-13	26	E	Start	8:35					
			N	12:09	0.000	20.9	650	0	
			S	12:10	0.000	20.9	630	0	
			E	12:08	0.000	20.9	650	0	
			W	12:09	0.000	20.9	650	0	
			Well Head	12:11	0.000	20.9	650	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	12:35					
19-Dec-13	18	NE	Start	8:10					
			N	11:57	0.000	20.9	720	0	
			S	11:56	0.000	20.9	740	0	
			E	11:56	0.000	20.9	720	0	
			W	11:56	0.000	20.9	740	0	
			Well Head	11:57	0.000	20.9	740	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	12:10					

LCP BRUNSWICK - CARBON DIOXIDE SPARGING
AMBIENT AIR MONITORING DATA

Date	Sparge Well	Wind Direction	Test Location	Time	Hg (ppm)	O2 (%)	CO2 (ppm)	H2S (ppm)	Comments
19-Dec-13	65	NE	Start	8:07					
			N	12:00	0.000	20.9	720	0	
			S	11:59	0.000	20.9	720	0	
			E	11:59	0.000	20.9	720	0	
			W	11:59	0.000	20.9	700	0	
			Well Head	12:00	0.000	20.9	720	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	12:08					
19-Dec-13	16	NE	Start	9:14					
			N	12:13	0.000	20.9	650	0	
			S	12:14	0.000	20.9	650	0	
			E	12:13	0.000	20.9	650	0	
			W	12:19	0.000	20.9	630	0	
			Well Head	12:15	0.000	20.9	630	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	7:38 (12/20)					
19-Dec-13	7	NE	Start	8:45					
			N	12:02	0.000	20.9	700	0	
			S	12:03	0.000	20.9	650	0	
			E	12:04	0.000	20.9	680	0	
			W	12:03	0.000	20.9	700	0	
			Well Head	12:04	0.000	20.9	700	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	12:43					
19-Dec-13	32	NE	Start	12:44					
			N	13:13	0.000	20.9	440	0	
			S	13:12	0.000	20.9	440	0	
			E	12:12	0.000	20.9	440	0	
			W	13:14	0.000	20.9	420	0	
			Well Head	13:14	0.000	20.9	440	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	16:50					
19-Dec-13	14		Start	13:04					
			N	15:25	0.000	20.9	550	0	
			S	15:26	0.000	20.9	570	0	
			E	15:24	0.000	20.9	530	0	
			W	15:24	0.000	20.9	540	0	
			Well Head	15:27	0.000	20.9	560	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	15:19					

LCP BRUNSWICK - CARBON DIOXIDE SPARGING
AMBIENT AIR MONITORING DATA

Date	Sparge Well	Wind Direction	Test Location	Time	Hg (ppm)	O2 (%)	CO2 (ppm)	H2S (ppm)	Comments
19-Dec-13	13		Start	13:08					
			N	15:19	0.000	20.9	480	0	
			S	15:18	0.000	20.9	480	0	
			E	15:18	0.000	20.9	460	0	
			W	15:19	0.000	20.9	480	0	
			Well Head	15:20	0.000	20.9	480	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	17:06					
19-Dec-13	27		Start	12:36					
			N	15:42	0.000	20.9	550	0	
			S	15:41	0.000	20.9	550	0	
			E	15:41	0.000	20.9	550	0	
			W	15:40	0.000	20.9	550	0	
			Well Head	15:43	0.000	20.9	550	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	16:49					
19-Dec-13	4	E	Start	12:20					
			N	16:20	0.000	20.9	650	0	
			S	16:19	0.000	20.9	530	0	
			E	16:19	0.000	20.9	510	0	
			W	16:20	0.000	20.9	550	0	
			Well Head	16:21	0.000	20.9	530	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	16:38					
19-Dec-13	37	E	Start	12:38					
			N	16:00	0.000	20.9	610	0	
			S	16:01	0.000	20.9	670	0	
			E	16:02	0.000	20.9	630	0	
			W	16:01	0.000	20.9	590	0	
			Well Head	16:02	0.000	20.9	590	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	16:49					
19-Dec-13	2	NE	Start	12:09					
			N	16:12	0.000	20.9	550	0	
			S	16:11	0.000	20.9	550	0	
			E	16:12	0.000	20.9	550	0	
			W	16:11	0.000	20.9	530	0	
			Well Head	16:13	0.000	20.9	590	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	16:39					

LCP BRUNSWICK - CARBON DIOXIDE SPARGING
AMBIENT AIR MONITORING DATA

Date	Sparge Well	Wind Direction	Test Location	Time	Hg (ppm)	O2 (%)	CO2 (ppm)	H2S (ppm)	Comments
19-Dec-13	7	NE	Start	8:45					
			N	16:06	0.000	20.9	590	0	
			S	16:07	0.000	20.9	550	0	
			E	16:08	0.000	20.9	550	0	
			W	16:07	0.000	20.9	570	0	
			Well Head	16:08	0.000			0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	12:43					
19-Dec-13			Start						
			N						
			S						
			E						
			W						
			Well Head						
			N						
			S						
			E						
			W						
			Well Head						
			Finish						
19-Dec-13			Start						
			N						
			S						
			E						
			W						
			Well Head						
			N						
			S						
			E						
			W						
			Well Head						
			Finish						
19-Dec-13			Start						
			N						
			S						
			E						
			W						
			Well Head						
			N						
			S						
			E						
			W						
			Well Head						
			Finish						
19-Dec-13			Start						
			N						
			S						
			E						
			W						
			Well Head						
			N						
			S						
			E						
			W						
			Well Head						
			Finish						

LCP BRUNSWICK - CARBON DIOXIDE SPARGING
AMBIENT AIR MONITORING DATA

Date	Sparge Well	Wind Direction	Test Location	Time	Hg (ppm)	O2 (%)	CO2 (ppm)	H2S (ppm)	Comments
20-Dec-13	22	SE	Start	7:47					
			N	11:44	0.000	20.9	380	0	
			S	11:42	0.000	20.9	440	0	
			E	11:43	0.000	20.9	420	0	
			W	11:44	0.000	20.9	400	0	
			Well Head						
			N						
			S						
			E						
			W						
			Well Head						
			Finish	11:50					
20-Dec-13	6	SE	Start	7:40					
			N	11:38	0.000	20.9	400	0	
			S	11:37	0.000	20.9	470	0	
			E	11:38	0.000	20.9	480	0	
			W	11:39	0.000	20.9	480	0	
			Well Head	11:39	0.000	20.9	400	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	11:48					
20-Dec-13	28	SE	Start	8:33					
			N	11:26	0.000	20.9	340	0	
			S	11:25	0.000	20.9	340	0	
			E	11:26	0.000	20.9	340	0	
			W	11:27	0.000	20.9	340	0	
			Well Head	11:28	0.000	20.9	340	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	12:32					
20-Dec-13	26		Start	8:35					
			N	11:31	0.000	20.9	390	0	
			S	11:33	0.000	20.9	400	0	
			E	11:33	0.000	20.9	400	0	
			W	11:32	0.000	20.9	420	0	
			Well Head	11:34	0.000	20.9	440	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	12:35					
20-Dec-13	48	SE	Start	7:47					
			N	11:52	0.000	20.9	550	0	
			S	11:50	0.000	20.9	550	0	
			E	11:51	0.000	20.9	510	0	
			W	11:52	0.000	20.9	530	0	
			Well Head	11:53	0.000	20.9	530	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	12:03					

LCP BRUNSWICK - CARBON DIOXIDE SPARGING
AMBIENT AIR MONITORING DATA

Date	Sparge Well	Wind Direction	Test Location	Time	Hg (ppm)	O2 (%)	CO2 (ppm)	H2S (ppm)	Comments
20-Dec-13	49	SE	Start	9:10					
			N	11:59	0.000	20.9	480	0	
			S	11:58	0.000	20.9	550	0	
			E	11:59	0.000	20.9	550	0	
			W	12:00	0.000	20.9	510	0	
			Well Head	12:01	0.000	20.9	510	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	13:16					
20-Dec-13			Start						
			N						
			S						
			E						
			W						
			Well Head						
			N						
			S						
			E						
			W						
			Well Head						
			Finish						
20-Dec-13			Start						
			N						
			S						
			E						
			W						
			Well Head						
			N						
			S						
			E						
			W						
			Well Head						
			Finish						
20-Dec-13			Start						
			N						
			S						
			E						
			W						
			Well Head						
			N						
			S						
			E						
			W						
			Well Head						
			Finish						
20-Dec-13			Start						
			N						
			S						
			E						
			W						
			Well Head						
			N						
			S						
			E						
			W						
			Well Head						
			Finish						

LCP BRUNSWICK - CARBON DIOXIDE SPARGING
AMBIENT AIR MONITORING DATA

Date	Sparge Well	Wind Direction	Test Location	Time	Hg (ppm)	O2 (%)	CO2 (ppm)	H2S (ppm)	Comments
16-Jan-14	31		Start	8:15					
			N	15:40	0.000	20.9	740	0	
			S	15:43	0.000	20.9	740	0	
			E	15:42	0.000	20.9	740	0	
			W	15:44	0.000	20.9	760	0	
			Well Head	15:44	0.000	20.9	760	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	16:42					
16-Jan-14	51		Start	8:12					
			N	15:33	0.000	20.9	740	0	
			S	15:35	0.000	20.9	760	0	
			E	15:36	0.000	20.9	760	0	
			W	15:37	0.000	20.9	740	0	
			Well Head	15:39	0.000	20.9	740	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	16:15					
16-Jan-14	13		Start	12:21					
			N	15:46	0.000	20.9	760	0	
			S	15:47	0.000	20.9	740	0	
			E	15:48	0.000	20.9	790	0	
			W	15:49	0.000	20.9	740	0	
			Well Head	15:50	0.000	20.9	760	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	16:23					
16-Jan-14	5		Start	12:09					
			N	15:52	0.000	20.9	840	0	
			S	15:53	0.000	20.9	790	0	
			E	15:54	0.000	20.9	790	0	
			W	15:55	0.000	20.9	740	0	
			Well Head						
			N						
			S						
			E						
			W						
			Well Head						
			Finish	16:11					
16-Jan-14	27		Start	11:53					
			N	15:59	0.000	20.9	710	0	
			S	16:00	0.000	20.9	710	0	
			E	16:01	0.000	20.9	740	0	
			W	16:02	0.000	20.9	710	0	
			Well Head	16:03	0.000	20.9	760	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	16:05					

LCP BRUNSWICK - CARBON DIOXIDE SPARGING
AMBIENT AIR MONITORING DATA

Date	Sparge Well	Wind Direction	Test Location	Time	Hg (ppm)	O2 (%)	CO2 (ppm)	H2S (ppm)	Comments
21-Jan-14	33		Start	12:13					
			N	15:15	0.000	20.9	660	0	
			S	15:16	0.000	20.9	640	0	
			E	15:18	0.000	20.9	640	0	
			W	15:17	0.000	20.9	640	0	
			Well Head	15:19	0.000	20.9	640	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	16:42					
21-Jan-14	54		Start	12:10					
			N	15:21	0.000	20.9	610	0	
			S	15:22	0.000	20.9	610	0	
			E	15:23	0.000	20.9	610	0	
			W	15:24	0.000	20.9	610	0	
			Well Head	15:25	0.000	20.9	610	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	16:41					
21-Jan-14	31		Start	12:36					
			N	15:27	0.000	20.9	610	0	
			S	15:28	0.000	20.9	580	0	
			E	15:29	0.000	20.9	580	0	
			W	15:30	0.000	20.9	580	0	
			Well Head	15:31	0.000	20.9	610	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	16:51					
21-Jan-14	9		Start	12:51					
			N	15:34	0.000	20.9	610	0	
			S	15:35	0.000	20.9	610	0	
			E	15:36	0.000	20.9	610	0	
			W	15:37	0.000	20.9	610	0	
			Well Head	15:38	0.000	20.9	610	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	17:00					
21-Jan-14	7		Start	13:06					
			N	15:40	0.000	20.9	610	0	
			S	15:41	0.000	20.9	610	0	
			E	15:42	0.000	20.9	610	0	
			W	15:43	0.000	20.9	640	0	
			Well Head	15:44	0.000	20.9	640	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	17:10					

LCP BRUNSWICK - CARBON DIOXIDE SPARGING
AMBIENT AIR MONITORING DATA

Date	Sparge Well	Wind Direction	Test Location	Time	Hg (ppm)	O2 (%)	CO2 (ppm)	H2S (ppm)	Comments
21-Jan-14	36		Start	8:24					
			N	15:46	0.000	20.9	640	0	
			S	15:47	0.000	20.9	660	0	
			E	15:48	0.000	20.9	610	0	
			W	15:49	0.000	20.9	640	0	
			Well Head	15:50	0.000	20.9	640	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	17:08					
21-Jan-14			Start						
			N						
			S						
			E						
			W						
			Well Head						
			N						
			S						
			E						
			W						
			Well Head						
			Finish						
21-Jan-14			Start						
			N						
			S						
			E						
			W						
			Well Head						
			N						
			S						
			E						
			W						
			Well Head						
			Finish						
21-Jan-14			Start						
			N						
			S						
			E						
			W						
			Well Head						
			N						
			S						
			E						
			W						
			Well Head						
			Finish						
21-Jan-14			Start						
			N						
			S						
			E						
			W						
			Well Head						
			N						
			S						
			E						
			W						
			Well Head						
			Finish						

LCP BRUNSWICK - CARBON DIOXIDE SPARGING
AMBIENT AIR MONITORING DATA

Date	Sparge Well	Wind Direction	Test Location	Time	Hg (ppm)	O2 (%)	CO2 (ppm)	H2S (ppm)	Comments
22-Jan-14	44		Start	8:06					
			N	15:03	0.000	20.9	580	0	
			S	15:04	0.000	20.9	580	0	
			E	15:05	0.000	20.9	580	0	
			W	15:06	0.000	20.9	580	0	
			Well Head	15:07	0.000	20.9	580	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	16:59					
22-Jan-14	52		Start	7:57					
			N	15:10	0.000	20.9	580	0	
			S	15:11	0.000	20.9	580	0	
			E	15:12	0.000	20.9	560	0	
			W	15:13	0.000	20.9	610	0	
			Well Head	15:14	0.000	20.9	580	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	16:11					
22-Jan-14	5		Start	12:41					
			N	15:16	0.000	20.9	640	0	
			S	15:17	0.000	20.9	560	0	
			E	15:18	0.000	20.9	580	0	
			W	15:19	0.000	20.9	580	0	
			Well Head	15:20	0.000	20.9	610	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	16:52					
22-Jan-14	2		Start	8:15					
			N	15:23	0.000	20.9	660	0	
			S	15:24	0.000	20.9	610	0	
			E	15:25	0.000	20.9	640	0	
			W	15:26	0.000	20.9	640	0	
			Well Head	15:27	0.000	20.9	640	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	16:31					
22-Jan-14	37		Start	8:21					
			N	15:31	0.000	20.9	610	0	
			S	15:32	0.000	20.9	640	0	
			E	15:33	0.000	20.9	610	0	
			W	15:34	0.000	20.9	610	0	
			Well Head	15:35	0.000	20.9	660	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	16:38					

LCP BRUNSWICK - CARBON DIOXIDE SPARGING
AMBIENT AIR MONITORING DATA

Date	Sparge Well	Wind Direction	Test Location	Time	Hg (ppm)	O2 (%)	CO2 (ppm)	H2S (ppm)	Comments
23-Jan-14	53		Start	7:39					
			N	15:33	0.000	20.9	510	0	
			S	15:34	0.000	20.9	530	0	
			E	15:35	0.000	20.9	560	0	
			W	15:36	0.000	20.9	610	0	
			Well Head	15:37	0.000	20.9	580	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	16:19					
23-Jan-14	44		Start	7:47					
			N	15:25	0.000	20.9	510	0	
			S	15:26	0.000	20.9	480	0	
			E	15:27	0.000	20.9	510	0	
			W	15:28	0.000	20.9	480	0	
			Well Head	15:29	0.000	20.9	510	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	16:25					
23-Jan-14	23		Start	11:27					
			N	15:46	0.000	20.9	560	0	
			S	15:47	0.000	20.9	560	0	
			E	15:48	0.000	20.9	560	0	
			W	15:49	0.000	20.9	580	0	
			Well Head	15:50	0.000	20.9	580	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	16:32					
23-Jan-14	42		Start	7:43					
			N	15:40	0.000	20.9	560	0	
			S	15:41	0.000	20.9	610	0	
			E	15:42	0.000	20.9	580	0	
			W	15:43	0.000	20.9	560	0	
			Well Head	15:44	0.000	20.9	580	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	16:14					
23-Jan-14	21		Start	12:10					
			N	15:52	0.000	20.9	580	0	
			S	15:53	0.000	20.9	580	0	
			E	15:54	0.000	20.9	640	0	
			W	15:55	0.000	20.9	610	0	
			Well Head	15:56	0.000	20.9	610	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	16:39					

LCP BRUNSWICK - CARBON DIOXIDE SPARGING
AMBIENT AIR MONITORING DATA

Date	Sparge Well	Wind Direction	Test Location	Time	Hg (ppm)	O2 (%)	CO2 (ppm)	H2S (ppm)	Comments
23-Jan-14	9		Start	11:27					
			N	15:58	0.000	20.9	580	0	
			S	15:59	0.000	20.9	580	0	
			E	16:00	0.000	20.9	580	0	
			W	16:01	0.000	20.9	580	0	
			Well Head	16:02	0.000	20.9	640	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	16:32					
23-Jan-14			Start						
			N						
			S						
			E						
			W						
			Well Head						
			N						
			S						
			E						
			W						
			Well Head						
			Finish						
23-Jan-14			Start						
			N						
			S						
			E						
			W						
			Well Head						
			N						
			S						
			E						
			W						
			Well Head						
			Finish						
23-Jan-14			Start						
			N						
			S						
			E						
			W						
			Well Head						
			N						
			S						
			E						
			W						
			Well Head						
			Finish						
23-Jan-14			Start						
			N						
			S						
			E						
			W						
			Well Head						
			N						
			S						
			E						
			W						
			Well Head						
			Finish						

LCP BRUNSWICK - CARBON DIOXIDE SPARGING
AMBIENT AIR MONITORING DATA

Date	Sparge Well	Wind Direction	Test Location	Time	Hg (ppm)	O2 (%)	CO2 (ppm)	H2S (ppm)	Comments
3-Feb-14	32		Start	8:10					
			N	14:25	0.000	20.9	1130	0	
			S	14:26	0.000	20.9	1320	0	
			E	14:27	0.000	20.9	1130	0	
			W	14:28	0.000	20.9	1130	0	
			Well Head	14:29	0.000	20.9	1230	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	9:22 (2/4/14)					
3-Feb-14	44		Start	8:14					
			N	14:31	0.000	20.9	1090	0	
			S	14:32	0.000	20.9	1090	0	
			E	14:33	0.000	20.9	1180	0	
			W	14:34	0.000	20.9	1090	0	
			Well Head	14:35	0.000	20.9	1180	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	10:14 (2/4/14)					
3-Feb-14	23		Start	8:44					
			N	14:53	0.000	20.9	1040	0	
			S	14:54	0.000	20.9	1040	0	
			E	14:55	0.000	20.9	970	0	
			W	14:56	0.000	20.9	1090	0	
			Well Head	14:57	0.000	20.9	970	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	9:33 (2/4/14)					
3-Feb-14	31		Start	8:36					
			N	14:48	0.000	20.9	1090	0	
			S	14:49	0.000	20.9	1000	0	
			E	14:50	0.000	20.9	1000	0	
			W	14:51	0.000	20.9	1000	0	
			Well Head	14:52	0.000	20.9	970	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	9:33 (2/4/14)					
3-Feb-14	42		Start	8:21					
			N	14:37	0.000	20.9	1180	0	
			S	14:38	0.000	20.9	1090	0	
			E	14:39	0.000	20.9	1040	0	
			W	14:40	0.000	20.9	1040	0	
			Well Head	14:41	0.000	20.9	1090	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	9:53 (2/4/14)					

LCP BRUNSWICK - CARBON DIOXIDE SPARGING
AMBIENT AIR MONITORING DATA

Date	Sparge Well	Wind Direction	Test Location	Time	Hg (ppm)	O2 (%)	CO2 (ppm)	H2S (ppm)	Comments
3-Feb-14	51		Start	8:25					
			N	14:42	0.000	20.9	1040	0	
			S	14:43	0.000	20.9	1040	0	
			E	14:44	0.000	20.9	1000	0	
			W	14:45	0.000	20.9	1000	0	
			Well Head	14:46	0.000	20.9	1040	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	9:53 (2/4/14)					
3-Feb-14			Start						
			N						
			S						
			E						
			W						
			Well Head						
			N						
			S						
			E						
			W						
			Well Head						
			Finish						
3-Feb-14			Start						
			N						
			S						
			E						
			W						
			Well Head						
			N						
			S						
			E						
			W						
			Well Head						
			Finish						
3-Feb-14			Start						
			N						
			S						
			E						
			W						
			Well Head						
			N						
			S						
			E						
			W						
			Well Head						
			Finish						
3-Feb-14			Start						
			N						
			S						
			E						
			W						
			Well Head						
			N						
			S						
			E						
			W						
			Well Head						
			Finish						

LCP BRUNSWICK - CARBON DIOXIDE SPARGING
AMBIENT AIR MONITORING DATA

Date	Sparge Well	Wind Direction	Test Location	Time	Hg (ppm)	O2 (%)	CO2 (ppm)	H2S (ppm)	Comments
5-Feb-14	32		Start	8:19					
			N	14:38	0.000	20.9	660	0	
			S	14:39	0.000	20.9	610	0	
			E	14:40	0.000	20.9	580	0	
			W	14:41	0.000	20.9	610	0	
			Well Head	14:42	0.000	20.9	610	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	7:44 (2/6/14)					
5-Feb-14	44		Start	8:23					
			N	14:43	0.000	20.9	610	0	
			S	14:44	0.000	20.9	610	0	
			E	14:45	0.000	20.9	610	0	
			W	14:46	0.000	20.9	610	0	
			Well Head	14:47	0.000	20.9	640	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	7:41 (2/6/14)					
5-Feb-14	51		Start	8:28					
			N	14:49	0.000	20.9	580	0	
			S	14:50	0.000	20.9	580	0	
			E	14:51	0.000	20.9	610	0	
			W	14:52	0.000	20.9	580	0	
			Well Head	14:53	0.000	20.9	610	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	8:19 (2/6/14)					
5-Feb-14	42		Start	8:32					
			N	14:54	0.000	20.9	580	0	
			S	14:55	0.000	20.9	610	0	
			E	14:56	0.000	20.9	580	0	
			W	14:57	0.000	20.9	640	0	
			Well Head	14:58	0.000	20.9	610	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	8:20 (2/6/14)					
5-Feb-14	31		Start	8:04					
			N	15:02	0.000	20.9	1130	0	
			S	15:03	0.000	20.9	1320	0	
			E	15:04	0.000	20.9	1130	0	
			W	15:05	0.000	20.9	1130	0	
			Well Head	15:06	0.000	20.9	1230	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	7:59 (2/6/14)					

LCP BRUNSWICK - CARBON DIOXIDE SPARGING
AMBIENT AIR MONITORING DATA

Date	Sparge Well	Wind Direction	Test Location	Time	Hg (ppm)	O2 (%)	CO2 (ppm)	H2S (ppm)	Comments
5-Feb-14	23		Start	8:12					
			N	15:07	0.000	20.9	640	0	
			S	15:08	0.000	20.9	640	0	
			E	15:09	0.000	20.9	710	0	
			W	15:10	0.000	20.9	660	0	
			Well Head	15:11	0.000	20.9	710	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	8:00 (2/6/14)					
5-Feb-14	20		Start	7:54					
			N	15:18	0.000	20.9	690	0	
			S	15:19	0.000	20.9	690	0	
			E	15:20	0.000	20.9	690	0	
			W	15:21	0.000	20.9	690	0	
			Well Head	15:22	0.000	20.9	690	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	15:58					
5-Feb-14	11		Start	7:32					
			N	15:13	0.000	20.9	640	0	
			S	15:14	0.000	20.9	660	0	
			E	15:15	0.000	20.9	660	0	
			W	15:16	0.000	20.9	660	0	
			Well Head	15:17	0.000	20.9	710	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	16:04					
5-Feb-14			Start						
			N						
			S						
			E						
			W						
			Well Head						
			N						
			S						
			E						
			W						
			Well Head						
			Finish						
5-Feb-14			Start						
			N						
			S						
			E						
			W						
			Well Head						
			N						
			S						
			E						
			W						
			Well Head						
			Finish						

LCP BRUNSWICK - CARBON DIOXIDE SPARGING
AMBIENT AIR MONITORING DATA

Date	Sparge Well	Wind Direction	Test Location	Time	Hg (ppm)	O2 (%)	CO2 (ppm)	H2S (ppm)	Comments
6-Feb-14	33		Start	7:46					
			N	13:25	0.000	20.9	640	0	
			S	13:26	0.000	20.9	640	0	
			E	13:27	0.000	20.9	610	0	
			W	13:28	0.000	20.9	580	0	
			Well Head	13:29	0.000	20.9	580	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	17:13					
6-Feb-14	52		Start	8:20					
			N	13:31	0.000	20.9	580	0	
			S	13:32	0.000	20.9	530	0	
			E	13:33	0.000	20.9	530	0	
			W	13:34	0.000	20.9	560	0	
			Well Head	13:35	0.000	20.9	560	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	7:53 (2/7/14)					
6-Feb-14	58		Start	8:24					
			N	13:36	0.000	20.9	580	0	
			S	13:37	0.000	20.9	560	0	
			E	13:38	0.000	20.9	580	0	
			W	13:39	0.000	20.9	560	0	
			Well Head	13:40	0.000	20.9	560	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	17:24					
6-Feb-14	14		Start	8:10					
			N	13:42	0.000	20.9	580	0	
			S	13:43	0.000	20.9	530	0	
			E	13:44	0.000	20.9	530	0	
			W	13:45	0.000	20.9	530	0	
			Well Head	13:46	0.000	20.9	530	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	17:21					
6-Feb-14	22		Start	10:47					
			N	13:50	0.000	20.9	610	0	
			S	13:51	0.000	20.9	640	0	
			E	13:52	0.000	20.9	580	0	
			W	13:53	0.000	20.9	560	0	
			Well Head	13:54	0.000	20.9	560	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	8:04 (2/7/14)					

