Technical Memorandum:
ISB Year 1 Optimization

GEORGETOWN FACILITY

SEATTLE, WASHINGTON

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1.0 Introduction

Dalton, Olmsted, and Fuglevand, Inc. (DOF), has prepared this In-Situ Bioremediation (ISB) Year 1 Optimization Memorandum on behalf of Stericycle Environmental Solutions, Inc. (Stericycle). ISB involves supplementing natural geochemical conditions to promote and accelerate existing biological processes in order to degrade targeted constituents of concern (COCs). For this treatment system carbohydrates are being delivered via a groundwater recirculation system so that the existing microorganisms can accelerate the reductive de-chlorination of chlorinated volatile organic compounds (VOCs) inside the subsurface barrier wall at Stericycle's Georgetown Site in Seattle, WA (Figure 1). The system consists of six extraction wells and 42 injection wells, to be used in various arrangements for recirculating carbohydrate-treated groundwater over a four-year period. This memorandum summarizes operational optimization work performed during Year 1 of operation, as required in the EDR.

The ISB recirculation system was completed as per the Engineering Design Report (EDR) [AMEC Geomatrix, 2011] and baseline groundwater sampling was conducted in November 2015 at the six extraction wells and other monitoring wells (Attachment A, Figure 2) as specified in the EDR's Long Term Monitoring Plan. Prior to the first recirculation event DOF submitted a Pre-Startup Conditions Evaluation Memorandum (DOF, 2016) which described minor amendments to the ISB design based on baseline monitoring event results. In April 2016, the first recirculation event commenced with ISB pump testing and injection of substrate at a treatment cell centered around extraction well EW-3 (Attachment A, Figure 2). In May 2016, ISB pump testing continued at a treatment cell around extraction well EW-1. Fouling and higher than anticipated water level drawdown led to temporary suspension of ISB operations in order to re-evaluate the injection design and discuss injection reconfiguration options with Ecology. Based on the operational results from the first two cells (around EW-3 and EW-1) Stericycle suggested changes to the ISB implementation approach, including alternate treatment cell designs. These changes were approved by Ecology via email on June 23, 2016 (Attachment B). System adjustments were completed by the end of August 2016 and injection and recirculation were restarted. Injections were completed at treatment cells 4-6-A and 1-2-A (Attachment B, Figure 1), by the end of September 2016. ISB performance monitoring was completed in late November 2016, and data validation was completed in January 2017.

A summary of completed tasks and updated schedule for ISB operations is provided on Figure 2.

2.0 Overview of EDR performance goals

The general goal of ISB is to enhance and accelerate anaerobic biological degradation of chlorinated VOCs. This is completed by injection of a substrate to encourage microbial growth that is already occurring within the contaminated source areas inside the subsurface barrier wall. Since concentrations of COCs are known to be high and the deeper saturated soils are in a heterogeneous aquifer with interbedded silty sands and silts, the site-specific goal of ISB identified in the EDR is to reduce total contaminant mass by enhancing the anaerobic degradation process within the upper 30 to 40 feet of hydrostratigraphy for a period of four years. This section summarizes the EDR-applicable performance criteria being assessed during operations as part of optimization.

Site-specific ISB design criteria, as approved in the EDR, are summarized below:

- Create conditions favorable to complete anaerobic bioremediation of chlorinated ethenes in groundwater within the two areas designated in the Corrective Action Plan (CAP) where chlorinated COC concentrations are elevated and dense non-aqueous phase liquid (DNAPL) is likely to be present.
- Inject and effectively distribute the electron donor and other treatment chemicals to groundwater within the lateral and vertical extent of the areas to be remediated.
- Provide capability to inject different electron donor materials so that treatment can be adapted, as appropriate, to treat potentially changing site conditions.
- Construct well surface completions in a manner sufficient to allow expected vehicular traffic and future facility use.
- Comply with applicable laws and regulations for installation, substrate injection, and monitoring of the ISB program.
- Provide a high degree of reliability and flexibility for the ISB system.

Initial treatment cells, injection operations, and substrate dosing specified in the EDR are provided in Attachment A.

The EDR acknowledged that the ISB system would need to be built with flexibility in order to optimize the system to account for changing conditions over time, and to account for the heterogeneous nature of the aquifer soils and COC distribution. As such, the effectiveness criteria identified in the EDR allowed for some flexibility, as listed below.

- Assuming heterogeneous aquifer conditions, substrate should be effectively distributed throughout the target areas and will be evaluated by:
  - Recirculation times are equal to (or less than 25% over) the estimated time for 80% of the treatment cells (as based on pump test results);
  - Substrate concentrations measured at the extraction well for each treatment cell reach recommended values for greater than 80% of the treatment cells (for molasses and high fructose corn syrup this value is 50 to 500 mg/L);
  - Injection well flow rates in 80% percent (or greater) of the injection wells are receiving adequate recirculation time for effective substrate distribution (when compared to startup test and particle model results);
- Favorable conditions for anaerobic bioremediation of chlorinated ethenes in groundwater within the target areas will be evaluated by:
  - Redox conditions for 80% (or greater) of the treatment cells reach recommended literature values (AFCEE, 2004);
  - Substrate concentrations for 80% of the treatment cells (measured at the extraction well for each treatment cell) reach recommended values (for molasses or high fructose corn syrup 50 to 500 mg/L).

The EDR also clarified that the target is for 100% of the treatment cells to meet design goals, and optimization of the system will be conducted to attempt to reach design goals, even if parts of the system initially fall short. The EDR acknowledged that design assumptions would likely need to be revisited once operations commenced for ISB, and flow rates and substrate distribution could be better estimated from data generated from the first round of injections. Thus, in the event that the ISB system fails to meet one or more of the effectiveness criteria, the troubleshooting guidance in the ISB Standard Operating Procedures (SOPs) is to be consulted and subsequent injection events will be modified to improve effectiveness, to the extent practicable, based on aquifer heterogeneities. The following sections describe the results of initial operations, data generated, and the optimization performed to date.

3.0 Initial Pump Test and Injection Results

The first pump test was performed at Cell 3-A, as shown on Figure A-2 (Attachment A), on April 13 and 14, 2016 with substrate injection occurring from April 26 to May 6, 2016. The second pump test was performed at Cell 1-A on May 11 and 12, 2016.

The ISB equipment performed well and operated according to design parameters as noted below:

- The recirculation equipment was able to pump at up to 40 gallons per minute (gpm).
- The system provided satisfactory mixing of substrate with extracted groundwater prior to reinjection.
- Injection pressures were well within design expectations, initially only a few PSI – indicating a low risk of fracking.
- Flows were easily balanced between the eight injection wells, shallow and deep wells had similar flow rates, indicating good distribution during injection both vertically and horizontally.
- The full amount of substrate was injected in Cell 3-A in accordance with the design and the total organic carbon concentration was within AFCEE guidelines, as measured at the extraction well EW-3.

However, there were some differences in performance from design and model expectations:

- Extraction flow rates were significantly lower than model predictions at the two treatment cells tested.
- The total organic carbon concentration at the extraction well EW-3 was lower than the target design concentration (although it was double the minimum guidelines from the AFCEE).
- A lower extraction flow rate combined with a lower than expected recovery rate of substrate at the extraction well likely indicates a smaller cone of depression at the extraction well and a resulting wider distribution of the substrate material than presumed in the EDR. Since less substrate is getting pulled all the way back to the extraction well, more substrate is being distributed to elsewhere in the treatment cell.
- Significant fouling occurred at Cell 3-A and in surrounding wells, with pressures at injection wells increasing significantly as the recirculation continued.

Injection details (including updated system piping and instrumentation diagram, photos, pump curves, and detailed pressure and flow data) are provided for each treatment cell in Attachment C.

The first treatment cell tested was Treatment Cell 3-A, which is located very close to a corner of the barrier wall. This cell was selected to test first as it is the likely worst case scenario of increased water level drawdown and reduced groundwater extraction rates due to the no flow boundary the barrier wall creates. The pump test indicated that the maximum sustained flow without significant drawdown was about 25 gpm, which was substantially lower than the EDR design estimate (40 gpm). During injection and recirculation the flow rates were also lower than design, averaging approximately 15 gpm but varying from 7 to 18 gpm (Attachment C). Operating at higher flow rates led to air being pulled into the pump due to excessive drawdown of water inside the extraction well casing. The target dose of substrate was successfully injected (Attachment C) and useful design data for future injections was collected. However the injection took almost double the time specified in the EDR (Attachment A) and resulted in heavy biological fouling of extraction well EW-3 and nearby wells (Attachment C Photo log).

The second treatment cell tested was Cell 1-A. Extraction well EW-1 is located closer to the center of the area contained by the barrier wall and flow rates at this extraction well were expected to be less affected by the barrier wall [Figure A-2, Attachment A). The extraction flow rate achieved at EW-1 was greater than 30 gpm for several hours, but ultimately this flow rate was not sustainable, dropping to less than 8 gpm. Once the water level drawdown in EW-1 reached 30 feet below ground surface (where the pump was positioned), the pump began pulling in air. Because of the high iron concentrations in the groundwater, the system was shut down to reduce iron oxide fouling of the well screens. A summary of pump test and injection details for the first two cells is provided on Table 1.

Both cells showed much lower feasible extraction rates than estimated in the EDR (Attachment A) and in comparison to the successful dewatering completed inside the barrier wall for hydraulic containment and soil vapor extraction system operations. Given the significant differences, review of the original design and model expectations from the EDR and comparison to previously collected data was completed.

Flow rates

- The flow rate at groundwater pretreatment (GWPT) system extraction wells for the hydraulic control system has historically been as high as 8 gpm with minimal water level drawdown and no re-injection of water.
- The ISB system extraction wells showed greater than 20 feet of drawdown, even with flow rates as low as 6 to 7 gpm. Even assuming some time lag as a result of reinjection wells sitting approximately 30 feet away, water levels did not recover to sustain higher extraction rates.

Well construction and lithology

- Both types of extraction wells (GWPT system extraction wells for the pump and treat hydraulic control system and ISB extraction wells) have:
    - Six inch diameter screens with 10-slot vee-wire
    - Screened from depth of 15 to between 34 and 38 feet below ground surface (bgs)

  - 10/20 sized filter pack
  - Screened in poorly graded sand with no major differences in lithology

- Differences between the GWPT and ISB extraction wells include:
  - GWPT wells were constructed with stainless steel screens and ISB wells were constructed with PVC screens

Total organic carbon concentrations

- EW-1 was sampled for total organic carbon on May 12, 2016 with a result of 11. 3 mg/L. This was higher than the baseline sample of 5.5 mg/L (November, 2015), but not substantially higher than baseline concentrations for other wells in the area and is most likely a result of mixing due to the high extraction rates.

3.1 Troubleshooting Data Collection

The ISB troubleshooting guide in the EDR was reviewed because startup testing indicated lower than expected flow rates at two of the six original treatment cells proposed in the EDR for Round 1 (33% of the proposed cells), lower total organic carbon concentrations at the extraction well EW-3, and significant fouling of several wells. Several operational changes were considered:

- Increase the recirculation time,
- Change recirculation patterns,
- Increase or decrease substrate dosage, and/or
- Change the type of substrate injected.

Additional information was collected to aid in the troubleshooting evaluation. A video inspection of the extraction wells was performed on May 18, 2016. A camera was lowered into each extraction well with significant fouling found in EW-1, EW-3, EW-4, EW-5, and EW-6, indicating that injections in 3-A may have had a wider dispersion than modelled in the EDR. The screens were only inspected in wells EW-1, EW-2, and EW-5 because excessive fouling blocked the camera view in wells EW-3, EW-4, and EW-6 (Photo log, Attachment C). Screens for EW-1 and EW-2 showed some iron oxide buildup, with more significant biological buildup on the screen for EW-5.

Grab groundwater samples were collected via peristaltic pump and analyzed for total organic carbon from four injection wells (IW-21, IW-27, IW-29, and IW-31) and the extraction well (EW-3) on May 19, 2016 to assess if the substrate had spread farther or in a different pattern than originally modelled in the EDR (Attachment D, Slide 1). Baseline samples for total organic carbon ranged between 12 and 22 mg/L for wells EW-3, EW-4, and EW-5 (Table 3). Concentrations of total organic carbon varied between 5 and 16 mg/L in the Cell 3-A injection wells and the nearby extraction wells at the completion of Round 1. Only one injection well sampled (IW-21, 41.1 mg/L) had total organic carbon significantly above any of the baseline concentrations (Table 2).

In addition, a four gas meter and photoionization detector (PID) were used to sample head space from several of the wells. Results are provided in Table 2. Significant concentrations of methane, hydrogen sulfide, and carbon monoxide were detected at extraction well EW-3, with very little detected at the injection wells IW-21 and IW-27.

4.0 Operational Adjustments

A meeting to review this preliminary data with Ecology was held on May 24, 2016. In the meeting, Stericycle proposed a temporary pause in injection operations to allow for general operational changes centered on using two extraction wells simultaneously, rather than a single extraction well. Ecology agreed that operational changes were warranted and agreed that postponing further injections was necessary until a revised methodology was agreed upon. Stericycle proceeded with review of EDR modeling against actual flow and drawdown data, and with additional modelling and design calculations based on data collected from operations at Cell 3-A and 1-A.

The following changes in operations were proposed to Ecology and approved over email in June 2016:

- Modification of the ISB system to allow for pumping from two extraction wells and injecting at eight wells simultaneously.
- Instead of six treatment cells (each with one extraction well) as proposed in the EDR, three treatment cells (each with two extraction wells) would run for each round of injections, targeting the same total treatment area as proposed in the EDR.
- Total recirculation times were updated based on modelling performed to estimate time for substrate to make it back to the extraction wells (Table B-1, Attachment B).
- To reduce fouling, the updated procedure would generally include recirculation for a day prior to injection of substrate and cessation of substrate injection a day before projected detection of substrate back at the extraction well. For the much longer flow paths present under the former White Satin Sugar building, even more recirculation would be performed.
- Also to reduce fouling, the target dose of substrate for the target area was lowered to 150 mg/L, down from 500 mg/L, but still within the range the AFCEE recommended (50-500 mg/L).
- Since recirculation is ended before substrate breaks through at the extraction well, monitoring total organic carbon at the extraction wells would not be useful for monitoring effectiveness of distribution. Instead, to confirm effective substrate distribution, several injection wells not used during the injections (but in the likely flow path of substrate) were proposed for total organic carbon sampling (Attachment B Table B-2).

The well layouts for the next two injection events are provided on Figure 1, Attachment B. A summary of ISB modelling used to develop this revised approach is provided in Attachment D. The original particle track modelling for Cell 3-A is provided on Slide 1, based on a flow rate of 40 gpm. Slide 2 shows particle tracks from EDR modelling that are more likely based on the actual average flow rate of 13 gpm in Cell 3-A. Slides 3 through 6 show new particle tracking models for each of the treatment cells proposed to Ecology. In summary:

- Model runs were performed for two different extraction well flow rates (7.5 and 15 gpm from each extraction well), to allow for design flexibility going forward during operation.
- Cells 1-2-A, 1-2-B, 3-5-A, and 3-5-B are spaced similarly and hence model runs for Cell 3-5-A were deemed representative of all four proposed treatment cells.

- Cell 4-6-B has two different stages of operation in order to make up for differences in distance. One utilizes all eight injection wells and one utilizes only four injection wells. Model runs were performed for both phases of operation.
- The estimated time to breakthrough ranges from 9-52 days depending on the flow path.

Ecology suggested considering alternate treatment cells based on synchronizing total time of injection to be similar at each injection well (Attachment B, Table B-2). Stericycle reviewed these suggested treatment cell layouts and agreed that they would likely be reasonable layouts to try for one of the future injection rounds. However, the layouts suggested by Ecology do not allow for as much sampling in-between injection points, and therefore Stericycle proposed to reserve to try the Ecology suggested treatment layouts during later injection rounds, once recirculation patterns are better understood.

Stericycle began ordering of equipment and modifications of controls to allow for simultaneous operation of two extraction well pumps. The modified system was constructed as detailed on Attachment C Figure 6. Commissioning of the modified system began during the week of August 19, 2016 and was completed by August 30, 2016.

5.0 Monitoring Results and Revised Operational Findings

Injections at the revised treatment cells began with pump testing at Treatment Cell 4-6-A on August 31, 2016 with substrate injection occurring from September 9 to 14, 2016. The second pump test was performed at Cell 1-2-A on September 15 and 16, 2016 with substrate injection occurring from September 19 to 29, 2016. Record sampling required groundwater monitoring, specified in the EDR to be conducted in between injection rounds, was completed on November 16, 2016 at the extraction wells after the Round 1 operations and prior to commencing Round 2 (scheduled for March 2017).

Injections at modified Cells 4-6-A and 1-2-A generally went as expected per the revised injection plan (Attachment B):

- The modified equipment performed well and operated in accordance with the revised injection plan.
- The full design amount of substrate was injected for Cells 4-6-A and 1-2-A in accordance with the revised injection plan.
- Flows were successfully balanced and at least 90% of target recirculation volumes were reached for each injection well for Cells 4-6-A and 1-2-A in accordance with the revised injection plan.
- Total organic carbon sampling was completed at four locations for each treatment cell, at wells likely to be within the recirculation flow path (Table 4).

One minor issue encountered during treatment at Cell 1-2-A was that the extraction flow rate at EW-1 was significantly less than 7.5 gpm, likely as a result of fouling due to the high flow rates attempted during the original pump test. Injection details (including updated system piping and instrumentation diagram, photos, pump curves, and detailed pressure and flow data) are provided for each treatment cell in Attachment C.

Performance monitoring results have been tabulated with the results of baseline samples, collected prior to starting ISB operations, for comparison (Table 3). The results show that injections have had noticeable effects on groundwater at each extraction well, even in EW-5 (which was not utilized as part of Round 1 operations).

Several monitoring parameter results are indicative of increased biological activity and the ability for the aquifer to sustain anaerobic biodegradation:

- Alkalinity increased at the wells that were part of recirculation cells. It increased substantially at wells EW-1, EW-2, and EW-3, less dramatically at EW-4, and EW-5 and decreased slightly at EW-6. There is typically a positive correlation between zones of microbial activity and increased alkalinity.
- pH was not significantly depressed, remaining close to neutral, indicating that sufficient buffering capacity exists for the concentration of substrate injected during Round 1 operations.
- Methane concentrations significantly increased in the majority of the wells, indicating increased biological activity.
- Sulfate concentrations significantly decreased in the majority of the wells, which can be an indicator of biological activity.
- Dissolved oxygen increased in the extraction well sample taken immediately after recirculation was completed, but decreased to less than 1 mg/L after the aquifer was left undisturbed. This is consistent with anaerobic conditions necessary for biodegradation.

Trends for other parameters were not indicative of sustaining conditions suitable for anaerobic biodegradation:

- Total iron and ferrous iron concentrations significantly decreased in the majority of the wells, which is atypical behavior for anaerobic biostimulation.
- Redox Potential increased for all of the extraction wells and did not recover to levels consistent with anaerobic conditions.
- Total organic carbon concentrations increased immediately after pumping at EW-1, 2, 3, and 4, but not at EW-6. However, total organic carbon concentrations then decreased at all wells to levels below baseline concentration at most wells.
- Total organic carbon concentrations at wells in the recirculation flow path for Treatment cells 1-2-A and 4-6-A were not significantly above baseline concentrations (Table 4).

There are several possible explanations for the variability in total organic carbon sample results.

- Samples collected from injection wells were grab samples and not collected via low-flow methods, so it is possible that these are representative of a limited area and not the greater area around the wells.
- Substrate may have found a preferential pathway along the no flow barrier next to the barrier wall, increasing flow towards IW-21. Modelling indicates that flows would be

predominantly towards the west due to the confines of the barrier wall (Attachment D Slide 2).

- The heterogeneous nature of site soils may make for higher variability than anticipated. A sampling method utilizing a larger purge volume technique may pull in nearby substrate that the low flow sampling method may miss.

Record sampling results for VOCs, from groundwater monitoring conducted prior to and after Round 1 injections, are provided in Table 5. There are no discernable trends in VOC concentrations for a majority of the wells. There are some notable increases at EW-1 for vinyl chloride and at EW-6 for non-chlorinated solvents (toluene, xylenes).

A summary results table of baseline record sampling conducted prior to the Round 1 injections for the full suite of constituents analyzed (VOCs, Polychlorinated Biphenyls [PCBs], Metals, and petroleum hydrocarbons) is provided as Table 6, including monitoring required by Appendix D of the EDR (Long Term Groundwater Monitoring Plan). PCB concentrations greater than 20 μg/L were detected in EW-1 and EW-5. As discussed in the Pre-Startup Conditions Evaluation (DOF 2016), these concentrations of PCBs exceed the King County discharge permit limits for the site, so additional treatment measures are required for treating any purged groundwater from these areas. The groundwater treatment system at the site is equipped to manage this when required.

5.1 Conclusions

Overall, Round 1 results showed that that when treatment goals for injection volume and substrate injection were attained, performance monitoring results were mixed. Results included indicators of increased biological activity (methane production, substantial increase in alkalinity), but also results atypical of sustaining anaerobic biodegradation of chlorinated solvents (positive redox potential and low total organic carbon). Given that this was the first round of injections and substantial mixing occurred inside an area that has been surrounded by a low flow boundary for over a decade, it is expected that it may take several rounds of injections to homogenize the aquifer and promote sustained anaerobic conditions.

In addition, injection and recirculation at Cells 1-2-A and 4-6-A was stopped before significant substrate breakthrough was allowed to occur (in order to reduce fouling like what occurred at Cell 3-A), so it would be unexpected to find highly reducing conditions or high total organic carbon at those extraction well points. Samples were taken from nearby wells in the recirculation flow path, but as noted above, they may be biased low.

6.0 Planned Round 2 Operations and Schedule

Based on Round 1 results, limiting water level drawdown, dosing substrate at the lower end of the AFCEE recommended range, and flushing clean water through the injection and extraction well screens after injection of substrate are appropriate procedures to continue. These modifications appear to reduce fouling and help keep the system operational, while providing sufficient distribution of substrate in the subsurface to create conditions conducive to anaerobic degradation of chlorinated solvents.

Stericycle plans to continue with the revised injection plan from June 2016 with the following minor modifications to operating and performance monitoring, in an effort to improve ISB operations going forward.

- Reduce aeration of the water in the extraction wells by slowly ramping up extraction flow rates and erring on the side of lower flow rates to reduce water level drawdown in the wells.
- Collect total organic carbon samples from wells using modified methods - higher rate purge that may pull water from a larger radius of influence, but not as grab samples which showed substantial variability in results from initial rounds.

Stericycle plans to inject the same high fructose corn syrup substrate as used in Round 1 at Cells 1-2-B, 3-5-B, and 4-6-B in Round 2 as detailed in Table 7. However, given the fouling that occurred at Cell 3-A and the reduced flows that occurred at EW-1, Stericycle plans to conduct a physical cleaning of EW-1, EW-3, and EW-5, and inspection of EW-2, EW-4 and EW-6 as well as injection wells IW-17, 18, 19, 20, 23, 24, 25, and 26. The cleaning would follow procedures employed over the last decade to maintain the existing groundwater extraction wells at the facility that are used as part of the hydraulic containment system. In an effort to reduce disruption to biological activity, chemical treatment of the wells will be avoided if at all possible.

This physical cleaning would consist of brushing down the interior of the wells, pumping out accumulated solids, and surging and purging the wells for several hours. The wells would then be inspected for iron oxide or iron hydroxide build up. If the screens are determined to remain significantly fouled, weak acid treatment of the wells with biodispersant and biocides would be employed. Stericycle has successfully used Remede Redux 333 biodispersant and Redux 610 biocide for cleaning iron related fouling from the onsite groundwater extraction wells used for operation of the hydraulic containment system. The biodispersant and/or biocide would be added to the well, surged for a minimum of one hour and then allowed to sit overnight. The well would be surged again and accumulated solids would be pumped out the following day. Typical dosage for the biodispersant and biocide have ranged from 100 to 400 ppm. Once dispersed and diluted both the biodispersant and biocide are easily broken down by groundwater bacteria, ensuring minimal detrimental impact to the anaerobic biodegradation bacteria community.

Updated SOPS and SDS for treatment chemicals are provided in Appendix E.

Stericycle plans to begin well cleaning and setup for Round 2 injections the week of March 6, 2017.

7.0 References

AFCEE (Air Force Center for Environmental Excellence), 2004. Final Principles and Practices of Enhanced Anaerobic Bioremediation of Chlorinated Solvents, Air Force Center for Environmental Excellence Brooks City-Base, Texas, 2004.

AMEC Geomatrix, Inc., 2011, Revised Engineering Design Report, PSC Georgetown Facility, Seattle, Washington. September.

Dalton Olmsted & Fuglevand (DOF), 2016, Georgetown In-Situ Bioremediation Pre-Startup Conditions Evaluation. January.

8.0 Closing and Signature

The services described in this report were performed consistent with generally accepted professional consulting principles and practices. No other warranty, expressed or implied, is made. This report is solely for the use and information of our client unless otherwise noted. Any reliance on this report by a third party is at such party's sole risk.

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Tables

TABLE 1
SUMMARY OF FIRST TWO TREATMENT CELL OPERATIONS
Stericycle Georgetown Facility
Seattle, Washington

Treatment Cell	Parameter	Design Expectation	Pump Test Expectation	Actual During Injection
Cell 3-A	Extraction flow rate	40 gpm	25 gpm	7-18 gpm
	Completion/recirculation time	3-5 days	4 days	9.5 days
	TOC @ EW-1 after recirculation	225-325 mg/L	150-200 mg/L	108 mg/L
	Drawdown (ft bgs)	< 15 ft bgs	5-20 ft bgs	>25ft bgs after 4 days
Cell 1-A	Extraction flow rate	40 gpm	< 8 gpm	No injection performed for this treatment cell pattern.
	Completion/recirculation time	3-5 days	14 days	
	TOC @ EW-3 after recirculation	225-325 mg/L	150-200 mg/L	
	Drawdown (ft bgs)	< 15 ft bgs	> 30 ft bgs in 6 hours	

Notes:
TOC = total organic carbon
gpm = gallons per minute
ft = feet
bgs = below ground surface
mg/L = milligrams per liter

TABLE 2

CELL 3-A INITIAL MONITORING RESULTS

Stericycle Georgetown Facility

Seattle, Washington

	Well	EW-3				IW-21	IW-27	IW-29	IW-31
	Date	11/9/2015	5/5/2016	5/6/2016	5/19/2016	5/19/2016	5/19/2016	5/19/2016	5/19/2016
	Units								
Analytical Results									
Total Organic Carbon	mg/L	22.3	98.1	108	--	41.1	16.1	5.47	7.79
Field-Measured Water Quality Measurements									
Temperature	Deg C	19.61	--	16.92	--	15.75	14.42	--	--
pH	units	6.31	--	7.31	--	6.09	6.05	--	--
Oxidation Reduction Potential	mV	-80	--	323.3	--	-88	-69	--	--
Specific Conductivity	mS/cm	0.591	--	1.16	--	0.466	0.441	--	--
Turbidity	NTU	3.9	--	4.3	--	0.6	129	--	--
Dissolved Oxygen	mg/L	0.48	--	1.31	--	3.05	2.6	--	--
Field-Measured Air Quality Measurements									
Methane	ppm	--	--	--	>50,000	0	0	--	--
Hydrogen Sulfide	ppm	--	--	--	>40,000	0	0	--	--
Oxygen	%	--	--	--	17.2	20.9	20.9	--	--
Carbon Monoxide	ppm	--	--	--	>12,500	29	4	--	--
Volatile Organic Compounds	ppm	0.3	--	--	114	0.1	0	--	--

Definitions

Deg C = degrees Celsius mV = millivolts ppm = parts per million

mS/cm = microsiemens/ centimeter NTU = nephelometric turbidity unit

-- no sample collected

Notes

1. 11/19/2015 water quality readings are stabilized values from low-flow sampling. The TOC sample was collected by a peristaltic pump using low-flow sampling techniques.
2. 5/5/2016 and 5/6/2016 Total Organic Carbon samples were collected from the sample port on the ISB injection cart.
3. All 5/19/2016 samples and water quality readings were taken as grab samples from a peristaltic pump and did not utilize low-flow sampling techniques
   Rain increased to downpour after first 3 wells and water quality instrument battery died, so only TOC grab samples collected for IW-29 and IW-31 (no field measurements).