LCP BRUNSWICK - CARBON DIOXIDE SPARGING
AMBIENT AIR MONITORING DATA

Date	Sparge Well	Wind Direction	Test Location	Time	Hg (ppm)	O2 (%)	CO2 (ppm)	H2S (ppm)	Comments
6-Feb-14	59		Start	16:17 (2/5/14)					
			N	14:00	0.000	20.9	560	0	
			S	14:01	0.000	20.9	530	0	
			E	14:02	0.000	20.9	530	0	
			W	14:03	0.000	20.9	560	0	
			Well Head	14:04	0.000	20.9	560	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	17:43 (2/7/14)					
6-Feb-14			Start						
			N						
			S						
			E						
			W						
			Well Head						
			N						
			S						
			E						
			W						
			Well Head						
			Finish						
6-Feb-14			Start						
			N						
			S						
			E						
			W						
			Well Head						
			N						
			S						
			E						
			W						
			Well Head						
			Finish						
6-Feb-14			Start						
			N						
			S						
			E						
			W						
			Well Head						
			N						
			S						
			E						
			W						
			Well Head						
			Finish						
6-Feb-14			Start						
			N						
			S						
			E						
			W						
			Well Head						
			N						
			S						
			E						
			W						
			Well Head						
			Finish						

LCP BRUNSWICK - CARBON DIOXIDE SPARGING
AMBIENT AIR MONITORING DATA

Date	Sparge Well	Wind Direction	Test Location	Time	Hg (ppm)	O2 (%)	CO2 (ppm)	H2S (ppm)	Comments
10-Feb-14	44		Start	8:35					
			N	15:05	0.000	20.9	610	0	
			S	15:06	0.000	20.9	640	0	
			E	15:07	0.000	20.9	580	0	
			W	15:08	0.000	20.9	560	0	
			Well Head	15:09	0.000	20.9	560	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	17:27					
10-Feb-14	54		Start	13:10					
			N	15:10	0.000	20.9	610	0	
			S	15:11	0.000	20.9	640	0	
			E	15:12	0.000	20.9	580	0	
			W	15:13	0.000	20.9	560	0	
			Well Head	15:14	0.000	20.9	560	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	17:27					
10-Feb-14	52		Start	8:46					
			N	15:21	0.000	20.9	610	0	
			S	15:22	0.000	20.9	640	0	
			E	15:23	0.000	20.9	580	0	
			W	15:24	0.000	20.9	560	0	
			Well Head	15:25	0.000	20.9	560	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	17:36					
10-Feb-14	59		Start	8:47					
			N	15:16	0.000	20.9	610	0	
			S	15:17	0.000	20.9	640	0	
			E	15:18	0.000	20.9	580	0	
			W	15:19	0.000	20.9	560	0	
			Well Head	15:20	0.000	20.9	560	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	9:00 (2/12/14)					
10-Feb-14	6		Start	8:57					
			N	15:50	0.000	20.9	610	0	
			S	15:51	0.000	20.9	640	0	
			E	15:52	0.000	20.9	580	0	
			W	15:53	0.000	20.9	560	0	
			Well Head	15:54	0.000	20.9	560	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	17:42					

LCP BRUNSWICK - CARBON DIOXIDE SPARGING
AMBIENT AIR MONITORING DATA

Date	Sparge Well	Wind Direction	Test Location	Time	Hg (ppm)	O2 (%)	CO2 (ppm)	H2S (ppm)	Comments
10-Feb-14	19		Start	9:16					
			N	15:39	0.000	20.9	610	0	
			S	15:40	0.000	20.9	640	0	
			E	15:41	0.000	20.9	580	0	
			W	15:42	0.000	20.9	560	0	
			Well Head	15:43	0.000	20.9	560	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	17:48					
10-Feb-14	28		Start	9:27					
			N	15:34	0.000	20.9	610	0	
			S	15:35	0.000	20.9	640	0	
			E	15:36	0.000	20.9	580	0	
			W	15:37	0.000	20.9	560	0	
			Well Head	15:38	0.000	20.9	560	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	17:51					
10-Feb-14	20		Start	9:30					
			N	15:27	0.000	20.9	610	0	
			S	15:28	0.000	20.9	640	0	
			E	15:29	0.000	20.9	580	0	
			W	15:30	0.000	20.9	560	0	
			Well Head	15:30	0.000	20.9	560	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	17:53					
10-Feb-14	11		Start	9:15					
			N	15:44	0.000	20.9	610	0	
			S	15:45	0.000	20.9	640	0	
			E	15:46	0.000	20.9	580	0	
			W	15:47	0.000	20.9	560	0	
			Well Head	15:48	0.000	20.9	560	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	17:47					
10-Feb-14			Start						
			N						
			S						
			E						
			W						
			Well Head						
			N						
			S						
			E						
			W						
			Well Head						
			Finish						

LCP BRUNSWICK - CARBON DIOXIDE SPARGING
AMBIENT AIR MONITORING DATA

Date	Sparge Well	Wind Direction	Test Location	Time	Hg (ppm)	O2 (%)	CO2 (ppm)	H2S (ppm)	Comments
11-Feb-14	32		Start	7:40					
			N	14:15	0.000	20.9	970	0	
			S	14:16	0.000	20.9	920	0	
			E	14:17	0.000	20.9	920	0	
			W	14:18	0.000	20.9	920	0	
			Well Head	14:19	0.000	20.9	920	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	17:36					
11-Feb-14	58		Start	7:52					
			N	14:25	0.000	20.9	890	0	
			S	14:26	0.000	20.9	870	0	
			E	14:27	0.000	20.9	840	0	
			W	14:28	0.000	20.9	870	0	
			Well Head	14:29	0.000	20.9	870	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	17:28					
11-Feb-14	31		Start	7:54					
			N	14:20	0.000	20.9	920	0	
			S	14:21	0.000	20.9	940	0	
			E	14:22	0.000	20.9	920	0	
			W	14:23	0.000	20.9	890	0	
			Well Head	14:24	0.000	20.9	890	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	17:26					
11-Feb-14	6		Start	8:08					
			N	14:41	0.000	20.9	740	0	
			S	14:42	0.000	20.9	740	0	
			E	14:43	0.000	20.9	710	0	
			W	14:44	0.000	20.9	710	0	
			Well Head	14:45	0.000	21.1	690	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	17:23					
11-Feb-14	52		Start	8:00					
			N	14:30	0.000	20.9	870	0	
			S	14:31	0.000	20.9	840	0	
			E	14:32	0.000	20.9	820	0	
			W	14:33	0.000	20.9	820	0	
			Well Head	14:34	0.000	20.9	790	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	15:22 (2/13/14)					

LCP BRUNSWICK - CARBON DIOXIDE SPARGING
AMBIENT AIR MONITORING DATA

Date	Sparge Well	Wind Direction	Test Location	Time	Hg (ppm)	O2 (%)	CO2 (ppm)	H2S (ppm)	Comments
11-Feb-14	59		Start	8:47 (2/10/14)					
			N	14:35	0.000	20.9	820	0	
			S	14:36	0.000	20.9	790	0	
			E	14:37	0.000	20.9	790	0	
			W	14:38	0.000	20.9	760	0	
			Well Head	14:39	0.000	20.9	760	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	9:00 (2/12/14)					
11-Feb-14	19		Start	8:32					
			N	14:52	0.000	21.1	580	0	
			S	14:53	0.000	21.1	610	0	
			E	15:54	0.000	21.1	610	0	
			W	14:55	0.000	21.1	610	0	
			Well Head	14:56	0.000	21.1	660	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	17:10					
11-Feb-14	28		Start	8:31					
			N	14:47	0.000	21.1	740	0	
			S	14:48	0.000	21.1	690	0	
			E	14:49	0.000	21.1	690	0	
			W	14:50	0.000	21.1	640	0	
			Well Head	14:51	0.000	21.1	660	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	7:14 (2/13/13)					
11-Feb-14	37		Start	12:32					
			N	14:57	0.000	21.1	580	0	
			S	14:58	0.000	21.1	540	0	
			E	14:59	0.000	21.1	560	0	
			W	15:00	0.000	21.1	560	0	
			Well Head	15:01	0.000	21.1	560	0	
			N						
			S						
			E						
			W						
			Well Head						
			Finish	17:13					
11-Feb-14			Start						
			N						
			S						
			E						
			W						
			Well Head						
			N						
			S						
			E						
			W						
			Well Head						
			Finish						

Appendix G:

Laboratory Analytical Data

			Location	Equipment Blank		Equipment Blank		Equipment Blank		EW-1		EW-1		EW-2		EW-2	
			Field Sample ID	EQB-082613		EQB-082813		EQB-0903B-090313		EW-01-090413		EW-1-022714		EW-02-090513		EW-022-090513	
			Sample Date	8/26/2013		8/28/2013		9/3/2013		9/4/2013		2/27/2014		9/5/2013		9/5/2013	
			SDG	680-93690-1		680-93690-1		680-93870-1		680-93870-1		680-99043-1		680-93954-1		680-93954-1	
			Matrix	WATER		WATER		WATER		WATER		WATER		WATER		WATER	
			Sample Purpose	Equipment blank		Equipment blank		Equipment blank		Regular sample		Regular sample		Regular sample		Field duplicate	
			Sample Type	Blank water (field)		Blank water (field)		Blank water (field)		Ground water		Ground water		Ground water		Ground water	
Method	Parameter Name	Units	Filtered														
SM2320B	ALKALINITY, BICARBONATE (AS CACO3)	mg/L	N	5	U	5	U	5	U	350		2500		510		530	
SM2320B	ALKALINITY, CARBONATE (AS CACO3)	mg/L	N	5	U	5	U	5	U	290		25	U	460		470	
SM2320B	ALKALINITY, TOTAL	mg/L	N	5	U	5	U	5	U	690		2500		1000		1100	
SM2540C	TOTAL DISSOLVED SOLIDS (RESIDUE, FILTERABLE)	mg/L	N	12		5	U	10		3500		5700		5200		4300	
SM3500-FeD	FERROUS IRON	ug/L	N	25	U,HF	25	U,HF	25	U,HF	2900	HF	14000	HF	1500	HF	1700	HF
SM5310B	DISSOLVED ORGANIC CARBON	mg/L	Y	0.5	U	0.5	U	0.5	U	72		32		260		250	
SM5310B	TOTAL ORGANIC CARBON	mg/L	N	0.5	U	0.5	U	0.5	U	74		37		230		230	
SW6010	ALUMINUM	mg/L	N	0.1	U	0.1	U	0.1	U	2.1		0.55		12		12	
SW6010	ANTIMONY	ug/L	N	5.3	U	5.3	U	5.3	U	5.3	U	20	U	5.3	U	5.3	U
SW6010	ARSENIC	mg/L	N	0.0046	U	0.0046	U	0.0046	U	0.038		0.0069	J	0.024		0.022	
SW6010	BARIUM	mg/L	N	0.0023	U	0.0023	U	0.0023	U	0.2		0.051		0.28		0.27	
SW6010	BERYLLIUM	mg/L	N	0.0002	U	0.0002	U	0.0002	U	0.0038	J	0.0042		0.011		0.011	
SW6010	CADMIUM	mg/L	N	0.002	U	0.002	U	0.002	U	0.002	U	0.005	U	0.002	U	0.002	U
SW6010	CALCIUM	mg/L	N	0.096	U	0.096	U	0.096	U	14		18		21		21	
SW6010	CHROMIUM	mg/L	N	0.0012	U	0.0012	U	0.0012	U	0.07		0.069		0.12		0.11	
SW6010	COBALT	mg/L	N	0.00095	U	0.00095	U	0.00095	U	0.002	J	0.01	U	0.00095	U	0.00095	U
SW6010	COPPER	mg/L	N	0.0019	U	0.0019	U	0.0019	U	0.0087	J	0.02	U	0.0019	U	0.0019	U
SW6010	IRON	mg/L	N	0.05	U	0.05	U	0.05	U	5.8		30		1.1		0.99	
SW6010	LEAD	mg/L	N	0.004	U	0.004	U	0.004	U	0.041		0.0045	J	0.0042	J	0.004	U
SW6010	MAGNESIUM	mg/L	N	0.0099	U	0.0099	U	0.017	J	0.64		5.7		1		1.1	
SW6010	MANGANESE	mg/L	N	0.002	U	0.002	U	0.002	U	0.046		0.6		0.032		0.033	
SW6010	NICKEL	mg/L	N	0.0023	U	0.0023	U	0.0023	U	0.014	J	0.04	U	0.016	J	0.014	J
SW6010	POTASSIUM	mg/L	N	0.022	U	0.022	U	0.022	U	12		13		5.1		5.2	
SW6010	RESPIRABLE QUARTZ	ug/L	Y	50	U	50	U	130	J	300000		84000		64000		66000	
SW6010	SELENIUM	mg/L	N	0.0064	U	0.0064	U	0.0064	U	0.0064	U	0.02	U	0.0064	U	0.0064	U
SW6010	SILVER	mg/L	N	0.00089	U	0.00089	U	0.00089	U	0.00089	U	0.01	U	0.00089	U	0.00089	U
SW6010	SODIUM	mg/L	N	1.4		2.4		0.5	U	1100		2400		1600		1600	
SW6010	THALLIUM	mg/L	N	0.0088	U	0.0088	U	0.0088	U	0.0088	U	0.025	U	0.0088	U	0.0088	U
SW6010	VANADIUM	ug/L	N	2.4	U	2.4	U	2.4	U	110		21		370		380	
SW6010	ZINC	ug/L	N	8.7	U	8.7	U	8.7	U	43		9.6	J	15	J	14	J
SW7470	MERCURY	ug/L	N	0.091	U	0.091	U	0.091	U	50		0.53		60		71	
SW7470	MERCURY	ug/L	Y														
SW9034	SULFIDE	mg/L	N	10	U	10	U	10	U	10	U	10	U	10	U	10	U
SW9038	SULFATE	mg/L	N					5	U	25	U	15		100	U	100	U
SW9056	SULFATE	mg/L	N	0.25	U	0.25	U										
SW9040	pH	S.U.	N	6.57	H	7.48	H	7.47	H	10.3		6.83	H	10.2	H	10.2	H
SW9056	CHLORIDE	mg/L	N	0.25	U	0.25	U										
SW9251	CHLORIDE	mg/L	N					0.31	J	1400		2000		1900		1900	

			Location	EW-2		EW-3		EW-3		EW-4		EW-4		EW-5		EW-5		EW-6	
			Field Sample ID	EW-2-022714		EW-03-090513		EW-3-022714		EW-4-112113		EW-4-030414		EW-5-112013		EW-5-030514		EW-06-090513	
			Sample Date	2/27/2014		9/5/2013		2/27/2014		11/21/2013		3/4/2014		11/20/2013		3/5/2014		9/5/2013	
			SDG	680-99043-1		680-93954-1		680-99043-1		680-96469-1		680-99155-1		680-96469-1		680-99155-1		680-93954-1	
			Matrix	WATER		WATER		WATER		WATER		WATER		WATER		WATER		WATER	
			Sample Purpose	Regular sample		Regular sample		Regular sample		Regular sample		Regular sample		Regular sample		Regular sample		Regular sample	
			Sample Type	Ground water		Ground water		Ground water		Ground water		Ground water		Ground water		Ground water		Ground water	
Method	Parameter Name	Units	Filtered																
SM2320B	ALKALINITY, BICARBONATE (AS CACO3)	mg/L	N	2700		520		3100		110		3500		1500	H	3100		940	
SM2320B	ALKALINITY, CARBONATE (AS CACO3)	mg/L	N	50	U	600		3100		1300		50	U	4000	H	6900		7100	
SM2320B	ALKALINITY, TOTAL	mg/L	N	2700		1200		6300		1400		3500		5700	H	10000		8400	
SM2540C	TOTAL DISSOLVED SOLIDS (RESIDUE, FILTERABLE)	mg/L	N	6200		5800		11000		4900		7300		12000		25000		34000	
SM3500-FeD	FERROUS IRON	ug/L	N	4200	HF	1000	HF	2200	HF	1900	HF	13000	HF	3600	HF	13000	HF	2700	HF
SM5310B	DISSOLVED ORGANIC CARBON	mg/L	Y	190		350		240		230		170		800		750		390	
SM5310B	TOTAL ORGANIC CARBON	mg/L	N	140		320		250		160		140		340		750		300	
SW6010	ALUMINUM	mg/L	N	7.4		4.2		0.62		2.2		1.3		1.6		0.56		0.54	J
SW6010	ANTIMONY	ug/L	N	20	U	5.3	U	14	J	20	U	20	U	20	U	20	U	27	U
SW6010	ARSENIC	mg/L	N	0.022		0.025		0.064		0.068		0.062		0.21		0.73		0.5	
SW6010	BARIUM	mg/L	N	0.23		0.22		0.093		0.33		0.14		0.23		0.087		0.057	
SW6010	BERYLLIUM	mg/L	N	0.0094		0.0081		0.0011	J	0.004		0.0053		0.01		0.0029	J	0.0018	J
SW6010	CADMIUM	mg/L	N	0.005	U	0.002	U	0.005	U	0.005	U	0.005	U	0.005	U	0.002	J	0.01	U
SW6010	CALCIUM	mg/L	N	25		8.6		13		27		31		12		15		5.1	
SW6010	CHROMIUM	mg/L	N	0.15		0.13		0.22		0.22		0.21		0.72		1.1		0.38	
SW6010	COBALT	mg/L	N	0.001	J	0.00095	U	0.003	J	0.0081	J	0.0017	J	0.004	J	0.006	J	0.0048	U
SW6010	COPPER	mg/L	N	0.0072	J	0.0019	U	0.19		0.028		0.01	J	0.048		0.064		0.053	J
SW6010	IRON	mg/L	N	3.5		1		2.3		3.7		14		4.3		6.1		5.9	
SW6010	LEAD	mg/L	N	0.0099	J	0.0049	J	0.067		0.043		0.01		0.0064	J	0.01	U	0.032	J
SW6010	MAGNESIUM	mg/L	N	11		0.12	J	0.17	J	0.21	J	4.6		0.13	J	0.15	J	0.1	J
SW6010	MANGANESE	mg/L	N	0.16		0.015		0.0083	J	0.024		0.21		0.025		0.0066	J	0.013	J
SW6010	NICKEL	mg/L	N	0.019	J	0.017	J	0.062		0.046		0.031	J	0.13		0.23		0.15	J
SW6010	POTASSIUM	mg/L	N	6.5		1.4		44		13		12		22		25		18	
SW6010	RESPIRABLE QUARTZ	ug/L	Y	67000		29000		330000		760000		920000		2100000		2400000		6300000	
SW6010	SELENIUM	mg/L	N	0.013	J	0.014	J	0.026		0.02	U	0.021	B	0.028		0.063	B	0.1	
SW6010	SILVER	mg/L	N	0.01	U	0.00089	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.0045	U
SW6010	SODIUM	mg/L	N	1800		1900		3900		1600		2500		6900		13000		11000	
SW6010	THALLIUM	mg/L	N	0.025	U	0.0088	U	0.025	U	0.025	U	0.025	U	0.025	U	0.025	U	0.044	U
SW6010	VANADIUM	ug/L	N	240		460		540		460		360		1700		3500		1400	
SW6010	ZINC	ug/L	N	20	U	28		66		110		27		32		52		44	U
SW7470	MERCURY	ug/L	N	6.7		7.2		71		160		20		300		180		430	
SW7470	MERCURY	ug/L	Y																
SW9034	SULFIDE	mg/L	N	10	U	10	U	10	U	12		10	U	42		36		10	U
SW9038	SULFATE	mg/L	N	12		100	U	25	U	25	U	160		25	U	130		25	U
SW9056	SULFATE	mg/L	N																
SW9040	pH	S.U.	N	7	H	10.5	H	9.82	H	11.2	H	7.47	H	10.8	H	10.5	H	11.5	H
SW9056	CHLORIDE	mg/L	N																
SW9251	CHLORIDE	mg/L	N	2100		2400		5900		1600		1500		7200		13000		12000	

			Location	EW-6		EW-8		EW-8		EW-9		EW-9		EW-10		EW-10		EW-11	
			Field Sample ID	EW-6-022814		EW-8-112113		EW-8-030314		EW-9-112113		EW-9-030414		EW-10-112113		EW-10-030314		EW-11-112113	
			Sample Date	2/28/2014		11/21/2013		3/3/2014		11/21/2013		3/4/2014		11/21/2013		3/3/2014		11/21/2013	
			SDG	680-99043-1		680-96469-1		680-99155-1		680-96469-1		680-99155-1		680-96469-1		680-99155-1		680-96469-1	
			Matrix	WATER		WATER		WATER		WATER		WATER		WATER		WATER		WATER	
			Sample Purpose	Regular sample		Regular sample		Regular sample		Regular sample		Regular sample		Regular sample		Regular sample		Regular sample	
			Sample Type	Ground water		Ground water		Ground water		Ground water		Ground water		Ground water		Ground water		Ground water	
Method	Parameter Name	Units	Filtered																
SM2320B	ALKALINITY, BICARBONATE (AS CACO3)	mg/L	N	13000		420		2500		300		2900		550	H	2600		4800	H
SM2320B	ALKALINITY, CARBONATE (AS CACO3)	mg/L	N	150		1800		330		2400		25	U	2000	H	50	U	390	H
SM2320B	ALKALINITY, TOTAL	mg/L	N	14000		2200		2800		2700		2900		2800	H	2700		5200	H
SM2540C	TOTAL DISSOLVED SOLIDS (RESIDUE, FILTERABLE)	mg/L	N	42000		6400		6600		8000		6300		9700		7800		17000	
SM3500-FeD	FERROUS IRON	ug/L	N	1700	HF	1500	HF	1200	HF	2600	HF	5700	HF	1400	HF	2800	HF	2600	HF
SM5310B	DISSOLVED ORGANIC CARBON	mg/L	Y	260		270		250		400		200		310		210		260	
SM5310B	TOTAL ORGANIC CARBON	mg/L	N	270		230		230		310		190		250		200		150	
SW6010	ALUMINUM	mg/L	N	0.2	U	0.37		0.92		0.36		0.19	J	0.26		1.1		0.13	J
SW6010	ANTIMONY	ug/L	N	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U
SW6010	ARSENIC	mg/L	N	0.057		0.032		0.032		0.059		0.018	J	0.042		0.036		0.051	
SW6010	BARIUM	mg/L	N	0.096		0.11		0.14		0.15		0.13		0.13		0.074		0.13	
SW6010	BERYLLIUM	mg/L	N	0.0016	J	0.0016	J	0.0044		0.017		0.011		0.01		0.015		0.0029	J
SW6010	CADMIUM	mg/L	N	0.0022	J	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U
SW6010	CALCIUM	mg/L	N	31		18		24		19		96		12		35		19	
SW6010	CHROMIUM	mg/L	N	0.26		0.13		0.16		0.27		0.17		0.18		0.17		0.48	
SW6010	COBALT	mg/L	N	0.0013	J	0.0016	J	0.01	U	0.002	J	0.01	U	0.01	U	0.01	U	0.0026	J
SW6010	COPPER	mg/L	N	0.014	J	0.0098	J	0.0068	J	0.014	J	0.0037	J	0.013	J	0.019	J	0.02	
SW6010	IRON	mg/L	N	1.3		0.87		1.2		1.7		5.8		1.2		2.8		3.1	
SW6010	LEAD	mg/L	N	0.01	U	0.0093	J	0.01	U	0.011		0.01	U	0.011		0.014		0.01	U
SW6010	MAGNESIUM	mg/L	N	20		0.036	J	2.5		0.041	J	19		0.026	J	4.3		13	
SW6010	MANGANESE	mg/L	N	0.048		0.0055	J	0.029		0.046		1.3		0.018		0.26		0.26	
SW6010	NICKEL	mg/L	N	0.043		0.031	J	0.018	J	0.046		0.016	J	0.038	J	0.023	J	0.051	
SW6010	POTASSIUM	mg/L	N	48		8.4		11		4.6		14		19		14		20	
SW6010	RESPIRABLE QUARTZ	ug/L	Y	53000		860000		160000		420000		100000		880000		120000		140000	
SW6010	SELENIUM	mg/L	N	0.029		0.015	J	0.021	B	0.012	J	0.015	J,B	0.012	J	0.017	J,B	0.023	
SW6010	SILVER	mg/L	N	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
SW6010	SODIUM	mg/L	N	13000		2800		3000		4100		2400		5600		3100		9900	
SW6010	THALLIUM	mg/L	N	0.025	U	0.025	U	0.025	U	0.025	U	0.025	U	0.025	U	0.025	U	0.025	U
SW6010	VANADIUM	ug/L	N	590		260		200		590		210		560		330		960	
SW6010	ZINC	ug/L	N	15	J	16	J	15	J	15	J	20	U	12	J	24		11	J
SW7470	MERCURY	ug/L	N	180		48		2.7		120		4.6		68		35		48	
SW7470	MERCURY	ug/L	Y																
SW9034	SULFIDE	mg/L	N	20	U	12		10	U	31		10	U	28		10	U	10	U
SW9038	SULFATE	mg/L	N	500	U	56		250	U	29		27		25	U	120		500	U
SW9056	SULFATE	mg/L	N																
SW9040	pH	S.U.	N	7.63	H	10.6	H	9.09	H	10.9	H	6.96	H	11.1	H	7.57	H	8.62	H
SW9056	CHLORIDE	mg/L	N																
SW9251	CHLORIDE	mg/L	N	13000		2800		2200		4800		2300		7000		3300		12000	

			Location	EW-11		EW-11		EW-11		MW-1A		MW-1A		MW-1B		MW-1B		MW-1C	
			Field Sample ID	EW 11-121213		EW-11-022814		EW-11DUP-022814		MW-1A-090613		MW-1A-022414		MW-1B-083013		MW-1B-022414		MW-1C-083013	
			Sample Date	12/12/2013		2/28/2014		2/28/2014		9/6/2013		2/24/2014		8/30/2013		2/24/2014		8/30/2013	
			SDG	680-97103-1		680-99043-1		680-99043-1		680-93954-1		680-98941-1		680-93799-1		680-98941-1		680-93799-1	
			Matrix	WATER		WATER		WATER		WATER		WATER		WATER		WATER		WATER	
			Sample Purpose	Regular sample		Regular sample		Field duplicate		Regular sample		Regular sample		Regular sample		Regular sample		Regular sample	
			Sample Type	Ground water		Ground water		Ground water		Ground water		Ground water		Ground water		Ground water		Ground water	
Method	Parameter Name	Units	Filtered																
SM2320B	ALKALINITY, BICARBONATE (AS CACO3)	mg/L	N			4400		4400		1500		1600		1300		1200		6300	
SM2320B	ALKALINITY, CARBONATE (AS CACO3)	mg/L	N			25	U	25	U	10	U	50	U	50	U	50	U	600	
SM2320B	ALKALINITY, TOTAL	mg/L	N			4500		4400		1500		1600		1300		1200		6900	
SM2540C	TOTAL DISSOLVED SOLIDS (RESIDUE, FILTERABLE)	mg/L	N			26000		24000		8900		9500		6200		4200		43000	
SM3500-FeD	FERROUS IRON	ug/L	N			7500	HF	7000	HF	48	J,HF	77	J,HF	4800	HF	3600	HF	1800	HF
SM5310B	DISSOLVED ORGANIC CARBON	mg/L	Y			160		160		150		130		170		200		300	
SM5310B	TOTAL ORGANIC CARBON	mg/L	N			170		130		160		150		180		150		1100	
SW6010	ALUMINUM	mg/L	N			0.2	U	0.2	U	2.1		3		3.5		5.1		0.5	U
SW6010	ANTIMONY	ug/L	N			5.3	J	20	U	5.3	U	5.3	J	5.3	U	20	U	27	U
SW6010	ARSENIC	mg/L	N			0.02	U	0.0054	J	0.0046	U	0.0067	J	0.011	J	0.0056	J	0.023	U
SW6010	BARIUM	mg/L	N			0.15		0.16		0.025		0.041		0.027		0.031		0.067	
SW6010	BERYLLIUM	mg/L	N			0.0018	J	0.0018	J	0.001	J	0.0011	J	0.014		0.016		0.0047	J
SW6010	CADMIUM	mg/L	N			0.005	U	0.005	U	0.002	U	0.005	U	0.002	U	0.005	U	0.01	U
SW6010	CALCIUM	mg/L	N			30		31		25		31		9.8		9		6	
SW6010	CHROMIUM	mg/L	N			0.16		0.2		0.018		0.026		0.098		0.086		0.53	
SW6010	COBALT	mg/L	N			0.01	U	0.01	U	0.00095	U	0.01	U	0.00095	U	0.01	U	0.0048	U
SW6010	COPPER	mg/L	N			0.0021	J	0.0025	J	0.0019	U	0.02	U	0.0047	J	0.0019	J	0.016	J
SW6010	IRON	mg/L	N			7.3		7.6		0.083	J	0.055	J	4.8		4.6		1.3	
SW6010	LEAD	mg/L	N			0.01	U	0.01	U	0.004	U	0.01	U	0.011		0.019		0.02	U
SW6010	MAGNESIUM	mg/L	N			21		21		19		27		7.7		6.7		2	J
SW6010	MANGANESE	mg/L	N			0.28		0.28		0.089		0.14		0.14		0.11		0.014	J
SW6010	NICKEL	mg/L	N			0.0071	J	0.0073	J	0.0032	J	0.0051	J	0.0052	J	0.0057	J	0.045	J
SW6010	POTASSIUM	mg/L	N			22		22		37		46		2.6		2.1		26	
SW6010	RESPIRABLE QUARTZ	ug/L	Y			72000		72000		22000		17000		66000		57000		75000	
SW6010	SELENIUM	mg/L	N			0.019	J	0.03		0.018	J	0.029		0.012	J	0.011	J	0.073	J
SW6010	SILVER	mg/L	N			0.01	U	0.01	U	0.00089	U	0.01	U	0.0013	J	0.01	U	0.0045	U
SW6010	SODIUM	mg/L	N			8400		8600		3400		3700		1500		1300		15000	
SW6010	THALLIUM	mg/L	N			0.025	U	0.025	U	0.0088	U	0.025	U	0.0088	U	0.025	U	0.044	U
SW6010	VANADIUM	ug/L	N			140		160		79		96		110		120		1000	
SW6010	ZINC	ug/L	N			20	U	20	U	8.7	U	20	U	8.7	U	9.9	J	44	U
SW7470	MERCURY	ug/L	N	23		3		3.9		0.41		0.46		3.2		4.3		43	
SW7470	MERCURY	ug/L	Y																
SW9034	SULFIDE	mg/L	N			10	U	10	U	10	U	10	U	31		40	U	35	
SW9038	SULFATE	mg/L	N			5	U	5	U	10	U	5	U	31		29		500	U
SW9056	SULFATE	mg/L	N																
SW9040	pH	S.U.	N			6.8	H	6.83	H	6.83		6.96	H	6.63		6.59	H	8.62	
SW9056	CHLORIDE	mg/L	N																
SW9251	CHLORIDE	mg/L	N			10000		9700		4700		5100		1600		1500		17000	

			Location	MW-1C		MW-1C		MW-2A		MW-2A		MW-2B		MW-2B		MW-2C		MW-2C	
			Field Sample ID	MW 1C (Duplicate)-022414		MW-1C-022414		MW-2A-090613		MW-2A-030514		MW-2B-083013		MW-2B-030414		MW-2C-082713		MW-2C-022414	
			Sample Date	2/24/2014		2/24/2014		9/6/2013		3/5/2014		8/30/2013		3/4/2014		8/27/2013		2/24/2014	
			SDG	680-98941-1		680-98941-1		680-93954-1		680-99155-1		680-93799-1		680-99155-1		680-93690-1		680-98941-1	
			Matrix	WATER		WATER		WATER		WATER		WATER		WATER		WATER		WATER	
			Sample Purpose	Field duplicate		Regular sample		Regular sample		Regular sample		Regular sample		Regular sample		Regular sample		Regular sample	
			Sample Type	Ground water		Ground water		Ground water		Ground water		Ground water		Ground water		Ground water		Ground water	
Method	Parameter Name	Units	Filtered																
SM2320B	ALKALINITY, BICARBONATE (AS CACO3)	mg/L	N	7400		7300		1400		1700		1400		1300		3800		5600	
SM2320B	ALKALINITY, CARBONATE (AS CACO3)	mg/L	N	50	U	50	U	50	U	25	U	25	U	25	U	510		50	U
SM2320B	ALKALINITY, TOTAL	mg/L	N	7400		7300		1500		1700		1400		1300		4300		5700	
SM2540C	TOTAL DISSOLVED SOLIDS (RESIDUE, FILTERABLE)	mg/L	N	28000		17000		5200		4700		5500		3500		26000		17000	
SM3500-FeD	FERROUS IRON	ug/L	N	6800	HF	6700	HF	630	HF	210	HF	3200	HF	3900	HF	1300	HF	2300	HF
SM5310B	DISSOLVED ORGANIC CARBON	mg/L	Y	270		280		210		210		200		230		250	B	340	
SM5310B	TOTAL ORGANIC CARBON	mg/L	N	290		270		240		180		200		200		340		320	
SW6010	ALUMINUM	mg/L	N	0.14	J	0.13	J	13		9.3		2.8		3.7		0.1	U	0.13	J
SW6010	ANTIMONY	ug/L	N	20	U	20	U	5.3	U	20	U	5.3	U	20	U	89		210	
SW6010	ARSENIC	mg/L	N	0.02	U	0.1	U	0.0046	U	0.0091	J	0.011	J	0.017	J	0.028		0.067	
SW6010	BARIUM	mg/L	N	0.25		0.25		0.086		0.069		0.048		0.046		0.079		0.11	
SW6010	BERYLLIUM	mg/L	N	0.0031	J	0.003	J	0.0032	J	0.0026	J	0.0093		0.011		0.0031	J	0.0024	J
SW6010	CADMIUM	mg/L	N	0.0034	J	0.0032	J	0.002	U	0.005	U	0.002	U	0.005	U	0.002	U	0.0028	J
SW6010	CALCIUM	mg/L	N	33		33		18		14		12		10		12		28	
SW6010	CHROMIUM	mg/L	N	0.26		0.27		0.044		0.058		0.08		0.098		0.34		0.4	
SW6010	COBALT	mg/L	N	0.01	U	0.01	U	0.00095	U	0.0013	J	0.00095	U	0.01	U	0.0011	J	0.01	U
SW6010	COPPER	mg/L	N	0.0092	J	0.0088	J	0.0019	U	0.02	U	0.0019	U	0.0029	J	0.014	J	0.024	
SW6010	IRON	mg/L	N	7.7		7.8		0.34		0.42		2.8		3.7		0.83		3.2	
SW6010	LEAD	mg/L	N	0.01	U	0.01	U	0.004	U	0.01	U	0.011		0.015		0.004	U	0.01	U
SW6010	MAGNESIUM	mg/L	N	15		15		3.5		3.4		3.8		3.2		3.3		4.6	
SW6010	MANGANESE	mg/L	N	0.12		0.1		0.32		0.21		0.074		0.05		0.038		0.21	
SW6010	NICKEL	mg/L	N	0.013	J	0.01	J	0.0041	J	0.0062	J	0.0053	J	0.0068	J	0.044		0.058	
SW6010	POTASSIUM	mg/L	N	42		42		15		11		3		1.9		18		50	
SW6010	RESPIRABLE QUARTZ	ug/L	Y	58000		53000		21000		16000		42000		46000		130000		59000	
SW6010	SELENIUM	mg/L	N	0.02	U	0.1	U	0.0064	U	0.02	B	0.011	J	0.013	J	0.021		0.011	J
SW6010	SILVER	mg/L	N	0.01	U	0.01	U	0.00089	U	0.01	U	0.0015	J	0.01	U	0.027		0.01	U
SW6010	SODIUM	mg/L	N	13000		13000		1900		1900		1500		1300		10000		13000	
SW6010	THALLIUM	mg/L	N	0.025	U	0.025	U	0.0088	U	0.025	U	0.0088	U	0.025	U	0.0088	U	0.025	U
SW6010	VANADIUM	ug/L	N	360		360		93		89		120		140		870		950	
SW6010	ZINC	ug/L	N	20	U	20	U	8.7	U	20	U	8.7	U	20	U	17	J	23	
SW7470	MERCURY	ug/L	N	10		11		3.3		0.63		2.7		0.92		49		34	
SW7470	MERCURY	ug/L	Y																
SW9034	SULFIDE	mg/L	N	40	U	40	U	10	U	10	U	15		10	U	13		40	U
SW9038	SULFATE	mg/L	N	1100		1100		26		16		30		100	U			1200	
SW9056	SULFATE	mg/L	N													750			
SW9040	pH	S.U.	N	7.04	H	7	H	7.61		7.59	H	7.01		6.73	H	8.87	H	6.72	H
SW9056	CHLORIDE	mg/L	N													13000			
SW9251	CHLORIDE	mg/L	N	15000		15000		2200		1900		1500		1300				15000	

			Location	MW-3A		MW-3A	
			Field Sample ID	MW-3A-090613		MW-3A-030514	
			Sample Date	9/6/2013		3/5/2014	
			SDG	680-93954-1		680-99155-1	
			Matrix	WATER		WATER	
			Sample Purpose	Regular sample		Regular sample	
			Sample Type	Ground water		Ground water	
Method	Parameter Name	Units	Filtered				
SM2320B	ALKALINITY, BICARBONATE (AS CACO3)	mg/L	N	5000		5700	
SM2320B	ALKALINITY, CARBONATE (AS CACO3)	mg/L	N	50	U	50	U
SM2320B	ALKALINITY, TOTAL	mg/L	N	5000		5800	
SM2540C	TOTAL DISSOLVED SOLIDS (RESIDUE, FILTERABLE)	mg/L	N	20000		18000	
SM3500-FeD	FERROUS IRON	ug/L	N	2800	HF	1000	HF
SM5310B	DISSOLVED ORGANIC CARBON	mg/L	Y	390		270	
SM5310B	TOTAL ORGANIC CARBON	mg/L	N	320		220	
SW6010	ALUMINUM	mg/L	N	20		8.5	
SW6010	ANTIMONY	ug/L	N	5.3	U	5.4	J
SW6010	ARSENIC	mg/L	N	0.016	J	0.014	J
SW6010	BARIUM	mg/L	N	0.14		0.094	
SW6010	BERYLLIUM	mg/L	N	0.0023	J	0.0015	J
SW6010	CADMIUM	mg/L	N	0.002	U	0.005	U
SW6010	CALCIUM	mg/L	N	40		63	
SW6010	CHROMIUM	mg/L	N	0.054		0.071	
SW6010	COBALT	mg/L	N	0.00095	U	0.01	U
SW6010	COPPER	mg/L	N	0.0019	U	0.02	U
SW6010	IRON	mg/L	N	5.7		3.2	
SW6010	LEAD	mg/L	N	0.004	U	0.01	U
SW6010	MAGNESIUM	mg/L	N	19		32	
SW6010	MANGANESE	mg/L	N	0.49		0.47	
SW6010	NICKEL	mg/L	N	0.018	J	0.018	J
SW6010	POTASSIUM	mg/L	N	82		72	
SW6010	RESPIRABLE QUARTZ	ug/L	Y	18000		13000	
SW6010	SELENIUM	mg/L	N	0.024		0.037	B
SW6010	SILVER	mg/L	N	0.00089	U	0.01	U
SW6010	SODIUM	mg/L	N	8700		10000	
SW6010	THALLIUM	mg/L	N	0.0088	U	0.025	U
SW6010	VANADIUM	ug/L	N	160		120	
SW6010	ZINC	ug/L	N	17	J	11	J
SW7470	MERCURY	ug/L	N	1.5		0.96	
SW7470	MERCURY	ug/L	Y				
SW9034	SULFIDE	mg/L	N	10	U	10	U
SW9038	SULFATE	mg/L	N	220		50	U
SW9056	SULFATE	mg/L	N				
SW9040	pH	S.U.	N	7.35		6.93	H
SW9056	CHLORIDE	mg/L	N				
SW9251	CHLORIDE	mg/L	N	9700		11000	

			Location	MW-105A		MW-105A		MW-105B		MW-105B	
			Field Sample ID	MW-105A-090413		MW-105A-030514		MW-105B-090413		MW-105B-030514	
			Sample Date	9/4/2013		3/5/2014		9/4/2013		3/5/2014	
			SDG	680-93870-1		680-99155-1		680-93870-1		680-99155-1	
			Matrix	WATER		WATER		WATER		WATER	
			Sample Purpose	Regular sample		Regular sample		Regular sample		Regular sample	
			Sample Type	Ground water		Ground water		Ground water		Ground water	
Method	Parameter Name	Units	Filtered								
SM2320B	ALKALINITY, BICARBONATE (AS CACO3)	mg/L	N	130		130		320		310	
SM2320B	ALKALINITY, CARBONATE (AS CACO3)	mg/L	N	5	U	5	U	50	U	25	U
SM2320B	ALKALINITY, TOTAL	mg/L	N	130		130		320		310	
SM2540C	TOTAL DISSOLVED SOLIDS (RESIDUE, FILTERABLE)	mg/L	N	370		340		980		940	
SM3500-FeD	FERROUS IRON	ug/L	N	3600	HF	950	HF	240	HF	190	HF
SM5310B	DISSOLVED ORGANIC CARBON	mg/L	Y	34		26		130		99	
SM5310B	TOTAL ORGANIC CARBON	mg/L	N	33		25		130		85	
SW6010	ALUMINUM	mg/L	N	0.1	U	0.2	U	12		5.4	
SW6010	ANTIMONY	ug/L	N	5.3	U	20	U	5.3	U	20	U
SW6010	ARSENIC	mg/L	N	0.0046	U	0.02	U	0.0077	J	0.0086	J
SW6010	BARIUM	mg/L	N	0.014		0.015		0.036		0.019	
SW6010	BERYLLIUM	mg/L	N	0.0002	U	0.004	U	0.00048	J	0.004	U
SW6010	CADMIUM	mg/L	N	0.002	U	0.005	U	0.002	U	0.005	U
SW6010	CALCIUM	mg/L	N	74		72		2.9		7.2	
SW6010	CHROMIUM	mg/L	N	0.0012	U	0.01	U	0.037		0.019	
SW6010	COBALT	mg/L	N	0.00095	U	0.01	U	0.00095	U	0.01	U
SW6010	COPPER	mg/L	N	0.0019	U	0.02	U	0.0068	J	0.0031	J
SW6010	IRON	mg/L	N	3.8		0.88		1		0.52	
SW6010	LEAD	mg/L	N	0.004	U	0.01	U	0.053		0.025	
SW6010	MAGNESIUM	mg/L	N	14		13		0.84		1.7	
SW6010	MANGANESE	mg/L	N	0.27		0.23		0.0078	J	0.012	
SW6010	NICKEL	mg/L	N	0.0023	U	0.04	U	0.0065	J	0.0032	J
SW6010	POTASSIUM	mg/L	N	6.1		5.5		1.6		1.9	
SW6010	RESPIRABLE QUARTZ	ug/L	Y	2800		1900		7100		2900	
SW6010	SELENIUM	mg/L	N	0.0064	U	0.02	U	0.0064	U	0.01	J
SW6010	SILVER	mg/L	N	0.00089	U	0.01	U	0.00089	U	0.01	U
SW6010	SODIUM	mg/L	N	7.7		13		250		310	
SW6010	THALLIUM	mg/L	N	0.0088	U	0.025	U	0.0088	U	0.025	U
SW6010	VANADIUM	ug/L	N	2.4	U	10	U	64		38	
SW6010	ZINC	ug/L	N	8.7	U	20		12	J	9.1	J
SW7470	MERCURY	ug/L	N	0.091	U	0.2	U	7.7		0.71	
SW7470	MERCURY	ug/L	Y								
SW9034	SULFIDE	mg/L	N	10	U	10	U	10	U	10	U
SW9038	SULFATE	mg/L	N	160		150		13		13	
SW9056	SULFATE	mg/L	N								
SW9040	pH	S.U.	N	6.03	H	6.53	H	5.69	H	6.85	H
SW9056	CHLORIDE	mg/L	N								
SW9251	CHLORIDE	mg/L	N	7.5		9.8		160		200	

			Location	MW-105C		MW-105C		MW-112C		MW-112C		MW-113C		MW-113C		MW-113C	
			Field Sample ID	MW-105C-083013		MW-105C-030414		MW-112C-090513		MW-112C-022814		MW-113C-090313		MW-113C-030414		MW-113CDUPLICATE-030414	
			Sample Date	8/30/2013		3/4/2014		9/5/2013		2/28/2014		9/3/2013		3/4/2014		3/4/2014	
			SDG	680-93799-1		680-99155-1		680-93954-1		680-99043-1		680-93870-1		680-99155-1		680-99155-1	
			Matrix	WATER		WATER		WATER		WATER		WATER		WATER		WATER	
			Sample Purpose	Regular sample		Regular sample		Regular sample		Regular sample		Regular sample		Regular sample		Field duplicate	
			Sample Type	Ground water		Ground water		Ground water		Ground water		Ground water		Ground water		Ground water	
Method	Parameter Name	Units	Filtered														
SM2320B	ALKALINITY, BICARBONATE (AS CACO3)	mg/L	N	170		4200		1400		960		850		2200		2200	
SM2320B	ALKALINITY, CARBONATE (AS CACO3)	mg/L	N	300		25	U	2300		2600		140		610		620	
SM2320B	ALKALINITY, TOTAL	mg/L	N	520		4200		3800		3700		1000		2800		2800	
SM2540C	TOTAL DISSOLVED SOLIDS (RESIDUE, FILTERABLE)	mg/L	N	2600		4700		28000		30000		27000		23000		22000	
SM3500-FeD	FERROUS IRON	ug/L	N	6800	HF	3800	HF	4300	HF	9500	HF	320	HF	2400	HF	2700	HF
SM5310B	DISSOLVED ORGANIC CARBON	mg/L	Y	86		37		740		680		690		1000		1100	
SM5310B	TOTAL ORGANIC CARBON	mg/L	N	86		34		580		1200		710		970		940	
SW6010	ALUMINUM	mg/L	N	6.6		0.95		1.5		0.3		2.9		6.8		6.5	
SW6010	ANTIMONY	ug/L	N	27	U	20	U	5.3	U	20	U	5.3	U	20	U	20	U
SW6010	ARSENIC	mg/L	N	0.059	J	0.0075	J	0.026		0.021		0.0069	J	0.026		0.019	J
SW6010	BARIUM	mg/L	N	0.36		0.13		0.02		0.0065	J	1.5		0.12		0.11	
SW6010	BERYLLIUM	mg/L	N	0.012	J	0.0039	J	0.0088		0.0015	J	0.0083		0.018		0.018	
SW6010	CADMIUM	mg/L	N	0.01	U	0.005	U	0.002	U	0.005	U	0.002	U	0.0023	J	0.0022	J
SW6010	CALCIUM	mg/L	N	7.3		2.8		31		7.4		820		20		18	
SW6010	CHROMIUM	mg/L	N	0.09		0.049		0.83		1.1		0.26		0.75		0.72	
SW6010	COBALT	mg/L	N	0.0048	U	0.01	U	0.0012	J	0.0032	J	0.00095	U	0.0036	J	0.0034	J
SW6010	COPPER	mg/L	N	0.0095	U	0.02	U	0.054		0.11		0.019	J	0.063		0.058	
SW6010	IRON	mg/L	N	14		6.4		4.5		3.1		0.45		1.2		1.2	
SW6010	LEAD	mg/L	N	0.039	J	0.01	U	0.0049	J	0.01	U	0.004	U	0.01	U	0.01	U
SW6010	MAGNESIUM	mg/L	N	0.38	J	0.73		0.098	J	0.04	J	0.073	J	0.12	J	0.11	J
SW6010	MANGANESE	mg/L	N	0.036	J	0.032		0.056		0.0072	J	0.002	U	0.0095	J	0.0095	J
SW6010	NICKEL	mg/L	N	0.012	U	0.04	U	0.069		0.14		0.036	J	0.11		0.11	
SW6010	POTASSIUM	mg/L	N	0.68	J	3		27		18		65		83		82	
SW6010	RESPIRABLE QUARTZ	ug/L	Y	170000		41000		490000		650000		3700		2600		2600	
SW6010	SELENIUM	mg/L	N	0.032	U	0.011	J,B	0.027		0.04		0.039		0.064	B	0.065	B
SW6010	SILVER	mg/L	N	0.0045	U	0.01	U	0.00089	U	0.01	U	0.0059	J	0.01	U	0.01	U
SW6010	SODIUM	mg/L	N	720		2200		13000		5200		8500		12000		12000	
SW6010	THALLIUM	mg/L	N	0.044	U	0.025	U	0.0088	U	0.025	U	0.0088	U	0.025	U	0.025	U
SW6010	VANADIUM	ug/L	N	73		16		4400		2700		1300		2700		2600	
SW6010	ZINC	ug/L	N	70	J	13	J	22		25		11	J	13	J	17	J
SW7470	MERCURY	ug/L	N	58		2.4		14		10		45		3.1		3	
SW7470	MERCURY	ug/L	Y	21													
SW9034	SULFIDE	mg/L	N	22		10	U	35		15		10	U	10	U	10	U
SW9038	SULFATE	mg/L	N	29		10	U	50	U	500	U	400		250	U	250	U
SW9056	SULFATE	mg/L	N														
SW9040	pH	S.U.	N	11		7.24	H	10.2	H	10.5	H	8.94	H	9.13	H	9.14	H
SW9056	CHLORIDE	mg/L	N														
SW9251	CHLORIDE	mg/L	N	630		560		13000		14000		14000		15000		14000	