TABLE 3
SUMMARY OF PERFORMANCE MONITORING GROUNDWATER RESULTS
Stericycle Georgetown Facility
Seattle, Washington

Location	EW-1				EW-2			EW-3			EW-4			EW-5			EW-6		
Date	11/9/2015	5/12/2016	9/23/2016	11/16/2016	11/6/2015	9/23/2016	11/16/2016	11/9/2015	5/6/2016	11/16/2016	11/9/2015	9/12/2016	11/16/2016	11/9/2015	9/13/2016	11/16/2016	11/9/2015	9/12/2016	11/16/2016
Laboratory Tests																			
Total Alkalinity (mg/L)	126	--	146	183	47	114	214	157	369	654	255	239	234	129	--	147	72	151	134
Total Organic Carbon (mg/L)	5.5	11.3	9.4	3.67	5.11	13.5	7.54	22.3	108	14.6	14.6	31	5.19	12.8	4.69	3..82	10.4	29	40
Iron (µg/L)	41,200	--	31,200	7,060	54,000	46,800	10,400	22,700	22,500	4,050	13,100	23,400	5,310	84,100	--	33,400	25,900	32,000	34,800
Ferrous Iron (mg/L)	37.3	--	30.7	0.21 J	55.1	51.5	0.23 J	15.9	24.6	0.3 J	8.2	23.9 J	0.21 J	70.2	--	6.47 J	22.0	29.8 J	6.41 J
Methane (µg/L)	1,700	--	--	3,900	1,200	--	3,400	520	--	4,000	4,700	--	2,900	2,200	--	2,600	650	--	3,600
Nitrate + Nitrite as Nitrogen(mg/L)	0.024 J	--	0.10 U	0.10 U	0.050 U	0.10 U	0.10 U	0.028 J	0.200 U	0.10 U	0.025 J	0.06 J	0.10 U	0.021 J	--	0.10 U	0.034 J	0.10 UJ	0.10 U
Sulfate (mg/L)	205	--	155	149	253	328	161	151	140	1.41	3.92	77.1	95.8	483	--	213	3.2	18.4	1.32
Sulfide (mg/L)	--	--	0.0676	0.044 J	--	0.0772	0.0181	--	1.01	0.208	--	--	0.0709	--	--	0.0063	--	--	0.25
Field Parameters																			
pH (standard units)	6.17	--	6.23	6.87	5.62	6.01	6.89	6.31	7.31	7.31	5.97	5.47	7.22	5.73	--	6.91	5.77	5.82	6.49
Dissolved Oxygen (mg/L)	0.97	--	4.55	0.67	0.51	2.19	0.70	0.48	1.31	0.97	0.52	6.2	0.72	0.65	--	0.68	0.37	5.34	0.96
Temperature (°C)	16.43	--	15.45	17.24	19.37	16.72	18.16	19.61	16.92	18.37	17.21	16.64	17.2	19.63	--	18.16	14.48	15.03	15.35
Redox Potential (mv)	-57	--	221.3	252.3	31	227.6	216.9	-80	323.3	246.8	-20	235.0	261.4	12	--	214.6	-44	257.2	301.2
Specific Conductance (ms/cm)	0.651	--	0.968	0.907	0.604	1.347	0.940	0.591	1.160	1.308	0.432	0.900	0.767	0.966	--	0.888	0.178	0.586	0.462

Notes
1. Data qualifiers are as follows:
J = Analyte was positively identified; indicated concentration is estimated.
U = Analyte was not detected at the reporting limit indicated.
-- indicates that this compound was not tested
2. Methane was inadvertently left of the sampling plan for the second round of performance monitoring sampling at each well.
3. No groundwater extraction was completed at EW-5 during round 1, so no second sample was taken.

Abbreviations
µg/kg = micrograms per liter
mg/L = milligrams per liter
°C = Celsius
mV = millivolts
ms/cm =milisiemens per centimeter

TABLE 4

Cell 1-2-A and 4-6-A TOTAL ORGANIC CARBON RESULTS

Stericycle Georgetown Facility

Seattle, Washington

Date	Cell	Well ID	Total Organic Carbon mg/L
9/23/2016	1-2-A	EW-1	9.4
		EW-2	13.5
		IW-11	18.0
		IW-13	17.3
		IW-3	5.3
		IW-5	4.35
9/12/2016	4-6-A	EW-4	31
9/13/2016		EW-5	4.69
9/12/2016		EW-6	29
9/13/2016		IW-27	10.0
9/13/2016		IW-31	15.1
9/13/2016		IW-39	8.8

Abbreviations

mg/L = milligrams per liter

TABLE 5
SUMMARY OF VOC RECORD SAMPLING RESULTS
Stericycle Georgetown Facility Seattle, Washington

Location	EW-1		EW-2		EW-3		EW-4		EW-5		EW-6	
Date	11/9/2015	11/16/2016	11/6/2015	11/16/2016	11/9/2015	11/16/2016	11/9/2015	11/16/2016	11/9/2015	11/16/2016	11/9/2015	11/16/2016
VOCs (µg/L)												
1,1,1-Trichloroethane	0.50 U	1.0 U	0.25 J	0.080 J	0.50 U	0.50 U	0.50 U	0.13 J	0.50 U	0.50 U	2.5 U	3.4 J
1,1,2-Trichlorotrifluoroethane	0.50 U	1.0 U	0.50	0.15 J	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	2.5 U	5.0 U
1,1-Dichloroethane	3.8	30	16	4.8	0.34 J	0.26 J	1.7	7.3	11	0.96	3.0	6.8
1,1-Dichloroethene	0.50 U	1.0 U	0.5 U	0.090 J	0.50 U	0.50 U	0.50 U	0.14 J	0.50 U	0.50 U	2.5 U	5.0 U
1,2,4-Trimethylbenzene	0.16 J	0.28 J	0.10 J	2.0 U	0.080 J	0.49 J	2.2	0.10 J	0.090 J	2.0 U	210	420
1,2-Dichlorobenzene	0.26 J	1.0 U	3.9	0.45 J	28	2.3	2.7	0.50 U	6.0	0.16 J	6.3	12
1,2-Dichloroethane	0.50 U	1.0 U	16	0.21 J	0.50	0.22 J	0.15 J	0.16 J	0.25 J	0.50 U	0.65 J	1.1 J
1,2-Dichloropropane	0.50 U	1.0 U	0.50 U	0.50 U	0.50 U	0.20 J	0.50 U	0.22 J	0.50 U	5.7	2.5 U	5.0 U
1,3,5-Trimethylbenzene	2.0 U	4.0 U	2.0 U	2.0 U	2.0 U	2.0 U	0.40 J	2.0 U	2.0 U	2.0 U	100	180
1,3-Dichlorobenzene	0.50 U	1.0 U	0.31 J	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.14 J	0.50 U	2.5 U	5.0 U
1,4-Dichlorobenzene	0.50 U	1.0 U	1.7	0.19 J	0.35 J	0.50 U	0.29 J	0.50 U	0.87	0.50 U	2.5 U	5.0 U
2-Butanone	20 U	40 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	9.6 J	200 U
4-Isopropyltoluene	2.0 U	4.0 U	0.12 J	2.0 U	2.0 U	2.0 U	0.71 J	2.0 U	0.15 J	2.0 U	3.2 J	6.6 J
Acetone	20 U	8.3 J	20 U	6.0 J	20 U	4.3 J	20 U	6.3 J	20 U	6.6 J	100 U	200 U
Benzene	1.8	0.86 J	2.3	4.2	0.91	0.87	11	0.77	3.9	0.13 J	2.5 U	5.0 U
Carbon Disulfide	0.50 UJ	1.0 U	0.50 UJ	0.50 U	0.87 J	0.090 U	0.79 J	0.080 U	0.080 J	0.50 U	2.5 UJ	5.0 U
Chlorobenzene	0.21 J	1.0 U	0.22 J	0.50 U	19	2.8	3.5	0.50 U	0.84	0.50 U	0.70 J	2.6 J
Chloroethane	43 J	1.9	19 J	1.5	1.9 J	3.9	49 J	12	96 J	1.8	2.5 U	4.8 J
Chloromethane	0.50 U	1.0 U	0.50 U	0.080 J	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.070 J	2.5 U	5.0 U
cis-1,2-Dichloroethene	1.4	2.4	22	2.5	0.37 J	0.28 J	6.0	5.8	1.0	1.9	1.5 J	4.1 J
Dichlorodifluoromethane	0.50 U	1.0 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	2.5 U	5.0 U
Ethylbenzene	1.2	0.66 J	0.20 J	0.10 J	0.18 J	0.58	40	1.0	1.2	0.070 J	390	1100
Isopropylbenzene	0.10 J	4.0 U	2.0 U	2.0 U	0.12 J	0.51 J	9.5	0.080 J	0.31 J	2.0 U	23	61
m,p-Xylene	2.0	1.4	0.16 J	0.20 J	0.50 U	0.58	11	0.82	0.29 J	0.18 J	1700	4200
Methylene Chloride	2.0 U	0.30 U	2.0 U	0.15 U	2.0 U	0.34 U	2.0 U	0.34 U	2.1	0.16 U	10 U	1.7 U
Naphthalene	2.0 U	4.0 U	0.090 J	2.0 U	2.0 UJ	0.10 J	2.0 UJ	2.0 U	0.23 J	2.0 U	15 J	45
n-Propylbenzene	0.10 J	4.0 U	2.0 U	2.0 U	0.11 J	0.15 J	3.4	2.0 U	0.67 J	2.0 U	49	100
o-Xylene	0.69	0.66 J	0.70	0.11 J	0.14 J	0.75	26	0.87	0.43 J	0.090 J	340	860
sec-Butylbenzene	2.0 U	4.0 U	2.0 U	2.0 U	0.44 J	2.0 U	0.94 J	2.0 U	0.33 J	2.0 U	3.8 J	8.4 J
Tetrachloroethene	0.50 U	1.0 U	0.78	0.13 J	0.50 U	0.50 U	0.50 U	0.50 U	0.13 J	0.50 U	2.5 U	5.0 U
Toluene	0.52	8.8	0.5 U	0.22 U	0.27 J	0.55 J	45	1.6	0.57	0.17 U	1200	3000
trans-1,2-Dichloroethene	0.76	38	0.93	0.37 J	0.88	0.21 J	2.4	0.64	1.5	0.70	2.5 U	5.0 U
Trichloroethene	0.79	1.0 U	2.4	0.54	0.23 J	0.50 U	0.54	0.22 J	1.4	0.27 J	2.5 U	5.0 U
Vinyl Chloride	1.5	2000	16	15	0.65	0.54	8.3	26	4.4	0.83	0.70 J	2.1 J

Notes
1. Data qualifiers are as follows:
   J = Indicated concentration is estimated.
   U = Analyte was not detected at the reporting limit indicated.
-- = Not analyzed

Abbreviations
µg/L = micrograms per liter
mg/L = milligrams per liter

TABLE 6

SUMMARY OF BASELINE RECORD SAMPLING RESULTS

Stericycle Georgetown Facility

Seattle, Washington

Location	CG-6-S1	CG-117-79	CG-117-WT	CG-146-80	CG-146-WT	CG-150-68	CG-150-WT	CG-152-WT	CG-9-152-WT*	CG-152-79	EW-1	EW-2	EW-3	EW-4	EW-5	EW-6
Date	**11/4/2015**	**11/4/2015**	**11/4/2015**	**11/4/2015**	**11/5/2015**	**11/5/2015**	**11/5/2015**	**11/6/2015**	**11/6/2015**	**11/6/2015**	**11/9/2015**	**11/6/2015**	**11/9/2015**	**11/9/2015**	**11/9/2015**	**11/9/2015**
Total Metals (mg/L)																
Arsenic	0.01371	0.00150	0.00169	0.00172	0.00478	0.00029 J	0.00596	0.00064	0.00065	0.00205	--	--	--	--	--	--
Barium	0.007855	0.021601	0.007912	0.016501	0.005817	0.00815	0.022713	0.009526	0.009418	0.026608	--	--	--	--	--	--
Copper	0.00912	0.00702	0.00284	0.01017	0.00042	0.0008	0.01309	0.00024	0.00028	0.00305	--	--	--	--	--	--
Iron	25.0	3.87	8.76	3.55	42	6.03	47.3	49	48	4.62	--	--	--	--	--	--
Lead	0.000285	0.002723	0.000014 J	0.000942	0.00012	0.000141	0.000054	0.000104	0.000112	0.000502	--	--	--	--	--	--
Manganese	0.91726	0.07669	0.34534	0.07047	0.43375	0.21523	3.0583	0.77059	0.77241	0.07309	--	--	--	--	--	--
Mercury	--	--	--	--	0.00020 U	0.00020 U	0.00020 U	--	--	--	--	--	--	--	--	--
Nickel	0.00829	0.00147	0.01188	0.00074	0.00038	0.00044	0.0727	0.00284	0.00315	0.0013	--	--	--	--	--	--
Vanadium	0.00731	0.04073	0.00056	0.04673	--	0.00307	--	--	--	0.08295	--	--	--	--	--	--
Dissolved Metals (mg/L)																
Arsenic	--	0.00140	--	--	--	0.00018 J	--	--	--	--	--	--	--	--	--	--
Barium	--	0.018666	--	--	--	0.007635	--	--	--	--	--	--	--	--	--	--
Copper	--	0.00161	--	--	--	0.00015	--	--	--	--	--	--	--	--	--	--
Iron	--	3.22	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Lead	--	0.000312	--	--	--	0.000022	--	--	--	--	--	--	--	--	--	--
Manganese	--	0.07989	--	--	--	0.22488	--	--	--	--	--	--	--	--	--	--
Nickel	--	0.00067	--	--	--	0.00022	--	--	--	--	--	--	--	--	--	--
Vanadium	--	0.03907	--	--	--	0.00285	--	--	--	--	--	--	--	--	--	--
Conventionals (mg/L)																
Cyanide	0.010 U	0.010 U	0.010 U	0.010 U	0.003 J	0.010 U	0.010 U	0.005 J	0.005 J	0.010 U						
Detected VOCs (µg/L)																
1,1,1-Trichloroethane	0.50 U	0.50 U	0.17 J	0.50 U	0.50 U	0.50 U	2.0	0.50 U	0.50 U	1.0 U	0.50 U	0.25 J	0.50 U	0.50 U	0.50 U	2.5 U
1,1,2-Trichloroethane	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.37 J	0.50 U	0.50 U	1.0 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	2.5 U
1,1,2-Trichlorotrifluoroethane	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	1.6	0.50 U	0.50 U	1.0 U	0.50 U	0.50	0.50 U	0.50 U	0.50 U	2.5 U
1,1-Dichloroethane	1.6	0.50 U	4.1	0.50 U	0.92	0.54	77	0.18 J	0.17 J	0.72 J	3.8	16	0.34 J	1.7	11	3.0
1,1-Dichloroethene	0.0098 J	0.020 UJ	0.018 J	0.020 UJ	0.020 UJ	0.020 UJ	0.23 J	0.020 UJ	0.020 U	0.020 UJ	0.50 U	0.5 U	0.50 U	0.50 U	0.50 U	2.5 U
1,2,4-Trichlorobenzene	6.7	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	1.3 J	2.0 U	2.0 U	4.0 U	2.0 U	0.12	2.0 U	2.0 U	0.12 J	10 U
1,2,4-Trimethylbenzene	1.0 J	2.0 U	2.0 U	2.0 U	0.34 J	2.0 U	15	0.10 J	2.0 U	0.36 J	0.16 J	0.10 J	0.080 J	2.2	0.090 J	210
1,2-Dichlorobenzene	0.96	0.50 U	0.13 J	0.50 U	0.58	0.50 U	4.5	0.65	0.61	1.0 U	0.26 J	3.9	28	2.7	6.0	6.3
1,2-Dichloroethane	0.070	0.020 U	0.054	0.020 U	0.099	0.0072 J	1.4	0.11	0.11	0.020 U	0.50 U	16	0.50	0.15 J	0.25 J	0.65 J
1,3,5-Trimethylbenzene	1.2 J	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	17	2.0 U	2.0 U	4.0 U	2.0 U	2.0 U	2.0 U	0.40 J	2.0 U	100
1,3-Dichlorobenzene	0.18 J	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.71	0.50 U	0.50 U	1.0 U	0.50 U	0.31 J	0.50 U	0.50 U	0.14 J	2.5 U
1,4-Dichlorobenzene	0.62	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	3.0	0.50 U	0.50 U	1.0 U	0.50 U	1.7	0.35 J	0.29 J	0.87	2.5 U
2-Butanone	2.6 J	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	40 U	20 U	20 U	20 U	20 U	20 U	9.6 J
4-Isopropyltoluene	0.090 J	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	3.6	2.0 U	2.0 U	4.0 U	2.0 U	0.12 J	2.0 U	0.71 J	0.15 J	3.2 J
Acetone	20 U	20 U	20 U	20 U	20 U	20 U	3.4 J	20 U	20 U	40 U	20 U	20 U	20 U	20 U	20 U	100 U
Benzene	0.38 J	0.50 U	0.50 U	0.50 U	0.91	0.50 U	3.8	0.67	0.64	1.0 U	1.8	2.3	0.91	11	3.9	2.5 U
Carbon Disulfide	0.11 J	0.50 U	0.50 UJ	0.50 UJ	0.50 UJ	0.50 UJ	0.50 U	0.50 UJ	0.070 J	1.0 UJ	0.50 UJ	0.50 UJ	0.87 J	0.79 J	0.080 J	2.5 UJ
Chlorobenzene	0.45 J	0.50 U	0.50 U	0.50 U	0.50	0.50 U	0.94	5.2	5.0	1.0 U	0.21 J	0.22 J	19	3.5	0.84	0.70 J
Chloroethane	2.5	0.50 U	0.50 U	21	2.3 J	6.0 J	21 J	4.6 J	4.4 J	1.0 U	43 J	19 J	1.9 J	49 J	96 J	2.5 U
Chloroform	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.090 J	0.50 U	0.50 U	1.0 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	2.5 U
Chloromethane	0.15 J	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	1.0 U	0.50 U	0.070 J	0.080 J	0.15 J	0.10 J	2.5 U
cis-1,2-Dichloroethene	3.0	0.50 U	1.8	0.50 U	0.17 J	0.50 U	110	0.17 J	0.10 J	1.0 U	1.4	22	0.37 J	6.0	1.0	1.5 J
Ethylbenzene	23	0.50 U	0.50 U	0.50 U	0.090 J	0.50 U	21	0.12 J	0.090 J	0.42 J	1.2	0.20 J	0.18 J	40	1.2	390
Isopropylbenzene	0.46 J	2.0 U	2.0 U	2.0 U	0.37 J	2.0 U	0.89 J	2.0 U	2.0 U	4.0 U	0.10 J	2.0 U	0.12 J	9.5	0.31 J	23
m,p-Xylene	1.4	0.50 U	0.50 U	0.50 U	1.9	0.50 U	2.6	0.41 J	0.40 J	1.8	2.0	0.16 J	0.50 U	11	0.29 J	1700
Methylene Chloride	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	4.8	2.0 U	2.0 U	4.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.1	10 U
Naphthalene	2.5 J	2.0 U	2.0 UJ	2.0 UJ	0.11 J	2.0 UJ	2.3	2.0 UJ	2.0 UJ	4.0 UJ	2.0 U	0.090 J	2.0 UJ	2.0 UJ	0.23 J	15 J
n-Propylbenzene	0.52 J	2.0 U	2.0 U	2.0 U	0.58 J	2.0 U	1.2 J	2.0 U	2.0 U	4.0 U	0.10 J	2.0 U	0.11 J	3.4	0.67 J	49
o-Xylene	0.66	0.50 U	0.50 U	0.50 U	0.38 J	0.50 U	5.4	0.26 J	0.23 J	0.30 J	0.69	0.70	0.14 J	26	0.43 J	340
sec-Butylbenzene	0.21 J	2.0 U	2.0 U	2.0 U	0.19 J	2.0 U	3.7	2.0 U	2.0 U	4.0 U	2.0 U	2.0 U	0.44 J	0.94 J	0.33 J	3.8 J
Styrene	0.65	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	1.0 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	2.5 U
Tetrachloroethene	0.29 J	0.50 U	0.37 J	0.50 U	0.50 U	0.50 U	0.89	0.50 U	0.50 U	1.0 U	0.50 U	0.78	0.50 U	0.50 U	0.13 J	2.5 U
Toluene	1.5	0.090 J	0.060 J	0.16 J	1.4	0.50 U	7.8	0.50 U	0.50 U	0.82 J	0.52	0.5 U	0.27 J	45	0.57	1200
trans-1,2-Dichloroethene	0.23 J	0.50 U	0.24 J	0.50 U	0.25 J	0.50 U	6.4	0.31 J	0.30 J	6.2	0.76	0.93	0.88	2.4	1.5	2.5 U
Trichloroethene	0.64	0.020 U	0.85	0.020 U	0.020 U	0.020 U	3.0	0.020 U	0.020 U	0.052	0.79	2.4	0.23 J	0.54	1.4	2.5 U
Vinyl Chloride	0.73 J	0.063 J	0.78 J	0.055 J	0.072 J	0.059 J	210 J	0.18 J	0.19	1.3 J	1.5	16	0.65	8.3	4.4	0.70 J

TABLE 6
SUMMARY OF BASELINE RECORD SAMPLING RESULTS
Stericycle Georgetown Facility
Seattle, Washington

Location	CG-6-S1	CG-117-79	CG-117-WT	CG-146-80	CG-146-WT	CG-150-68	CG-150-WT	CG-152-WT	CG-9-152-WT*	CG-152-79	EW-1	EW-2	EW-3	EW-4	EW-5	EW-6
Detected SVOCs (µg/L)																
1,4-Dioxane	1.6	--	1.4	--	0.20 J	--	17	0.68	0.71	--	--	--	--	--	--	--
1-Methylnaphthalene	1.1 J	--	0.020 U	--	0.033	--	0.46 J	0.020 U	0.020 U	--	--	--	--	--	--	--
2,4,5-Trichlorophenol	0.53 J	--	0.49 U	--	0.48 U	--	4.8 U	0.50 U	0.50 U	--	--	--	--	--	--	--
2-Chlorophenol	4.9 U	--	0.49 U	--	0.48 U	--	4.8 U	0.50 U	0.070 J	--	--	--	--	--	--	--
2-Methylnaphthalene	0.27 J	--	0.0029 J	--	0.025	--	0.18	0.020 U	0.020 U	--	--	--	--	--	--	--
2-Methylphenol	2.9 J	--	0.49 U	--	0.48 U	--	10	0.50 U	0.50 U	--	--	--	--	--	--	--
4-Methylphenol	4.8 J	--	0.49 U	--	0.48 U	--	12	0.50 U	0.50 U	--	--	--	--	--	--	--
Acenaphthene	0.39 J	--	0.020 U	--	0.0090 J	--	0.072 J	0.0057 J	0.0070 J	--	--	--	--	--	--	--
Acetophenone	8.5	--	0.49 U	--	0.62 U	--	4.8 U	0.50 U	0.50 U	--	--	--	--	--	--	--
Benzyl Alcohol	4.9 U	--	0.49 U	--	0.48 U	--	1.8 J	0.50 U	0.50 U	--	--	--	--	--	--	--
Dibenzofuran	0.22 J	--	0.020 U	--	0.020 U	--	0.081 J	0.020 U	0.020 U	--	--	--	--	--	--	--
Diethyl Phthalate	1.1 J	--	0.061 J	--	0.19 U	--	1.9 U	0.085 J	0.084 J	--	--	--	--	--	--	--
Dimethyl Phthalate	2.0 U	--	0.20 U	--	0.19 U	--	1.9 U	0.20 U	0.20 U	--	--	--	--	--	--	--
Di-n-butyl Phthalate	1.4 J	--	0.20 U	--	0.12 J	--	1.9 U	0.13 J	0.13 J	--	--	--	--	--	--	--
Fluoranthene	0.077 J	--	0.020 U	--	0.020 U	--	0.019 U	0.020 U	0.020 U	--	--	--	--	--	--	--
Fluorene	0.40 J	--	0.020 U	--	0.0073 J	--	0.038 J	0.020 U	0.020 U	--	--	--	--	--	--	--
Isophorone	2.4	--	0.20 U	--	0.19 U	--	18	0.20 U	0.20 U	--	--	--	--	--	--	--
Phenanthrene	1.2 J	--	0.020 U	--	0.020 U	--	0.015 J	0.020 U	0.020 U	--	--	--	--	--	--	--
Phenol	12	--	0.13 J	--	0.30 J	--	22	1.5	7.9	--	--	--	--	--	--	--
Pyrene	0.12	--	0.020 U	--	0.020 U	--	0.019 U	0.020 U	0.020 U	--	--	--	--	--	--	--
Detected PCBs (µg/L)																
Aroclor 1232	3.9	--	0.0088 J	--	0.0032 J	--	0.021	0.0050 U	0.0079	--	65	0.021 U	0.19	0.52	21	0.17
Aroclor 1242	0.50 U	--	0.0050 U	--	0.0050 U	--	0.0050 U	0.0050 U	0.0050 U	--	5.0 U	0.98	0.025 U	0.10 U	2.5 U	0.025 U
Total PCBs	3.9	--		--	0.0032 J	--	0.021		0.0079	--	65	0.98	0.19	0.52	21	0.17
VPH (µg/L)																
>C8-C10 Aromatics	52	--	50 U	--	50 U	--	230	50 U	50 U	--	--	--	--	--	--	--
>C8-C10 Aromatics	140	--	50 U	--	50 U	--	370	50 U	50 U	--	--	--	--	--	--	--
>C12-C13 Aromatics	67	--	50 U	--	50 U	--	56	50 U	50 U	--	--	--	--	--	--	--
C5-C6 Aliphatics	50 U	--	50 U	--	50 U	--	50 U	50 U	50 U	--	--	--	--	--	--	--
C6-C8 Aliphatics	50 U	--	50 U	--	50 U	--	50 U	50 U	50 U	--	--	--	--	--	--	--
C8-C10 Aliphatics	50 U	--	50 U	--	50 U	--	50 U	50 U	50 U	--	--	--	--	--	--	--
C10-C12 Aliphatics	50 U	--	50 U	--	50 U	--	440	50 U	50 U	--	--	--	--	--	--	--
EPH (µg/L)																
C8-C10 Aliphatics	40 U	--	40 U	--	40 U	--	40 U	40 U	40 U	--	--	--	--	--	--	--
C10-C12 Aliphatics	40 U	--	40 U	--	40 U	--	45	40 U	40 U	--	--	--	--	--	--	--
C12-C16 Aliphatics	40 U	--	40 U	--	40 U	--	40 U	40 U	40 U	--	--	--	--	--	--	--
C16-C21 Aliphatics	40 U	--	40 U	--	40 U	--	40 U	40 U	40 U	--	--	--	--	--	--	--
C21-C34 Aliphatics	40 U	--	40 U	--	40 U	--	40 U	40 U	40 U	--	--	--	--	--	--	--
C8-C10 Aromatics	40 U	--	40 U	--	40 U	--	56	40 U	40 U	--	--	--	--	--	--	--
C10-C12 Aromatics	40 U	--	40 U	--	40 U	--	81	40 U	40 U	--	--	--	--	--	--	--
C12-C16 Aromatics	40 U	--	40 U	--	40 U	--	40 U	40 U	40 U	--	--	--	--	--	--	--
C16-C21 Aromatics	40 U	--	40 U	--	40 U	--	40 U	40 U	40 U	--	--	--	--	--	--	--
C21-C34 Aromatics	40 U	--	40 U	--	40 U	--	40 U	40 U	40 U	--	--	--	--	--	--	--