			Location	MW-115A		MW-115A		MW-115A		MW-115B		MW-115B		MW-115C		MW-115C		MW-352A
			Field Sample ID	MW-115A-090513		MW-115A2-090513		MW-115A-030414		MW-115B-090513		MW-115B-030414		MW-115C-082713		MW-115C-022414		MW-352A-090513
			Sample Date	9/5/2013		9/5/2013		3/4/2014		9/5/2013		3/4/2014		8/27/2013		2/24/2014		9/5/2013
			SDG	680-93954-1		680-93954-1		680-99155-1		680-93954-1		680-99155-1		680-93690-1		680-98941-1		680-93954-1
			Matrix	WATER		WATER		WATER		WATER		WATER		WATER		WATER		WATER
			Sample Purpose	Regular sample		Field duplicate		Regular sample		Regular sample		Regular sample		Regular sample		Regular sample		Regular sample
			Sample Type	Ground water		Ground water		Ground water		Ground water		Ground water		Ground water		Ground water		Ground water
Method	Parameter Name	Units	Filtered															
SM2320B	ALKALINITY, BICARBONATE (AS CACO3)	mg/L	N	860		840		800		700		1300		1100		6200		430
SM2320B	ALKALINITY, CARBONATE (AS CACO3)	mg/L	N	50	U	50	U	50	U	50	U	50	U	3700		55		580
SM2320B	ALKALINITY, TOTAL	mg/L	N	870		850		800		730		1300		4900		6200		1100
SM2540C	TOTAL DISSOLVED SOLIDS (RESIDUE, FILTERABLE)	mg/L	N	4300		4200		3800		3600		3600		32000		16000		3800
SM3500-FeD	FERROUS IRON	ug/L	N	630	HF	660	HF	480	HF	1400	HF	2800	HF	1600	HF	3000	HF	13000
SM5310B	DISSOLVED ORGANIC CARBON	mg/L	Y	210		220		260		230		230		320		300		360
SM5310B	TOTAL ORGANIC CARBON	mg/L	N	220		230		230		230		220		290		310		2600
SW6010	ALUMINUM	mg/L	N	20		20		23		4		5.4		0.1	U	0.13	J	4.7
SW6010	ANTIMONY	ug/L	N	5.6	J	5.3	U	20	U	5.3	U	20	U	36		11	J	5.3
SW6010	ARSENIC	mg/L	N	0.0046	U	0.0051	J	0.014	J	0.012	J	0.019	J	0.092		0.02	U	0.055
SW6010	BARIUM	mg/L	N	0.053		0.054		0.074		0.06		0.04		0.021		0.19		0.28
SW6010	BERYLLIUM	mg/L	N	0.0031	J	0.003	J	0.0035	J	0.012		0.012		0.0017	J	0.0028	J	0.0051
SW6010	CADMIUM	mg/L	N	0.002	U	0.002	U	0.005	U	0.002	U	0.005	U	0.002	U	0.0025	J	0.0022
SW6010	CALCIUM	mg/L	N	20		19		18		15		9.1		0.87		13		9.4
SW6010	CHROMIUM	mg/L	N	0.045		0.045		0.089		0.076		0.089		0.16		0.27		0.56
SW6010	COBALT	mg/L	N	0.00095	U	0.00095	U	0.0019	J	0.00095	U	0.01	U	0.00095	U	0.01	U	0.023
SW6010	COPPER	mg/L	N	0.0019	U	0.0019	U	0.0069	J	0.004	J	0.0032	J	0.0026	J	0.013	J	0.064
SW6010	IRON	mg/L	N	0.38		0.36		1.1		0.91		2.4		0.91		4.4		12
SW6010	LEAD	mg/L	N	0.0042	J	0.0044	J	0.032		0.02		0.014		0.004	U	0.01	U	0.098
SW6010	MAGNESIUM	mg/L	N	4.1		4		3.6		2.6		4.8		0.052	J	10		0.14
SW6010	MANGANESE	mg/L	N	0.39		0.39		0.34		0.013		0.056		0.002	U	0.13		0.024
SW6010	NICKEL	mg/L	N	0.0065	J	0.0076	J	0.014	J	0.0094	J	0.0076	J	0.023	J	0.027	J	0.084
SW6010	POTASSIUM	mg/L	N	8.6		8.4		6.6		0.69	J	1		13		30		1.4
SW6010	RESPIRABLE QUARTZ	ug/L	Y	17000		17000		17000		22000		59000		1600000		59000		260000
SW6010	SELENIUM	mg/L	N	0.0075	J	0.0089	J	0.009	J	0.0064	U	0.01	J	0.034		0.02	U	0.026
SW6010	SILVER	mg/L	N	0.00089	U	0.00089	U	0.01	U	0.00089	U	0.01	U	0.034		0.0014	J	0.00089
SW6010	SODIUM	mg/L	N	1300		1300		1300		1000		1300		13000		12000		930
SW6010	THALLIUM	mg/L	N	0.0088	U	0.0088	U	0.025	U	0.0088	U	0.025	U	0.0088	U	0.025	U	0.0088
SW6010	VANADIUM	ug/L	N	110		120		150		130		140		1400		510		350
SW6010	ZINC	ug/L	N	9.2	J	8.7	U	10	J	15	J	20	U	38		11	J	150
SW7470	MERCURY	ug/L	N	5.3		4.1		0.57		5.2		0.65		62		19		300
SW7470	MERCURY	ug/L	Y															300
SW9034	SULFIDE	mg/L	N	10	U	10	U	10	U	10	U	10	U	11		40	U	10
SW9038	SULFATE	mg/L	N	120		130		110		30		100	U			1100		250
SW9056	SULFATE	mg/L	N											950				
SW9040	pH	S.U.	N	7.51	H	7.48	H	7.59	H	8.91	H	6.52	H	10.7	H	7.56	H	10.7
SW9056	CHLORIDE	mg/L	N											15000				
SW9251	CHLORIDE	mg/L	N	1600		1600		1500		1300		1200				14000		610

			Location		MW-352A		MW-352B		MW-352B		MW-353B		MW-353B		MW-357A		MW-357A	
			Field Sample ID		MW-352A-022714		MW-352B-09032013		MW-352B-022714		MW-353B-090313		MW-353B-030414		MW-357A-082813		MW-357A-030314	
			Sample Date		2/27/2014		9/3/2013		2/27/2014		9/3/2013		3/4/2014		8/28/2013		3/3/2014	
			SDG		680-99043-1		680-93870-1		680-99043-1		680-93870-1		680-99155-1		680-93799-1		680-99155-1	
			Matrix		WATER		WATER		WATER		WATER		WATER		WATER		WATER	
			Sample Purpose		Regular sample		Regular sample		Regular sample		Regular sample		Regular sample		Regular sample		Regular sample	
			Sample Type		Ground water		Ground water		Ground water		Ground water		Ground water		Ground water		Ground water	
Method	Parameter Name	Units	Filtered															
SM2320B	ALKALINITY, BICARBONATE (AS CACO3)	mg/L	N		2900		1400		1500		2600		2700		850		3700	
SM2320B	ALKALINITY, CARBONATE (AS CACO3)	mg/L	N		25	U	15000		15000		1300		1300		1100		50	U
SM2320B	ALKALINITY, TOTAL	mg/L	N		2900		17000		17000		4000		4000		2000		3700	
SM2540C	TOTAL DISSOLVED SOLIDS (RESIDUE, FILTERABLE)	mg/L	N		5400		56000		20000		34000		22000		11000		9100	
SM3500-FeD	FERROUS IRON	ug/L	N	HF	27000	HF	3000	HF	4300	HF	13000	HF	2900	HF	1300	HF	7300	HF
SM5310B	DISSOLVED ORGANIC CARBON	mg/L	Y		150		450		240		3600		1300		270		260	
SM5310B	TOTAL ORGANIC CARBON	mg/L	N		91		340		280		4400		1100		230		210	
SW6010	ALUMINUM	mg/L	N		16		1.9		1.8		27		24		7.7		1.6	
SW6010	ANTIMONY	ug/L	N	U	20	U	5.3	U	100	U	5.3	U	20	U	5.3	U	20	U
SW6010	ARSENIC	mg/L	N		0.0055	J	0.79		0.84		0.087		0.09		0.033		0.036	
SW6010	BARIUM	mg/L	N		0.078		0.21		0.25		1.1		1.1		0.053		0.11	
SW6010	BERYLLIUM	mg/L	N		0.0072		0.0015	J	0.0014	J	0.046		0.049		0.019		0.034	
SW6010	CADMIUM	mg/L	N	J	0.005	U	0.0021	J	0.025	U	0.002	U	0.002	J	0.002	U	0.005	U
SW6010	CALCIUM	mg/L	N		5		3.6		5.5		22		25		11		26	
SW6010	CHROMIUM	mg/L	N		0.24		0.053		0.087		2		1.9		0.17		0.34	
SW6010	COBALT	mg/L	N		0.0033	J	0.00095	U	0.05	U	0.0085	J	0.0087	J	0.0018	J	0.01	U
SW6010	COPPER	mg/L	N		0.018	J	0.0089	J	0.012	J	0.14		0.096		0.0058	J	0.0054	J
SW6010	IRON	mg/L	N		17		19		29		2		1.9		0.84		6.7	
SW6010	LEAD	mg/L	N		0.031		0.0068	J	0.034	J	0.016		0.014		0.0077	J	0.0056	J
SW6010	MAGNESIUM	mg/L	N	J	0.61		0.053	J	2.5	U	0.68		1		0.46	J	13	
SW6010	MANGANESE	mg/L	N		0.087		0.0045	J	0.05	U	0.1		0.069		0.04		0.079	
SW6010	NICKEL	mg/L	N		0.021	J	0.039	J	0.07	J	0.3		0.28		0.022	J	0.022	J
SW6010	POTASSIUM	mg/L	N		2.4		34		55		18		21		3.2		3.7	
SW6010	RESPIRABLE QUARTZ	ug/L	Y		85000		17000000		14000000		6400		5200		30000		110000	
SW6010	SELENIUM	mg/L	N		0.015	J	0.04		0.1		0.035		0.056	B	0.0081	J	0.011	J,B
SW6010	SILVER	mg/L	N	U	0.01	U	0.00089	U	0.05	U	0.00089	U	0.01	U	0.00089	U	0.01	U
SW6010	SODIUM	mg/L	N		1000		13000		16000		11000		11000		2200		3900	
SW6010	THALLIUM	mg/L	N	U	0.025	U	0.0088	U	0.13	U	0.0088	U	0.025	U	0.0088	U	0.025	U
SW6010	VANADIUM	ug/L	N		100		200		280		3700		3900		320		290	
SW6010	ZINC	ug/L	N		36		54		59	J	46		45		64		20	U
SW7470	MERCURY	ug/L	N		11		690		260		27		13		71		4.1	
SW7470	MERCURY	ug/L	Y															
SW9034	SULFIDE	mg/L	N	U	10	U	10	U	10	U	91		71		19		10	U
SW9038	SULFATE	mg/L	N	U	140		80		89		510		500	U	160		83	
SW9056	SULFATE	mg/L	N															
SW9040	pH	S.U.	N	H	6.81	H	11.5	H	11.6	H	9.36	H	9.42	H	10.2	H	6.75	H
SW9056	CHLORIDE	mg/L	N															
SW9251	CHLORIDE	mg/L	N		460		15000		14000		14000		12000		3200		3600	

			Location	MW-357B		MW-357B		MW-357B		MW-358B		MW-358B		MW-501A		MW-501A	
			Field Sample ID	MW-357B-082813		MW-357B-030314		MW-357BDUPLICATE-030314		MW-358B-090413		MW-358B-022814		MW-501A-082913		MW-501A-022714	
			Sample Date	8/28/2013		3/3/2014		3/3/2014		9/4/2013		2/28/2014		8/29/2013		2/27/2014	
			SDG	680-93690-1		680-99155-1		680-99155-1		680-93870-1		680-99043-1		680-93799-1		680-99043-1	
			Matrix	WATER		WATER		WATER		WATER		WATER		WATER		WATER	
			Sample Purpose	Regular sample		Regular sample		Field duplicate		Regular sample		Regular sample		Regular sample		Regular sample	
			Sample Type	Ground water		Ground water		Ground water		Ground water		Ground water		Ground water		Ground water	
Method	Parameter Name	Units	Filtered														
SM2320B	ALKALINITY, BICARBONATE (AS CACO3)	mg/L	N	630		2400		2300		1100		780		220		540	
SM2320B	ALKALINITY, CARBONATE (AS CACO3)	mg/L	N	2500		110		120		1800		1700		25	U	25	U
SM2320B	ALKALINITY, TOTAL	mg/L	N	3200		2500		2400		2900		2600		220		540	
SM2540C	TOTAL DISSOLVED SOLIDS (RESIDUE, FILTERABLE)	mg/L	N	15000		6300		6200		23000		21000		840		740	
SM3500-FeD	FERROUS IRON	ug/L	N	2100	HF	440	HF	410	HF	620	HF	1500	HF	740	HF	250	HF
SM5310B	DISSOLVED ORGANIC CARBON	mg/L	Y	280		100		100		530		540		110		42	
SM5310B	TOTAL ORGANIC CARBON	mg/L	N	290		89		91		470		500		100		42	
SW6010	ALUMINUM	mg/L	N	0.13	J	0.14	J	0.15	J	11		7.4		1.2		2.6	
SW6010	ANTIMONY	ug/L	N	5.3	U	20	U	20	U	5.3	U	20	U	5.3	U	20	U
SW6010	ARSENIC	mg/L	N	0.047		0.0095	J	0.0052	J	0.037		0.028		0.049		0.02	U
SW6010	BARIUM	mg/L	N	0.069		0.11		0.11		0.046		0.036		0.28		0.015	
SW6010	BERYLLIUM	mg/L	N	0.0047		0.0028	J	0.0029	J	0.03		0.025		0.0028	J	0.004	U
SW6010	CADMIUM	mg/L	N	0.002	U	0.005	U	0.005	U	0.002	U	0.005	U	0.002	U	0.005	U
SW6010	CALCIUM	mg/L	N	12		40		41		15		12		9.2		1.6	
SW6010	CHROMIUM	mg/L	N	0.19		0.067		0.07		1.1		0.82		0.046		0.0088	J
SW6010	COBALT	mg/L	N	0.0016	J	0.01	U	0.01	U	0.0026	J	0.0023	J	0.0018	J	0.01	U
SW6010	COPPER	mg/L	N	0.015	J	0.0033	J	0.0032	J	0.046		0.03		0.0047	J	0.02	U
SW6010	IRON	mg/L	N	1.1		0.65		0.67		1.1		0.91		11		0.5	
SW6010	LEAD	mg/L	N	0.004	J	0.01	U	0.01	U	0.0092	J	0.006	J	0.036		0.0068	J
SW6010	MAGNESIUM	mg/L	N	0.062	J	4.5		4.6		0.34	J	0.3	J	0.087	J	0.75	
SW6010	MANGANESE	mg/L	N	0.021		0.12		0.12		0.086		0.066		0.12		0.0091	J
SW6010	NICKEL	mg/L	N	0.047		0.013	J	0.012	J	0.11		0.081		0.013	J	0.04	U
SW6010	POTASSIUM	mg/L	N	4.8		8.6		9		9.1		6		4.3		2.5	
SW6010	RESPIRABLE QUARTZ	ug/L	Y	1100000		130000		130000		4800		5600		9800		6400	
SW6010	SELENIUM	mg/L	N	0.019	J	0.029	B	0.031	B	0.027		0.027		0.009	J	0.02	U
SW6010	SILVER	mg/L	N	0.0058	J	0.01	U	0.01	U	0.00089	U	0.01	U	0.00089	U	0.01	U
SW6010	SODIUM	mg/L	N	4400		2500		2600		8400		6300		2200		260	
SW6010	THALLIUM	mg/L	N	0.0088	U	0.025	U	0.025	U	0.0088	U	0.025	U	0.0088	U	0.025	U
SW6010	VANADIUM	ug/L	N	480		120		120		1800		1400		70		33	
SW6010	ZINC	ug/L	N	16	J	20	U	8.9	J	21		16	J	45		20	U
SW7470	MERCURY	ug/L	N	180		5.7		5.6		7.1		3		4.3		1.1	
SW7470	MERCURY	ug/L	Y											1.5			
SW9034	SULFIDE	mg/L	N	12		16		14	H	23		10	U	22		10	U
SW9038	SULFATE	mg/L	N			23		25		100	U	250	U	13		10	U
SW9056	SULFATE	mg/L	N	300	J												
SW9040	pH	S.U.	N	11.2	H	8.6	H	8.61	H	5.61	H	10.4	H	6.94	H	6.15	H
SW9056	CHLORIDE	mg/L	N	5500													
SW9251	CHLORIDE	mg/L	N			2600		2700		12000		12000		57		41	

			Location	MW-501B		MW-501B		MW-502A	
			Field Sample ID	MW-501B-082913		MW-501B-022714		MW-502A-082913	
			Sample Date	8/29/2013		2/27/2014		8/29/2013	
			SDG	680-93799-1		680-99043-1		680-93799-1	
			Matrix	WATER		WATER		WATER	
			Sample Purpose	Regular sample		Regular sample		Regular sample	
			Sample Type	Ground water		Ground water		Ground water	
Method	Parameter Name	Units	Filtered						
SM2320B	ALKALINITY, BICARBONATE (AS CACO3)	mg/L	N	200		7800		650	
SM2320B	ALKALINITY, CARBONATE (AS CACO3)	mg/L	N	940		37		160	
SM2320B	ALKALINITY, TOTAL	mg/L	N	1300		7900		820	
SM2540C	TOTAL DISSOLVED SOLIDS (RESIDUE, FILTERABLE)	mg/L	N	8300		14000		3200	
SM3500-FeD	FERROUS IRON	ug/L	N	8100	HF	4900	HF	2100	HF
SM5310B	DISSOLVED ORGANIC CARBON	mg/L	Y	50		34		270	
SM5310B	TOTAL ORGANIC CARBON	mg/L	N	44		34		220	
SW6010	ALUMINUM	mg/L	N	8.1		0.2	U	56	
SW6010	ANTIMONY	ug/L	N	5.3	U	7.5	J	5.3	U
SW6010	ARSENIC	mg/L	N	0.0046	U	0.015	J	0.015	J
SW6010	BARIUM	mg/L	N	0.037		0.44		0.36	
SW6010	BERYLLIUM	mg/L	N	0.00039	J	0.00062	J	0.0048	
SW6010	CADMIUM	mg/L	N	0.002	U	0.005	U	0.002	U
SW6010	CALCIUM	mg/L	N	1.6		26		9.9	
SW6010	CHROMIUM	mg/L	N	0.03		0.02		0.14	
SW6010	COBALT	mg/L	N	0.0017	J	0.01	U	0.0031	J
SW6010	COPPER	mg/L	N	0.0028	J	0.02	U	0.0032	J
SW6010	IRON	mg/L	N	1.8		23		3.7	
SW6010	LEAD	mg/L	N	0.017		0.01	U	0.038	
SW6010	MAGNESIUM	mg/L	N	0.39	J	22		0.76	
SW6010	MANGANESE	mg/L	N	0.015		0.39		0.04	
SW6010	NICKEL	mg/L	N	0.0036	J	0.0038	J	0.019	J
SW6010	POTASSIUM	mg/L	N	1.3		21		1.6	
SW6010	RESPIRABLE QUARTZ	ug/L	Y	680000		57000		85000	
SW6010	SELENIUM	mg/L	N	0.0064	U	0.022		0.0064	U
SW6010	SILVER	mg/L	N	0.00089	U	0.01	U	0.00089	U
SW6010	SODIUM	mg/L	N	230		6700		730	
SW6010	THALLIUM	mg/L	N	0.0088	U	0.025	U	0.0088	U
SW6010	VANADIUM	ug/L	N	66		25		260	
SW6010	ZINC	ug/L	N	10	J	20	U	31	
SW7470	MERCURY	ug/L	N	48		13		69	
SW7470	MERCURY	ug/L	Y					88	
SW9034	SULFIDE	mg/L	N	19		40	U	22	
SW9038	SULFATE	mg/L	N	19		6.8		100	U
SW9056	SULFATE	mg/L	N						
SW9040	pH	S.U.	N	11.3	H	7.06	H	9.7	H
SW9056	CHLORIDE	mg/L	N						
SW9251	CHLORIDE	mg/L	N	2700		5800		400	

			Location	MW-502A		MW-502B		MW-502B		MW-502B		MW-502B		MW-503B		MW-503B	
			Field Sample ID	MW-502A-022714		MW-502B-083013		MW 502B-121113		MW-502B-022714		MW-502BDUP-022714		MW-503B-090313		MW-503B-030314	
			Sample Date	2/27/2014		8/30/2013		12/11/2013		2/27/2014		2/27/2014		9/3/2013		3/3/2014	
			SDG	680-99043-1		680-93799-1		680-97103-1		680-99043-1		680-99043-1		680-93870-1		680-99155-1	
			Matrix	WATER		WATER		WATER		WATER		WATER		WATER		WATER	
			Sample Purpose	Regular sample		Regular sample		Regular sample		Regular sample		Field duplicate		Regular sample		Regular sample	
			Sample Type	Ground water		Ground water		Ground water		Ground water		Ground water		Ground water		Ground water	
Method	Parameter Name	Units	Filtered														
SM2320B	ALKALINITY, BICARBONATE (AS CACO3)	mg/L	N	2600		420				3900		4100		95		81	
SM2320B	ALKALINITY, CARBONATE (AS CACO3)	mg/L	N	25	U	670				50	U	50	U	50	U	25	U
SM2320B	ALKALINITY, TOTAL	mg/L	N	2600		1200				3900		4100		95		81	
SM2540C	TOTAL DISSOLVED SOLIDS (RESIDUE, FILTERABLE)	mg/L	N	3800		3900				5300		4800		2800		2400	
SM3500-FeD	FERROUS IRON	ug/L	N	1700	HF	4900	HF			4800	HF	3400	HF	7100	HF	4400	HF
SM5310B	DISSOLVED ORGANIC CARBON	mg/L	Y	73		320				58		66		100		84	
SM5310B	TOTAL ORGANIC CARBON	mg/L	N	70		170				70		69		120		84	
SW6010	ALUMINUM	mg/L	N	1.9		2.5				1.4		1.4		7.5		5.1	
SW6010	ANTIMONY	ug/L	N	7.5	J	5.3	U			8	J	7	J	5.3	U	20	U
SW6010	ARSENIC	mg/L	N	0.02	U	0.022				0.02	U	0.02	U	0.0046	U	0.0049	J
SW6010	BARIUM	mg/L	N	0.097		0.22				0.026		0.027		0.042		0.033	
SW6010	BERYLLIUM	mg/L	N	0.00043	J	0.015				0.0028	J	0.0029	J	0.0015	J	0.0011	J
SW6010	CADMIUM	mg/L	N	0.005	U	0.002	U			0.005	U	0.005	U	0.002	U	0.005	U
SW6010	CALCIUM	mg/L	N	28		8.9				8.2		8.3		9.2		6.7	
SW6010	CHROMIUM	mg/L	N	0.032		0.19				0.034		0.036		0.048		0.038	
SW6010	COBALT	mg/L	N	0.01	U	0.0045	J			0.01	U	0.01	U	0.00095	U	0.01	U
SW6010	COPPER	mg/L	N	0.02	U	0.0056	J			0.02	U	0.02	U	0.0023	J	0.02	U
SW6010	IRON	mg/L	N	1.9		3.5				4.7		4.8		7.7		4.9	
SW6010	LEAD	mg/L	N	0.01	U	0.022				0.01	U	0.01	U	0.004	U	0.0048	J
SW6010	MAGNESIUM	mg/L	N	5.7		0.097	J			1.7		1.8		1.8		1.2	
SW6010	MANGANESE	mg/L	N	0.12		0.0096	J			0.06		0.062		0.11		0.072	
SW6010	NICKEL	mg/L	N	0.003	J	0.024	J			0.04	U	0.04	U	0.0052	J	0.0041	J
SW6010	POTASSIUM	mg/L	N	6.5		0.98	J			5.4		5.7		9.5		6.5	
SW6010	RESPIRABLE QUARTZ	ug/L	Y	22000		65000				44000		44000		8100		5200	
SW6010	SELENIUM	mg/L	N	0.02	U	0.01	J			0.017	J	0.01	J	0.016	J	0.013	J
SW6010	SILVER	mg/L	N	0.01	U	0.00089	U			0.01	U	0.01	U	0.00089	U	0.01	U
SW6010	SODIUM	mg/L	N	1500		940				1900		2000		990		840	
SW6010	THALLIUM	mg/L	N	0.025	U	0.0088	U			0.025	U	0.025	U	0.0088	U	0.025	U
SW6010	VANADIUM	ug/L	N	46		270				50		52		89		71	
SW6010	ZINC	ug/L	N	20	U	60				10	J	20	U	8.7	U	20	U
SW7470	MERCURY	ug/L	N	2.1		120		32		4.4		4.7		4.8		0.83	
SW7470	MERCURY	ug/L	Y														
SW9034	SULFIDE	mg/L	N	40	U	18				10	U	10	U	10	U	10	U
SW9038	SULFATE	mg/L	N	5	U	370				5	U	5	U	530		420	
SW9056	SULFATE	mg/L	N														
SW9040	pH	S.U.	N	6.75	H	10.9				6.82	H	6.85	H	5.86	H	5.76	H
SW9056	CHLORIDE	mg/L	N														
SW9251	CHLORIDE	mg/L	N	550		660				650		650		1400		1100	