Notes
1. Data qualifiers are as follows:
   J = Indicated concentration is estimated.
   U = Analyte was not detected at the reporting limit indicated
-- = Not analyzed
* CG-9-152-WT is a field duplicate sample associated with CG-152-WT

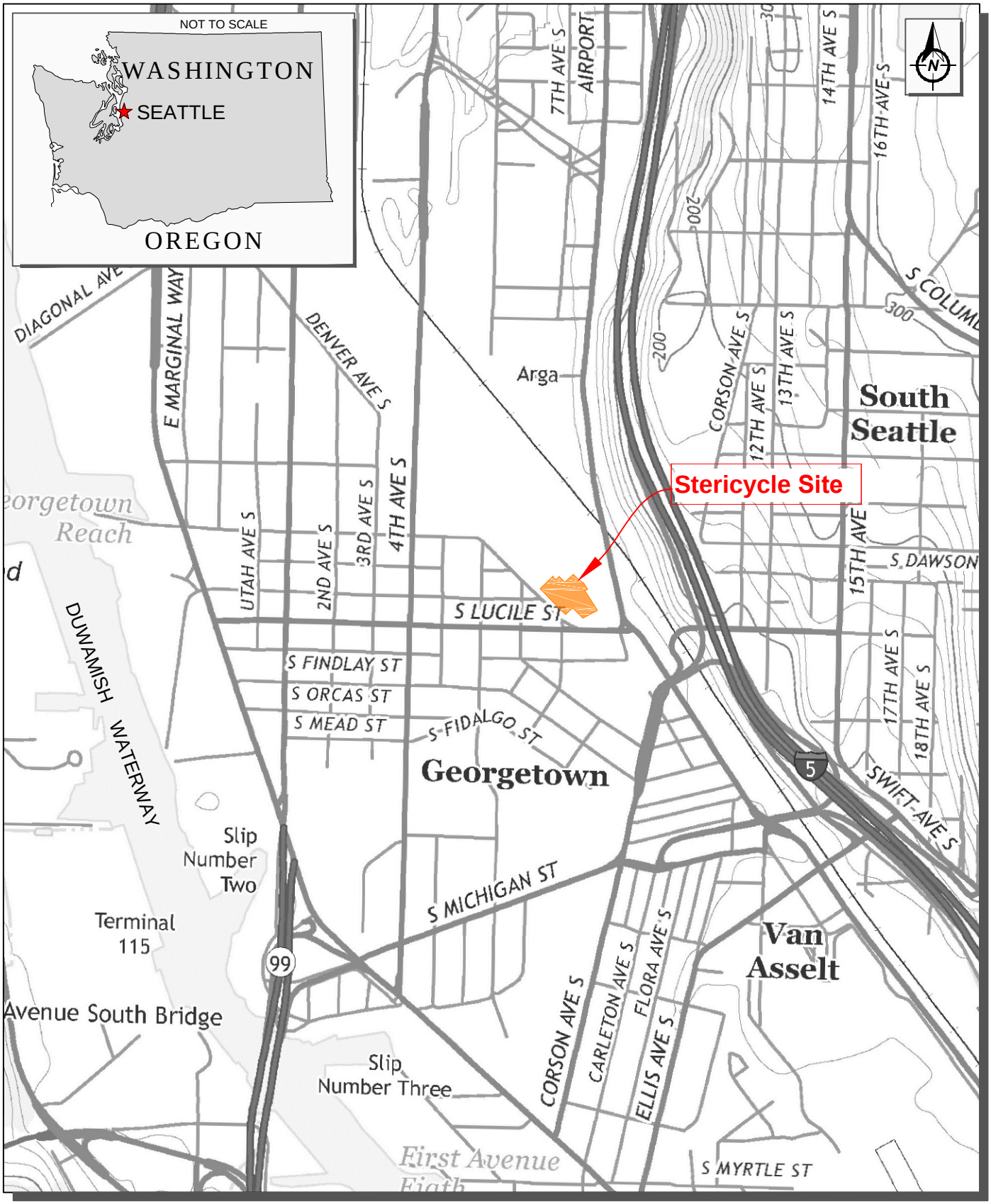
Abbreviations
µg/L = micrograms per liter
mg/L = milligrams per liter

TABLE 7
SUMMARY OF INJECTION ROUND 1 AND 2 TREATEMENT CELL DETAILS
Stericycle Georgetown Facility
Seattle, Washington

Treatment Cell	Extraction Well	Injection Wells	Target Ex Volume (gal)	Target Formation Volume (gal)	Target Formation Dose (mg/L)	Required Mass (lbs)	Required HFCS (gal)	Distance to closest EW (feet)	Distance to farthest EW (feet)	Estimated Injection Time (days)	Modeled MinTime Req. for substrate to reach EW (days)	Estimated Recirc Time (days)	Injection Concentration (mg/L)	Number of Extraction Points	Intended Extraction Flow Rate (gpm)	Number of Injection Pairs	Average Injection Flow Rate (gpm)	Injection Pattern
3-A	EW-3	IW-17, IW-18,	143,207	186,169	500	776	94.9	30	30	14	--	--	650	1	7	4	0.875	Inject at all wells until TOC is 150-200mg/L or 125% of estimated recirculation time is met.
		IW-19, IW-20,						30	30									
		IW-23, IW-24,						30	30									
		IW-25, IW-26						30	30									
1-2-A	EW-1, EW-2	IW-1, IW-2,	172,800	353,430	150	442	54.1	30	30	8	9	10	310	2	7.5	4	1.875	Pump test for 1 day. Inject at all wells for 8 days. Recirculate for 1 day.
		IW-7, IW-8,						30	75									
		IW-9, IW-10,						30	75									
		IW-15, IW-16						30	30									
3-5-A	EW-3, EW-5	IW-17, IW-18,	172,800	325,380	150	407	49.8	30	30	8	9	10	280	2	7.5	4	1.875	Pump test for 1 day. Inject at all wells for 8 days. Recirculate for 1 day.
		IW-25, IW-26,						30	65									
		IW-29, IW-30,						30	65									
		IW-37, IW-38						30	30									
4-6-A	EW-4, EW-6	IW-21, IW-22,	237,600	740,520	150	926	113.3	40	65	11	12	13	470	2	7.5	4	1.875	Pump test for 1 day. Inject at all wells for 11 days. Recirculate for 1 day.
		IW-33, IW-34,						30	110		12							
		IW-37, IW-38,						**65**	**65**		52							
		IW-41, IW-42						40	--		15							
1-2-B	EW-1, EW-2	IW-3, IW-4,	172,800	353,430	150	442	54.1	30	30	8	9	10	310	2	7.5	4	1.875	Pump test for 1 day. Inject at all wells for 8 days. Recirculate for 1 day.
		IW-5, IW-6,						30	75									
		IW-11, IW-12,						30	75									
		IW-13, IW-14						30	30									
3-5-B	EW-3, EW-5	IW-19, IW-20,	172,800	325,380	150	407	49.8	30	30	8	9	10	280	2	7.5	4	1.875	Pump test for 1 day. Inject at all wells for 8 days. Recirculate for 1 day.
		IW-23, IW-24,						30	65									
		IW-31, IW-32,						30	65									
		IW-35, IW-36						30	30									
4-6-B	EW-4, EW-6	IW-19, IW-20,	270,000	212,058	150	265	32.4	**65**	**75**	25	39	36	120	2	7.5	2	3.75	Pump test for 1 day. Inject at IW-19/20 and IW-39/40 pairs for 25 days. Pump test at all wells for 1 day. Inject at all wells for 8 days. Recirculate for 1 day.
		IW-27, IW-28,	43,200	90,882	150	114	13.9	30	65	8	9	10	320	2	7.5	4	1.875	
		IW-39, IW-40,	270,000	212,058	150	265	32.4	**65**	**145**	25	35	36	120	2	7.5	2	3.75	
		IW-41, IW-42	43,200	90,882	150	114	13.9	40	--	8	19	10	320	2	7.5	4	1.875	
TOTAL ANNUAL DEMAND			1,555,200	2,704,020	150	3380	413.6	--	--	--	--	89	--	--	7.5	--	--	--

Notes
Bolded injection-extraction well distances represent the longest flow paths for substrate distribution at wells surrounding EW-4 and EW-6.
Estimated recirc time account for initial flow stabilizing recirculation & post-injection recirculation time.

Figures



Stericycle

Georgetown Site

Seattle, Washington

Site Location

DALTON OLMSTED FUGLEVAND

Figure 1

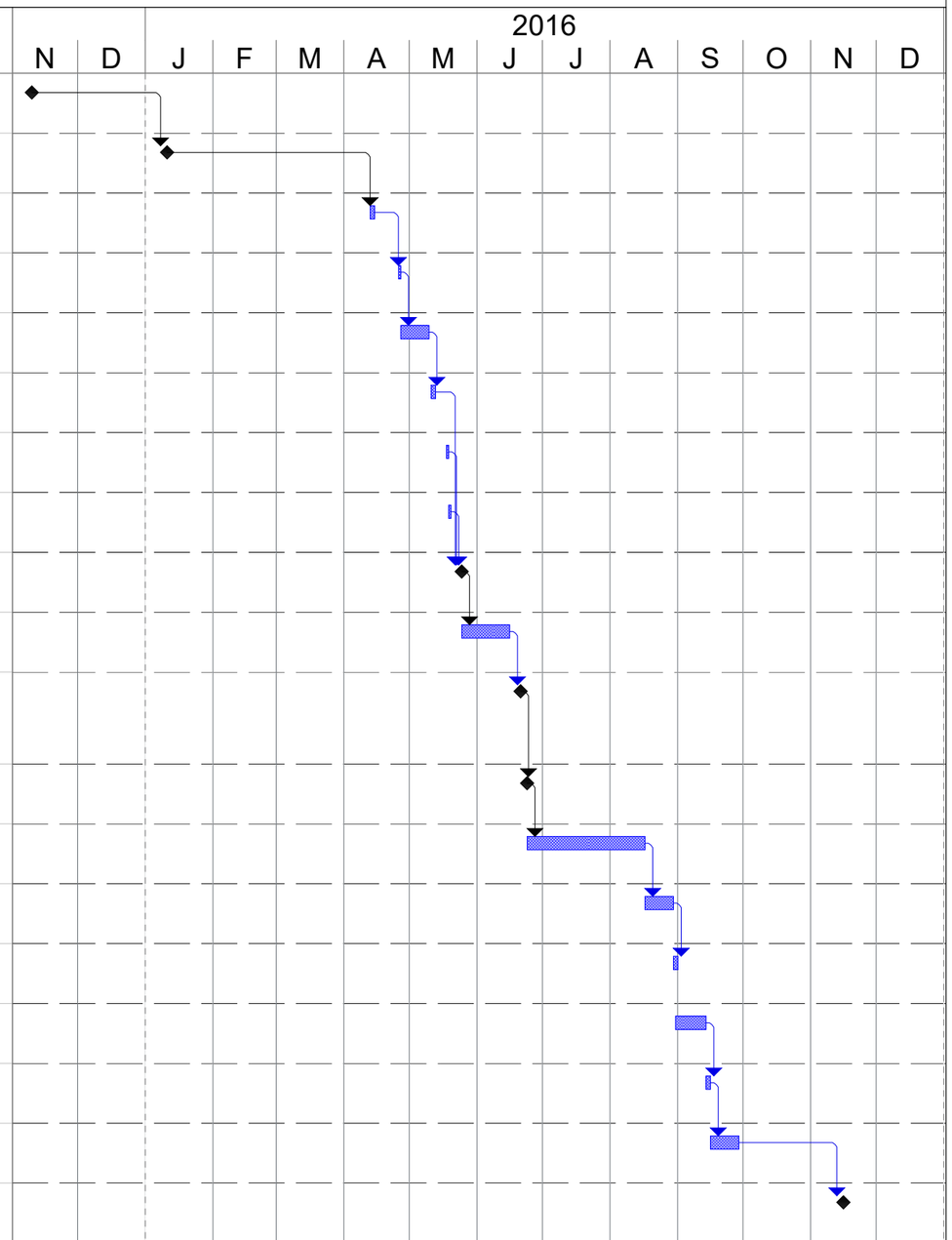
November 15, 2016

PLOT TIME: 11/15/2016 12:36 AM MOD TIME: 11/15/2016 12:31 AM USER: Lee Barras DWG: D:\Projects\Stericycle\GeorgeTown\Figures\2016-11\Pilot Study Report\2016-11-15 GT_2016 PSR 1 F1 Site Loc.dwg

Figure 2 ISB Work Completed To Date

Stericycle Georgetown Facility
Seattle, WA

ID	Task Name	Start	Finish	Duration	Predecessors
1	ISB Baseline Sampling	Mon 11/9/15	Mon 11/9/15	0 mons	
2	ISB PreStartup Memorandum	Mon 1/11/16	Mon 1/11/16	0 mons	1
3	Cell 3-A Pump Test	Wed 4/13/16	Thu 4/14/16	0.1 mons?	2
4	System Commissioning and Modifications	Tue 4/26/16	Tue 4/26/16	0.05 mons?	3
5	Cell 3-A Injection	Wed 4/27/16	Mon 5/9/16	0.45 mons?	4
6	Cell 1-A Pump Test	Wed 5/11/16	Thu 5/12/16	0.1 mons?	5
7	Video Inspection of Extraction Wells	Wed 5/18/16	Wed 5/18/16	0.05 mons?	
8	Additional TOC testing performed for Cell 3-A	Thu 5/19/16	Thu 5/19/16	1 day	
9	Meet with Ecology to review preliminary data	Tue 5/24/16	Tue 5/24/16	0 mons	8,7,6
10	Perform modelling to estimate time for new cells	Wed 5/25/16	Wed 6/15/16	0.8 mons?	9
11	Submit Proposal to Ecology for ISB Operational Changes	Tue 6/21/16	Tue 6/21/16	0 mons	10
12	ISB Operational Changes approved by Ecology	Thu 6/23/16	Thu 6/23/16	0 mons	11
13	Perform modifications to ISB system	Fri 6/24/16	Tue 8/16/16	1.9 mons?	12
14	Commissioning of Modified ISB system	Wed 8/17/16	Mon 8/29/16	0.45 mons?	13
15	Cell 4-6-A Pump Test	Tue 8/30/16	Wed 8/31/16	0.1 mons?	14
16	Cell 4-6-A Injection	Wed 8/31/16	Tue 9/13/16	0.5 mons?	
17	Cell 1-2-A Pump Test	Wed 9/14/16	Thu 9/15/16	0.1 mons?	16
18	Cell 1-2-A Injection	Fri 9/16/16	Wed 9/28/16	0.45 mons?	17
19	In-Between Sampling Event	Wed 11/16/16	Wed 11/16/16	0 mons	18

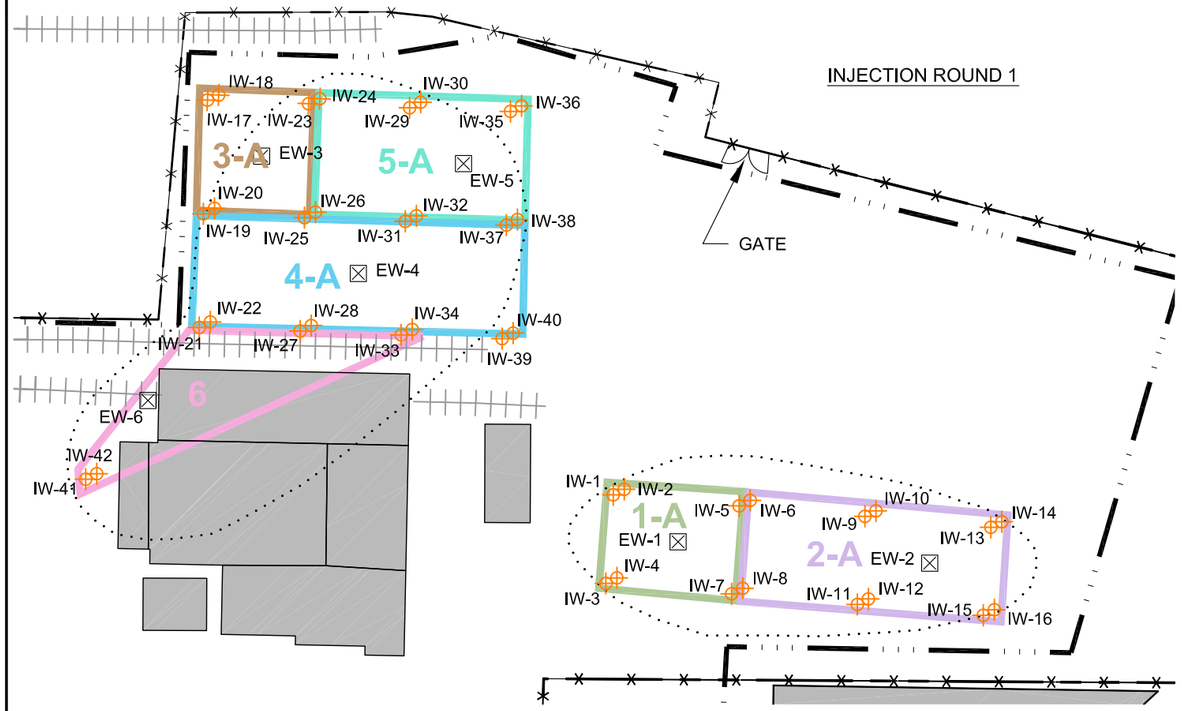


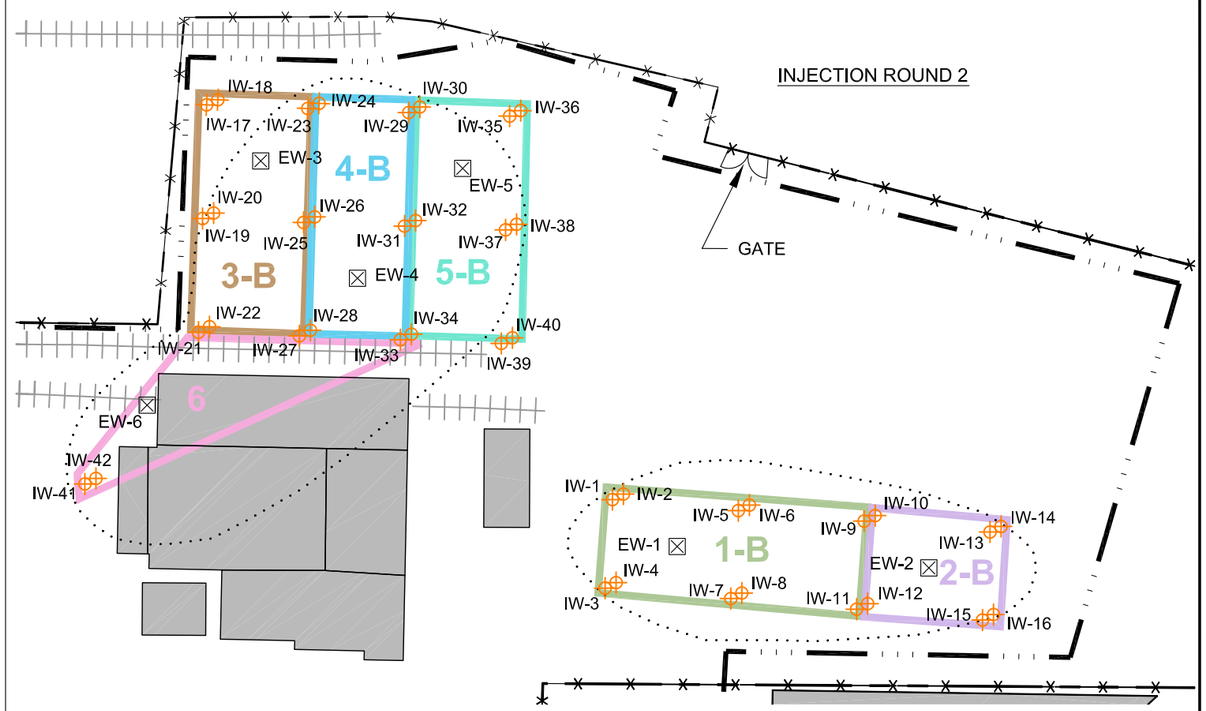
Project: Stericycle Georgetown
Date: Wed 2/22/17

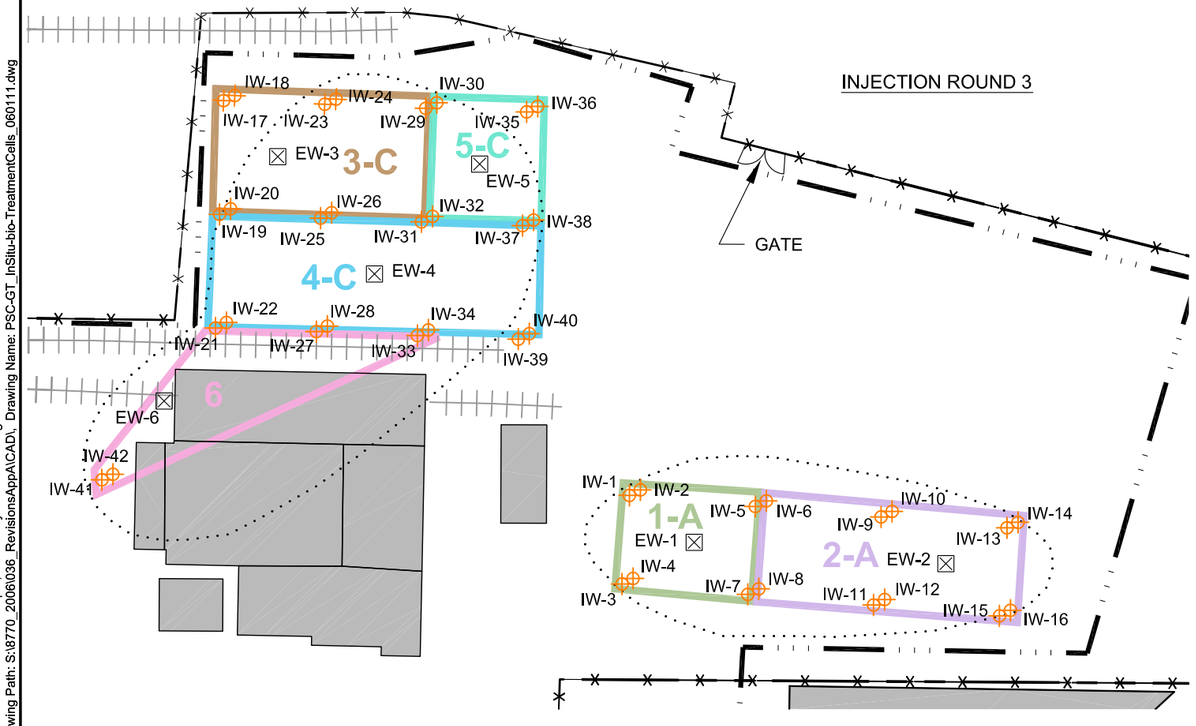
Task | Split | Milestone | Summary | Manual Summary | Progress

DALTON OLMSTED FUGLEVAND

Attachment A
EDR Figures and Tables







EXPLANATION

IN SITU BIOREMEDIATION SYSTEM

- NEW BIOREMEDIATION EXTRACTION WELL
- NEW BIOREMEDIATION INJECTION WELL PAIRS
- 2-B — TREATMENT CELL FOR ISB

OTHER FEATURES

- SUSPECTED DNAPL AREA
- BUILDING
- FENCE / PROPERTY BOUNDARY
- LOCATION OF EXISTING BARRIER WALL

0 30 60

APPROXIMATE SCALE IN FEET

NOTE:

TREATMENT CELLS SHOWN IN THIS FIGURE REPRESENT WELL CLUSTERS TO BE USED DURING INDIVIDUAL TREATMENT EVENTS AS LISTED IN TABLE A-3. THE AREAS OF TREATMENT ARE EXPECTED TO BE SIGNIFICANTLY LARGER THAN THE CELLS SHOWN HERE BASED ON PARTICLE TRACKING. SEE ATTACHMENT A-2 FOR ADDITIONAL INFORMATION REGARDING PARTICLE TRACKING.

TREATMENT CELLS FOR ISB
PSC Georgetown Facility
Seattle, Washington

By: APS	Date: 06/01/11	Project No. 08770
AMEC Geomatrix		Figure **A-2**

Plot Date: 06/01/11 - 1:30pm, Plotted by: adam.stenberg
Drawing Path: S:\8770_2006\036_RevisionsApp\ACAD\, Drawing Name: PSC-GT_InSitu-bio-TreatmentCells_060111.dwg

TABLE A-3

TREATMENT CELLS FOR ISB

PSC Georgetown Facility

Seattle, Washington

Injection Round	Treatment Cell	Extraction Well	Target Extraction Flowrate (gpm)	Injection Wells				Target Injection Well Flow rates (gpm)				Longest distance between EW and IW (feet)	Estimated Recirculation time (days)
1st Injection	Cell 1-A	EW-1	40	IW-1	IW-3	IW-5	IW-7	5	5	5	5	30	3-5
				IW-2	IW-4	IW-6	IW-8	5	5	5	5		
1st Injection	Cell 2-A	EW-2	40	IW-13	IW-15	IW-5	IW-7	2.5	2.5	7.5	7.5	77	10-15
				IW-14	IW-16	IW-6	IW-8	2.5	2.5	7.5	7.5		
1st Injection	Cell 3-A	EW-3	40	IW-17	IW-19	IW-23	IW-25	5	5	5	5	30	3-5
				IW-18	IW-20	IW-24	IW-26	5	5	5	5		
1st Injection	Cell 4-A	EW-4	40	IW-19	IW-21	IW-37	IW-39	5	5	5	5	64	10-15
				IW-20	IW-22	IW-38	IW-40	5	5	5	5		
1st Injection	Cell 5-A	EW-5	40	IW-23	IW-25	IW-35	IW-37	7.5	7.5	2.5	2.5	64	10-15
				IW-24	IW-26	IW-36	IW-38	7.5	7.5	2.5	2.5		
1st Injection	Cell 6	EW-6	40	IW-21	IW-27	IW-33	IW-41	2.5	7.5	7.5	2.5	100	15
				IW-22	IW-28	IW-34	IW-42	2.5	7.5	7.5	2.5		
2nd Injection	Cell 1-B	EW-1	40	IW-1	IW-3	IW-9	IW-11	2.5	2.5	7.5	7.5	77	10-15
				IW-2	IW-4	IW-10	IW-12	2.5	2.5	7.5	7.5		
2nd Injection	Cell 2-B	EW-2	40	IW-13	IW-15	IW-9	IW-11	5	5	5	5	30	3-5
				IW-14	IW-16	IW-10	IW-12	5	5	5	5		
2nd Injection	Cell 3-B	EW-3	40	IW-17	IW-23	IW-21	IW-27	2.5	2.5	7.5	7.5	71	10-15
				IW-18	IW-24	IW-22	IW-28	2.5	2.5	7.5	7.5		
2nd Injection	Cell 4-B	EW-4	40	IW-23	IW-29	IW-27	IW-33	7.5	7.5	2.5	2.5	71	10-15
				IW-24	IW-30	IW-28	IW-34	7.5	7.5	2.5	2.5		
2nd Injection	Cell 5-B	EW-5	40	IW-29	IW-35	IW-33	IW-39	2.5	2.5	7.5	7.5	71	10-15
				IW-30	IW-36	IW-34	IW-40	2.5	2.5	7.5	7.5		
2nd Injection	Cell 6	EW-6	40	IW-21	IW-27	IW-33	IW-41	2.5	7.5	7.5	2.5	100	15
				IW-22	IW-28	IW-34	IW-42	2.5	7.5	7.5	2.5		

TABLE A-3

TREATMENT CELLS FOR ISB
PSC Georgetown Facility
Seattle, Washington

Injection Round	Treatment Cell	Extraction Well	Target Extraction Flowrate (gpm)	Injection Wells				Target Injection Well Flow rates (gpm)				Longest distance between EW and IW (feet)	Estimated Recirculation time (days)
3rd Injection	Cell 1-A	EW-1	40	IW-1	IW-3	IW-5	IW-7	5	5	5	5	30	3-5
				IW-2	IW-4	IW-6	IW-8	5	5	5	5		
3rd Injection	Cell 2-A	EW-2	40	IW-13	IW-15	IW-5	IW-7	2.5	2.5	7.5	7.5	77	10-15
				IW-14	IW-16	IW-6	IW-8	2.5	2.5	7.5	7.5		
3rd Injection	Cell 3-C	EW-3	40	IW-17	IW-19	IW-29	IW-31	2.5	2.5	7.5	7.5	64	10-15
				IW-18	IW-20	IW-30	IW-32	2.5	2.5	7.5	7.5		
3rd Injection	Cell 4-C	EW-4	40	IW-19	IW-21	IW-37	IW-39	5	5	5	5	64	10-15
				IW-20	IW-22	IW-38	IW-40	5	5	5	5		
3rd Injection	Cell 5-C	EW-5	40	IW-29	IW-31	IW-35	IW-37	5	5	5	5	30	3-5
				IW-30	IW-32	IW-36	IW-38	5	5	5	5		
3rd Injection	Cell 6	EW-6	40	IW-21	IW-27	IW-33	IW-41	2.5	7.5	7.5	2.5	100	15
				IW-22	IW-28	IW-34	IW-42	2.5	7.5	7.5	2.5		

Abbreviations
ISB = in situ bioremediation
gpm = gallon per minute

DRAFT INJECTION CONCENTRATIONS FOR IN SITU BIOREMEDIATION
PSC Georgetown Facility
Seattle, Washington

Injection Round	Treatment Cell	Extraction Well	Target Volume (gallons)	Target Formation Dose (mg/L)	Required Mass Molasses (lbs)	Pathlength between EW and IW (feet)	Estimated Recirculation time (days)	Injection Concentration [1] (mg/L)	Injection Flow Rate (gpm)	Number of Injection Points	Proposed Injection Pattern	Injection Duration (hours)	Number of Injections per round	Total Mass Injected (lbs)	Extration Well Breakthrough Concentration (mg/L)
1st Injection	Cell 1-A	EW-1	222,567	500	927	30	3	650	5.0	8.0	Constant	72	1	936	200
1st Injection	Cell 2-A	EW-2	333,851	500	1,391	77	10	1,300	7.5	4.0	1 day inj/2 days recirc	24	3	1404	100
	Cell 2-A	EW-2	111,284	500	464	30	3	1,300	2.5	4.0	Constant	72	1	468	50
		EW-2 Total	445,134		1,855								EW-2 Total	1872	
1st Injection	Cell 3-A	EW-3	143,207	500	597	30	3	650	5.0	8.0	Constant	24	2	624	200
1st Injection	Cell 4-A	EW-4	429,622	500	1,790	64	10	1,300	5.0	8.0	1 day inj/2 days recirc	24	3	1872	200
1st Injection	Cell 5-A	EW-5	175,131	500	730	64	10	1,300	7.5	4.0	(days1-3) 1 day inj/2 days recirc	8	1	156	NA
								800	7.5	4.0	(days 4-10) 1 day inj/2 days recirc	24	2	576	100
			111,284	500	464	30	3	1,300	2.5	4.0	Constant	72	1	468	50
		EW-5 Total	286,415		1,193								EW-5 Total	1200	
1st Injection	Cell 6	EW-6	111,284	500	464	30	3	1,300	2.5	4.0	Constant	72	1	468	50
			318,339	500	1,326	100	15	1,300	7.5	4.0	(days1-3) 1 day inj/2 days recirc	8	1	156	NA
								800	7.5	4.0	(days 4-15) 1 day inj/2 days recirc	24	4	1152	100
		EW-6 Total	429,622		1,790								EW-6 Total	1776	
		TOTALS	**1,956,569**		**8,152**									**8,280**	
2nd Injection	Cell 1-B	EW-1	333,851	500	1,391	77	10	1,300	7.5	4.0	1 day inj/2 days recirc	24	3	1404	100
		EW-1	111,284	500	464	30	3	1,300	2.5	4.0	Constant	72	1	468	50
		EW-1 Total	445,134		1,855								EW-1 Total	1872	
2nd Injection	Cell 2-B	EW-2	222,567	500	927	30	3	650	5.0	8.0	Constant	72	1	936	200
2nd Injection	Cell 3-B	EW-3	175,131	500	730	71	10	1,300	7.5	4.0	(days1-3) 1 day inj/2 days recirc	8	1	156	NA
								900	7.5	4.0	(days 4-10) 1 day inj/2 days recirc	24	2	648	100
			111,284	500	464	30	3	1,300	2.5	4.0	Constant	72	1	468	50
		EW- 3 Total	286,415		1,193								EW- 3 Total	1272	
2nd Injection	Cell 4-B	EW-4	175,131	500	730	71	10	1,300	7.5	4.0	(days1-3) 1 day inj/2 days recirc	8	1	156	NA
								900	7.5	4.0	(days 4-10) 1 day inj/2 days recirc	24	2	648	100
			111,284	500	464	30	3	1,300	2.5	4.0	Constant	72	1	468	50
		EW-4 Total	286,415		1,193								EW-4 Total	1272	
2nd Injection	Cell 5-B	EW-5	175,131	500	730	71	10	1,300	7.5	4.0	(days1-3) 1 day inj/2 days recirc	8	1	156	NA
								900	7.5	4.0	(days 4-10) 1 day inj/2 days recirc	24	2	648	100
			111,284	500	464	30	3	1,300	2.5	4.0	Constant	72	1	468	50
		EW-5 Total	286,415		1,193								EW-5 Total	1272	
2nd Injection	Cell 6	EW-6	111,284	500	464	30	3	1,300	2.5	4.0	Constant	72	1	468	50
			318,339	500	1,326	100	15	1,300	7.5	4.0	(days1-3) 1 day inj/2 days recirc	8	1	156	NA
								800	7.5	4.0	(days 4-15) 1 day inj/2 days recirc	24	4	1152	100
		EW-6 Total	429,622		1,790								EW-6 Total	1776	
		TOTALS	**1,956,569**		**8,152**									**7464**	
3rd Injection	Cell 1-A	EW-1	222,567	500	927	30	3	650	5.0	8.0	Constant	72	1	936	200
3rd Injection	Cell 2-A	EW-2	333,851	500	1,391	77	10	1,300	7.5	4.0	1 day inj/2 days recirc	24	3	1404	100
			111,284	500	464	30	3	1,300	2.5	4.0	Constant	72	1	468	50
		EW-2 Total	445,134		1,855								EW-2 Total	1872	
3rd Injection	Cell 3-C	EW-3	175,131	500	730	64	10	1,300	7.5	4.0	(days1-3) 1 day inj/2 days recirc	8	1	156	NA
								800	7.5	4.0	(days 4-10) 1 day inj/2 days recirc	24	2	576	100
			111,284	500	464	30	3	1,300	2.5	4.0	Constant	72	1	468	50
		EW- 3 Total	286,415		1,193								EW- 3 Total	1200	
3rd Injection	Cell 4-A	EW-4	429,622	500	1,790	64	10	1,300	5.0	8.0	1 day inj/2 days recirc	24	3	1872	200
3rd Injection	Cell 5-C	EW-5	143,207	500	597	30	3	650	5.0	8.0	1 day inj/1day recirc/1 day inj	24	2	624	200

DRAFT INJECTION CONCENTRATIONS FOR IN SITU BIOREMEDIATION
PSC Georgetown Facility
Seattle, Washington

Injection Round	Treatment Cell	Extraction Well	Target Volume (gallons)	Target Formation Dose (mg/L)	Required Mass Molasses (lbs)	Pathlength between EW and IW (feet)	Estimated Recirculation time (days)	Injection Concentration [1] (mg/L)	Injection Flow Rate (gpm)	Number of Injection Points	Proposed Injection Pattern	Injection Duration (hours)	Number of Injections per round	Total Mass Injected (lbs)	Extration Well Breakthrough Concentration (mg/L)
3rd Injection	Cell 6	EW-6	111,284	500	464	30	3	1,300	2.5	4.0	Constant	72	1	468	50
			318,339	500	1,326	100	15	1,300	7.5	4.0	(days1-3) 1 day inj/2 days recirc	8	1	156	NA
								800	7.5	4.0	(days 4-15) 1 day inj/2 days recirc	24	4	1152	100
		EW-6 Total	429,622		1,790								EW-6 Total	1776	
		TOTALS	**1,956,569**		**8,152**									**8,280**	

Note:
1. In order to ensure the correct dose is supplied to the target area, injection concentrations will have to be adjusted in the field based on actual flow conditions.

Abbreviations
EW = extraction well
inj = injection
ISB = in situ bioremediation
IW = injection well
lbs = feet
lbs = pounds
mg/L = milligrams per liter
NA = Not Applicable
recirc = recirculation

ISB BACKUP CALCULATIONS
PSC Georgetown Facility
Seattle, Washington

Treatment Volume

	Vertical Extent		Target		Groundwater			Molasses		
	Min Depth	Max Depth	Area	Soil	Volume			Formation Target Concentration	Mass	
	ft	ft	ft^2	porosity	ft^3	gallons	liters	mg/L	g	lbs
North Field	10	35	19692	0.35	172,309	1,288,868	4,871,919	500	2435960	5370
South Field	10	35	10202	0.35	89,265	667,701	2,523,911	500	1261955	2782
Totals			29,894		261,573	1,956,569	7,395,830			8152

Substrate Dose

Extraction	Molasses		Mass
Flowrate	Dose Concentration	Time	Molasses
GPM	mg/L	days	lbs
40	200	1	96
40	300	3	432
40	300	5	720
40	300	10	1440
40	300	15	2160

Notes:
Target Area based on Suspected DNAPL Area shown in Drawing A-11(In Situ Bioremediation Site Plan).

Abbreviations
ft = feet
mg/L = milligrams per liter
lbs = pounds
GPM = gallons per minute

ISB BACKUP CALCULATIONS
PSC Georgetown Facility
Seattle, Washington

Target Substrate Dosing for ISB

Injection Round	Treatment Cell	Extraction Well	Target Volume (gallons)	Target Formation Dose (mg/L)	Required Mass Molasses (lbs)
1st Injection	Cell 1-A	EW-1	222,567	500	927
1st Injection	Cell 2-A	EW-2	445,134	500	1,855
1st Injection	Cell 3-A	EW-3	143,207	500	597
1st Injection	Cell 4-A	EW-4	429,622	500	1,790
1st Injection	Cell 5-A	EW-5	286,415	500	1,193
1st Injection	Cell 6	EW-6	429,622	500	1,790
Totals			1,956,569		8,152
2nd Injection	Cell 1-B	EW-1	445,134	500	1,855
2nd Injection	Cell 2-B	EW-2	222,567	500	927
2nd Injection	Cell 3-B	EW-3	286,415	500	1,193
2nd Injection	Cell 4-B	EW-4	286,415	500	1,193
2nd Injection	Cell 5-B	EW-5	286,415	500	1,193
2nd Injection	Cell 6	EW-6	429,622	500	1,790
Totals			1,956,569		8,152
3rd Injection	Cell 1-A	EW-1	222,567	500	927
3rd Injection	Cell 2-A	EW-2	445,134	500	1,855
3rd Injection	Cell 3-C	EW-3	286,415	500	1,193
3rd Injection	Cell 4-A	EW-4	429,622	500	1,790
3rd Injection	Cell 5-C	EW-5	143,207	500	597
3rd Injection	Cell 6	EW-6	429,622	500	1,790
Totals			1,956,569		8,152

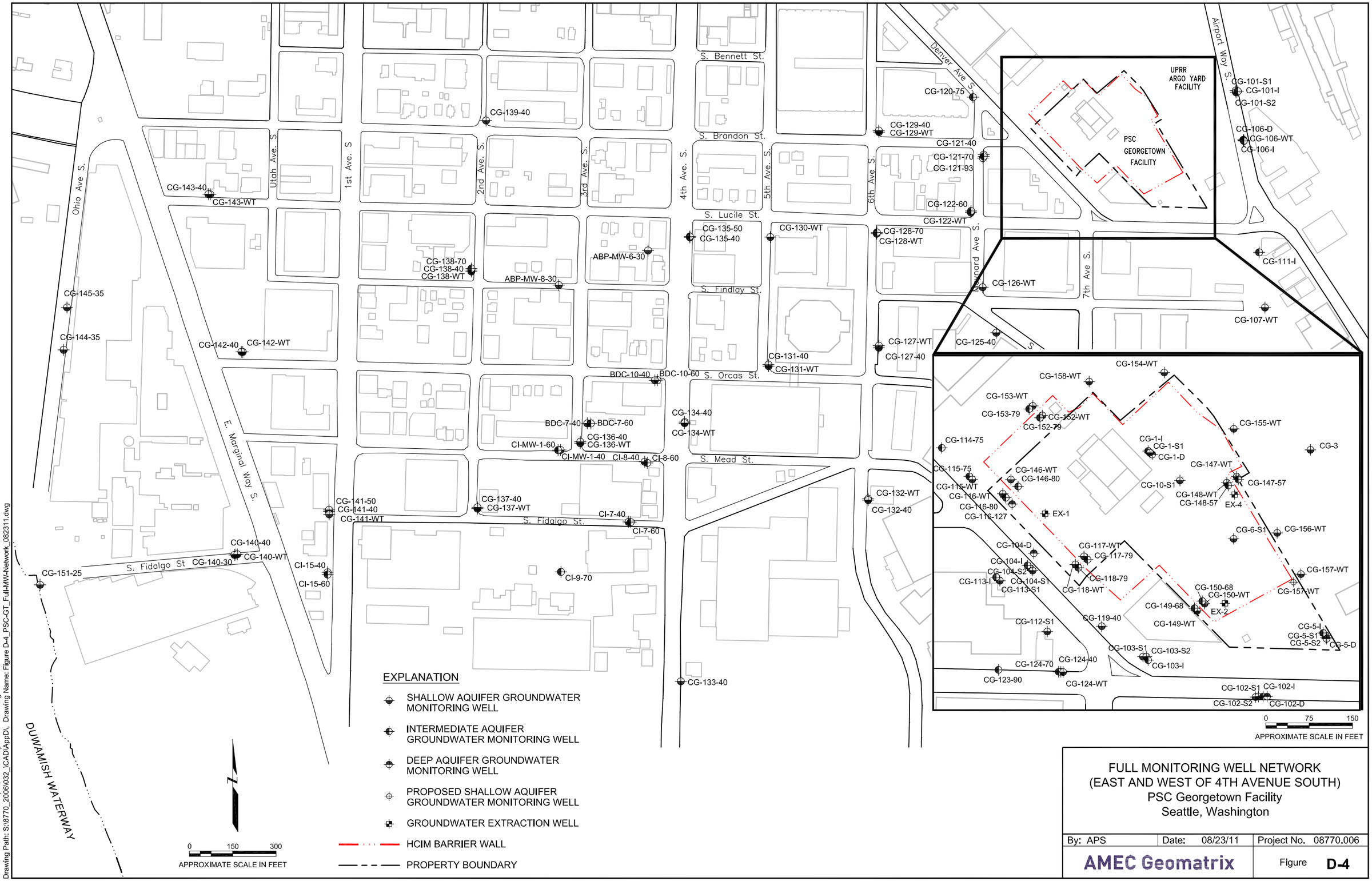
Abbreviations
ISB = in situ bioremediation
lbs = pounds
mg/L = milligrams per liter

ISB BACKUP CALCULATIONS
PSC Georgetown Facility
Seattle, Washington

Extraction Well Concentration Estimates

Model	# days recirculation	Pathway	Flowrate GPM	Tracks Captured %	Molasses Dose mg/L	Estimated Molasses Extraction Well Concentration mg/L
Recirculation Model 4	3 days	30 foot pathway	10	45%	500	225
Recirculation Model 5	5 days	30 foot pathway	10	65%	500	325
Recirculation Model 6	3 days	30 foot pathway	5	45%	500	56
	3 days	80 foot pathway	15	0%	500	
	5 days	30 foot pathway	5	65%	500	81
	5 days	80 foot pathway	15	0%	500	
	10 days	80 foot pathway	15	0%	500	0
	15 days	80 foot pathway	15	20%	500	100
Recirculation Model 7	3 days	30 foot pathway	5	45%	500	56
	3 days	80 foot pathway	15	0%	500	
	5 days	30 foot pathway	5	65%	500	81
	5 days	80 foot pathway	15	0%	500	
	10 days	80 foot pathway	15	0%	500	0
	15 days	80 foot pathway	15	20%	500	100
Recirculation Model 9	10 days	50 foot pathway	10	45%	500	225
Recirculation Model 10	15 days	50 foot pathway	10	60%	500	300

Abbreviations
GPM = gallon per minute
mg/L = milligrams per liter

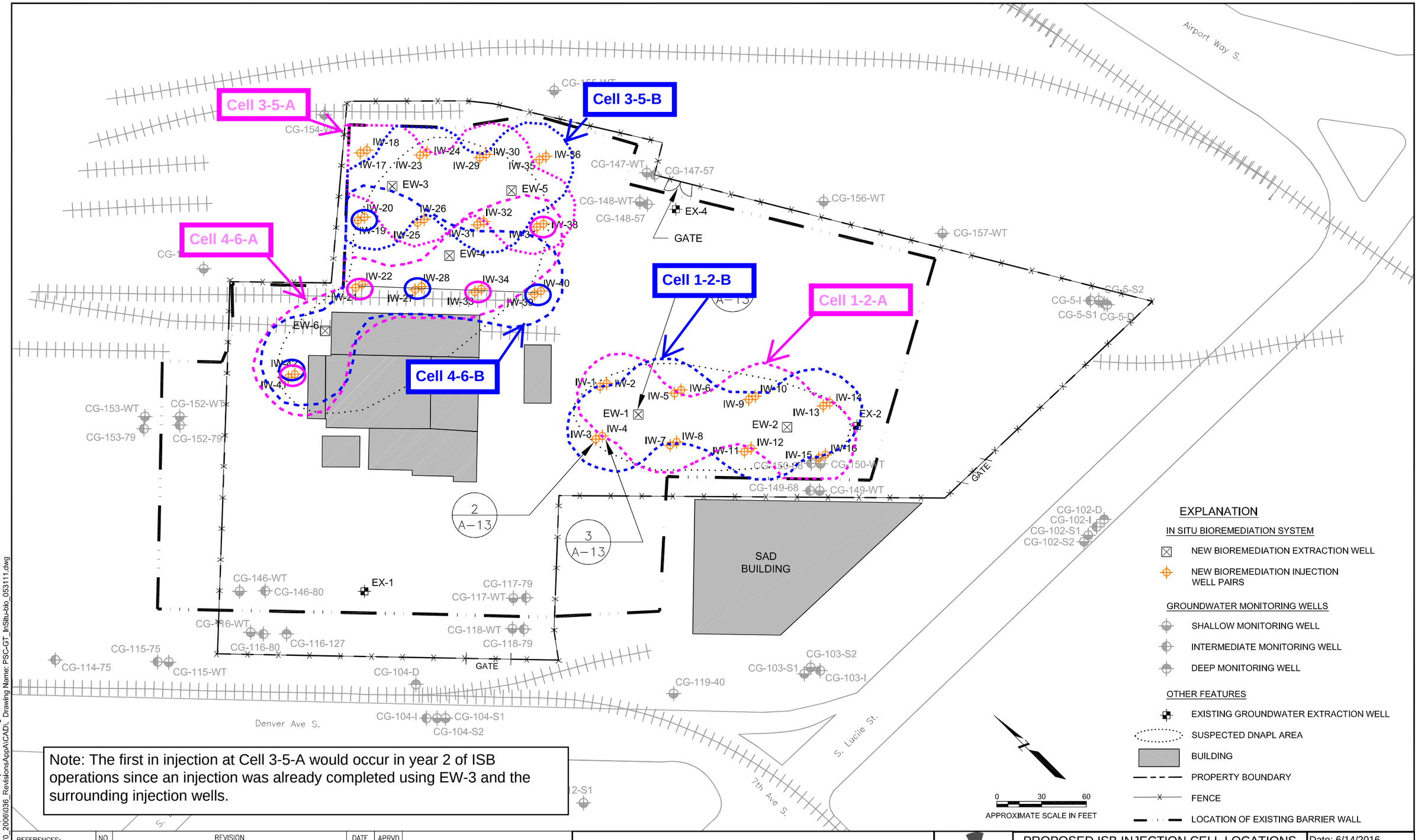


Plot Date: 08/23/11 - 1:59pm, Plotted by: adam.stenberg
Drawing Path: S:\8770_2006\032_\CAD\AppD\, Drawing Name: Figure D-4_PSC-GT_Full-MW-Network_082311.dwg

FULL MONITORING WELL NETWORK
(EAST AND WEST OF 4TH AVENUE SOUTH)
PSC Georgetown Facility
Seattle, Washington

By: APS	Date: 08/23/11	Project No. 08770.006
AMEC Geomatrix		Figure D-4

Attachment B
June 2016 Injection Plan



Note: The first in injection at Cell 3-5-A would occur in year 2 of ISB operations since an injection was already completed using EW-3 and the surrounding injection wells.

Plot Date: 05/31/11 - 3:46pm, Plotted by: adam.stenberg
Drawing Path: S:\8770_2006\036_RevisionsAppA\CAD\, Drawing Name: PSC-GT_InSitu-bio_053111.dwg

REFERENCES:	NO.	REVISION	DATE	APRVD
PLANS				
DATUM				
HORIZONTAL DATUM: WASP NAD83 N. FT.				
VERTICAL DATUM: NAVD 88 FT.				