			Location	MW-504A		MW-504A		MW-504B		MW-504B		MW-504B	
			Field Sample ID	MW-504A-082913		MW 504 A-022514		MW-504B-082913		MW 504B-121113		MW 504 B-022514	
			Sample Date	8/29/2013		2/25/2014		8/29/2013		12/11/2013		2/25/2014	
			SDG	680-93799-1		680-98941-1		680-93799-1		680-97103-1		680-98941-1	
			Matrix	WATER		WATER		WATER		WATER		WATER	
			Sample Purpose	Regular sample		Regular sample		Regular sample		Regular sample		Regular sample	
			Sample Type	Ground water		Ground water		Ground water		Ground water		Ground water	
Method	Parameter Name	Units	Filtered										
SM2320B	ALKALINITY, BICARBONATE (AS CACO3)	mg/L	N	1200		1800		490				3700	
SM2320B	ALKALINITY, CARBONATE (AS CACO3)	mg/L	N	50	U	50	U	1200				50	U
SM2320B	ALKALINITY, TOTAL	mg/L	N	1200		1800		1800				3700	
SM2540C	TOTAL DISSOLVED SOLIDS (RESIDUE, FILTERABLE)	mg/L	N	7700		7000		11000				6700	
SM3500-FeD	FERROUS IRON	ug/L	N	16000	HF	8600	HF	4500	HF			11000	HF
SM5310B	DISSOLVED ORGANIC CARBON	mg/L	Y	700		610		440				190	
SM5310B	TOTAL ORGANIC CARBON	mg/L	N	650		620		340				200	
SW6010	ALUMINUM	mg/L	N	46		62		1.5				0.78	
SW6010	ANTIMONY	ug/L	N	5.3	U	20	U	27	U			20	U
SW6010	ARSENIC	mg/L	N	0.011	J	0.029		0.14				0.0066	J
SW6010	BARIUM	mg/L	N	0.1		0.48		0.88				0.22	
SW6010	BERYLLIUM	mg/L	N	0.0025	J	0.0043		0.013	J			0.011	
SW6010	CADMIUM	mg/L	N	0.002	U	0.005	U	0.01	U			0.005	U
SW6010	CALCIUM	mg/L	N	16		19		19				11	
SW6010	CHROMIUM	mg/L	N	0.25		0.61		0.67				0.35	
SW6010	COBALT	mg/L	N	0.00095	U	0.0036	J	0.0085	J			0.01	U
SW6010	COPPER	mg/L	N	0.0019	U	0.026		0.031	J			0.0096	J
SW6010	IRON	mg/L	N	6.9		7.7		3.9				11	
SW6010	LEAD	mg/L	N	0.0041	J	0.043		0.034	J			0.0076	J
SW6010	MAGNESIUM	mg/L	N	4.4		3.8		0.11	J			7.6	
SW6010	MANGANESE	mg/L	N	0.084		0.14		0.02	J			0.078	
SW6010	NICKEL	mg/L	N	0.012	J	0.051		0.14	J			0.028	J
SW6010	POTASSIUM	mg/L	N	5.5		5.6		0.92	J			4	
SW6010	RESPIRABLE QUARTZ	ug/L	Y	49000		61000		110000				68000	
SW6010	SELENIUM	mg/L	N	0.012	J	0.029		0.032	U			0.02	U
SW6010	SILVER	mg/L	N	0.0031	J	0.01	U	0.0045	U			0.01	U
SW6010	SODIUM	mg/L	N	1700		1800		2800				4100	
SW6010	THALLIUM	mg/L	N	0.0088	U	0.025	U	0.044	U			0.025	U
SW6010	VANADIUM	ug/L	N	590		1000		1600				300	
SW6010	ZINC	ug/L	N	13	J	28		88	J			9	J
SW7470	MERCURY	ug/L	N	66		32		320		61		7.7	
SW7470	MERCURY	ug/L	Y										
SW9034	SULFIDE	mg/L	N	10	U	10	U	35				40	U
SW9038	SULFATE	mg/L	N	250	U	130		250	U			5	U
SW9056	SULFATE	mg/L	N										
SW9040	pH	S.U.	N	7.55	H	6.31	H	11	H			6.64	H
SW9056	CHLORIDE	mg/L	N										
SW9251	CHLORIDE	mg/L	N	1700		1500		3300				4000	

			Location	MW-505A		MW-505A		MW-505B		MW-505B		MW-507B		MW-507B		MW-508B	
			Field Sample ID	MW-505A-082913		MW-505A-022514		MW-505B-082913		MW-505B-022514		MW-507B-090413		MW-507B-022814		MW-508B-090313	
			Sample Date	8/29/2013		2/25/2014		8/29/2013		2/25/2014		9/4/2013		2/28/2014		9/3/2013	
			SDG	680-93799-1		680-98941-1		680-93799-1		680-98941-1		680-93870-1		680-99043-1		680-93870-1	
			Matrix	WATER		WATER		WATER		WATER		WATER		WATER		WATER	
			Sample Purpose	Regular sample		Regular sample		Regular sample		Regular sample		Regular sample		Regular sample		Regular sample	
			Sample Type	Ground water		Ground water		Ground water		Ground water		Ground water		Ground water		Ground water	
Method	Parameter Name	Units	Filtered														
SM2320B	ALKALINITY, BICARBONATE (AS CACO3)	mg/L	N	1200		1900		1400		7700		1200		1500		1400	
SM2320B	ALKALINITY, CARBONATE (AS CACO3)	mg/L	N	92		50	U	1200		50	U	1100		900		2900	
SM2320B	ALKALINITY, TOTAL	mg/L	N	1200		1900		2600		7700		2300		2400		4300	
SM2540C	TOTAL DISSOLVED SOLIDS (RESIDUE, FILTERABLE)	mg/L	N	6900		4700		19000		17000		27000		27000		36000	
SM3500-FeD	FERROUS IRON	ug/L	N	16000	HF	5100	HF	1200	HF	17000	HF	470	HF	810	HF	8700	HF
SM5310B	DISSOLVED ORGANIC CARBON	mg/L	Y	510		260		870		550		500		540		880	
SM5310B	TOTAL ORGANIC CARBON	mg/L	N	650		220		710		660		480		530		690	
SW6010	ALUMINUM	mg/L	N	46		19		34		7.7		0.53		0.71		2.6	
SW6010	ANTIMONY	ug/L	N	5.3	U	20	U	5.3	U	20	U	5.3	U	8.4	J	7.2	J
SW6010	ARSENIC	mg/L	N	0.015	J	0.017	J	0.052		0.022		0.0054	J	0.02	U	0.053	
SW6010	BARIUM	mg/L	N	0.17		0.25		0.82		0.65		0.019		0.025		0.086	
SW6010	BERYLLIUM	mg/L	N	0.0025	J	0.0027	J	0.013		0.0095		0.012		0.018		0.022	
SW6010	CADMIUM	mg/L	N	0.002	U	0.005	U	0.002	U	0.0027	J	0.002	U	0.005	U	0.003	J
SW6010	CALCIUM	mg/L	N	16		16		12		27		3.7		4.9		6.7	
SW6010	CHROMIUM	mg/L	N	0.27		0.32		0.32		0.91		0.23		0.27		1.4	
SW6010	COBALT	mg/L	N	0.00095	U	0.00095	J	0.0014	J	0.0017	J	0.00095	U	0.0012	J	0.0044	J
SW6010	COPPER	mg/L	N	0.0031	J	0.0098	J	0.0042	J	0.028		0.0089	J	0.0088	J	0.12	
SW6010	IRON	mg/L	N	6.9		5.1		0.97		17		0.55		0.64		2.8	
SW6010	LEAD	mg/L	N	0.0052	J	0.012		0.009	J	0.0085	J	0.004	U	0.01	U	0.004	U
SW6010	MAGNESIUM	mg/L	N	4.4		2.1		0.26	J	12		0.19	J	0.36	J	0.27	J
SW6010	MANGANESE	mg/L	N	0.084		0.14		0.015		0.28		0.0059	J	0.0088	J	0.021	
SW6010	NICKEL	mg/L	N	0.014	J	0.024	J	0.033	J	0.086		0.023	J	0.025	J	0.19	
SW6010	POTASSIUM	mg/L	N	5.5		7.6		3		11		9.2		9.4		30	
SW6010	RESPIRABLE QUARTZ	ug/L	Y	49000		53000		48000		63000		38000		22000		380000	
SW6010	SELENIUM	mg/L	N	0.012	J	0.014	J	0.007	J	0.02	U	0.027		0.043		0.039	
SW6010	SILVER	mg/L	N	0.0031	J	0.01	U	0.00089	U	0.01	U	0.00089	U	0.01	U	0.00089	U
SW6010	SODIUM	mg/L	N	1700		1700		4600		8600		11000		11000		13000	
SW6010	THALLIUM	mg/L	N	0.0088	U	0.025	U	0.0088	U	0.025	U	0.0088	U	0.025	U	0.0088	U
SW6010	VANADIUM	ug/L	N	590		460		1500		1100		560		640		3800	
SW6010	ZINC	ug/L	N	13	J	20	U	23		19	J	10	J	20	U	41	
SW7470	MERCURY	ug/L	N	87		37		53		32		1.9		2.2		92	
SW7470	MERCURY	ug/L	Y														
SW9034	SULFIDE	mg/L	N	21		10	U	67		40	U	14		10	U	18	
SW9038	SULFATE	mg/L	N	55		43		370		50	U	150		12		100	U
SW9056	SULFATE	mg/L	N														
SW9040	pH	S.U.	N	9.05	H	6.43	H	9.97	H	6.85	H	9.7	H	9.59	H	10.2	H
SW9056	CHLORIDE	mg/L	N														
SW9251	CHLORIDE	mg/L	N	1700		1400		6200		7900		15000		14000		19000	

			Location	MW-508B		MW-508B		MW-510B		MW-510B		MW-511A		MW-511A		MW-511B	
			Field Sample ID	MW-508B-022814		MW-508BDUP-022814		MW-510B-090313		MW-510B-022714		MW-511A-090413		MW-511A-030414		MW-511B-090313	
			Sample Date	2/28/2014		2/28/2014		9/3/2013		2/27/2014		9/4/2013		3/4/2014		9/3/2013	
			SDG	680-99043-1		680-99043-1		680-93870-1		680-99043-1		680-93870-1		680-99155-1		680-93870-1	
			Matrix	WATER		WATER		WATER		WATER		WATER		WATER		WATER	
			Sample Purpose	Regular sample		Field duplicate		Regular sample		Regular sample		Regular sample		Regular sample		Regular sample	
			Sample Type	Ground water		Ground water		Ground water		Ground water		Ground water		Ground water		Ground water	
Method	Parameter Name	Units	Filtered														
SM2320B	ALKALINITY, BICARBONATE (AS CACO3)	mg/L	N	2000		2000		1900		2600		720		2600		430	
SM2320B	ALKALINITY, CARBONATE (AS CACO3)	mg/L	N	1600		1700		2500		2100		50	U	25	U	3000	
SM2320B	ALKALINITY, TOTAL	mg/L	N	3600		3800		4500		4700		750		2700		3700	
SM2540C	TOTAL DISSOLVED SOLIDS (RESIDUE, FILTERABLE)	mg/L	N	45000		42000		23000		25000		2400		3900		15000	
SM3500-FeD	FERROUS IRON	ug/L	N	4100	HF	8100	HF	5500	HF	3200	HF	2500	HF	2300	HF	1200	HF
SM5310B	DISSOLVED ORGANIC CARBON	mg/L	Y	1100		1100		970		1100		320		160		120	
SM5310B	TOTAL ORGANIC CARBON	mg/L	N	1100		1100		780		1100		240		140		120	
SW6010	ALUMINUM	mg/L	N	3.7		7.8		9.2		1.7		8.8		9.5		0.15	J
SW6010	ANTIMONY	ug/L	N	5.9	J	20	U	5.3	U	20	U	5.3	U	20	U	5.3	U
SW6010	ARSENIC	mg/L	N	0.021		0.052		0.14		0.074		0.014	J	0.01	J	0.11	
SW6010	BARIUM	mg/L	N	0.11		0.21		0.32		0.2		0.025		0.018		0.092	
SW6010	BERYLLIUM	mg/L	N	0.031		0.057		0.043		0.014		0.016		0.0097		0.0016	J
SW6010	CADMIUM	mg/L	N	0.005	U	0.0021	J	0.002	U	0.005	U	0.002	U	0.005	U	0.002	U
SW6010	CALCIUM	mg/L	N	5.4		10		25		21		4.3		3.3		5.4	
SW6010	CHROMIUM	mg/L	N	1.2		2.2		0.71		1		0.1		0.053		0.07	
SW6010	COBALT	mg/L	N	0.0043	J	0.0075	J	0.0023	J	0.0037	J	0.0021	J	0.01	U	0.0036	J
SW6010	COPPER	mg/L	N	0.064		0.13		0.038		0.053		0.0057	J	0.0031	J	0.014	J
SW6010	IRON	mg/L	N	1.3		2.4		6.1		2		4		3.1		1.4	
SW6010	LEAD	mg/L	N	0.01	U	0.0055	J	0.014		0.0045	J	0.029		0.011		0.0066	J
SW6010	MAGNESIUM	mg/L	N	0.27	J	0.49	J	2.9		6.4		1.8		1.8		0.03	J
SW6010	MANGANESE	mg/L	N	0.017		0.035		0.2		0.038		0.013		0.022		0.0085	J
SW6010	NICKEL	mg/L	N	0.16		0.3		0.091		0.15		0.01	J	0.003	J	0.037	J
SW6010	POTASSIUM	mg/L	N	17		43		32		17		3.4		9.7		7.7	
SW6010	RESPIRABLE QUARTZ	ug/L	Y	11000		11000		1600000		380000		64000		61000		2500000	
SW6010	SELENIUM	mg/L	N	0.029		0.066		0.033		0.036		0.0064	U	0.0088	J,B	0.016	J
SW6010	SILVER	mg/L	N	0.01	U	0.01	U	0.00089	U	0.01	U	0.00089	U	0.01	U	0.00089	U
SW6010	SODIUM	mg/L	N	6100		13000		9000		5500		740		1400		4400	
SW6010	THALLIUM	mg/L	N	0.025	U	0.025	U	0.0088	U	0.025	U	0.0088	U	0.025	U	0.0088	U
SW6010	VANADIUM	ug/L	N	2400		4500		2100		2100		100		80		230	
SW6010	ZINC	ug/L	N	19	J	36		30		29		22		12	J	21	
SW7470	MERCURY	ug/L	N	40		35		97		72		3.9		0.28		160	
SW7470	MERCURY	ug/L	Y									3.5					
SW9034	SULFIDE	mg/L	N	59		61		10	U	10	U	10	U	10	U	10	U
SW9038	SULFATE	mg/L	N	1300		1300		50	U	250	U	260		50	U	18	
SW9056	SULFATE	mg/L	N														
SW9040	pH	S.U.	N	9.69	H	9.7	H	10.3	H	9.74	H	5.69	H	6.95	H	11.5	H
SW9056	CHLORIDE	mg/L	N														
SW9251	CHLORIDE	mg/L	N	16000		18000		9500		9000		410		320		6400	

			Location	MW-511B		MW-511B		MW-512A		MW-512A		MW-512B		MW-512B		MW-513A		MW-513A
			Field Sample ID	MW-511B2-090313		MW-511B-030414		MW-512A-082713		MW-512A-022714		MW-512B-082713		MW-512B-022714		MW-513A-082713		MW-513A-022514
			Sample Date	9/3/2013		3/4/2014		8/27/2013		2/27/2014		8/27/2013		2/27/2014		8/27/2013		2/25/2014
			SDG	680-93870-1		680-99155-1		680-93690-1		680-99043-1		680-93690-1		680-99043-1		680-93690-1		680-98941-1
			Matrix	WATER		WATER		WATER		WATER		WATER		WATER		WATER		WATER
			Sample Purpose	Field duplicate		Regular sample		Regular sample		Regular sample		Regular sample		Regular sample		Regular sample		Regular sample
			Sample Type	Ground water		Ground water		Ground water		Ground water		Ground water		Ground water		Ground water		Ground water
Method	Parameter Name	Units	Filtered															
SM2320B	ALKALINITY, BICARBONATE (AS CACO3)	mg/L	N	410		3400		390		1500		300		7400		750		1200
SM2320B	ALKALINITY, CARBONATE (AS CACO3)	mg/L	N	2900		2800		370		50	U	2300		59		25	U	50
SM2320B	ALKALINITY, TOTAL	mg/L	N	3700		6200		780		1500		2800		7500		760		1200
SM2540C	TOTAL DISSOLVED SOLIDS (RESIDUE, FILTERABLE)	mg/L	N	14000		15000		1800		2400		9600		12000		3600		3600
SM3500-FeD	FERROUS IRON	ug/L	N	980	HF	410	HF	3400	HF	2400	HF	1300	HF	1400	HF	20000	HF	22000
SM5310B	DISSOLVED ORGANIC CARBON	mg/L	Y	120		110		82		65		130		150		340		300
SM5310B	TOTAL ORGANIC CARBON	mg/L	N	120		83		86		66		140		91		410		270
SW6010	ALUMINUM	mg/L	N	0.16	J	0.2	U	7.6		17		0.25		0.2	U	56		45
SW6010	ANTIMONY	ug/L	N	5.3	U	20	U	5.3	U	20	U	5.3	U	6.5	J	5.3	U	20
SW6010	ARSENIC	mg/L	N	0.11		0.038		0.011	J	0.015	J	0.043		0.015	J	0.038		0.04
SW6010	BARIUM	mg/L	N	0.093		0.062		0.02		0.043		0.12		0.12		0.23		0.19
SW6010	BERYLLIUM	mg/L	N	0.0016	J	0.00068	J	0.0053		0.0053		0.0018	J	0.0024	J	0.0021	J	0.003
SW6010	CADMIUM	mg/L	N	0.002	U	0.005	U	0.002	U	0.005	U	0.002	U	0.005	U	0.002	U	0.005
SW6010	CALCIUM	mg/L	N	5.4		4.7		4.9		6.9		8.2		46		4		3.9
SW6010	CHROMIUM	mg/L	N	0.069		0.063		0.055		0.093		0.071		0.12		0.15		0.17
SW6010	COBALT	mg/L	N	0.0033	J	0.01	U	0.0011	J	0.0021	J	0.0045	J	0.01	U	0.0023	J	0.0035
SW6010	COPPER	mg/L	N	0.016	J	0.0058	J	0.0019	U	0.0037	J	0.011	J	0.0079	J	0.0098	J	0.021
SW6010	IRON	mg/L	N	1.4		0.61		5.6		9.5		1.2		1.6		32		25
SW6010	LEAD	mg/L	N	0.0074	J	0.01	U	0.0065	J	0.019		0.014		0.01	U	0.12		0.14
SW6010	MAGNESIUM	mg/L	N	0.027	J	0.56		1.5		3		0.014	J	23		0.42	J	0.72
SW6010	MANGANESE	mg/L	N	0.0089	J	0.0029	J	0.03		0.049		0.01		0.028		0.024		0.048
SW6010	NICKEL	mg/L	N	0.037	J	0.029	J	0.006	J	0.0097	J	0.03	J	0.025	J	0.012	J	0.017
SW6010	POTASSIUM	mg/L	N	9		15		2.1		3.9		3.2		26		1.4		2.4
SW6010	RESPIRABLE QUARTZ	ug/L	Y	2500000		820000		160000		100000		1800000		62000		55000		40000
SW6010	SELENIUM	mg/L	N	0.012	J	0.024	B	0.0064	U	0.0081	J	0.0064	U	0.026		0.0087	J	0.014
SW6010	SILVER	mg/L	N	0.00089	U	0.01	U	0.00089	U	0.01	U	0.00089	U	0.01	U	0.00089	U	0.01
SW6010	SODIUM	mg/L	N	4600		7100		500		840		2000		6200		760		960
SW6010	THALLIUM	mg/L	N	0.0088	U	0.025	U	0.0088	U	0.025	U	0.0088	U	0.025	U	0.0088	U	0.025
SW6010	VANADIUM	ug/L	N	230		240		71		85		160		200		350		300
SW6010	ZINC	ug/L	N	21		10	J	29		42		17	J	13	J	50		42
SW7470	MERCURY	ug/L	N	160		82		0.8		0.2	U	85		30		82		32
SW7470	MERCURY	ug/L	Y					0.63		0.095	J							
SW9034	SULFIDE	mg/L	N	10	U	10	U	14		10	U	10	U	40	U	11		10
SW9038	SULFATE	mg/L	N	19		100				22				6.9				47
SW9056	SULFATE	mg/L	N					44				160				39		
SW9040	pH	S.U.	N	11.5	H	9.84	H	10.2	H	8.62	H	11.4	H	7.21	H	7.54	H	6.31
SW9056	CHLORIDE	mg/L	N					120				3400				510		
SW9251	CHLORIDE	mg/L	N	6300		6200				110				5100				640

			Location		MW-513B		MW-513B		MW-513B		MW-514A		MW-514A		MW-514A		MW-514B	
			Field Sample ID		MW-513B-082713		MW-513B2-082713		MW-513B-022514		MW-514A-082813		MW 514A-121113		MW-514A-022814		MW-514B-082813	
			Sample Date		8/27/2013		8/27/2013		2/25/2014		8/28/2013		12/11/2013		2/28/2014		8/28/2013	
			SDG		680-93690-1		680-93690-1		680-98941-1		680-93690-1		680-97103-1		680-99043-1		680-93690-1	
			Matrix		WATER		WATER		WATER		WATER		WATER		WATER		WATER	
			Sample Purpose		Regular sample		Field duplicate		Regular sample		Regular sample		Regular sample		Regular sample		Regular sample	
			Sample Type		Ground water		Ground water		Ground water		Ground water		Ground water		Ground water		Ground water	
Method	Parameter Name	Units	Filtered															
SM2320B	ALKALINITY, BICARBONATE (AS CACO3)	mg/L	N		380		380		4900		250				2700		240	
SM2320B	ALKALINITY, CARBONATE (AS CACO3)	mg/L	N	U	1600		1600		50	U	990				25	U	1100	
SM2320B	ALKALINITY, TOTAL	mg/L	N		2100		2100		4900		1300				2700		1500	
SM2540C	TOTAL DISSOLVED SOLIDS (RESIDUE, FILTERABLE)	mg/L	N		6700		6900		11000		2500				3700		5300	
SM3500-FeD	FERROUS IRON	ug/L	N	HF	6600	HF	6700	HF	17000	HF	760	HF			2800	HF	2100	HF
SM5310B	DISSOLVED ORGANIC CARBON	mg/L	Y		250		250		220		49				33		35	
SM5310B	TOTAL ORGANIC CARBON	mg/L	N		250		250		210		50				33		35	
SW6010	ALUMINUM	mg/L	N		9.1		11		3.1		1.1				0.4		4.4	
SW6010	ANTIMONY	ug/L	N	U	5.3	U	5.3	U	20	U	5.3	U			20	U	5.3	U
SW6010	ARSENIC	mg/L	N		0.082		0.086		0.019	J	0.013	J			0.0065	J	0.042	
SW6010	BARIUM	mg/L	N		0.36		0.38		0.22		0.058				0.025		0.23	
SW6010	BERYLLIUM	mg/L	N	J	0.012		0.013		0.017		0.00064	J			0.00049	J	0.0023	J
SW6010	CADMIUM	mg/L	N	U	0.002	U	0.002	U	0.005	U	0.002	U			0.005	U	0.002	U
SW6010	CALCIUM	mg/L	N		16		17		22		2.7				8.8		7.4	
SW6010	CHROMIUM	mg/L	N		0.25		0.28		0.27		0.012				0.017		0.045	
SW6010	COBALT	mg/L	N	J	0.012		0.014		0.0021	J	0.00095	U			0.01	U	0.0064	J
SW6010	COPPER	mg/L	N		0.029		0.036		0.019	J	0.0035	J			0.0027	J	0.011	J
SW6010	IRON	mg/L	N		10		12		19		1.2				5.9		5.1	
SW6010	LEAD	mg/L	N		0.057		0.059		0.017		0.012				0.0049	J	0.042	
SW6010	MAGNESIUM	mg/L	N		0.99		1.1		7.2		0.14	J			2.2		0.61	
SW6010	MANGANESE	mg/L	N		0.13		0.13		0.35		0.0087	J			0.094		0.039	
SW6010	NICKEL	mg/L	N	J	0.064		0.069		0.041		0.0063	J			0.04	U	0.02	J
SW6010	POTASSIUM	mg/L	N		4.2		4.6		10		1.2				1.8		7.6	
SW6010	RESPIRABLE QUARTZ	ug/L	Y		750000		810000		220000		610000				100000		960000	
SW6010	SELENIUM	mg/L	N	J	0.0083	J	0.0067	J	0.02	U	0.0082	J			0.011	J	0.0064	U
SW6010	SILVER	mg/L	N	U	0.00089	U	0.00089	U	0.01	U	0.0013	J			0.01	U	0.00089	U
SW6010	SODIUM	mg/L	N		1900		2000		2500		860				1700		1600	
SW6010	THALLIUM	mg/L	N	U	0.0088	U	0.0088	U	0.025	U	0.0088	U			0.025	U	0.0088	U
SW6010	VANADIUM	ug/L	N		530		560		450		44				23		84	
SW6010	ZINC	ug/L	N		64		71		23		10	J			20	U	39	
SW7470	MERCURY	ug/L	N		12		14		11		350		120		47		40	
SW7470	MERCURY	ug/L	Y															
SW9034	SULFIDE	mg/L	N	U	11		19		10	U	10	U			10	U	10	U
SW9038	SULFATE	mg/L	N						5	U					7.5			
SW9056	SULFATE	mg/L	N		42		42				250	U					250	U
SW9040	pH	S.U.	N	H	11.1	H	11.1	H	6.94	H	11.4	H			7.18	H	11.3	H
SW9056	CHLORIDE	mg/L	N		1500		1500				310	J					1600	
SW9251	CHLORIDE	mg/L	N						1900						320			