DRAWN AS
DESIGNED HS
CHECKED PRH
REVIEWED LMM

Amec Foster Wheeler Environment & Infrastructure
600 University St., Ste. 600
Seattle, Washington

PROPOSED ISB INJECTION CELL LOCATIONS

Stericycle Georgetown Facility
Seattle, Washington

Date: 6/14/2016
Project 8770
Figure 1

Table B-1: Proposed ISB Treatment Cells and Injection Volumes June 2016

Treatment Cell	Extraction Well	Injection Wells	Target Extraction Volume (gal)	Target Formation Volume (gal)	Target Formation Dose (mg/L)	Required Mass (lbs)	Estimated Injection Time (days)	Modeled MinTime Req. for substrate to reach EW (days)	Estimated Recirculation Time (days)	Number of Extraction Points	Intended Extraction Flow Rate per well (gpm)	Number of Injection Pairs	Average Injection Flow Rate Per well (gpm)	Injection Pattern
Remaining treatment cells Injection event 1														
1-2-A	EW-1, EW-2	IW-1, IW-2, IW-7, IW-8, IW-9, IW-10, IW-15, IW-16	172,800	353,430	150	442	8	9	10	2	7.5	4	1.875	Pump test for 1 day. Inject at all wells for 8 days. Recirculate for 1 day.
4-6-A	EW-4, EW-6	IW-21, IW-22, IW-33, IW-34, IW-37, IW-38, IW-41, IW-42	237,600	740,520	150	926	11	12 12 52 15	13	2	7.5	4	1.875	Pump test for 1 day. Inject at all wells for 11 days. Recirculate for 1 day.
2nd Injection Event														
1-2-B	EW-1, EW-2	IW-3, IW-4, IW-5, IW-6, IW-11, IW-12, IW-13, IW-14	172,800	353,430	150	442	8	9	10	2	7.5	4	1.875	Pump test for 1 day. Inject at all wells for 8 days. Recirculate for 1 day.
3-5-B	EW-3, EW-5	IW-19, IW-20, IW-23, IW-24, IW-31, IW-32, IW-35, IW-36	172,800	325,380	150	407	8	9	10	2	7.5	4	1.875	Pump test for 1 day. Inject at all wells for 8 days. Recirculate for 1 day.
4-6-B	EW-4, EW-6	IW-19, IW-20,	270,000	212,058	150	265	25	39	36	2	7.5	2	3.75	Pump test for 1 day. Inject at IW-19/20 and IW-39/40 pairs for 25 days. Pump test at all wells for 1 day. Inject at all wells for 8 days. Recirculate for 1 day.
		IW-27, IW-28,	43,200	90,882	150	114	8	9	10	2	7.5	4	1.875	
		IW-39, IW-40,	270,000	212,058	150	265	25	35	36	2	7.5	2	3.75	
		IW-41, IW-42	43,200	90,882	150	114	8	19	10	2	7.5	4	1.875	
TOTAL ANNUAL DEMAND			1,382,400	2,378,640	150	2973	--	--	79	--	7.5	--	--	--

Table B-2: Proposed Additional Performance Monitoring June 2016

Treatment Cell	Extraction Well	Injection Wells	TOC Monitoring Points
Stericycle Proposed Performance Monitoring 06/21/16			
4-6-A	EW-4, EW-6	IW-21, IW-22, IW-33, IW-34, IW-37, IW-38, IW-41, IW-42	Ideal- IW-27,31 Maybe OK 39, and EW-5
4-6-B	EW-4, EW-6	IW-19, IW-20, IW-27, IW-28, IW-39, IW-40, IW-41, IW-42	Ideal- IW-21,25 Maybe OK IW-33
Ecology Proposed Performance Monitoring 06/23/16			
4-6-A-T	EW-4, EW-6	IW-21, IW-22, IW-33, IW-34, IW-27, IW-28, IW-41, IW-42	Maybe IW-39, but no points on push/pull pathway
4-6-B-T	EW-4, EW-6	IW-19, IW-20,	Ideal- IW-25,31,33, Maybe IW-21 and EW-5

Attachment C
Injection Details

EW - 3 CELL 3-A INJECTION DATA, ISB ROUND 1
Stericycle Georgetown Facility
Seattle, Washington

GENERAL PARAMETERS									INJECTION PRESSURES (PSI)								INJECTION FLOW RATES (GPM)								INJECTION FLOW TOTALS (GALLONS)								SUBSTRATE			
DATE	TIME	STAFF	PUMP	EW-1	EW-2	PI-INF	FI-INF	FI-INF	IW-15	IW-16	IW-9	IW-10	IW-8	IW-7	IW-2	IW-1	IW-15	IW-16	IW-9	IW-10	IW-8	IW-7	IW-2	IW-1	IW-15	IW-16	IW-9	IW-10	IW-8	IW-7	IW-2	IW-1	VFD	RATE	INTERV	TOTAL
MM/DD/YY	HH:MM	INTLS	HOURS	FT BTC	FT BTC	PSI	GPM	GAL	EPI-1	EPI-2	EPI-3	EPI-4	EPI-5	EPI-6	EPI-7	EPI-8	EFI-1	EFI-2	EFI-3	EFI-4	EFI-5	EFI-6	EFI-7	EFI-8	EFI-1	EFI-2	EFI-3	EFI-4	EFI-5	EFI-6	EFI-7	EFI-8	HZ	ML/MIN	INCHES	INCHES
9/13/2016	11:10	KK/SW	463.1	15.85	14.19	0	19.74	25555.5	0	0	0	0	0	0	0	2	2.97	2.82	2.75	2.87	2.9	2.88	2.75	2.62	3194.4	2898.5	3038.5	3930.8	3372.5	3172.5	2962	2986.3	2.6	23	0	0
9/14/2016	10:45	SW	486.8	18.70	15.00	0	19.55	56586.3	0	0	0	0	0	0	0	0	2.92	3.25	2.8	2.64	2.25	2.93	2.55	2.64	7073.3	7182.7	6942.4	7833.6	6903.5	7290.4	6662.1	6698.3	2.6	24.08	1.4	1.4
9/15/2016	10:30	LD	510.4	21.50	15.72	0	16.6	85622.4	2	3.5	0	4	4	2	4	3	2.31	1.09	2.89	0.71	0.23	2.38	1.72	3.34	10702.8	10133.1	10989.6	10710.6	10235.9	10804.9	10777.4	11268.1	2.6	29.32	1.5	2.75
9/16/2016	8:10	SW	532.1	21.55	14.81	0	9.78	98880.4	1	1	0	0	3	2	3	4	0.53	0.82	0.81	1.94	1.26	1.47	1.47	1.23	11791.6	11252.2	12486.3	13103.7	11637	12999.4	12333.1	13277.1	1.5	16.07	0.75	3.4
9/17/2016	8:45	SW	566.5	21.55	14.93	0	8.8	114160.2	0	0	2	2	4	2	3	3	1.98	1.81	0.03	0	0.77	0.49	0.9	0.27	16168.3	15064.7	12993.1	13149.5	13866.5	14885.4	14119.7	13913	1.5	18.8	1.4	4.75
9/18/2016	17:46	SW	589.5	21.55	15.01	0	8.55	123370.1	0	0	0	0	3	1	2	2	0.09	0.58	2.58	1.71	0.14	1.07	0.91	1.22	15421.3	15799.4	16217.3	14945	14619.1	16106	15033.4	15228.6	1.5	20.26	1	5.75
9/19/2016	8:40	SW	604.6	21.55	15.01	0	8.74	132014.9	3	3	2	4	4	2	3	4	0.2	0.67	2.88	1.36	0.53	0.88	0.95	1.21	16501.9	16194.8	18641.2	16129.5	15752.2	16822.4	15783	16189.9	1.5	30.95	1	6.75
9/20/2016	8:50	SW	628.1	24.08	15.09	0	7	142629.5	0	2	2	3	3	2	3	4	0.25	0.16	2.05	0.81	1.57	0.6	0.46	1.26	16679.8	16647	21955.4	17306.2	17586.5	17580.9	16988.7	17885	0.4	9.51	0.5	7.25
9/20/2016	12:00	PRH	632	--	--	0	7	144058.8	0	0	0	0	0	0	0	0	1.89	1.69	0.23	0.04	0.37	0.63	1.9	0.3	17074.8	16936	22008	17322	17700	17681	17370	17967	0.2	3.24	0.1	7.35
9/21/2016	13:20	SW	656.9	13.1	14.65	0	1.5	147902.1	2	0	0	4	3	2	2	3	0	0	0	0.31	0	0.64	0.48	0	17127.8	17289.2	22137.2	18007.3	17940	18555.3	18320.5	18524.8	0.2	3.24	0.1	7.45
9/22/2016	12:50	KK/SW	680.5	13.1	14.77	0	5	154172.7	0	0	0	4	2	0	1	4	3.06	0	0	0	0.48	0	0	0.88	20054.8	17854.8	22137.2	18143.7	18953.4	18927.5	18323.6	19777.7	--		0	0	7.45
9/23/2016	12:16	KK	700.8	13.14	12.59	0	0	159002.9	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	20054.8	19944.2	22152.6	18803.8	19523.9	19619.7	18888.2	20015.7	--		0	0	7.45

red = flowmeter reading is suspected to be low

blue = EFI-1 screen was malfunctioning. Flow totals in blue are estimated from other flow rates and not taken from the EFI-1 instrument.

					REQ RATE (0.71)	AVERAGE 123.97%	172800 GAL. TARGET			310 MG/L TARGET	54.63 GAL TARGET								
GENERAL DATA CHECK				**DATA SINCE LAST INSPECTION**			**DATA SINCE STARTUP**					**INJECTION FLOW TOTALS AS %REQUIRED FLOW TO DATE**							
DATE TIME	STAFF	CHECK FOR TIME CONTINUITY	FM CHECK	AVG FLOW RATE PER INTERVAL	TARGET SUBSTRATE DOSE	%REQUIRED DOSE PER INTERVAL	% REQUIRED GROUND WATER EXTRACTED	AVG FLOW RATE	% REQUIRED DOSE INJECTED	AVG INJECTION DOSE	TOTAL HFCS INJECTED TO DATE	IW-15	IW-16	IW-9	IW-10	IW-8	IW-7	IW-2	IW-1
MM/DD/YY HH:MM	INTLS	EST START TIME	SUM(INJ)/(EX)	GPM	ML/MIN	% MG/L TARGET	% GAL TARGET	GPM	% GAL TARGET	MG/L	GALLONS	%GAL	%GAL	%GAL	%GAL	%GAL	%GAL	%GAL	%GAL
9/13/16 11:10 AM	KK/SW	9/13/16 11:10 AM	114%	19.74	23.59	97.50%	14.79%	19.74	0.00%	--	-	--	--	--	--	--	--	--	--
9/14/16 10:45 AM	SW	9/13/16 11:03 AM	112%	21.93	26.21	105.18%	32.75%	21.82	18.89%	178.76	10.32	100.00%	101.55%	98.15%	**110.75%**	97.60%	103.07%	94.19%	94.70%
9/15/16 10:30 AM	LD	9/13/16 11:12 AM	88%	20.38	24.35	108.39%	49.55%	21.17	37.10%	232.05	20.27	100.00%	94.68%	102.68%	100.07%	95.64%	100.95%	100.70%	105.28%
9/16/16 8:10 AM	SW	9/13/16 11:12 AM	97%	10.20	12.19	114.29%	57.22%	17.72	45.87%	248.43	25.06	95.40%	91.04%	101.02%	106.02%	94.15%	105.17%	99.78%	107.42%
9/17/16 8:45 AM	SW	9/13/16 1:21 AM	71%	10.36	12.38	**205.97%**	66.06%	14.28	64.08%	300.60	35.01	**113.30%**	105.57%	91.05%	92.15%	97.17%	104.31%	98.95%	97.50%
9/18/16 5:46 PM	SW	9/13/16 11:22 AM	97%	4.65	5.56	**253.12%**	71.39%	12.90	77.57%	336.71	42.38	100.00%	102.45%	105.16%	96.91%	94.80%	104.44%	97.48%	98.75%
9/19/16 8:40 AM	SW	9/13/16 11:13 AM	99%	9.67	11.56	**269.67%**	76.40%	12.54	91.06%	369.37	49.75	100.00%	98.14%	**112.96%**	97.74%	95.46%	101.94%	95.64%	98.11%
9/20/16 8:50 AM	SW	9/13/16 11:50 AM	102%	7.32	8.75	109.81%	82.54%	11.83	97.81%	367.20	53.43	93.56%	93.37%	**123.15%**	97.07%	98.64%	98.61%	95.29%	100.32%
9/20/16 12:00 PM	PRH	9/13/16 11:06 AM	101%	7.52	8.99	**163.10%**	83.37%	11.69	99.16%	368.57	54.17	94.82%	94.05%	**122.22%**	96.19%	98.29%	98.19%	96.46%	99.78%
9/21/16 1:20 PM	SW	9/13/16 11:35 AM	95%	2.53	3.02	60.66%	85.59%	10.52	100.51%	363.88	54.91	92.64%	93.52%	**119.74%**	97.40%	97.04%	100.37%	99.10%	100.20%
9/22/16 12:50 PM	KK/SW	9/13/16 11:30 AM	88%	4.45	5.31	0.00%	89.22%	9.86	100.51%	349.09	54.91	104.06%	92.65%	**114.87%**	94.15%	98.35%	98.21%	95.08%	102.63%
9/23/16 12:16 PM	KK	9/13/16 2:34 PM	NA	3.44	4.11	0.00%	92.02%	9.36	100.51%	338.49	54.91	100.90%	100.35%	**111.46%**	94.61%	98.23%	98.71%	95.03%	100.71%

EW - 3 CELL 3-A INJECTION DATA, ISB ROUND 1
Stericycle Georgetown Facility
Seattle, Washington

GENERAL PARAMETERS									INJECTION PRESSURES (PSI)								INJECTION FLOW RATES (GPM)								INJECTION FLOW TOTALS (GALLONS)								SUBSTRATE			
DATE	TIME	STAFF	PUMP	EW-4	EW-6	PI-INF	FI-INF	FI-INF	IW-41	IW-42	IW-37	IW-38	IW-22	IW-21	IW-34	IW-33	IW-41	IW-42	IW-37	IW-38	IW-22	IW-21	IW-34	IW-33	IW-41	IW-42	IW-37	IW-38	IW-22	IW-21	IW-34	IW-33	VFD	RATE	INTER'	TOTAL
MM/DD/YY	HH:MM	INTLS	HOURS	FT BTC	FT BTC	PSI	GPM	GAL	EPI-1	EPI-2	EPI-3	EPI-4	EPI-5	EPI-6	EPI-7	EPI-8	EFI-1	EFI-2	EFI-3	EFI-4	EFI-5	EFI-6	EFI-7	EFI-8	EFI-1	EFI-2	EFI-3	EFI-4	EFI-5	EFI-6	EFI-7	EFI-8	HZ	ML/MIN	INCHE	INCHES
8/31/2016	14:45	LD	161.2	9.70	11.89	0	16.62	0	3	4	2	2	2	1	1	2	2.34	2.13	2.23	2.32	2.15	2.17	2.09	2.7	0	0	0	0	0	0	0	0	2.5	35	0	0
8/31/2016	17:00	LD	163.5	9.70	11.90	1	16.68	2288	3	4	2	2	0	0	0	0	2.39	2.1	2.23	2.3	2.13	2.19	2.29	2.4	329.5	294.5	309.4	322.5	292.3	300.4	276.4	382.1	2.5	35	0.1	0.1
9/1/2016	13:42	LD/MLI	184.2	9.76	11.92	0	16.31	22300.4	2	4	0	0	3	0	3	4	2.45	2.46	2.3	2.44	2.34	2.22	1.87	1.71	3290	3225.3	3118.7	3269	3269.4	2996.5	2745.9	2572.2	2.5	29.4	1.6	1.6
9/2/2016	8:51	LD/TG/	203.3	9.81	11.92	0	16.74	41499.8	3	4	0	0	4	0	0	2	2.23	2.12	2.12	2.03	2.09	2.02	3.06	2.58	5887.7	5749.3	5596.7	5672.2	5696.6	5409.7	6069.1	5492.8	2.6	19	0.875	2.5
9/3/2016	10:19	TG	228.8	9.78	11.92	0	16.07	66317.8	3	4	0	0	3	0	4	3	2.25	2.34	2.48	2.16	2.51	2.19	1.4	2.12	9362.8	9329	9325.6	9026.3	9460.2	8837	8520.3	8821.4	2.6	29.9	1.8	4.25
9/4/2016	12:00	DC	254.7	9.82	11.93	0	16.01	91271.1	0	4	0	0	2	0	0	2	2.15	2.16	1.79	2.05	2.34	2.2	2.87	2.22	12613	12597	12261	12200	13073	12223	12883	12263	2.6	22.6	1.375	5.6
9/5/2016	12:00	TG	278.4	9.86	11.99	0	15.7	114002.3	2	4	0	0	3	0	3	0	2.25	2.32	2.52	2.16	2.13	2.25	1.58	2.25	15889	15862	15850	15357	16186	15459	15436	15490	2.6	26.4	1.5	7.1
9/6/2016	10:56	LD	301.4	9.84	11.98	0	15.89	135920.5	2	4	0	0	3	0	0	1	2.18	2.12	2.13	2.27	2.04	2.19	2.67	2.06	18904.7	18854.3	18879.4	18466.6	19085	18507.2	19119.6	18434.2	2.6	27.6	1.5	8.5
9/7/2016	8:40	SW	323.8	9.99	12.08	0	15.05	155891.9	2	4	2	1	3	0	3	2	2.25	2.26	2.1	2.33	2.17	2.16	1.67	2.45	21833.1	21739.6	21689.4	21456.2	21796.5	21388.9	21503.8	21646.8	2.8	38.43	2	10.1
9/8/2016	8:50	SW	347.4	10.04	12.12	0	15.03	177693.1	3	4	3	2	3	1	4	3	2.1	2.24	2.04	2.35	2.23	2.27	1.97	2.35	24936.7	25030	24728.3	24805.6	25026.8	24709.5	23726.5	25044.4	2.8	31.43	1.8	11.6
9/9/2016	9:05	SW	371.6	10.11	12.14	0	15.76	200673.9	0	4	2	2	2	2	1	3	1.88	2.06	1.87	2.08	2.22	2.13	3.21	2.17	27590	28067.7	27679.8	27938.3	28145.7	27994.9	28502.4	28249.2	3.8	34.87	2	13.5
9/10/2016	13:00	KK	399.4	10.15	12.15	0	14.97	226299.8	0	1	0	0	0	0	0	0	2.26	2.37	2.98	2.74	2.23	2.25	1.29	1.72	31301.1	31958.3	32617	32268.1	31818.1	31634.7	30955.3	31298.2	3.8	15.15	1	14.5
9/11/2016	8:35	KK	419	10.2	12.2	0	15.52	244655.8	4	5	2	0	0	0	0	3	1.89	1.84	2.24	2.34	2.23	2.02	2.64	2.62	33576.3	34279.8	35415	35091.4	34369.6	34113.3	34037.6	34301.3	7.5	47.64	1	15.5
9/12/2016	7:35	KK/SW	442	10.36	12.24	0	15.21	265699.9	4	5	2	0	2	0	0	3	2.38	2.2	2.32	2.39	2.09	2.04	2.2	2.12	36931.2	37357.8	38591.5	38374.7	37411.4	36990.2	37230.1	37370.8	-	-	0	15.5

bolded injection rates were field-calculated.

Flow totals are italicized if taken as a sum of injection totalizers.

				REQ RATE 0.74	OVERALL 90.14%	237600 GAL. TARGET			470 MG/L TARGET	113.88 GAL TARGET								
GENERAL DATA CHECK				DATA SINCE LAST INSPECTION			DATA SINCE STARTUP					INJECTION FLOW TOTALS AS %REQUIRED FLOW TO DATE							
DATE TIME	STAFF	CHECK FOR TIME CONTINUITY	FM CHECK	AVG FLOW RATE PER INTERVAL	TARGET SUBSTRATE DOSE	%REQUIRED DOSE PER INTERVAL	% REQUIRED GROUND WATER EXTRACTED	AVG FLOW RATE	% REQUIRED DOSE INJECTED	AVG INJECTION DOSE	TOTAL HFCS INJECTED TO DATE	IW-41	IW-42	IW-37	IW-38	IW-22	IW-21	IW-34	IW-33
MM/DD/YY HH:MM	INTLS	EST START TIME	SUM(INJ)/(EX)	GPM	ML/MIN	% MG/L TARGET	% GAL TARGET	GPM	% GAL TARGET	MG/L	GALLONS	%GAL	%GAL	%GAL	%GAL	%GAL	%GAL	%GAL	%GAL
8/31/16 2:45 PM	LD	8/31/16 2:45 PM	109%	16.62	30.11	116.23%	0.00%	16.62	0.00%	--	-	--	--	--	--	--	--	--	--
8/31/16 5:00 PM	LD	8/31/16 2:45 PM	108%	16.95	30.71	67.20%	0.96%	16.95	0.65%	315.75	0.74	105.14%	93.97%	98.73%	102.91%	93.27%	95.86%	88.20%	**121.93%**
9/1/16 1:42 PM	LD/MLK	8/31/16 2:44 PM	109%	16.11	29.19	115.25%	9.39%	16.19	10.35%	518.23	11.79	107.49%	105.37%	101.89%	106.80%	106.81%	97.90%	89.71%	84.03%
9/2/16 8:51 AM	LD/TG/DC	8/31/16 2:45 PM	109%	16.71	30.27	72.08%	17.47%	16.43	16.18%	435.15	18.42	103.35%	100.92%	98.24%	99.57%	100.00%	94.96%	106.54%	96.42%
9/3/16 10:19 AM	TG	8/31/16 2:44 PM	109%	16.24	29.43	108.42%	27.91%	16.36	27.50%	462.91	31.32	103.05%	102.68%	102.64%	99.35%	104.13%	97.27%	93.78%	97.10%
9/4/16 12:00 PM	DC	8/31/16 2:35 PM	111%	16.19	29.34	83.18%	38.41%	16.29	36.24%	443.20	41.27	100.79%	100.66%	97.98%	97.49%	104.47%	97.67%	102.95%	97.99%
9/5/16 12:00 PM	TG	8/31/16 2:48 PM	111%	15.79	28.60	101.46%	47.98%	16.21	45.95%	449.87	52.33	101.26%	101.09%	101.01%	97.87%	103.15%	98.52%	98.37%	98.72%
9/6/16 10:56 AM	LD	8/31/16 2:46 PM	111%	15.93	28.86	98.21%	57.21%	16.16	55.01%	451.73	62.64	100.66%	100.39%	100.52%	98.32%	101.62%	98.54%	101.80%	98.15%
9/7/16 8:40 AM	SW	8/31/16 2:06 PM	116%	15.32	27.75	123.18%	65.61%	15.98	65.36%	467.98	74.44	100.93%	100.50%	100.27%	99.19%	100.76%	98.88%	99.41%	100.07%
9/8/16 8:50 AM	SW	8/31/16 2:41 PM	117%	15.04	27.24	105.79%	74.79%	15.91	75.07%	471.54	85.49	100.75%	101.13%	99.91%	100.22%	101.11%	99.83%	95.86%	101.19%
9/9/16 9:05 AM	SW	8/31/16 2:44 PM	112%	15.79	28.62	**127.12%**	84.46%	15.90	87.36%	485.92	99.49	98.46%	100.17%	98.78%	99.70%	100.45%	99.91%	101.72%	100.81%
9/10/16 1:00 PM	KK	8/31/16 2:48 PM	119%	15.30	27.72	60.00%	95.24%	15.83	93.84%	462.83	106.86	98.64%	100.72%	102.79%	101.69%	100.27%	99.70%	97.55%	98.63%
9/11/16 8:35 AM	KK	8/31/16 2:47 PM	115%	15.62	28.30	83.76%	102.97%	15.82	100.31%	471.21	114.23	97.61%	99.66%	102.96%	102.02%	99.92%	99.17%	98.95%	99.72%
9/12/16 7:35 AM	KK/SW	8/31/16 2:47 PM	117%	15.25	27.63	0.00%	111.83%	15.77	100.31%	471.21	114.23	98.40%	99.54%	102.82%	102.24%	99.68%	98.56%	99.20%	99.57%

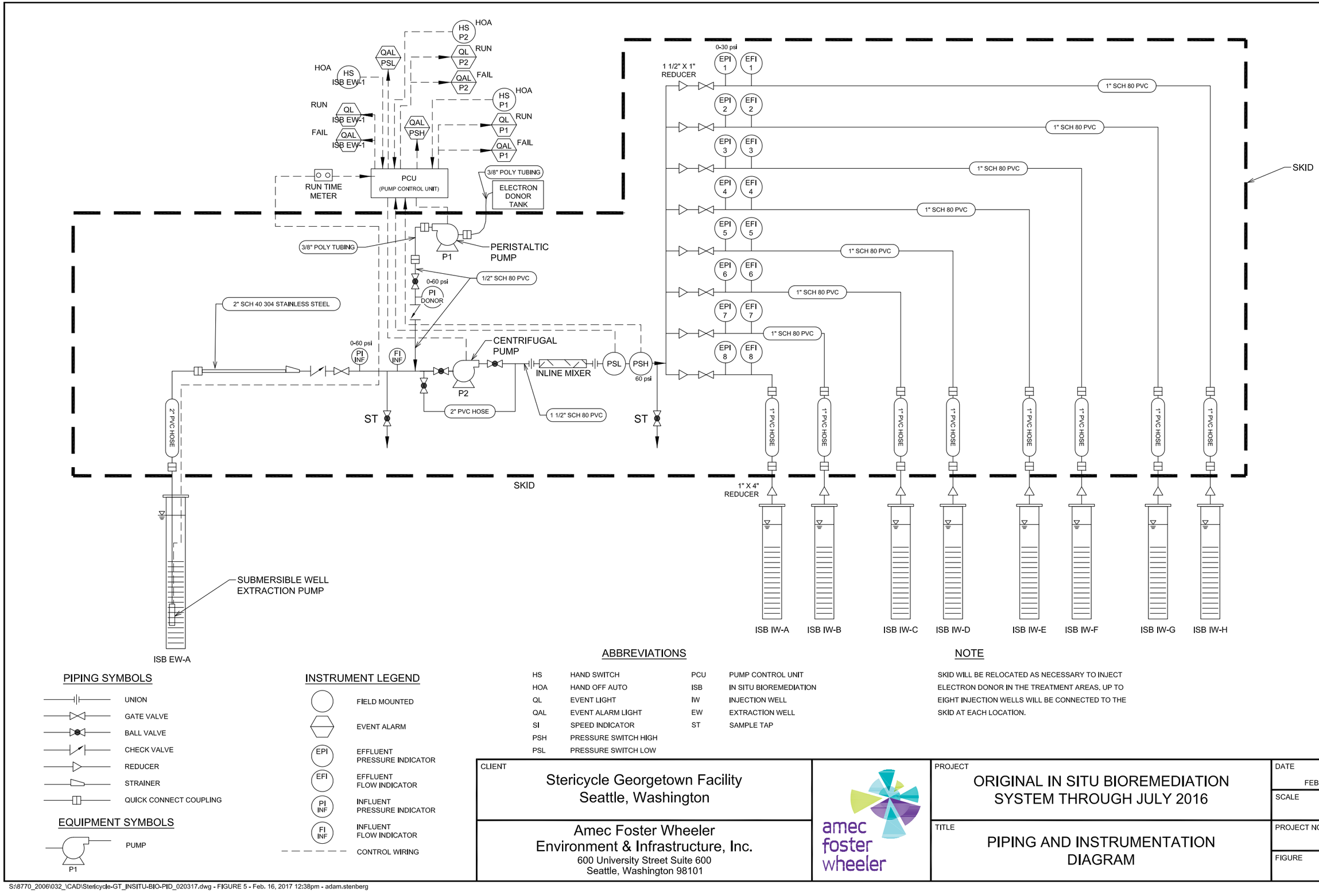
EW - 3 CELL 3-A INJECTION DATA, ISB ROUND 1
Stericycle Georgetown Facility
Seattle, Washington

GENERAL PARAMETERS								INJECTION PRESSURES (PSI)								INJECTION FLOW RATES (GPM)								INJECTION FLOW TOTALS (GALLONS)								SUBSTRATE		
DATE	TIME	STAFF	PUMP	EW-3	PI-INF	FI-INF	FI-INF	IW-17	IW-18	IW-23	IW-24	IW-25	IW-26	IW-19	IW-20	IW-17	IW-18	IW-23	IW-24	IW-25	IW-26	IW-19	IW-20	IW-17	IW-18	IW-23	IW-24	IW-25	IW-26	IW-19	IW-20	VFD	RATE	TOTAL
MM/DD/YY	HH:MM	INTLS	HOURS	FT BTC	PSI	GPM	GAL	EPI-1	EPI-2	EPI-3	EPI-4	EPI-5	EPI-6	EPI-7	EPI-8	EFI-1	EFI-2	EFI-3	EFI-4	EFI-5	EFI-6	EFI-7	EFI-8	EFI-1	EFI-2	EFI-3	EFI-4	EFI-5	EFI-6	EFI-7	EFI-8	HZ	ML/MIN	INCHES
4/26/2016	20:05	LD, JB	22.5	20	29	24	0	0	0	0	0	0	0	0	0	3	3	3	3	3	3	3	3	0	0	0	0	0	0	0	0	5	**63**	0
4/27/2016	13:10	LD, KK	39.58	22.8	11	15.61	*27924*	0	1.5	0	0	0	1.5	0	1	1.64	0	4.79	2.9	4.83	0	2.48	0.61	2899	3190	3975	2436	3950	3667	4172	3635	3.2	**60.4**	2
4/27/2016	15:24	LD, KK	41.81	23.15	11	14.91	*30148*	0	1.5	0	0	0	1.5	0	1	2.38	2.29	1.91	2.47	2.16	1.87	1.89	1.81	3209	3441	4271	2767	4211	3924	4429	3896	3.2	**40.5**	
4/28/2016	7:46	SW, JB	57.85	14.06	11	16.31	46761	1	0	2	2.5	0.5	1	1	2	1.26	6.82	0.52	0.88	2.42	2.78	1.19	1.67	4700	9420	5163	3782	6325	6739	5609	5514	3.2	**30.3**	1.56
4/28/2016	9:35	SW	59.67	15.56	12.5	18.21	49043	0	0	0	2.5	0	1	0.5	1	2.35	2.16	3.34	2.29	2.31	2.24	2.49	2.91	4968.2	10166	5501	4042	6582	6999	5870	5801	3.2	30.3	
4/28/2016	17:08	SW	67.21	18.35	18	17.54	57016	1	1	1	2	0.5	1	1	1	2.58	1.95	2.29	2.52	0	2.47	2.96	0	6126	11104	6588	5173	7179	8113	7190	6355	3.8	30.3	
4/29/2016	9:38	SW	83.72	23.75	13.5	12.16	72076	3	4	2	5	2	4	2	5	3.46	0.02	2.19	0.97	0	0	0	0.29	9086	12492	8784	7227	7235	8753	7598	8065	3.8	30.3	2.16
4/29/2016	10:13	SW	85.36	24.00	11	13.14	72469	2	8	4	8	4	8	5	8	2.73	0.07	2.59	0.02	0	0	5.32	0.28	9186	12495	8855	7253	7235	8753	7641	8073	2.8	**34.81**	
4/29/2016	14:53	SW	88.96	21.45	0	13.14	75839	3	8	3	9	4	8	1	9	1.59	1.6	2.18	1.64	1.55	1.58	1.14	1.38	9598	12830	9325	7707	7735	9381	8093	8497	2.8	34.81	
4/30/2016	8:00	SW	106.4	19.95	0	13.68	86623	5	10	5	10	6	10	4	12	1.48	1.03	1.58	2.05	1.68	1.11	1.4	1.35	10988	13855	10912	9716	9640	10913	9732	9851	2.8	**24.15**	1.2
4/30/2016	16:44	LD	114.8	19.62	0	12.22	91456	3	9	2	9	2	8	1	9	1.3	0.8	1.4	1.69	1.68	1.13	1.58	1.33	11649	14346	11660	10654	10535	11580	10541	10531	2.8	24.15	
5/1/2016	9:13	JB	131.3	21	0	8.92	*101966*	2	6	2	7	3	8	1	6	0.43	0.2	0.34	0.89	0.01	0	1.13	6.47	11992	14489	11957	11172	12105	11936	11704	16611	2.8	**20.29**	1.2
5/1/2016	16:59	SW	141	25	0	10.08	105189	3	8	4	10	4	7	0	7	1.47	0.51	1.52	2.05	2	1.81	1.53	0.08	12790	14879	12875	12284	13231	12650	12634	16909	2.8	**26.7**	0.6
5/2/2016	8:00	KK	153.7	24	0	8.98	111320	6	10	6	11	6	9	4	11	1.51	1.13	1.69	1.48	1.93	1.54	1.69	0.07	13890	15781	14112	13516	14620	13754	13908	16925	2.8	**32.5**	1
5/2/2016	13:27	KK	159.1	24	12.5	9.53	114484	3	11	2	9	1	7	2	6	1.55	1.46	1.73	1.28	1.91	1.84	1.8	0.13	14429	16300	14709	14066	15306	14265	14521	16967	2.8	**27.98**	
5/3/2016	11:00	LD	180.2	24	15	12.18	131146	4	9	4	11	4	12	4	10	2.58	0.24	2.25	1.77	1.24	3.14	2.17	0.56	17658	16820	17466	16811	16720	18992	17286	17816	2.8	**31.7**	1.6
5/3/2016	16:25	LD	185.8	25	12	11.24	135012	4	9	2	10	2	8	2	10	1.77	2.06	1.62	1.91	1.95	0.86	1.88	1.65	18221	17466	18000	17456	14363	19228	17893	18439	2.8	31.7	
5/4/2016	8:55	JB	202.3	25	14	11.85	146705	7	11	7	11	7	10	6	12	1.75	1.71	1.67	2	2.03	0.46	1.74	1.55	19968	19395	19700	19485	19385	19910	19708	20265	2.8	**36.76**	2
5/5/2016	12:30	SW	229.9	22.2	12	11.61	*174353*	7	10	5	12	6	10	6	10	1.3	1.39	1.09	1.52	1.31	0.31	1.08	0	22507	22235	22090	22540	22200	20602	22147	20032	2.8	**29.94**	1.75
5/6/2016	13:05	SW	254.5	24.5	12	11.61	184483	5	10	6	10	5	10	4	10	0	0	0	0	0	1.57	0	0	22718	22281	22988	22558	23785	23287	22391	23826	2.8	**26.5**	1.5
5/6/2016	20:00	SW	258.9	18.8	8	14.38	188699	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	22754	23319	22992	23007	23325	23323	22596	25664	0	0	

bolded injection rates were field-calculated.