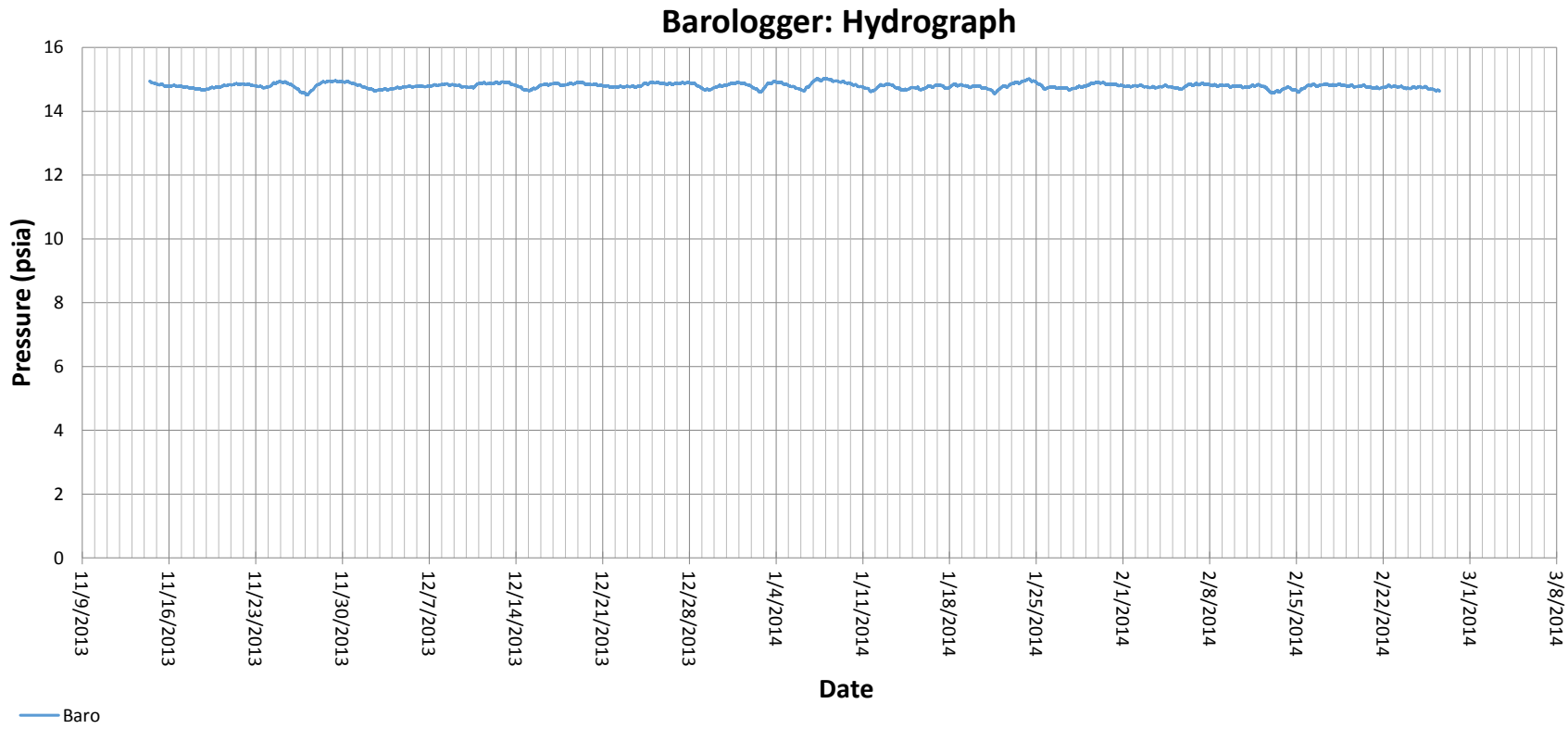
			Location	MW-514B		MW-515B		MW-515B		MW-516A		MW-516A		MW-516B		MW-516B		MW-517A	
			Field Sample ID	MW-514B-022814		MW-515B-090313		MW-515B-022514		MW-516A-082813		MW 516 A-022514		MW-516B-082813		MW 516 B-022514		MW-517A-090513	
			Sample Date	2/28/2014		9/3/2013		2/25/2014		8/28/2013		2/25/2014		8/28/2013		2/25/2014		9/5/2013	
			SDG	680-99043-1		680-93870-1		680-98941-1		680-93690-1		680-98941-1		680-93690-1		680-98941-1		680-93954-1	
			Matrix	WATER		WATER		WATER		WATER		WATER		WATER		WATER		WATER	
			Sample Purpose	Regular sample		Regular sample		Regular sample		Regular sample		Regular sample		Regular sample		Regular sample		Regular sample	
			Sample Type	Ground water		Ground water		Ground water		Ground water		Ground water		Ground water		Ground water		Ground water	
Method	Parameter Name	Units	Filtered																
SM2320B	ALKALINITY, BICARBONATE (AS CACO3)	mg/L	N	1800		950		3300		740		2400		520		960		930	
SM2320B	ALKALINITY, CARBONATE (AS CACO3)	mg/L	N	25	U	1600		280		910		50	U	3700		3300		100	
SM2320B	ALKALINITY, TOTAL	mg/L	N	1800		2600		3600		1700		2400		4400		4500		1000	
SM2540C	TOTAL DISSOLVED SOLIDS (RESIDUE, FILTERABLE)	mg/L	N	4200		12000		9300		6700		6100		25000		16000		3900	
SM3500-FeD	FERROUS IRON	ug/L	N	27000	HF	1800	HF	4500	HF	1900	HF	3000	HF	1400	HF	960	HF	3000	HF
SM5310B	DISSOLVED ORGANIC CARBON	mg/L	Y	29		290		360		210		190		230		240		200	
SM5310B	TOTAL ORGANIC CARBON	mg/L	N	29		360		310		230		170		240		200		200	
SW6010	ALUMINUM	mg/L	N	0.36		0.47		0.56		0.91		3.1		0.1	U	0.16	J	0.6	
SW6010	ANTIMONY	ug/L	N	5.6	J	5.3	U	20	U	5.3	U	20	U	5.3	U	20	U	5.3	U
SW6010	ARSENIC	mg/L	N	0.02	U	0.048		0.039		0.027		0.034		0.056		0.019	J	0.019	J
SW6010	BARIUM	mg/L	N	0.02		0.067		0.042		0.087		0.13		0.0043	J	0.01	U	0.18	
SW6010	BERYLLIUM	mg/L	N	0.00081	J	0.0089		0.017		0.024		0.02		0.0011	J	0.0011	J	0.02	
SW6010	CADMIUM	mg/L	N	0.005	U	0.002	U	0.005	U	0.002	U	0.005	U	0.002	U	0.0022	J	0.002	U
SW6010	CALCIUM	mg/L	N	12		13		17		5.6		20		2.8		2.9		12	
SW6010	CHROMIUM	mg/L	N	0.032		0.27		0.31		0.062		0.15		0.19		0.18		0.048	
SW6010	COBALT	mg/L	N	0.01	U	0.0023	J	0.01	U	0.00095	U	0.01	U	0.0011	J	0.01	U	0.00095	U
SW6010	COPPER	mg/L	N	0.02	U	0.018	J	0.018	J	0.0019	U	0.0038	J	0.046		0.044		0.0019	U
SW6010	IRON	mg/L	N	36		1.7		3.3		0.67		2.9		1.2		1.1		2.4	
SW6010	LEAD	mg/L	N	0.01	U	0.014		0.014		0.0076	J	0.017		0.004	U	0.0059	J	0.004	U
SW6010	MAGNESIUM	mg/L	N	3.7		0.029	J	2		0.22	J	6.5		0.026	J	0.02	J	2	
SW6010	MANGANESE	mg/L	N	0.78		0.02		0.11		0.013		0.064		0.002	U	0.01	U	0.03	
SW6010	NICKEL	mg/L	N	0.04	U	0.054		0.049		0.011	J	0.014	J	0.055		0.053		0.0065	J
SW6010	POTASSIUM	mg/L	N	5.5		8.4		11		1.4		2.3		40		32		1.3	
SW6010	RESPIRABLE QUARTZ	ug/L	Y	150000		800000		180000		16000		51000		1400000		1400000		27000	
SW6010	SELENIUM	mg/L	N	0.02	U	0.0099	J	0.02	U	0.0081	J	0.013	J	0.022		0.01	J	0.0064	U
SW6010	SILVER	mg/L	N	0.01	U	0.00089	U	0.01	U	0.00089	U	0.01	U	0.026		0.001	J	0.00089	U
SW6010	SODIUM	mg/L	N	1300		3800		4200		2400		2300		9000		8400		1700	
SW6010	THALLIUM	mg/L	N	0.025	U	0.0088	U	0.025	U	0.0088	U	0.025	U	0.0088	U	0.025	U	0.0088	U
SW6010	VANADIUM	ug/L	N	23		420		420		370		290		900		870		270	
SW6010	ZINC	ug/L	N	20	U	18	J	12	J	12	J	12	J	19	J	26		8.7	U
SW7470	MERCURY	ug/L	N	4.1		30		10		16		84		34		37		73	
SW7470	MERCURY	ug/L	Y																
SW9034	SULFIDE	mg/L	N	10	U	16		10	U	11		10	U	16		10	U	10	U
SW9038	SULFATE	mg/L	N	18		65		25	U			42				430		64	
SW9056	SULFATE	mg/L	N							52				790					
SW9040	pH	S.U.	N	6.75	H	10.3	H	8.81	H	10.2	H	6.44	H	11.3	H	11.2	H	9.11	H
SW9056	CHLORIDE	mg/L	N							2300				13000					
SW9251	CHLORIDE	mg/L	N	1100		4900		4400				2300				11000		2200	

			Location	MW-517A		MW-517A		MW-517B		MW-517B		MW-517B		MW-518A		MW-518A	
			Field Sample ID	MW 517A-121213		MW-517-A-022514		MW-517B-082613		MW-517B2-082613		MW-517-B-022514		MW-518A-082813		MW-518A2-082813	
			Sample Date	12/12/2013		2/25/2014		8/26/2013		8/26/2013		2/25/2014		8/28/2013		8/28/2013	
			SDG	680-97103-1		680-98941-1		680-93690-1		680-93690-1		680-98941-1		680-93690-1		680-93690-1	
			Matrix	WATER		WATER		WATER		WATER		WATER		WATER		WATER	
			Sample Purpose	Regular sample		Regular sample		Regular sample		Field duplicate		Regular sample		Regular sample		Field duplicate	
			Sample Type	Ground water		Ground water		Ground water		Ground water		Ground water		Ground water		Ground water	
Method	Parameter Name	Units	Filtered														
SM2320B	ALKALINITY, BICARBONATE (AS CACO3)	mg/L	N			1900		1600		1400		5000		4400		4400	
SM2320B	ALKALINITY, CARBONATE (AS CACO3)	mg/L	N			50	U	1500		1800		50	U	7000		6900	
SM2320B	ALKALINITY, TOTAL	mg/L	N			1900		3200		3300		5100		11000		11000	
SM2540C	TOTAL DISSOLVED SOLIDS (RESIDUE, FILTERABLE)	mg/L	N			4800		14000		13000		13000		5900		7200	
SM3500-FeD	FERROUS IRON	ug/L	N			6300	HF	2300	HF	2600	HF	7900	HF	690	HF	860	HF
SM5310B	DISSOLVED ORGANIC CARBON	mg/L	Y			160		250	B	290		240		230		230	
SM5310B	TOTAL ORGANIC CARBON	mg/L	N			140		260		260		330		240		230	
SW6010	ALUMINUM	mg/L	N			2		0.1	U	0.11	J	0.16	J	11		12	
SW6010	ANTIMONY	ug/L	N			20	U	5.3	U	5.3	U	20	U	5.3	U	5.3	U
SW6010	ARSENIC	mg/L	N			0.018	J	0.038		0.045		0.02	U	0.025		0.03	
SW6010	BARIUM	mg/L	N			0.13		0.043		0.042		0.026		0.046		0.046	
SW6010	BERYLLIUM	mg/L	N			0.0098		0.0047		0.0051		0.0047		0.017		0.017	
SW6010	CADMIUM	mg/L	N			0.005	U	0.002	U	0.002	U	0.0023	J	0.002	U	0.002	U
SW6010	CALCIUM	mg/L	N			16		13		13		24		7		7.1	
SW6010	CHROMIUM	mg/L	N			0.12		0.16		0.36		0.42		0.22		0.22	
SW6010	COBALT	mg/L	N			0.01	U	0.00095	U	0.0017	J	0.01	U	0.0043	J	0.0039	J
SW6010	COPPER	mg/L	N			0.0019	J	0.0019	U	0.02		0.017	J	0.011	J	0.011	J
SW6010	IRON	mg/L	N			6.7		1.3		1.6		9.4		0.69		0.64	
SW6010	LEAD	mg/L	N			0.02		0.0069	J	0.011		0.01	U	0.024		0.024	
SW6010	MAGNESIUM	mg/L	N			5		1		1		28		0.16	J	0.16	J
SW6010	MANGANESE	mg/L	N			0.075		0.03		0.03		0.2		0.025		0.025	
SW6010	NICKEL	mg/L	N			0.0078	J	0.025	J	0.064		0.035	J	0.032	J	0.032	J
SW6010	POTASSIUM	mg/L	N			2		11		11		34		2.8		2.8	
SW6010	RESPIRABLE QUARTZ	ug/L	Y			59000		350000		370000		69000		15000		15000	
SW6010	SELENIUM	mg/L	N			0.015	J	0.01	J	0.02		0.02	U	0.018	J	0.018	J
SW6010	SILVER	mg/L	N			0.01	U	0.0035	J	0.0032	J	0.01	U	0.0014	J	0.0014	J
SW6010	SODIUM	mg/L	N			2000		5700		5500		6900		2500		2600	
SW6010	THALLIUM	mg/L	N			0.025	U	0.0088	U	0.0088	U	0.025	U	0.0088	U	0.0088	U
SW6010	VANADIUM	ug/L	N			170		680		790		620		270		270	
SW6010	ZINC	ug/L	N			20	U	15	J	20		9.1	J	8.7	U	9.6	J
SW7470	MERCURY	ug/L	N	3.4		36		92		35		14		16		17	
SW7470	MERCURY	ug/L	Y														
SW9034	SULFIDE	mg/L	N			10	U	26		26		40	U	17		17	
SW9038	SULFATE	mg/L	N			26						5	U				
SW9056	SULFATE	mg/L	N					370		330				49		25	
SW9040	pH	S.U.	N			6.38	H	9.96	H	9.94	H	6.72	H	10.3	H	10.3	H
SW9056	CHLORIDE	mg/L	N					6100		6000				2400		2300	
SW9251	CHLORIDE	mg/L	N			1900						6900					

			Location	MW-518A		MW-518B		MW-518B		MW-518B		MW-519A		MW-519A		MW-519B		MW-519B	
			Field Sample ID	MW-518A-030314		MW-518B-082813		MW 518B-121113		MW-518B-030314		MW-519A-082713		MW-519A-022414		MW-519B-082713		MW-519B-022414	
			Sample Date	3/3/2014		8/28/2013		12/11/2013		3/3/2014		8/27/2013		2/24/2014		8/27/2013		2/24/2014	
			SDG	680-99155-1		680-93690-1		680-97103-1		680-99155-1		680-93690-1		680-98941-1		680-93690-1		680-98941-1	
			Matrix	WATER		WATER		WATER		WATER		WATER		WATER		WATER		WATER	
			Sample Purpose	Regular sample		Regular sample		Regular sample		Regular sample		Regular sample		Regular sample		Regular sample		Regular sample	
			Sample Type	Ground water		Ground water		Ground water		Ground water		Ground water		Ground water		Ground water		Ground water	
Method	Parameter Name	Units	Filtered																
SM2320B	ALKALINITY, BICARBONATE (AS CACO3)	mg/L	N	2500		800				3800		1900		1700		6000		7500	
SM2320B	ALKALINITY, CARBONATE (AS CACO3)	mg/L	N	50	U	2100				50	U	25	U	50	U	78		50	U
SM2320B	ALKALINITY, TOTAL	mg/L	N	2500		3000				3800		1900		1700		6100		7500	
SM2540C	TOTAL DISSOLVED SOLIDS (RESIDUE, FILTERABLE)	mg/L	N	6500		13000				8500		5000		3700		36000		17000	
SM3500-FeD	FERROUS IRON	ug/L	N	1100	HF	2300	HF			10000	HF	2800	HF	4100	HF	2800	HF	8000	HF
SM5310B	DISSOLVED ORGANIC CARBON	mg/L	Y	230		360				280		170		180		310		310	
SM5310B	TOTAL ORGANIC CARBON	mg/L	N	200		380				210		180		220		350		320	
SW6010	ALUMINUM	mg/L	N	9.1		0.28				0.38		1.4		1.8		0.5	U	0.15	J
SW6010	ANTIMONY	ug/L	N	20	U	5.3	U			20	U	5.3	U	20	U	27	U	20	U
SW6010	ARSENIC	mg/L	N	0.022		0.044				0.031		0.011	J	0.014	J	0.023	U	0.1	U
SW6010	BARIUM	mg/L	N	0.061		0.086				0.15		0.031		0.049		0.12		0.2	
SW6010	BERYLLIUM	mg/L	N	0.014		0.013				0.021		0.0073		0.01		0.0033	J	0.0031	J
SW6010	CADMIUM	mg/L	N	0.005	U	0.002	U			0.005	U	0.002	U	0.005	U	0.01	U	0.0038	J
SW6010	CALCIUM	mg/L	N	12		15				35		12		11		9.6		23	
SW6010	CHROMIUM	mg/L	N	0.16		0.31				0.38		0.065		0.085		0.26		0.33	
SW6010	COBALT	mg/L	N	0.0019	J	0.0015	J			0.01	U	0.00095	U	0.01	U	0.0048	U	0.01	U
SW6010	COPPER	mg/L	N	0.0061	J	0.016	J			0.0062	J	0.0019	U	0.02	U	0.0095	U	0.011	J
SW6010	IRON	mg/L	N	0.84		1.3				9.9		2.5		4.4		2.9		9.3	
SW6010	LEAD	mg/L	N	0.014		0.0077	J			0.01	U	0.004	J	0.0082	J	0.02	U	0.0063	J
SW6010	MAGNESIUM	mg/L	N	2.6		0.033	J			15		3.2		4.3		6.7		13	
SW6010	MANGANESE	mg/L	N	0.23		0.021				0.14		0.033		0.042		0.082		0.23	
SW6010	NICKEL	mg/L	N	0.021	J	0.05				0.025	J	0.0032	J	0.0043	J	0.015	J	0.014	J
SW6010	POTASSIUM	mg/L	N	3.7		5.6				6.6		1.6		1.5		44		44	
SW6010	RESPIRABLE QUARTZ	ug/L	Y	25000		370000				75000		41000		45000		61000		51000	
SW6010	SELENIUM	mg/L	N	0.021	B	0.012	J			0.015	J,B	0.0091	J	0.015	J	0.11		0.02	U
SW6010	SILVER	mg/L	N	0.01	U	0.0017	J			0.01	U	0.0027	J	0.01	U	0.0045	U	0.01	U
SW6010	SODIUM	mg/L	N	2800		5400				4500		2000		1700		17000		14000	
SW6010	THALLIUM	mg/L	N	0.025	U	0.0088	U			0.025	U	0.0088	U	0.025	U	0.044	U	0.025	U
SW6010	VANADIUM	ug/L	N	240		670				370		150		150		540		420	
SW6010	ZINC	ug/L	N	20	U	12	J			20	U	8.7	U	20	U	44	U	20	U
SW7470	MERCURY	ug/L	N	4.7		53		73		4.8		2.2		2.9		31		15	
SW7470	MERCURY	ug/L	Y																
SW9034	SULFIDE	mg/L	N	18		28				10	U	17		10	U	20	U	40	U
SW9038	SULFATE	mg/L	N	100	U					76				15				1200	
SW9056	SULFATE	mg/L	N			390						25	U			1300			
SW9040	pH	S.U.	N	7.32	H	10.7	H			6.64	H	6.72	H	6.72	H	7.66	H	6.87	H
SW9056	CHLORIDE	mg/L	N			5800						2200				19000			
SW9251	CHLORIDE	mg/L	N	2700						4700				1700				16000	

Appendix H:

Hydrographs for Observation Wells During Aquifer Testing

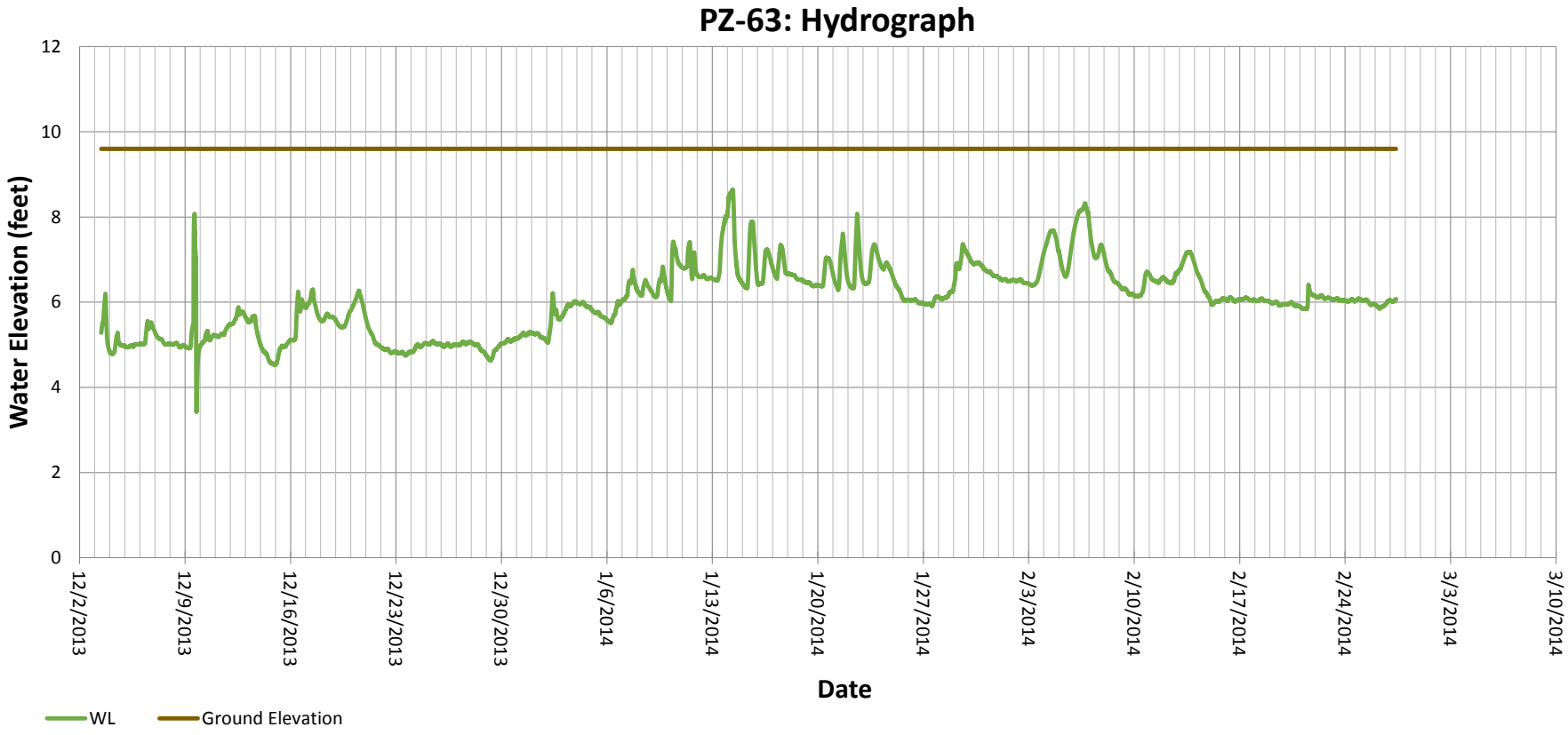


Mutch Associates, LLC
Environmental Engineers and Scientists

Barologger hydrograph.

Appendix H
H-1

LCP Chemicals Site, Brunswick, GA

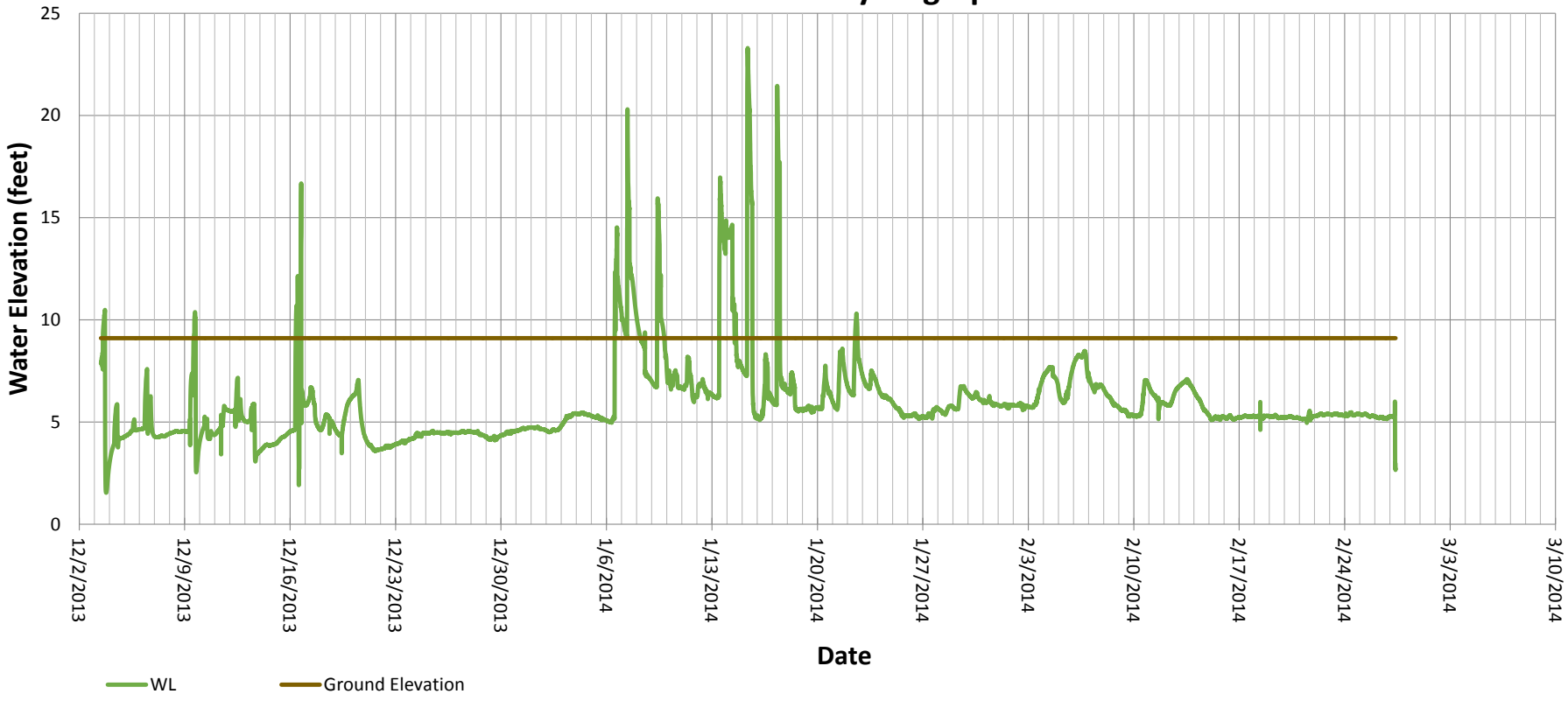


Mutch Associates, LLC
Environmental Engineers and Scientists

PZ-63 hydrograph in sparging footprint.

Appendix H
H-2

LCP Chemicals Site, Brunswick, GA



Mutch Associates, LLC
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MW-501B hydrograph in sparging footprint.

Appendix H
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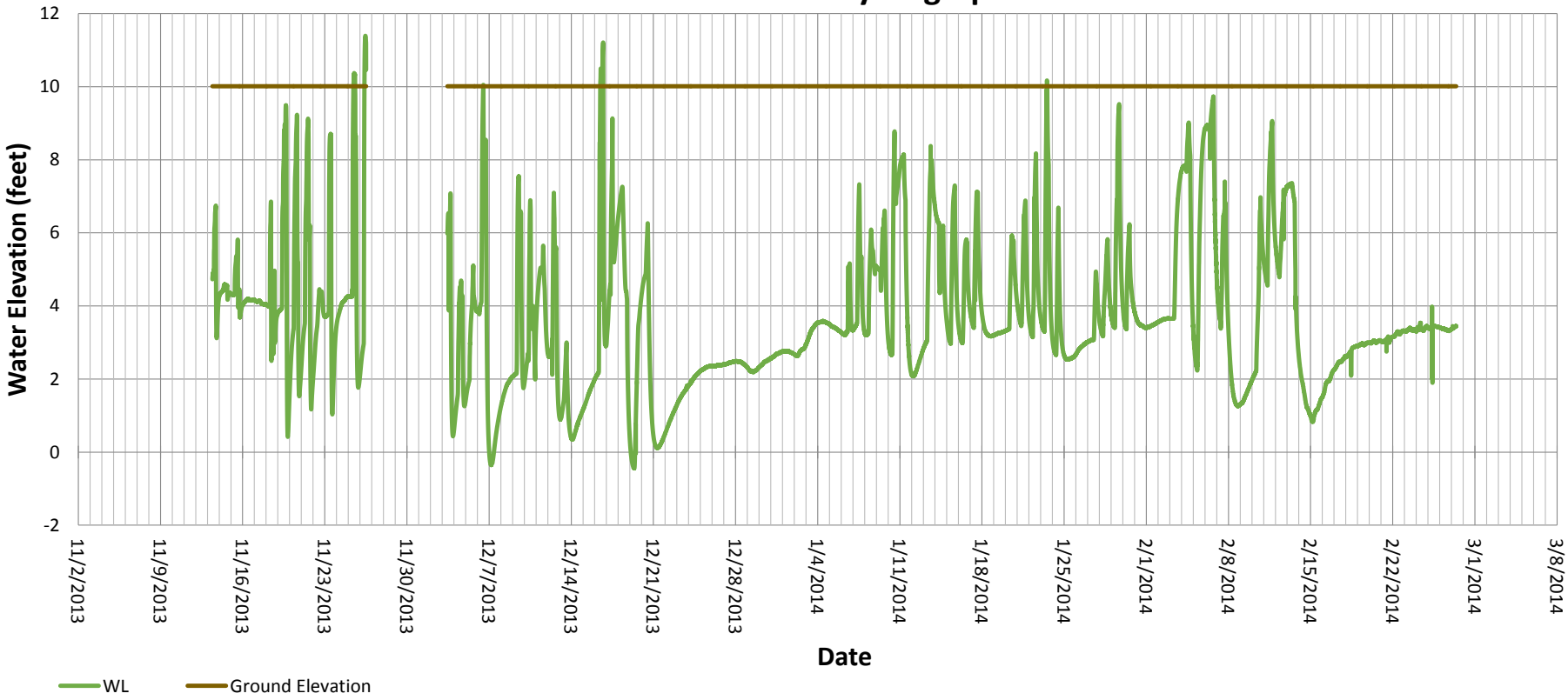
LCP Chemicals Site, Brunswick, GA



Mutch Associates, LLC
Environmental Engineers and Scientists

MW-513B hydrograph in sparging footprint.

Appendix H
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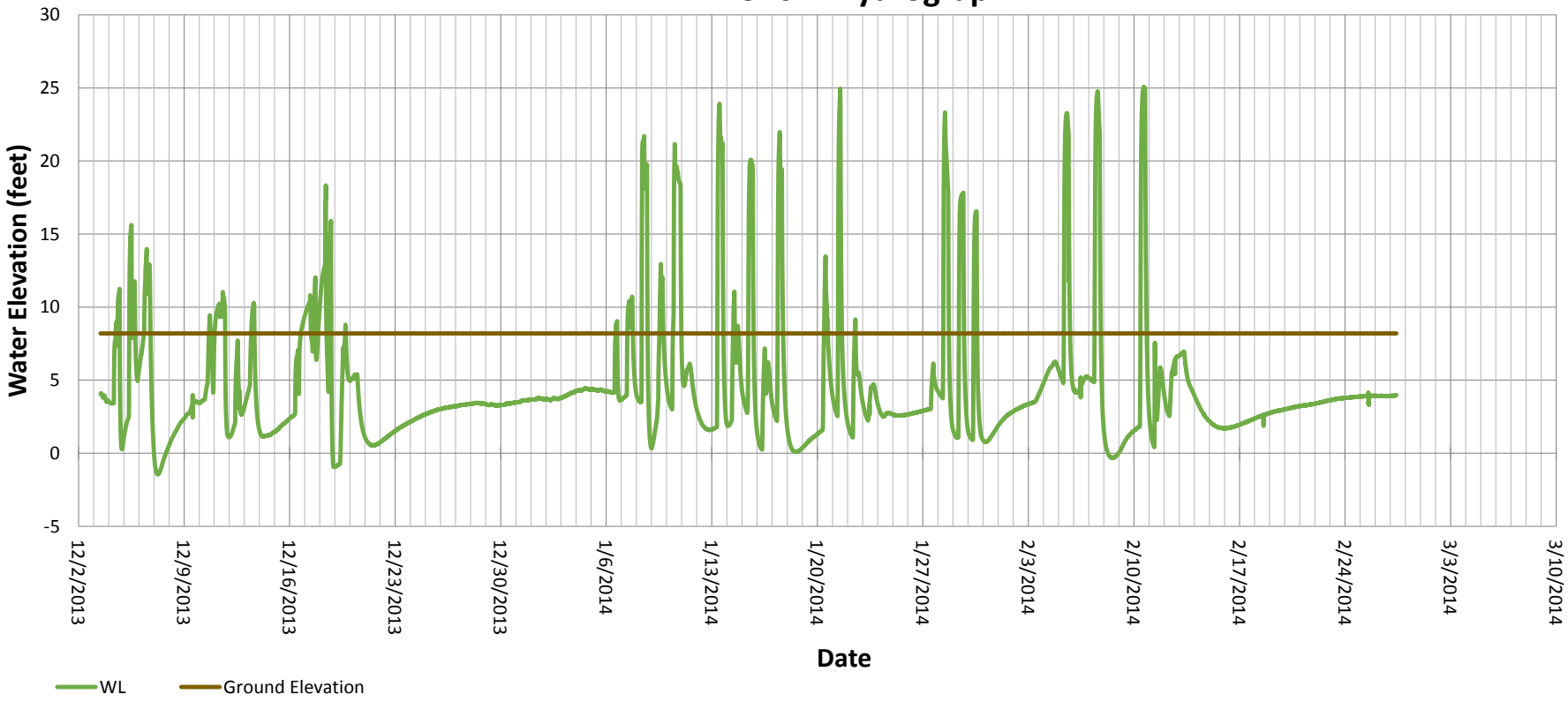
LCP Chemicals Site, Brunswick, GA



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MW-516B hydrograph in sparging footprint.

Appendix H
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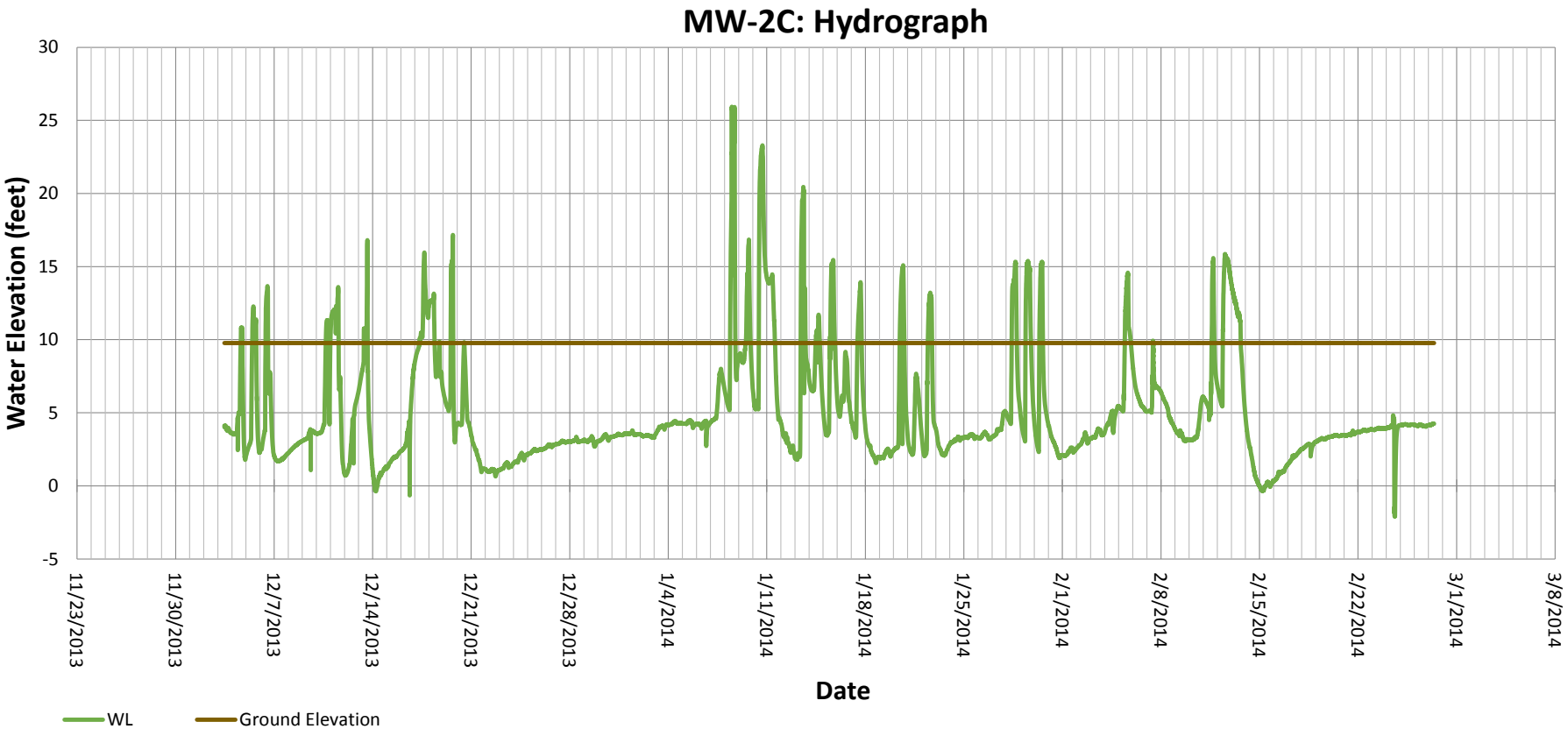
LCP Chemicals Site, Brunswick, GA



MW-2C hydrograph in sparging footprint.

Appendix H
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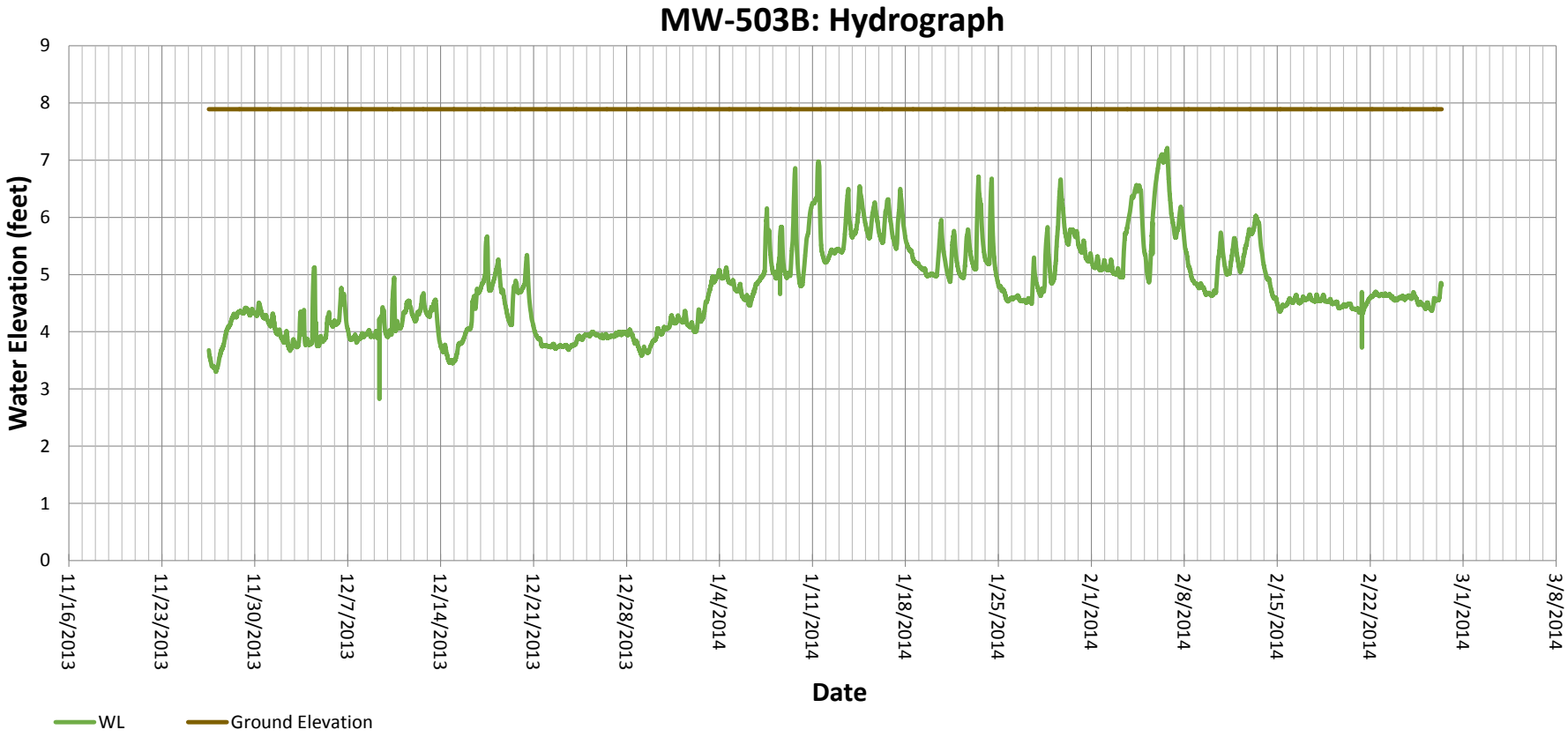
LCP Chemicals Site, Brunswick, GA



Mutch Associates, LLC
Environmental Engineers and Scientists

MW-503B hydrograph west of sparging footprint.

Appendix H
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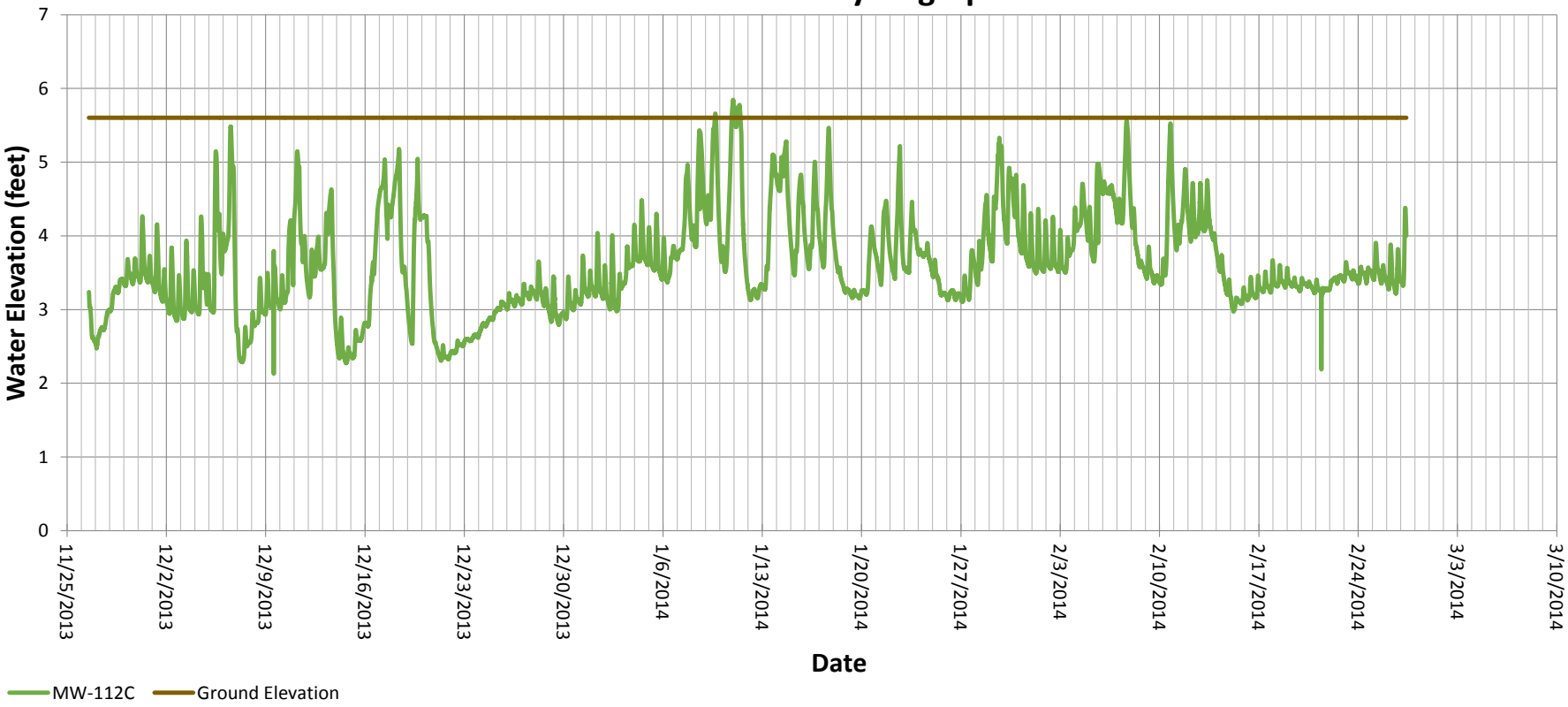
LCP Chemicals Site, Brunswick, GA



Mutch Associates, LLC
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MW-112C hydrograph west of sparging footprint.

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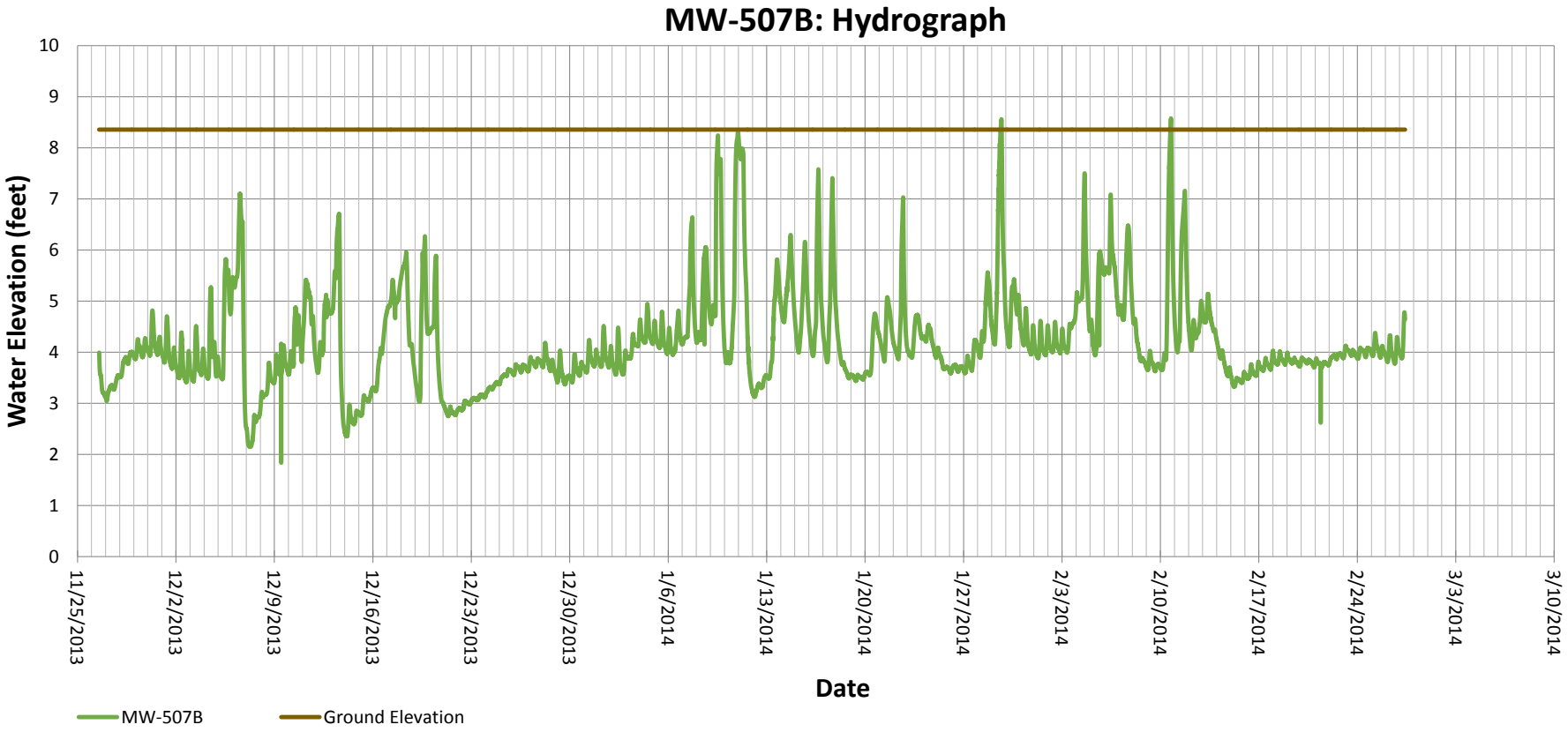
LCP Chemicals Site, Brunswick, GA



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MW-507B hydrograph west of sparging footprint.