Flow totals are italicized if taken as a sum of injection totalizers.

							143207 GAL. TARGET				650 MG/L TARGE	94.93 GAL TARGET							
GENERAL DATA CHECK				DATA SINCE LAST INSPECTION			DATA SINCE STARTUP						INJECTION FLOW TOTALS AS %REQUIRED FLOW TO DATE							
DATE TIME	STAFF	CHECK FOR TIME CONTINUITY	FM CHECK	AVG FLOW RATE PER INTERVAL	TARGET SUBSTRATE DOSE	%REQUIRED DOSE PER INTERVAL	% REQUIRED GROUND WATER EXTRACTED	AVG FLOW RATE	% REQUIRED DOSE INJECTED	AVG INJECTION DOSE	TOTAL HFCS INJECTED TO DATE		IW-17	IW-18	IW-23	IW-24	IW-25	IW-26	IW-19	IW-20
MM/DD/YY HH:MM	INTLS	EST START TIME	SUM(INJ)/(EX)	GPM	ML/MIN	% MG/L TARGET	% GAL TARGET	GPM	% GAL TARGET	MG/L	GALLONS		%GAL	%GAL	%GAL	%GAL	%GAL	%GAL	%GAL	%GAL
4/26/16 8:05 PM	LD, JB	4/26/16 8:05 PM	100%	24.00	60.13	104.78%	0.00%	24.00	0.00%	--	-		--	--	--	--	--	--	--	--
4/27/16 1:10 PM	LD, KK	4/26/16 8:05 PM	111%	27.24	68.25	88.50%	19.50%	27.25	14.14%	471.09	13.42		83.05%	91.39%	**113.88%**	69.79%	**113.16%**	105.06%	**119.52%**	104.14%
4/27/16 3:24 PM	LD, KK	4/26/16 8:05 PM	113%	16.60	41.58	97.40%	21.05%	26.02	14.14%	436.36	13.42		85.15%	91.31%	**113.33%**	73.42%	**111.74%**	104.13%	**117.53%**	103.38%
4/28/16 7:46 AM	SW, JB	4/26/16 8:25 PM	108%	16.92	42.38	71.49%	32.65%	22.05	25.17%	500.73	23.89		79.57%	**159.49%**	87.41%	64.03%	107.09%	**114.09%**	94.96%	93.35%
4/28/16 9:35 AM	SW	4/26/16 8:24 PM	110%	20.94	52.45	57.77%	34.25%	21.99	25.17%	477.45	23.89		79.60%	**162.89%**	88.14%	64.76%	105.46%	**112.14%**	94.05%	92.95%
4/28/16 5:08 PM	SW	4/26/16 8:25 PM	84%	17.60	44.09	68.72%	39.81%	21.25	25.17%	410.71	23.89		84.75%	**153.61%**	91.14%	71.56%	99.32%	**112.24%**	99.47%	87.92%
4/29/16 9:38 AM	SW	4/26/16 8:24 PM	57%	15.21	38.11	79.50%	50.33%	19.62	40.44%	521.96	38.39		104.98%	**144.33%**	101.49%	83.50%	83.59%	101.13%	87.79%	93.18%
4/29/16 10:13 AM	SW	4/26/16 7:21 PM	84%	11.23	28.13	123.74%	50.60%	19.21	40.44%	519.13	38.39		105.75%	**143.85%**	101.94%	83.50%	83.29%	100.77%	87.97%	92.94%
4/29/16 2:53 PM	SW	4/26/16 8:25 PM	96%	12.04	30.15	115.44%	52.96%	19.02	40.44%	496.07	38.39		104.94%	**140.28%**	101.96%	84.27%	84.57%	102.57%	88.49%	92.91%
4/30/16 8:00 AM	SW	4/26/16 8:04 PM	85%	10.50	26.31	91.80%	60.49%	17.20	48.92%	525.42	46.44		102.68%	**129.48%**	101.97%	90.80%	90.09%	101.98%	90.95%	92.06%
4/30/16 4:44 PM	LD	4/26/16 8:26 PM	89%	9.22	23.11	104.51%	63.86%	16.51	48.92%	497.66	46.44		101.85%	**125.43%**	101.95%	93.15%	92.11%	101.25%	92.17%	92.08%
5/1/16 9:13 AM	JB	4/26/16 8:28 PM	106%	10.63	26.62	76.21%	71.20%	15.63	57.40%	523.76	54.49		94.09%	**113.68%**	93.81%	87.65%	94.97%	93.65%	91.83%	**130.33%**
5/1/16 4:59 PM	SW	4/26/16 6:29 PM	109%	6.92	17.33	**154.09%**	73.45%	14.79	61.65%	545.22	58.52		94.52%	109.96%	95.15%	90.78%	97.78%	93.49%	93.37%	**124.96%**
5/2/16 8:00 AM	KK	4/26/16 8:48 PM	123%	6.80	17.05	**190.64%**	77.73%	14.14	68.72%	574.25	65.23		95.38%	108.36%	96.90%	92.81%	100.39%	94.44%	95.50%	**116.22%**
5/2/16 1:27 PM	KK	4/26/16 8:49 PM	123%	9.68	24.24	115.42%	79.94%	13.97	68.72%	558.39	65.23		95.74%	108.16%	97.60%	93.34%	101.56%	94.66%	96.35%	**112.59%**
5/3/16 11:00 AM	LD	4/26/16 9:18 PM	115%	12.89	32.28	98.19%	91.58%	13.86	80.03%	567.68	75.97		101.21%	96.41%	100.11%	96.36%	95.84%	108.86%	99.08%	102.12%
5/3/16 4:25 PM	LD	4/26/16 9:05 PM	122%	11.90	29.80	106.37%	94.28%	13.78	80.03%	551.43	75.97		103.33%	99.05%	102.08%	98.99%	81.45%	109.04%	101.47%	104.57%
5/4/16 8:55 AM	JB	4/26/16 9:06 PM	109%	11.81	29.59	124.23%	102.44%	13.60	94.17%	611.69	89.39		101.22%	98.32%	99.86%	98.77%	98.27%	100.93%	99.90%	102.73%
5/5/16 12:30 PM	SW	4/26/16 9:05 PM	69%	16.71	41.85	71.53%	121.75%	14.01	106.54%	692.00	101.13		103.27%	102.02%	101.36%	103.42%	101.86%	94.53%	101.62%	91.91%
5/6/16 1:05 PM	SW	4/26/16 9:07 PM	14%	6.87	17.21	**154.02%**	128.82%	13.26	117.14%	760.82	111.20		98.86%	96.96%	100.04%	98.17%	103.51%	101.34%	97.44%	103.68%
5/6/16 8:00 PM	SW	4/26/16 11:39 PM	0%	10.16	25.45	0.00%	131.77%	13.31	117.14%	760.82	111.20		97.35%	99.77%	98.37%	98.44%	99.80%	99.79%	96.68%	109.80%



PIPING SYMBOLS

- UNION
- GATE VALVE
- BALL VALVE
- CHECK VALVE
- REDUCER
- STRAINER
- QUICK CONNECT COUPLING

EQUIPMENT SYMBOLS

- PUMP (P1)

INSTRUMENT LEGEND

- FIELD MOUNTED
- EVENT ALARM
- EPI — EFFLUENT PRESSURE INDICATOR
- EFI — EFFLUENT FLOW INDICATOR
- PI INF — INFLUENT PRESSURE INDICATOR
- FI INF — INFLUENT FLOW INDICATOR
- CONTROL WIRING

ABBREVIATIONS

HS	HAND SWITCH	PCU	PUMP CONTROL UNIT
HOA	HAND OFF AUTO	ISB	IN SITU BIOREMEDIATION
QL	EVENT LIGHT	IW	INJECTION WELL
QAL	EVENT ALARM LIGHT	EW	EXTRACTION WELL
SI	SPEED INDICATOR	ST	SAMPLE TAP
PSH	PRESSURE SWITCH HIGH		
PSL	PRESSURE SWITCH LOW		

NOTE

SKID WILL BE RELOCATED AS NECESSARY TO INJECT ELECTRON DONOR IN THE TREATMENT AREAS. UP TO EIGHT INJECTION WELLS WILL BE CONNECTED TO THE SKID AT EACH LOCATION.

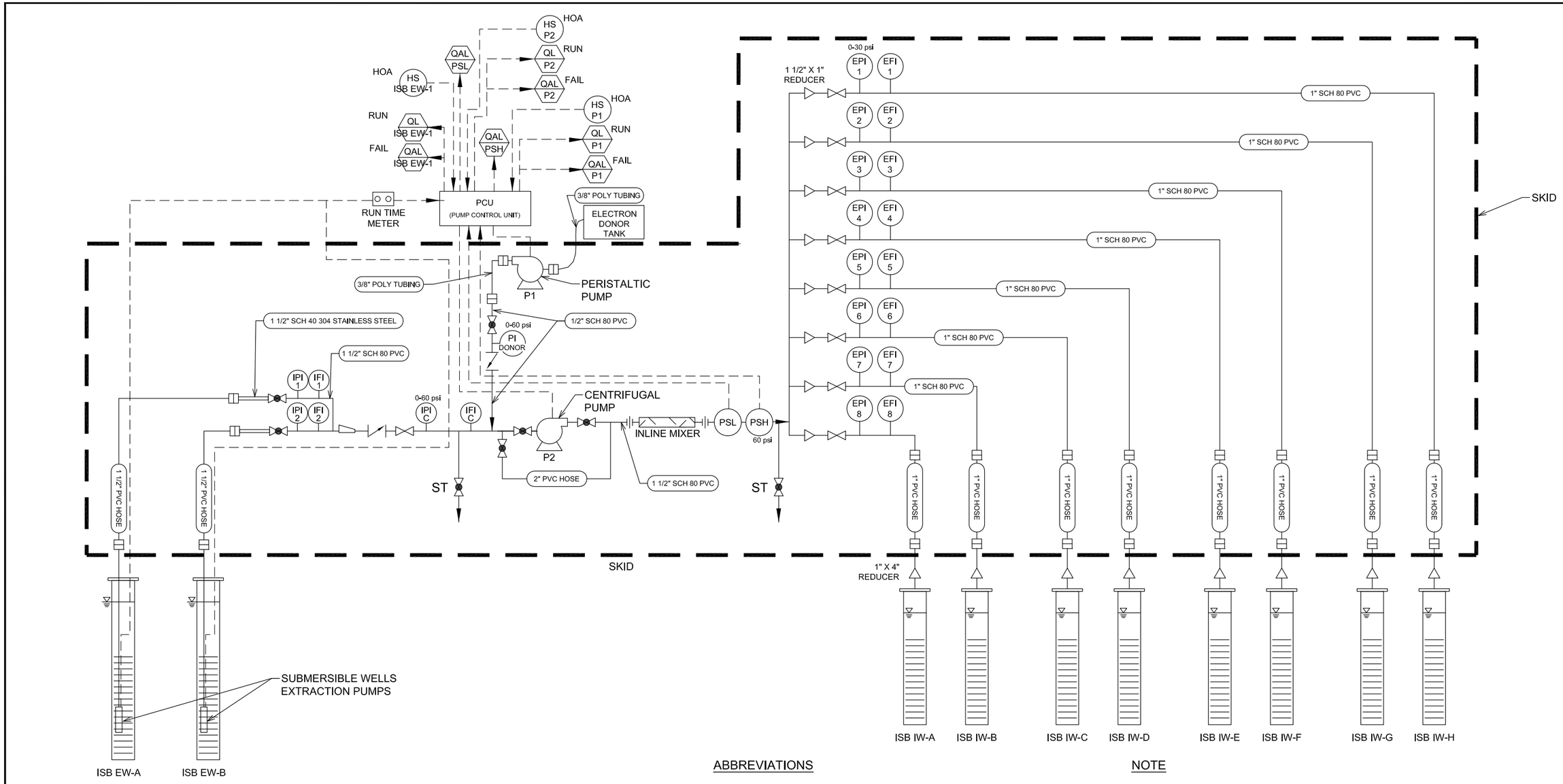
CLIENT
Stericycle Georgetown Facility
Seattle, Washington

Amec Foster Wheeler
Environment & Infrastructure, Inc.
600 University Street Suite 600
Seattle, Washington 98101

PROJECT
ORIGINAL IN SITU BIOREMEDIATION SYSTEM THROUGH JULY 2016

TITLE
PIPING AND INSTRUMENTATION DIAGRAM

DATE: FEBRUARY 2017
SCALE: AS SHOWN
PROJECT NO.: 08770
FIGURE: 5



PIPING SYMBOLS

- UNION
- GATE VALVE
- BALL VALVE
- CHECK VALVE
- REDUCER
- STRAINER
- QUICK CONNECT COUPLING

EQUIPMENT SYMBOLS

- PUMP (P1)

INSTRUMENT LEGEND

- FIELD MOUNTED
- EVENT ALARM
- EPI — EFFLUENT PRESSURE INDICATOR
- EFI — EFFLUENT FLOW INDICATOR
- IPI — INFLUENT PRESSURE INDICATOR
- IFI — INFLUENT FLOW INDICATOR
- CONTROL WIRING

ABBREVIATIONS

HS	HAND SWITCH	PCU	PUMP CONTROL UNIT
HOA	HAND OFF AUTO	ISB	IN SITU BIOREMEDIATION
QL	EVENT LIGHT	IW	INJECTION WELL
QAL	EVENT ALARM LIGHT	EW	EXTRACTION WELL
SI	SPEED INDICATOR	ST	SAMPLE TAP
PSH	PRESSURE SWITCH HIGH		
PSL	PRESSURE SWITCH LOW		

NOTE

SKID WILL BE RELOCATED AS NECESSARY TO INJECT ELECTRON DONOR IN THE TREATMENT AREAS. UP TO EIGHT INJECTION WELLS WILL BE CONNECTED TO THE SKID AT EACH LOCATION.

CLIENT
Stericycle Georgetown Facility
Seattle, Washington

Amec Foster Wheeler
Environment & Infrastructure, Inc.
600 University Street Suite 600
Seattle, Washington 98101

PROJECT
MODIFIED IN SITU BIOREMEDIATION SYSTEM AFTER JULY 2016

TITLE
PIPING AND INSTRUMENTATION DIAGRAM

DATE: FEBRUARY 2017
SCALE: AS SHOWN
PROJECT NO.: 08770
FIGURE: 6

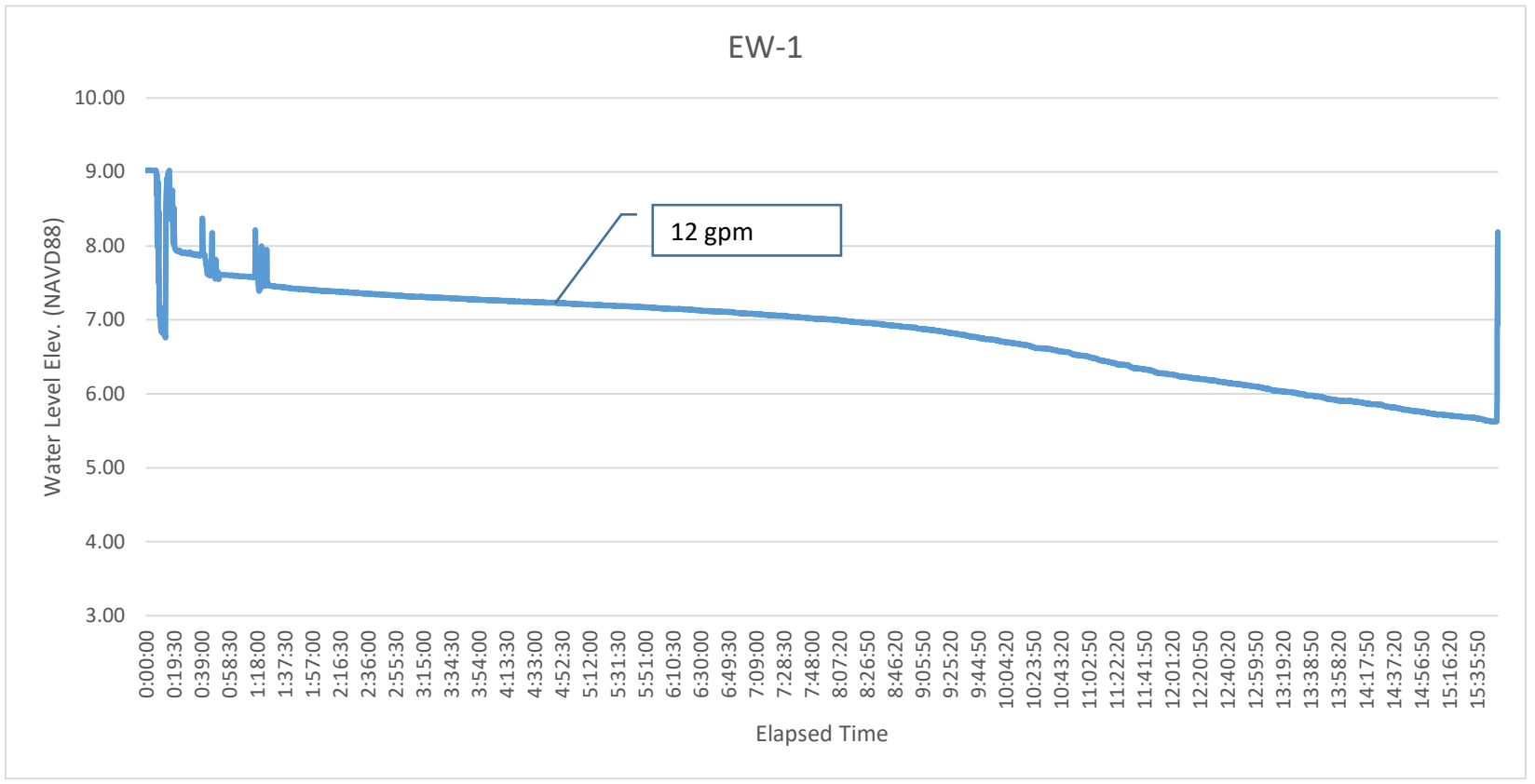
EW-1 & EW-2 Combined Pump Test

EW-1 Data

12-13 September 2016

1-2-A
Serial_number:
1027330
Project ID:
Stericycle GT ISB

Location:	EW-1	
UNIT: ft		
TOC Elev.	22.07	NAVD88
Transducer Elev.	-5.43	Correlated with manual reading @ 1636
Initial Water level	12.97	
Initial Water level elev.	9.10	



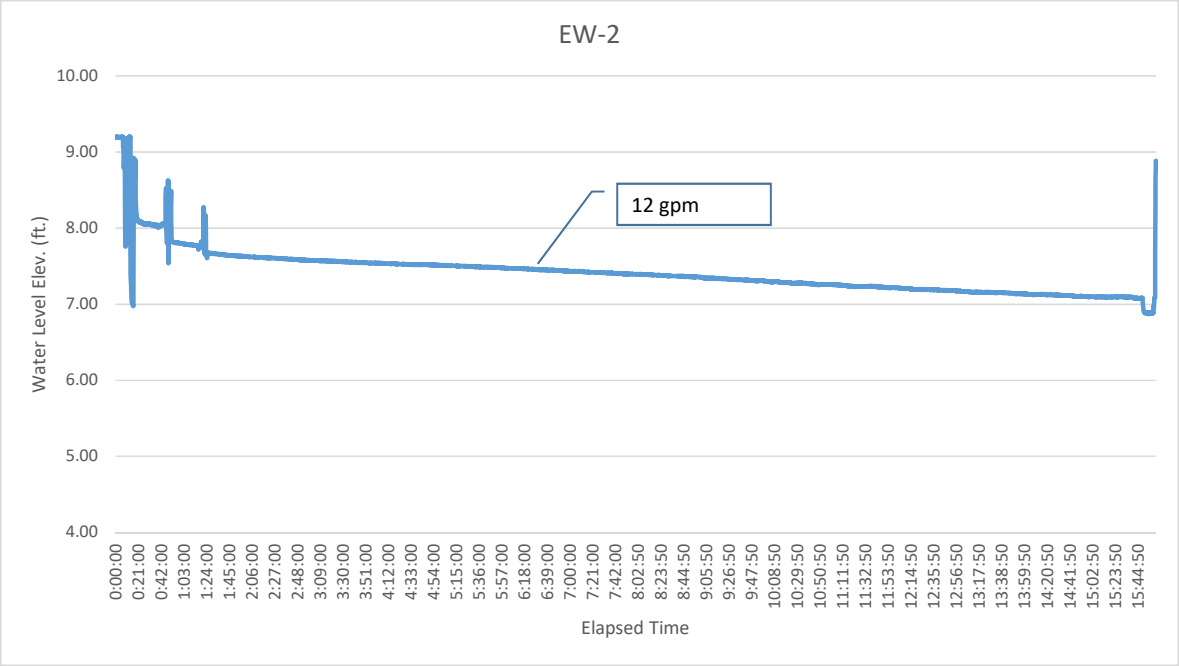
EW-1 & EW-2 Combined Pump Test

EW-2 Data

12-13 September 2016

1-2-A
Serial_number:
1047699
Project ID:
Stericycle GT ISB

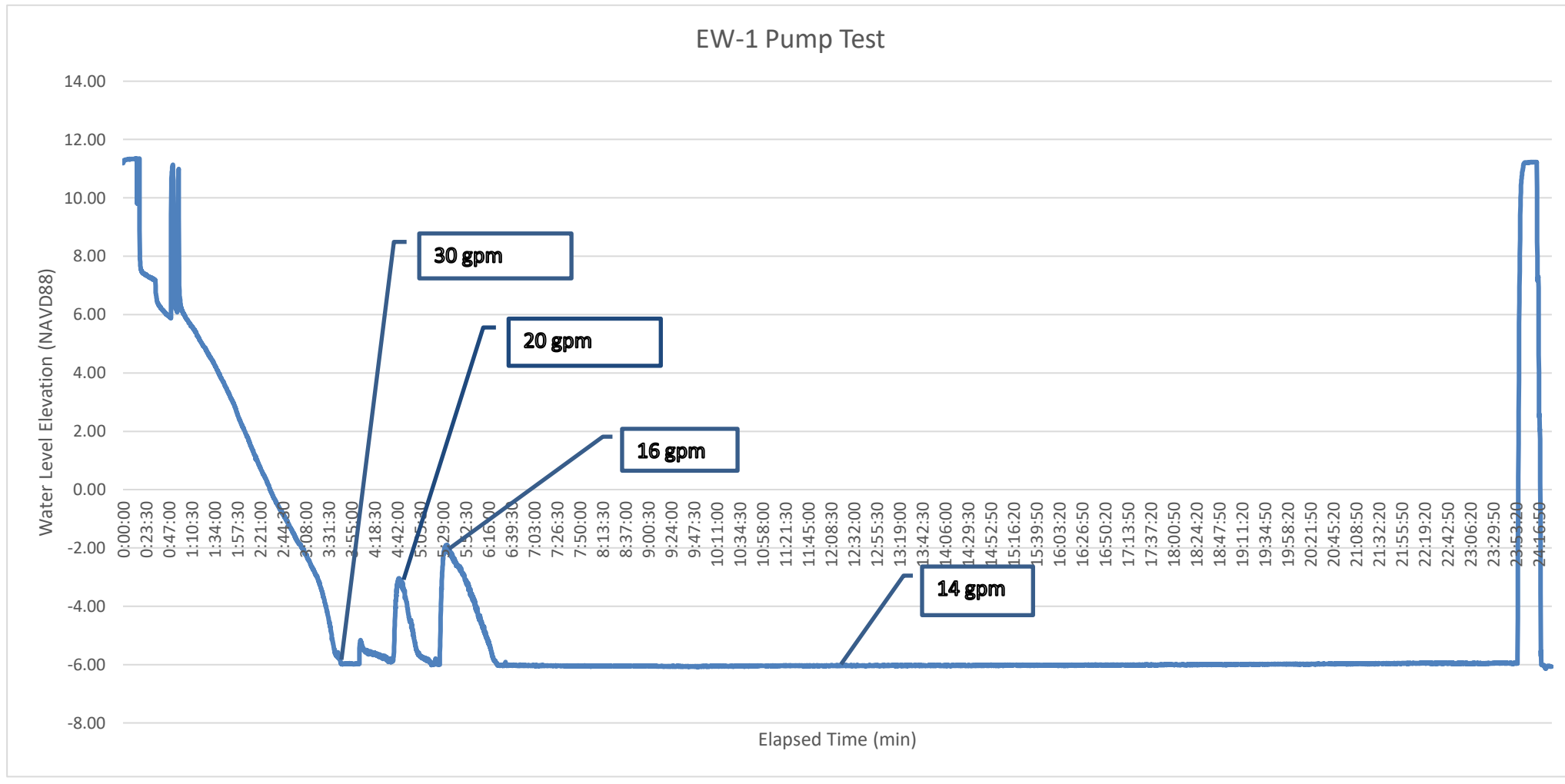
Location:	EW-2	
UNIT: ft		
TOC Elev.	21.54	NAVD88
Transducer Elev.	-4.53	Correlated with manual reading @ 1610
Initial Water level	12.35	
Initial Water level elev.	9.19	