Appendix H
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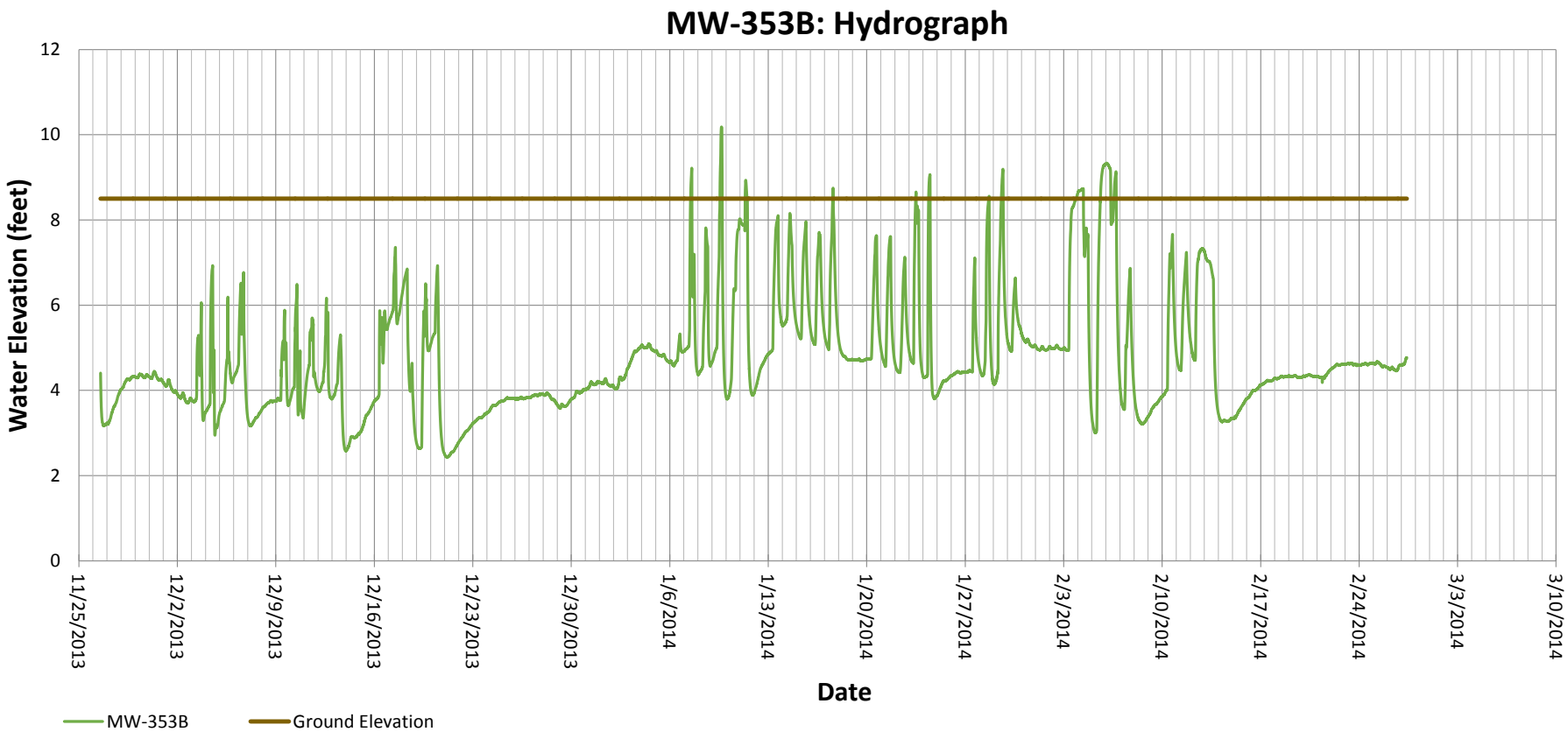
LCP Chemicals Site, Brunswick, GA



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MW-353B hydrograph west of sparging footprint.

Appendix H
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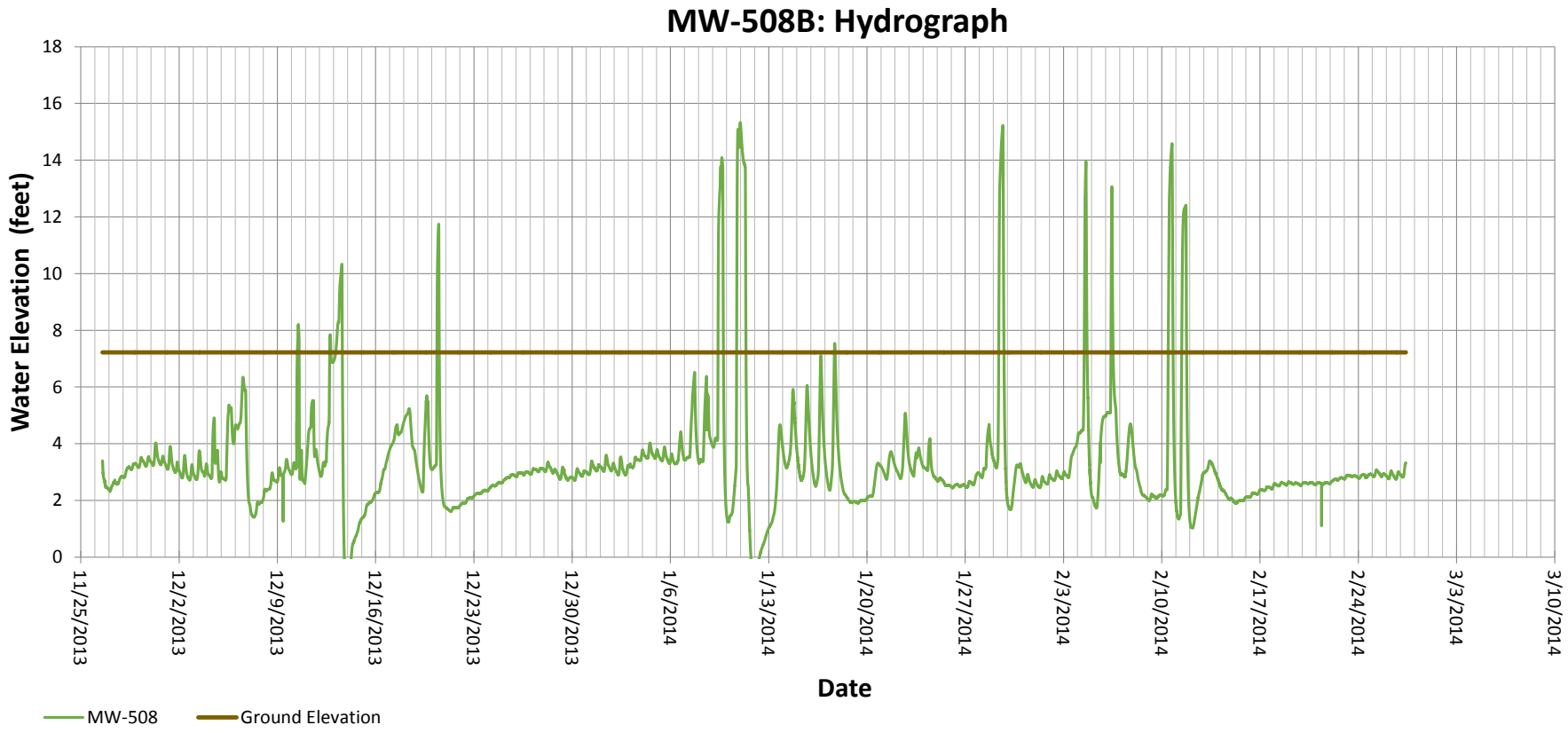
LCP Chemicals Site, Brunswick, GA



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MW-508B hydrograph west of sparging footprint.

Appendix H
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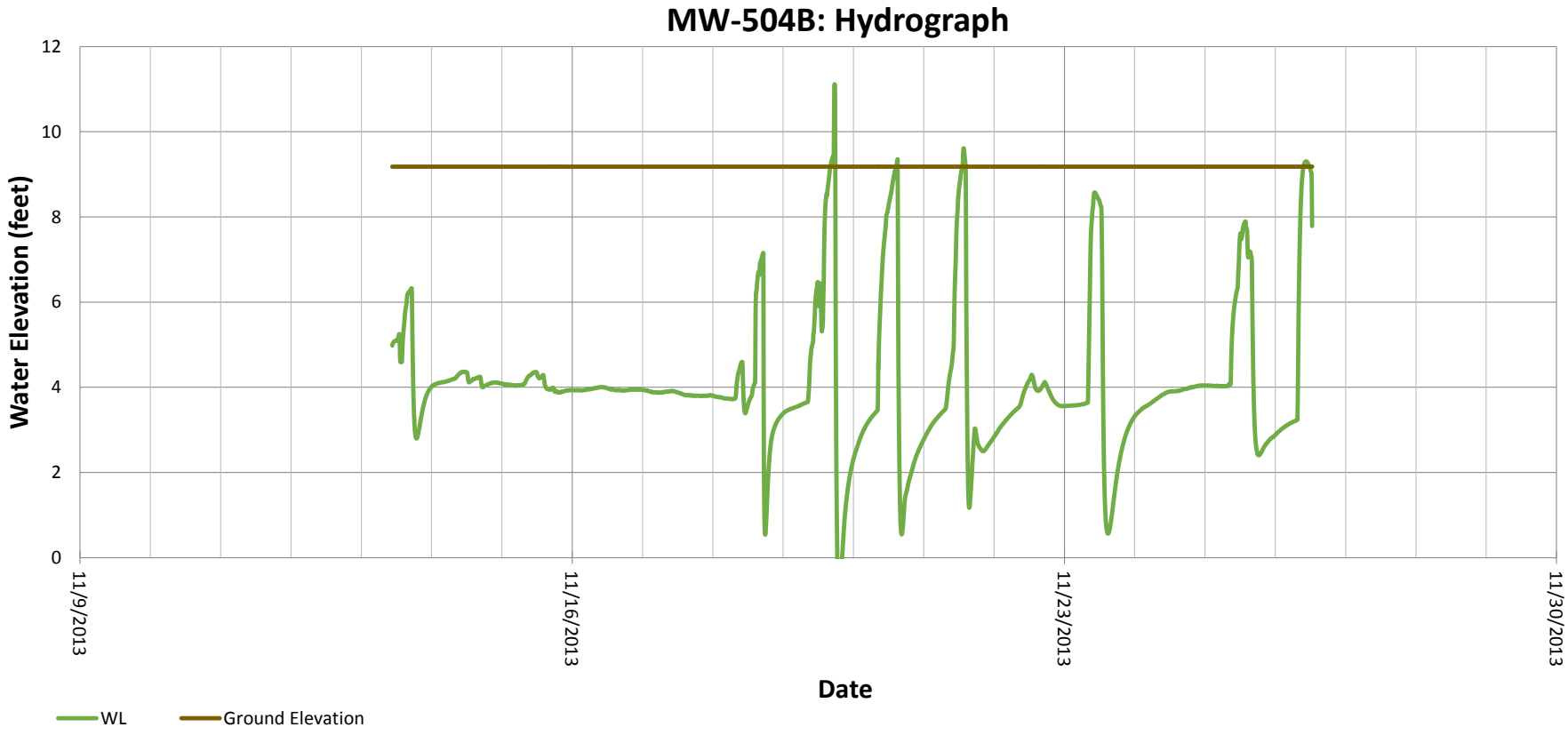
LCP Chemicals Site, Brunswick, GA



MW-504B break-in period hydrograph.

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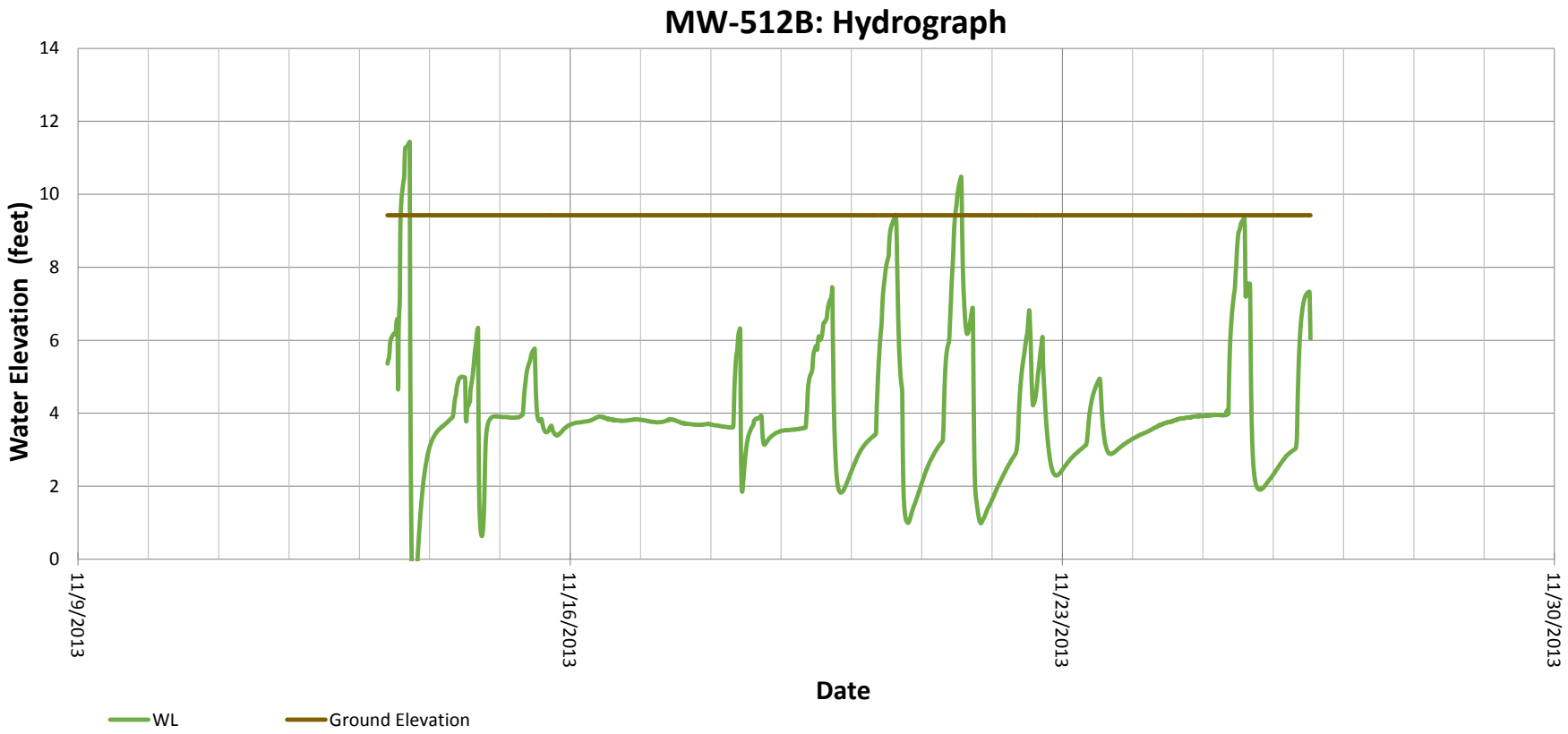
LCP Chemicals Site, Brunswick, GA



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MW-512B break-in period hydrograph.

Appendix H
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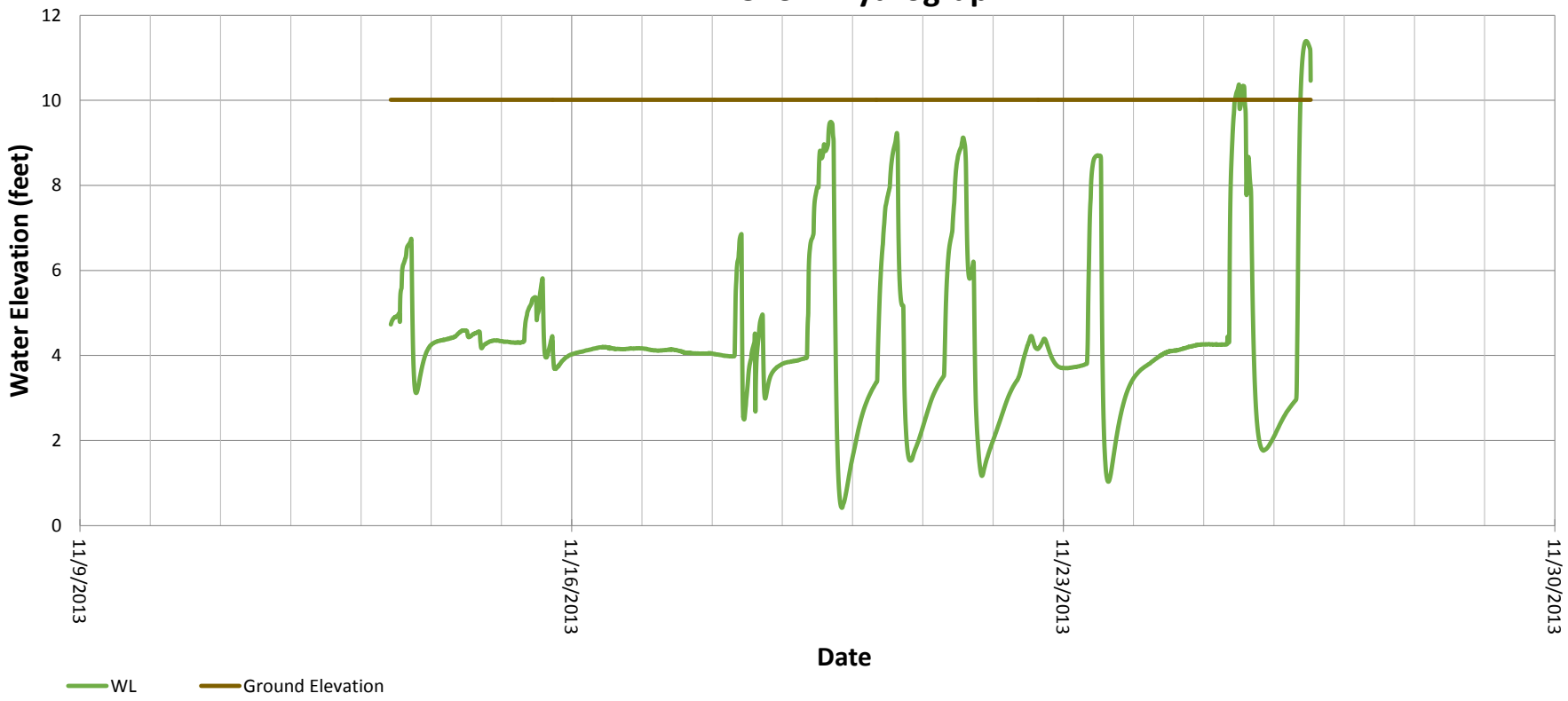
LCP Chemicals Site, Brunswick, GA



MW-513B break-in period hydrograph.

Appendix H
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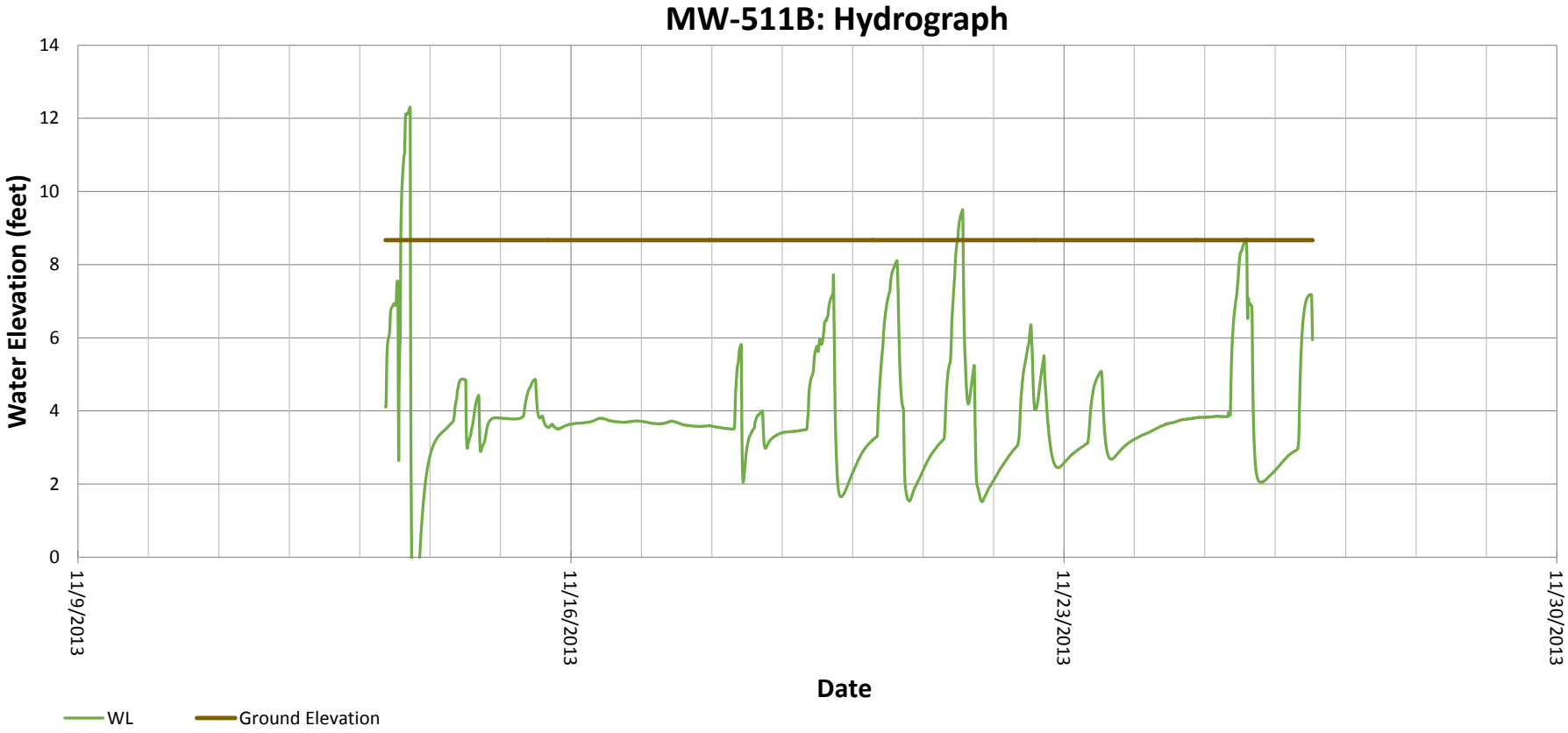
LCP Chemicals Site, Brunswick, GA



MW-511B break-in period hydrograph.

Appendix H
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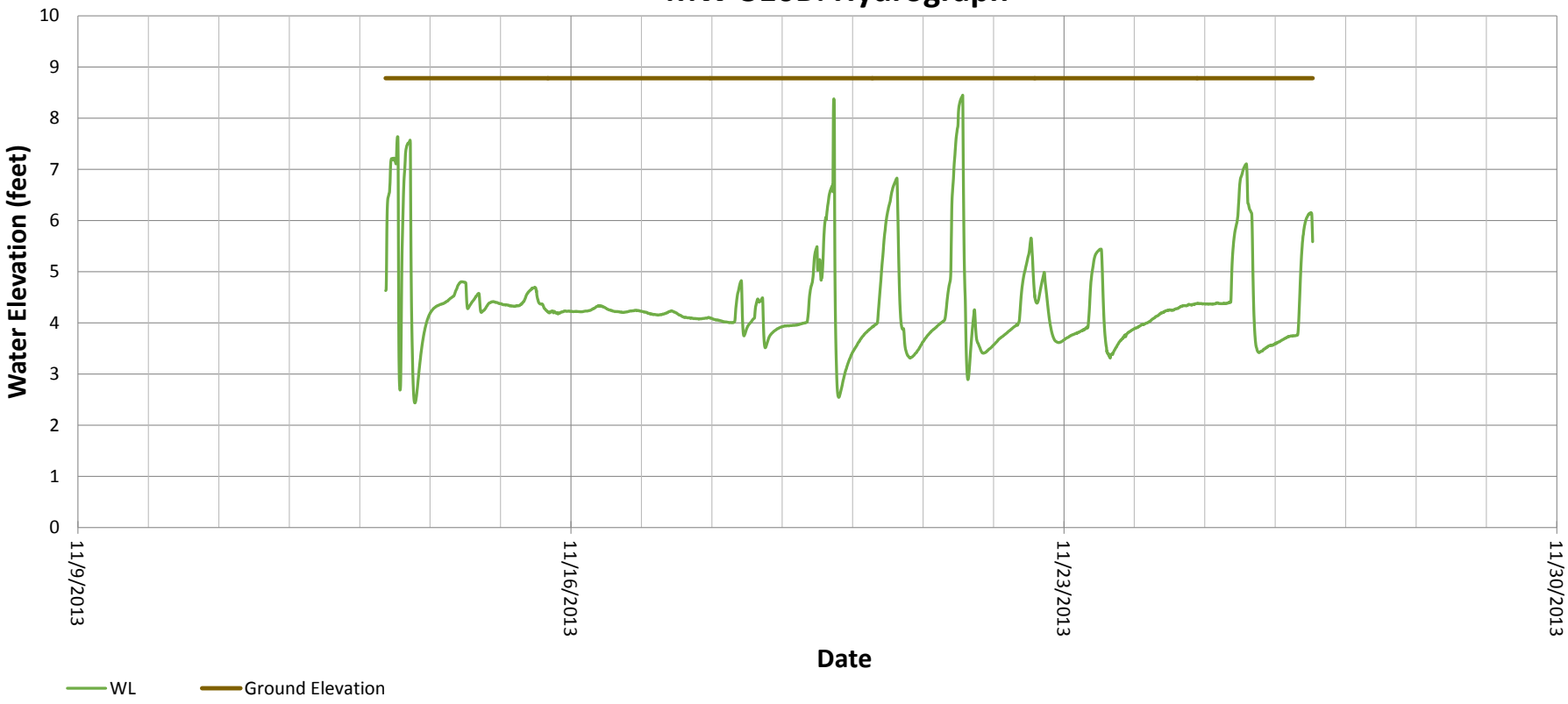
LCP Chemicals Site, Brunswick, GA



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MW-510B break-in period hydrograph.

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LCP Chemicals Site, Brunswick, GA