EW-1 PUMP TEST

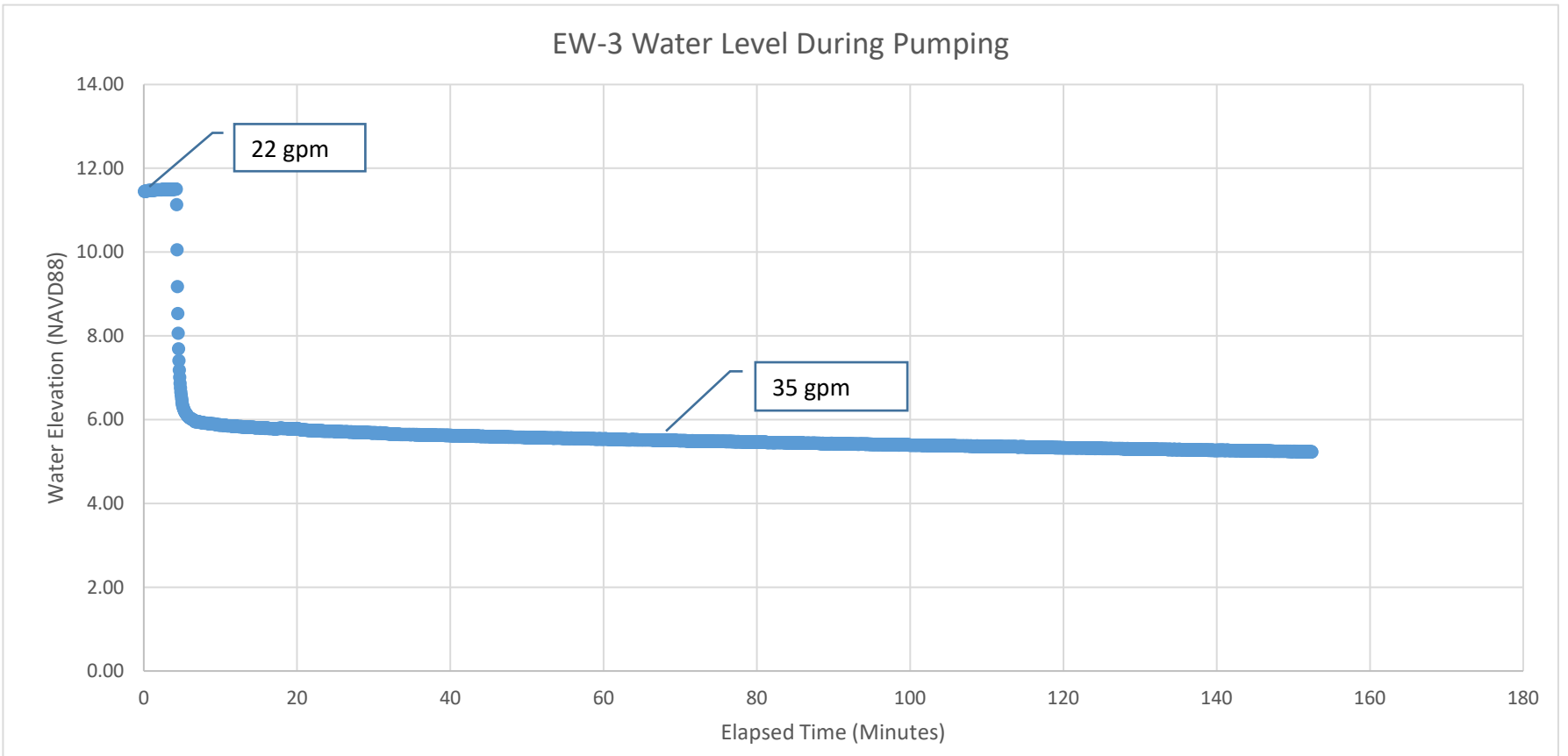
11 May 2016

Serial_number:		
2010724		
Project ID:		
Stericycle GT ISB		
Location:	EW-1	
UNIT: ft		
TOC Elev.	22.07	NAVD88
Transducer elev.	-39.94	Correlated to manual reading @ 0945
Initial Water Level	10.88	
Initial Water Level Elev.	11.19	



EW-3 PUMP TEST
13 April 2016

In-Situ Inc.	MiniTroll Pro		
Report generated:	4/15/2016	10:11:30 AM	
Report from file:	...\SN08499 2016-04-13 152643 EW-03-40gpm.bin		
Win-Situ® Version	4.58.18.0		
Serial number:		8499	
Firmware Version		3.09	
Test name:			EW-03-40gpm
Test defined on:	EW-03-40gpm		3:26:43 PM
Test started on:	4/13/2016		3:26:43 PM
Test stopped on:	N/A		N/A
Number of data samples:		3266	
Channel number [2]			
Measurement type:	Pressure		
Channel name:	level		
Sensor Range:	30 PSIG.		
Sensor Offset:	0.000 psi		
Specific gravity:	0.999		
TOC Elev.		16.90	NAVD88
Transducer Elev.		-6.53	Based on manual/transducer measurement correllation at 1610
Initial Water Level		5.31	
Initial Water Level Elev.		11.59	



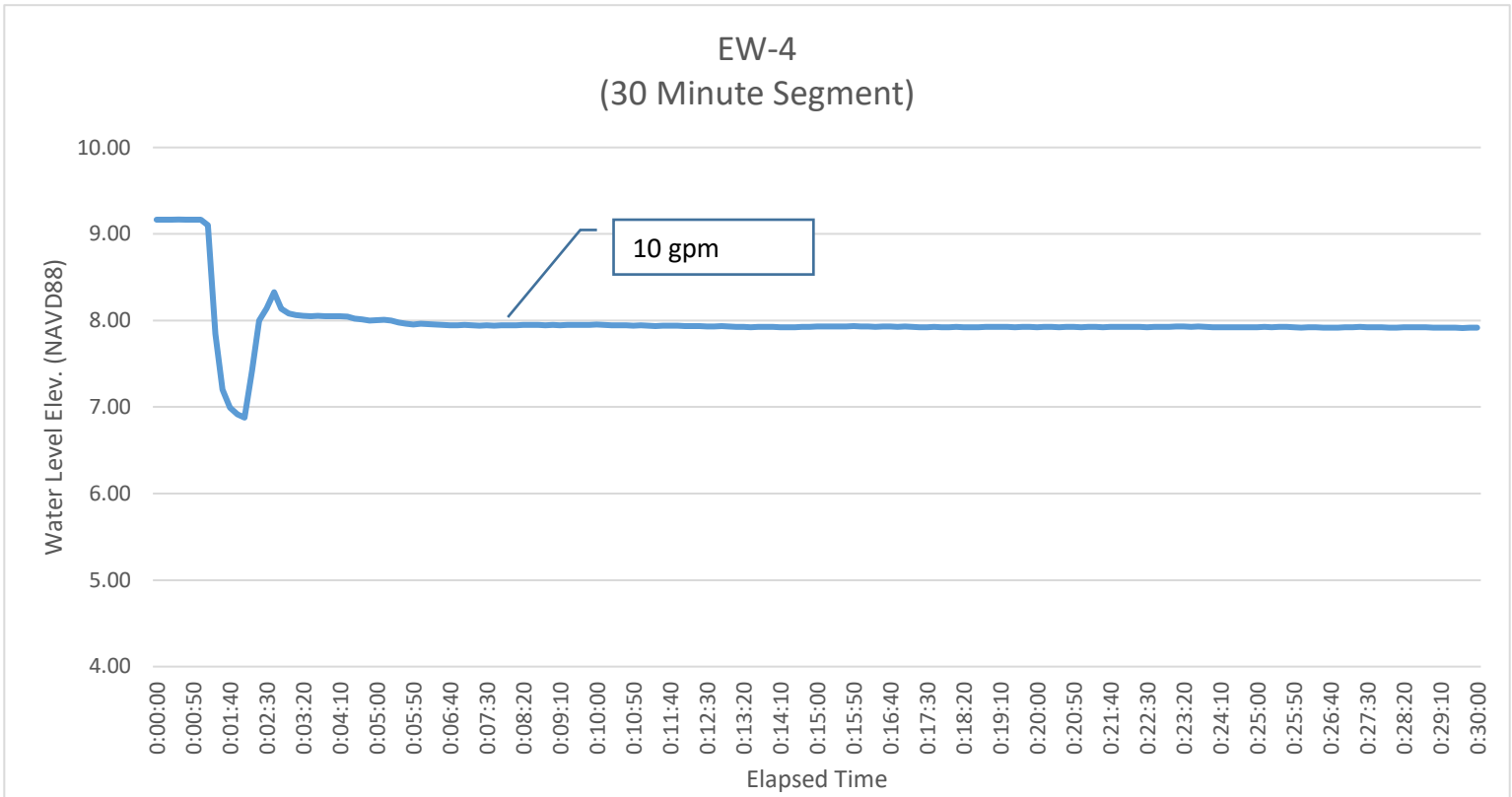
EW-4 & EW-6 Combined Pump Test

EW-4 Data

30-31 August 2016

Serial_number:
1027330
Project ID:
Stericycle GT ISB

Location:	EW-4	
UNIT: ft		
TOC Elev.	17.56	NAVD88
Transducer Elev.	-9.64	Correlated with manual reading @ 1300
Initial Water level	8.35	
Initial Water level elev.	9.21	

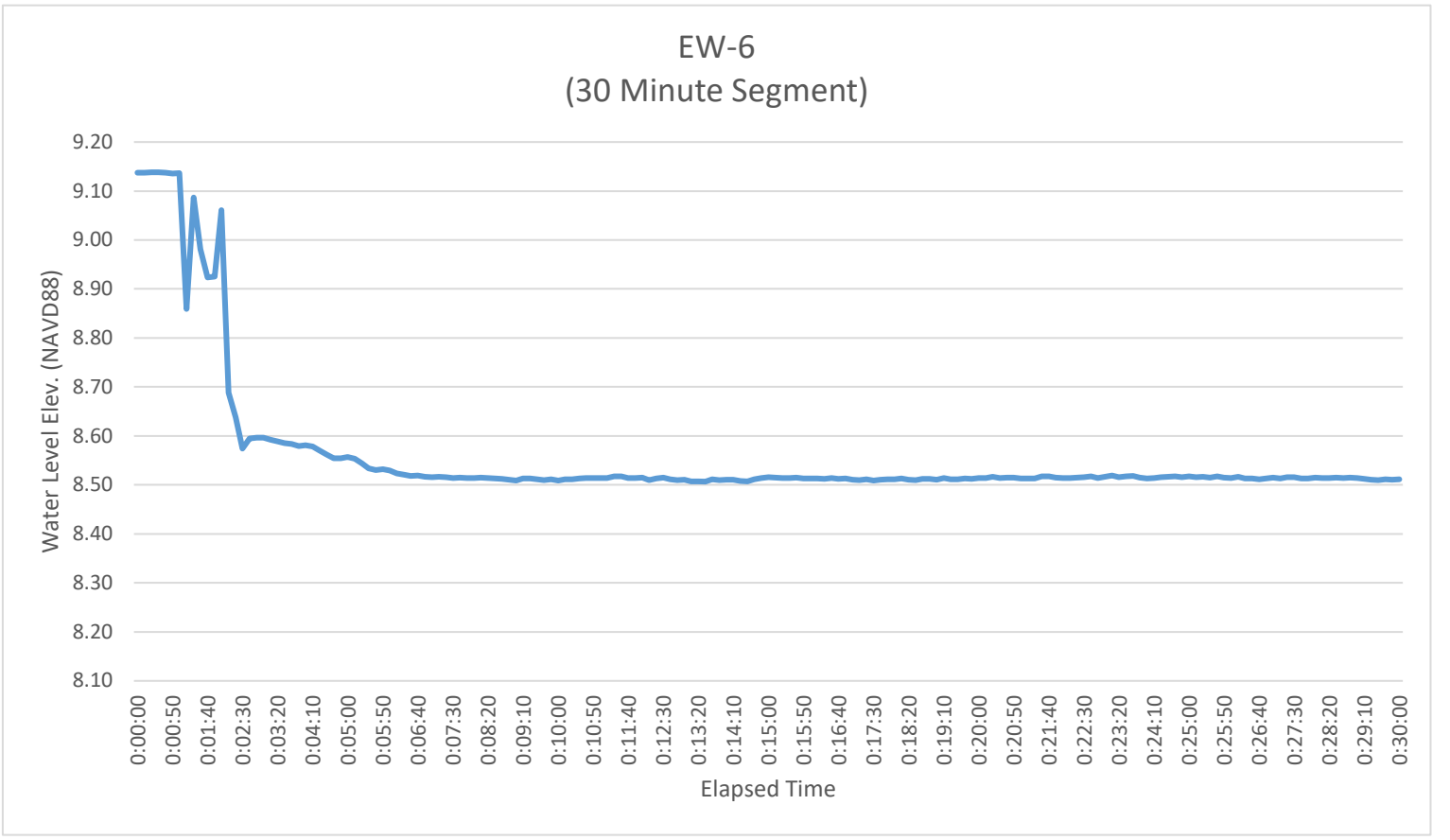


EW-4 & EW-6 Combined Pump Test

EW-6 Data

30-31 August 2016

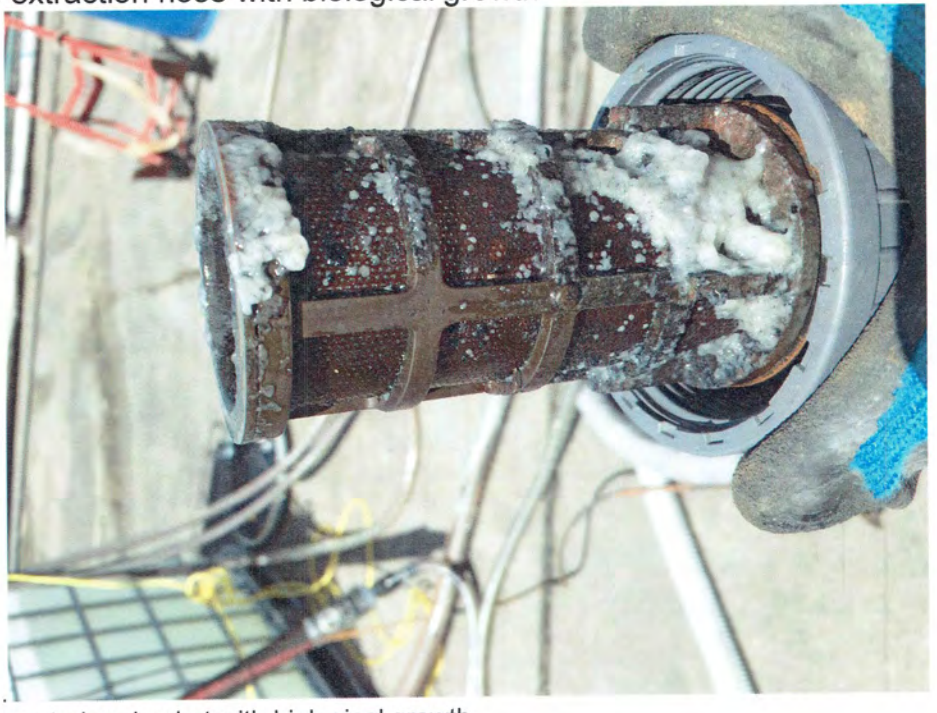
Serial_number:		
1047699		
Project ID:		
Stericycle GT ISB		
Location:	EW-6	
UNIT: ft		
TOC Elev.	20.32	NAVD88
Transducer Elev.	-7.12	Correlated with manual reading @ 1300
Initial Water level	11.14	
Initial Water level elev.	9.18	



ISB SYSTEM FOULING PHOTOS, 05/09/2016

Stericycle Georgetown Facility
Seattle, Washington

Photograph 1, extraction hose with biological growth

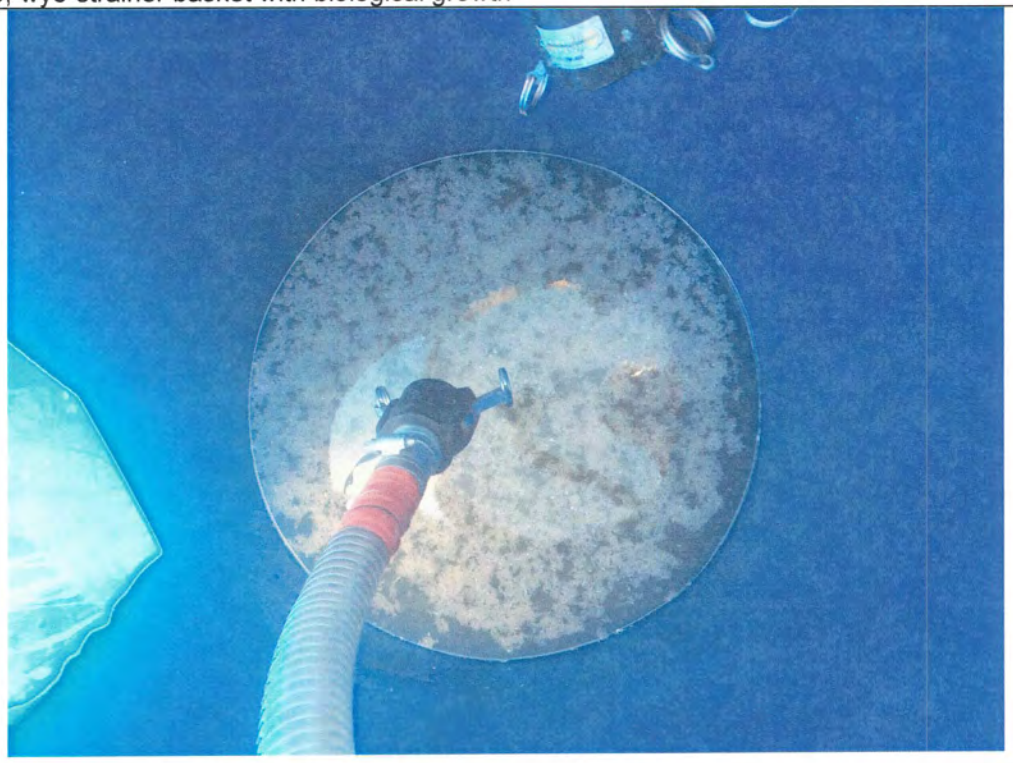


Photograph 2, wye-strainer basket with biological growth

ISB SYSTEM FOULING PHOTOS, 05/09/2016

Stericycle Georgetown Facility
Seattle, Washington

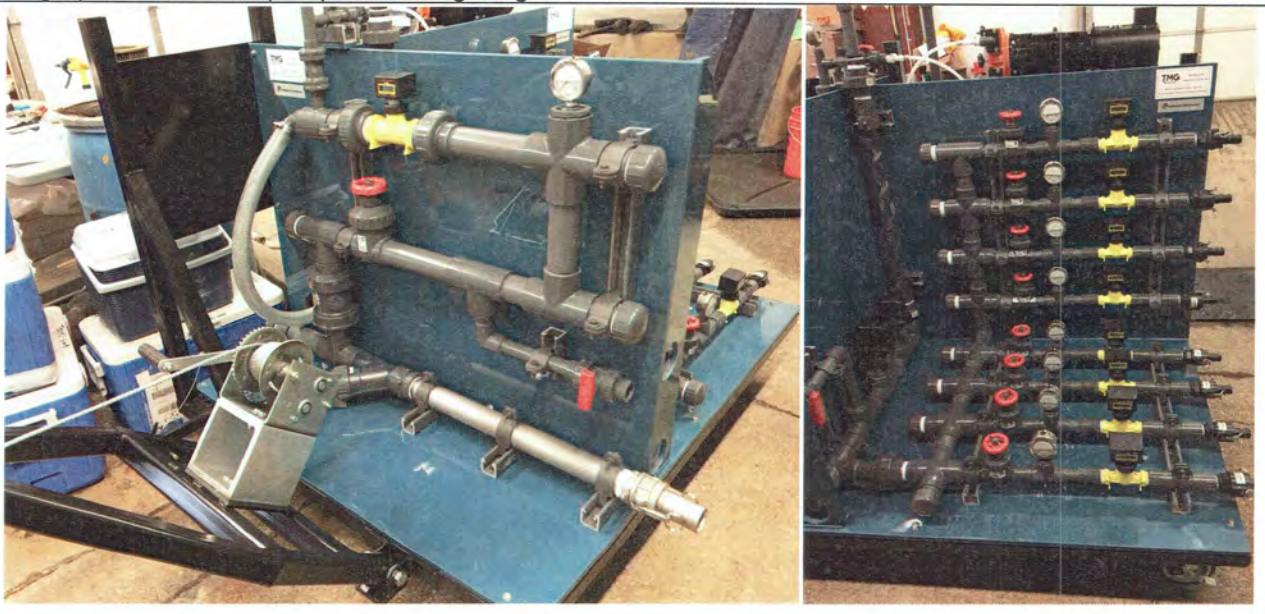
Photograph 3, wye-strainer basket with biological growth



ISB SYSTEM FOULING PHOTOS, 05/09/2016

Stericycle Georgetown Facility
Seattle, Washington

Photograph 5, extraction pump with biological growth and iron scale



Photograph 6, ISB injection cart prior to use

EXTRACTION WELL PHOTOS, 05/18/2016

Stericycle Georgetown Facility
Seattle, Washington

Photograph 1 Well ID EW-1, casing. May 18, 2016.

EXTRACTION WELL PHOTOS, 05/18/2016
Stericycle Georgetown Facility
Seattle, Washington

Photograph 2 Well ID EW-1, top of screen". May 18, 2016.

EXTRACTION WELL PHOTOS, 05/18/2016

Stericycle Georgetown Facility
Seattle, Washington

Photograph 3 Well ID EW-2, middle of screen. May 18, 2016.

EXTRACTION WELL PHOTOS, 05/18/2016
Stericycle Georgetown Facility
Seattle, Washington

Photograph 4 Well ID EW-2, casing. May 18, 2016.

EXTRACTION WELL PHOTOS, 05/18/2016

Stericycle Georgetown Facility
Seattle, Washington

Photograph 5 Well ID EW-2, top of screen. May 18, 2016.

EXTRACTION WELL PHOTOS, 05/18/2016

Stericycle Georgetown Facility
Seattle, Washington

Photograph 6 Well ID EW-3. May 18, 2016.

EXTRACTION WELL PHOTOS, 05/18/2016

Stericycle Georgetown Facility
Seattle, Washington

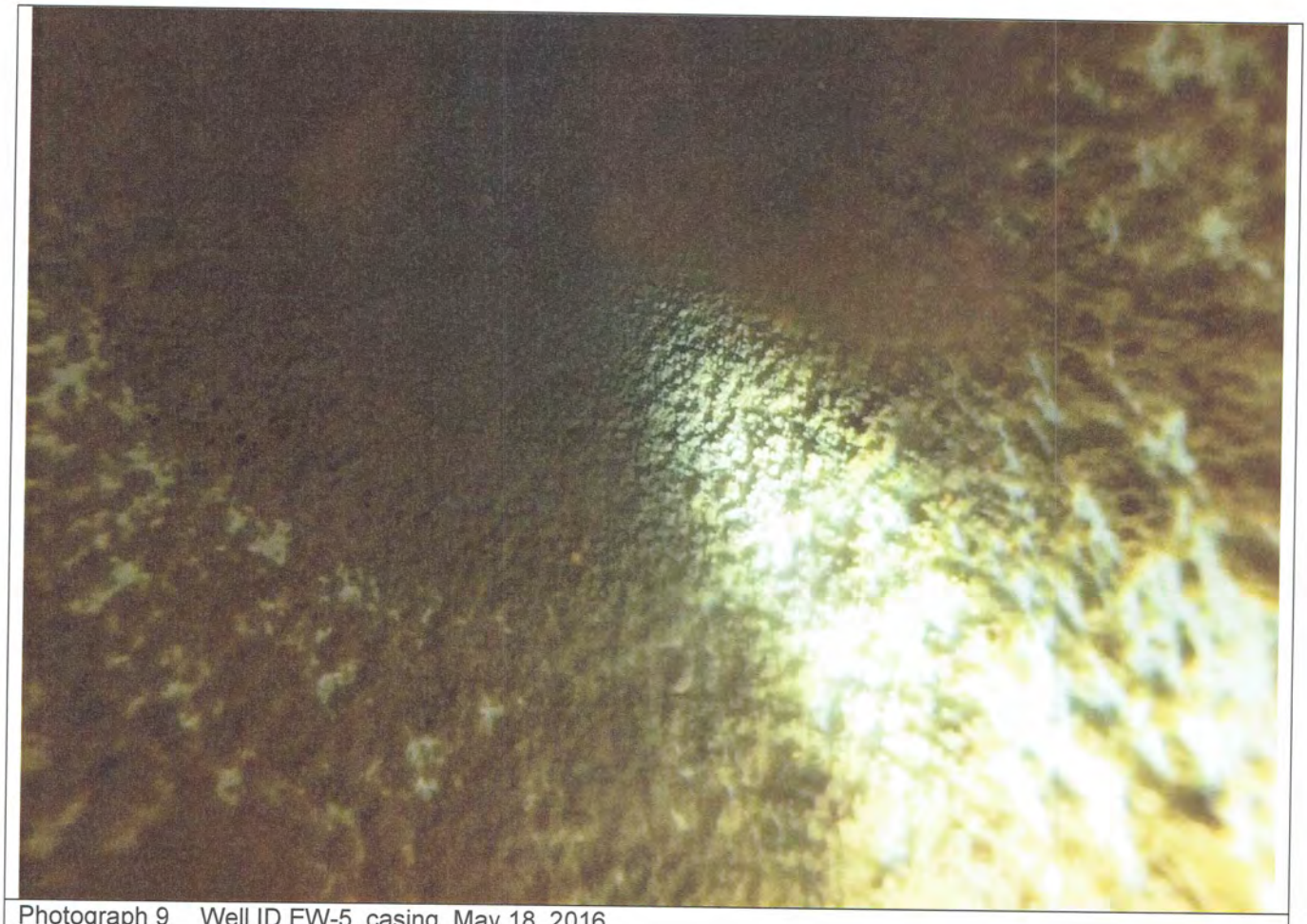
Photograph 7 Well ID EW-4. May 18, 2016.

EXTRACTION WELL PHOTOS, 05/18/2016

Stericycle Georgetown Facility
Seattle, Washington

Photograph 8 Well ID EW-4. May 18, 2016.

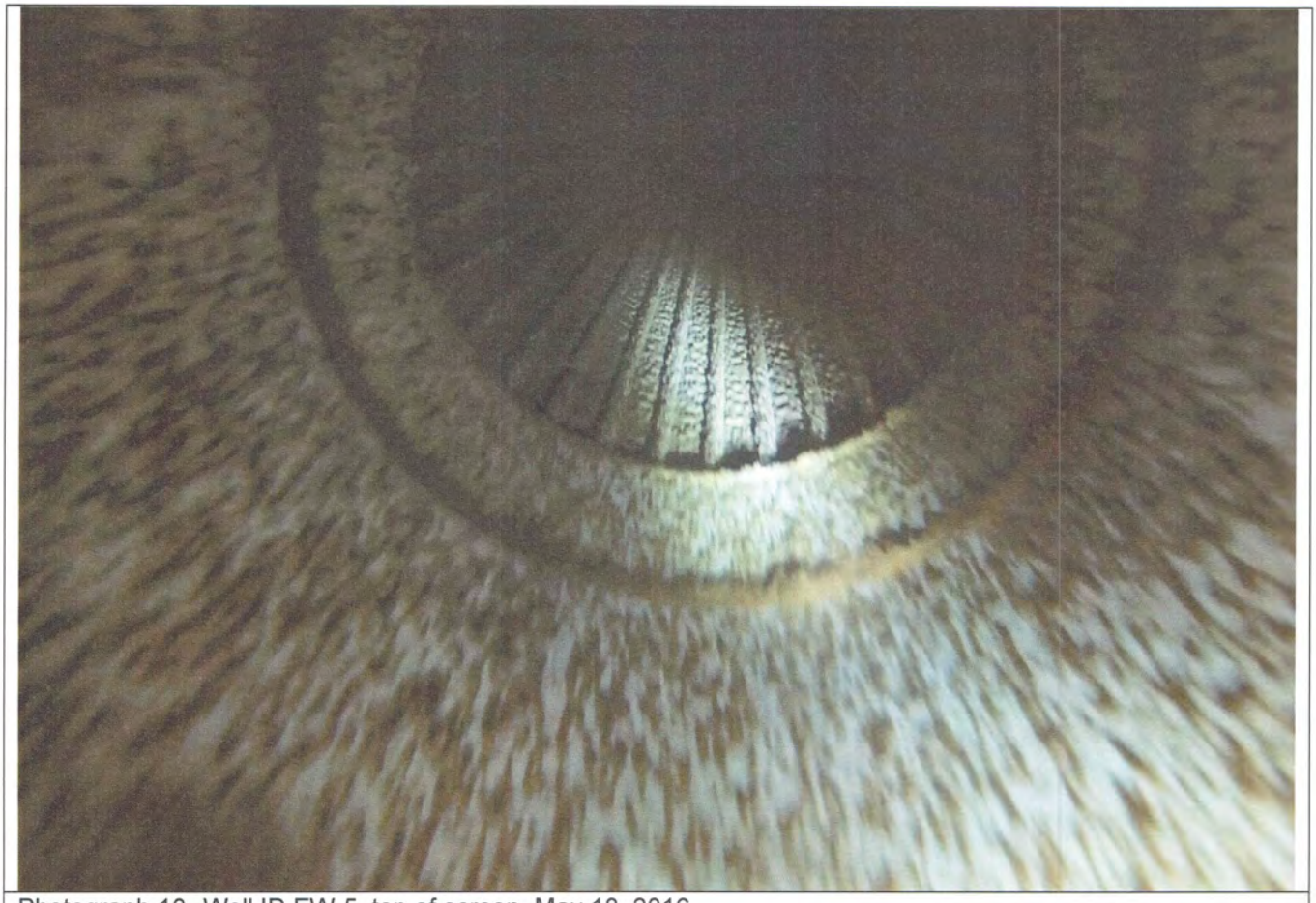
EXTRACTION WELL PHOTOS, 05/18/2016
Stericycle Georgetown Facility
Seattle, Washington



Photograph 9 Well ID EW-5, casing. May 18, 2016.

EXTRACTION WELL PHOTOS, 05/18/2016

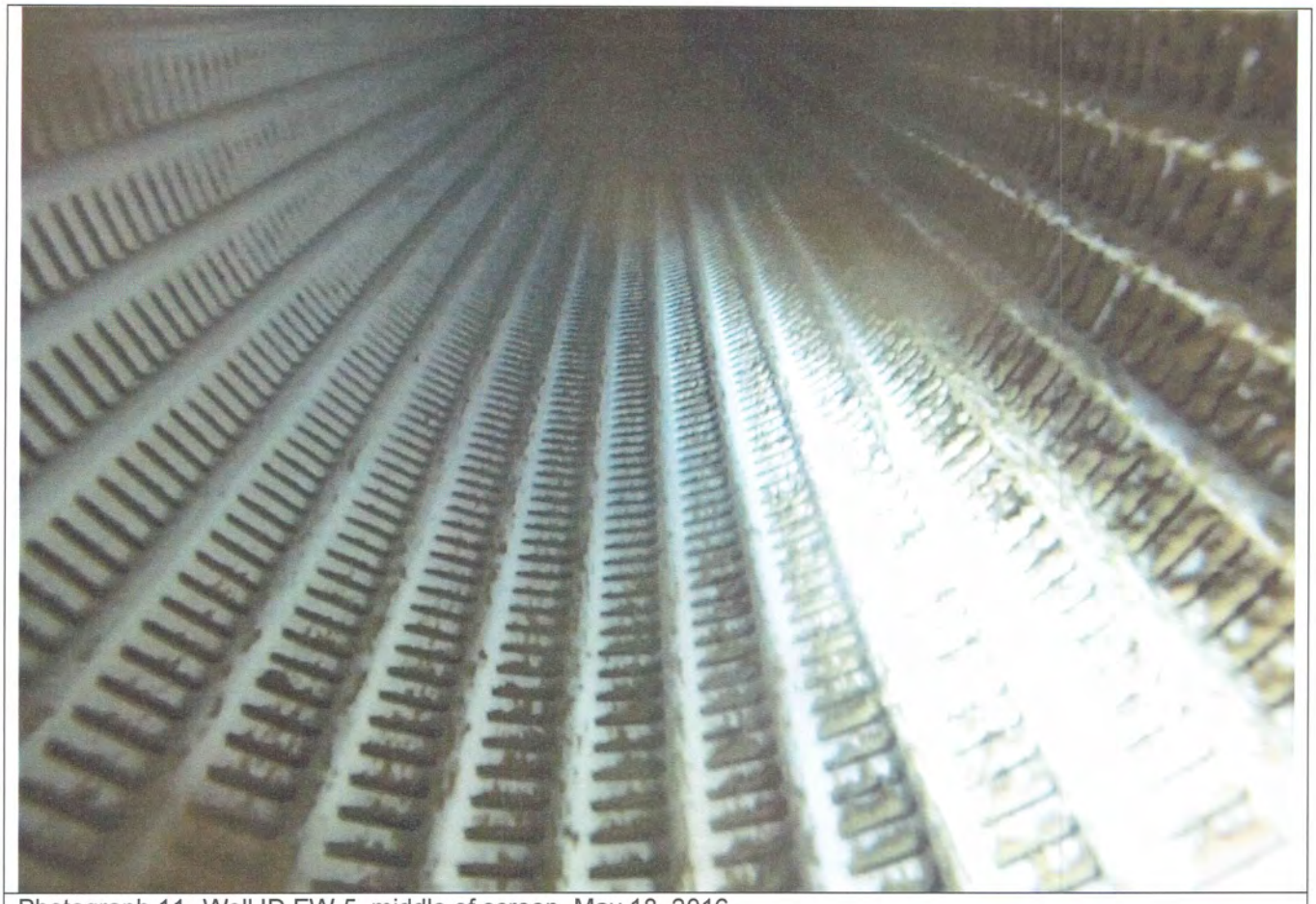
Stericycle Georgetown Facility
Seattle, Washington



Photograph 10 Well ID EW-5, top of screen. May 18, 2016.

EXTRACTION WELL PHOTOS, 05/18/2016

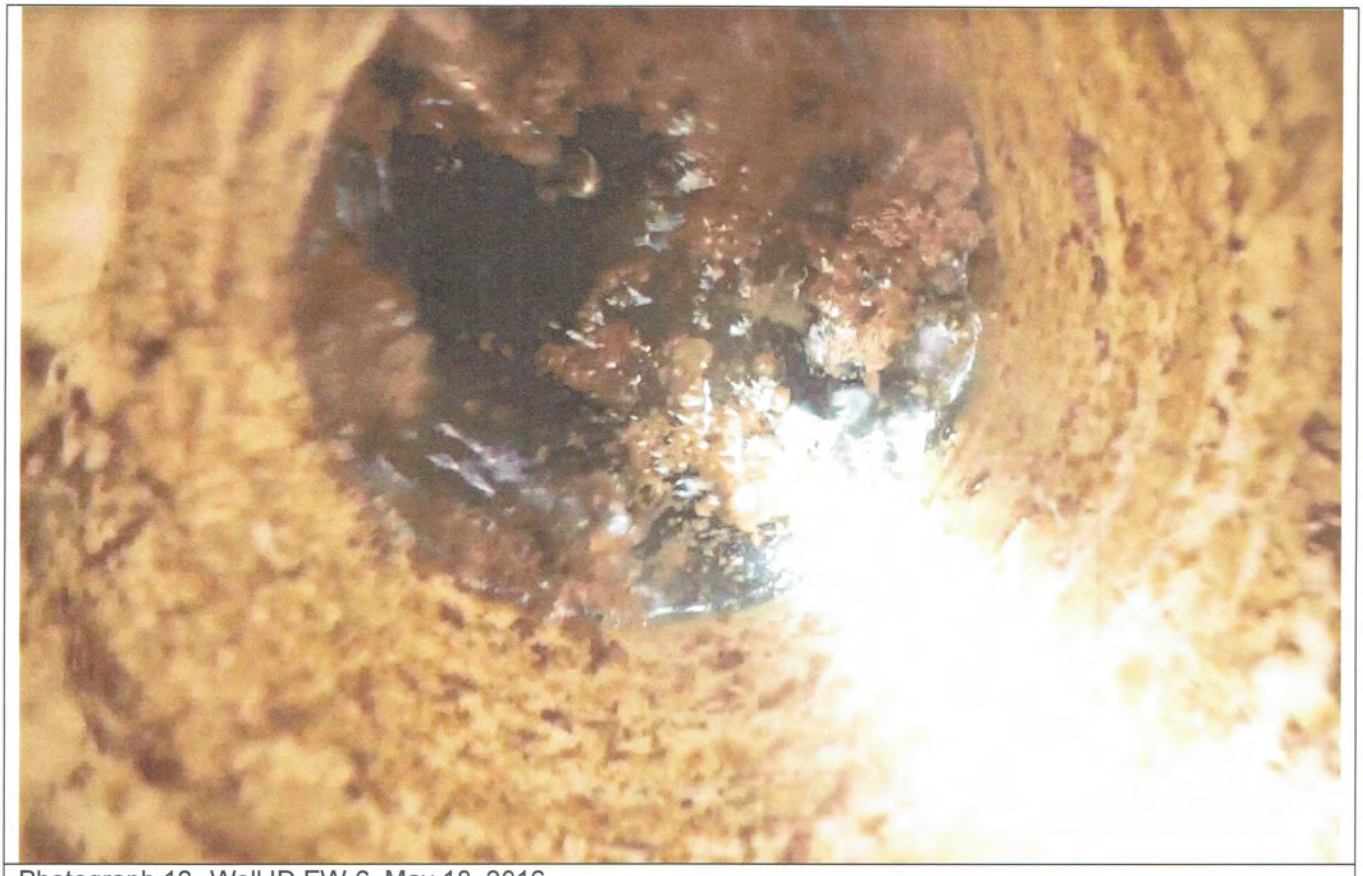
Stericycle Georgetown Facility
Seattle, Washington



Photograph 11 Well ID EW-5, middle of screen. May 18, 2016.

EXTRACTION WELL PHOTOS, 05/18/2016

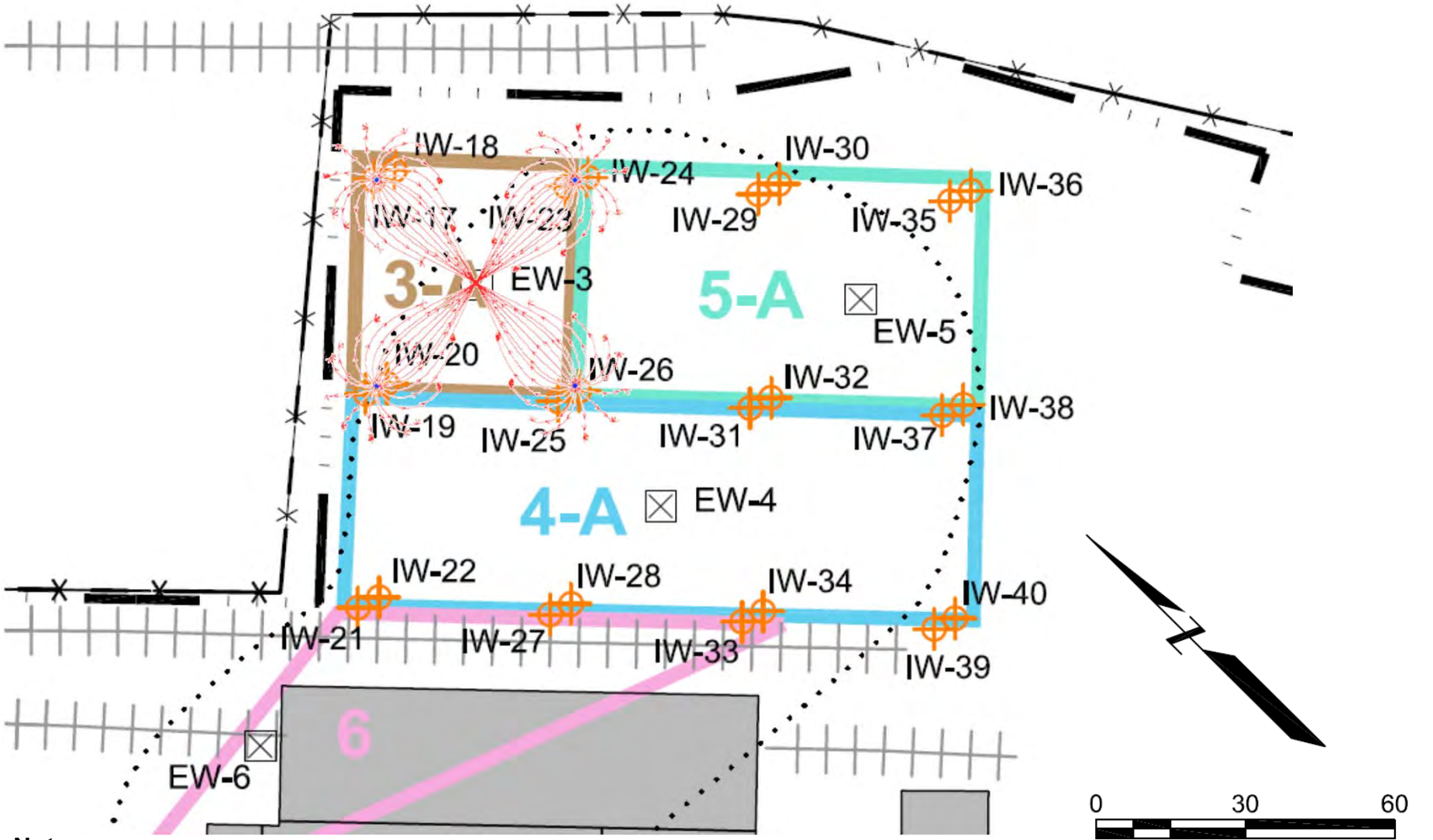
Stericycle Georgetown Facility
Seattle, Washington



Photograph 12 Well ID EW-6. May 18, 2016.

Attachment D
Modelling Backup Documentation

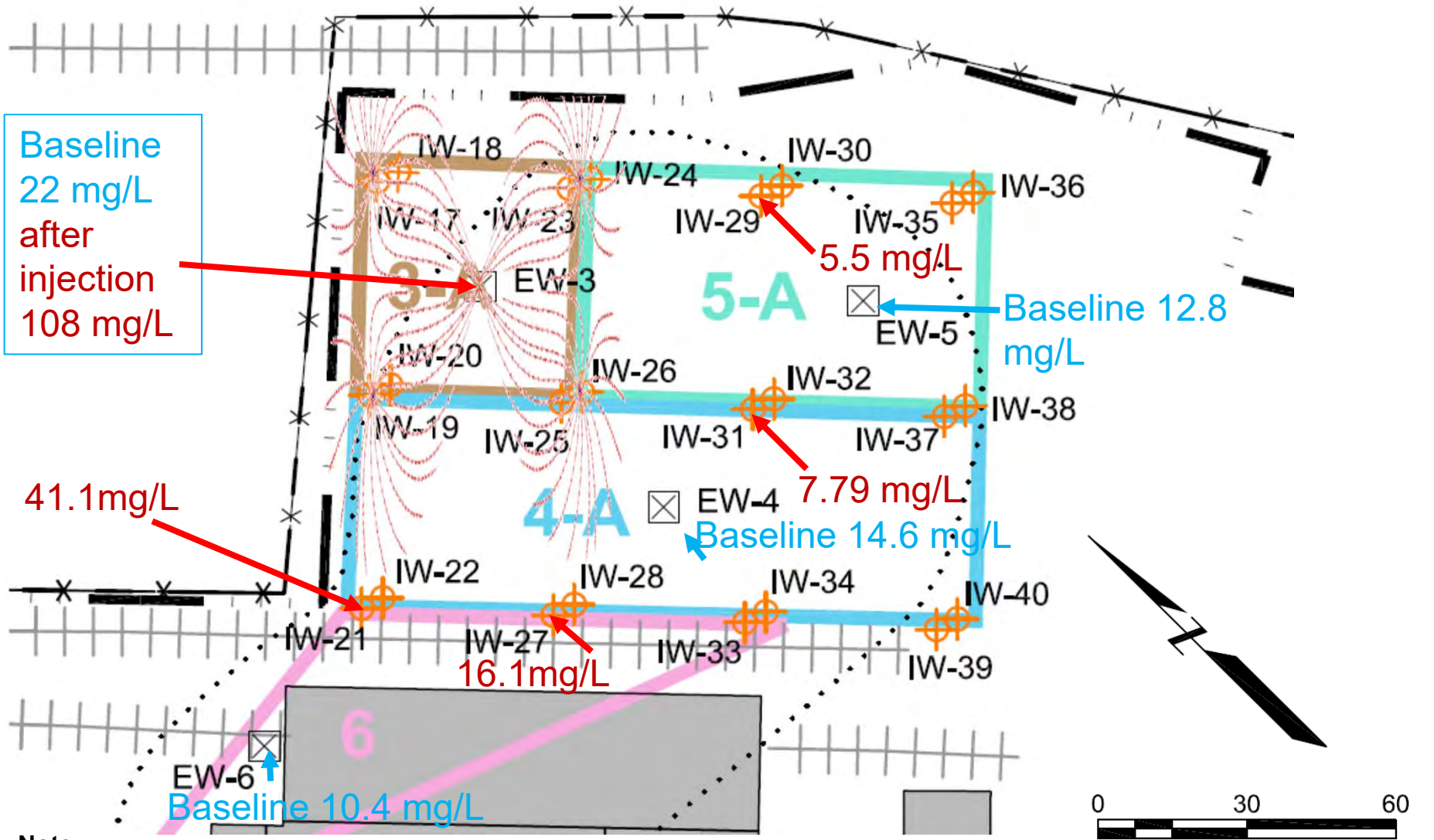
EDR Modeled/Expected Flow Behavior at Cell 3-A, 40GPM



Note
Red arrows represent particle modeling results for 40GPM at 30ft IW-EW spacing (from the Revised EDR).

Likely Flow Behavior for Observed Flow at Cell 3-A, ~13GPM

(With Total Organic Carbon Sample Data 05/19/16)



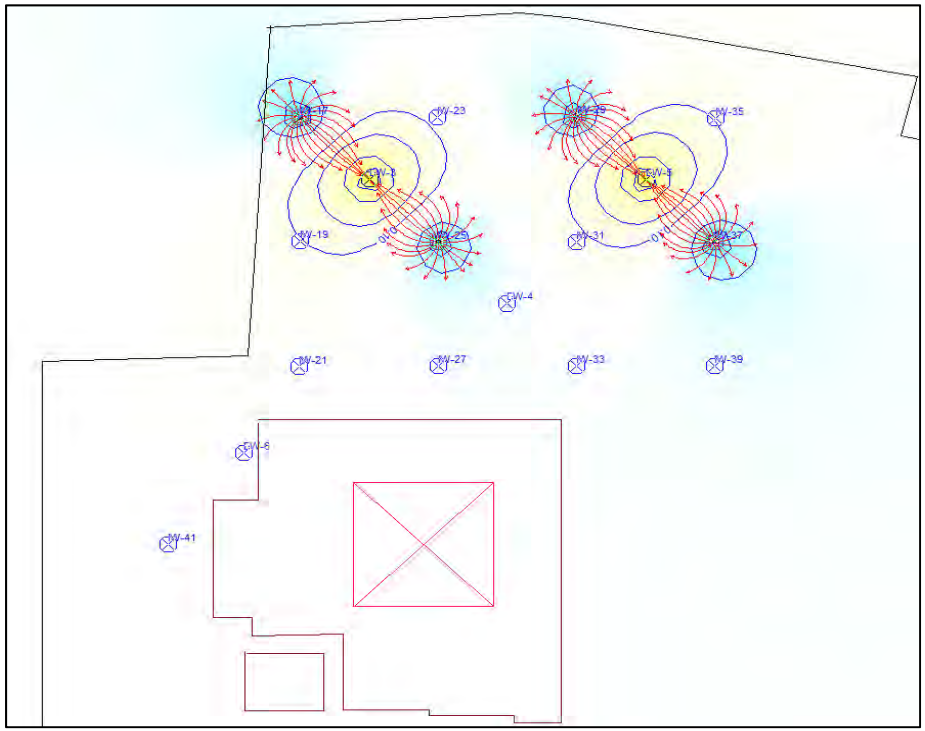
Note

Red arrows represent particle modeling results for 40GPM at 80ft injection well/extraction well spacing, or roughly 20GPM at 30ft IW-EW spacing (from the Revised EDR). 13GPM is likely even more disperse and would likely spread even more than shown by the arrows.

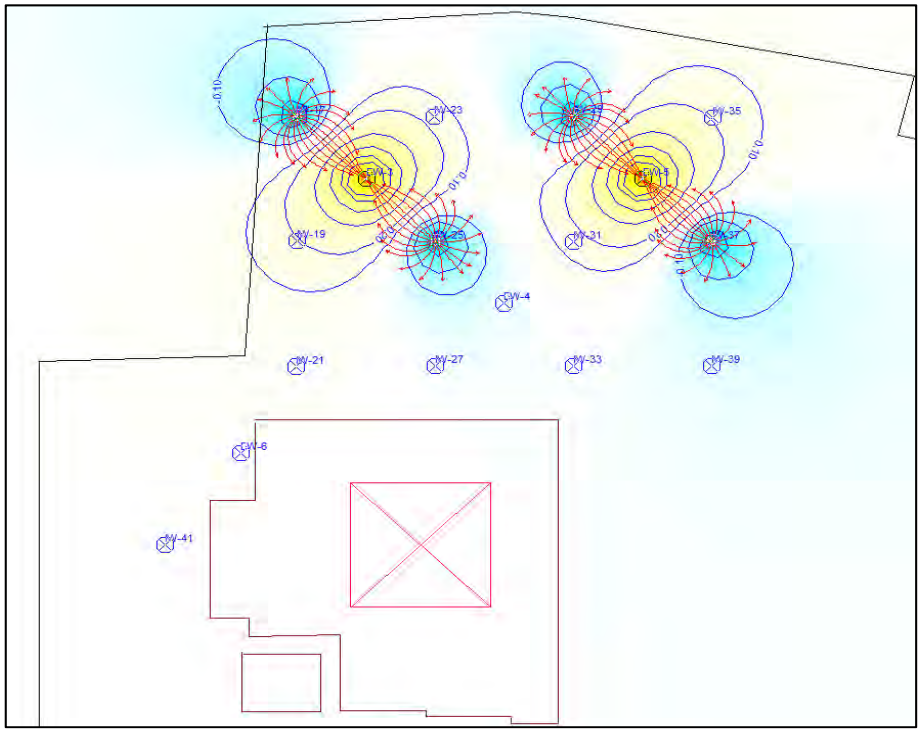
Particle Tracking Models for Cell 3-5-A

(Equivalent Spacing to Cells 1-2 A, 1-2-B, and 3-5-B)

EW-3 and EW-5 at 7.5 GPM each

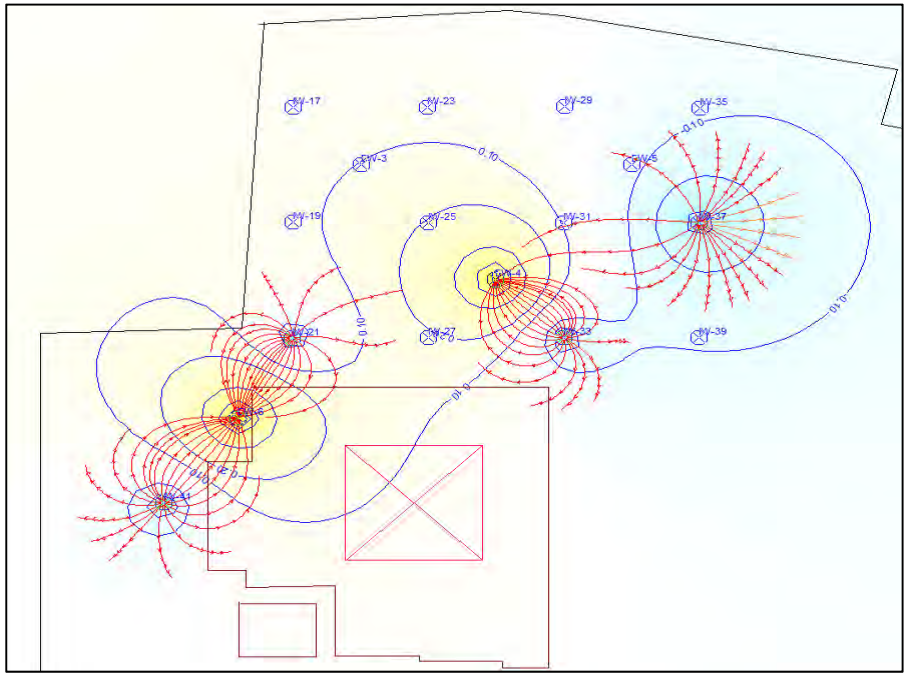


EW-3 and EW-5 @ at 15 GPM each

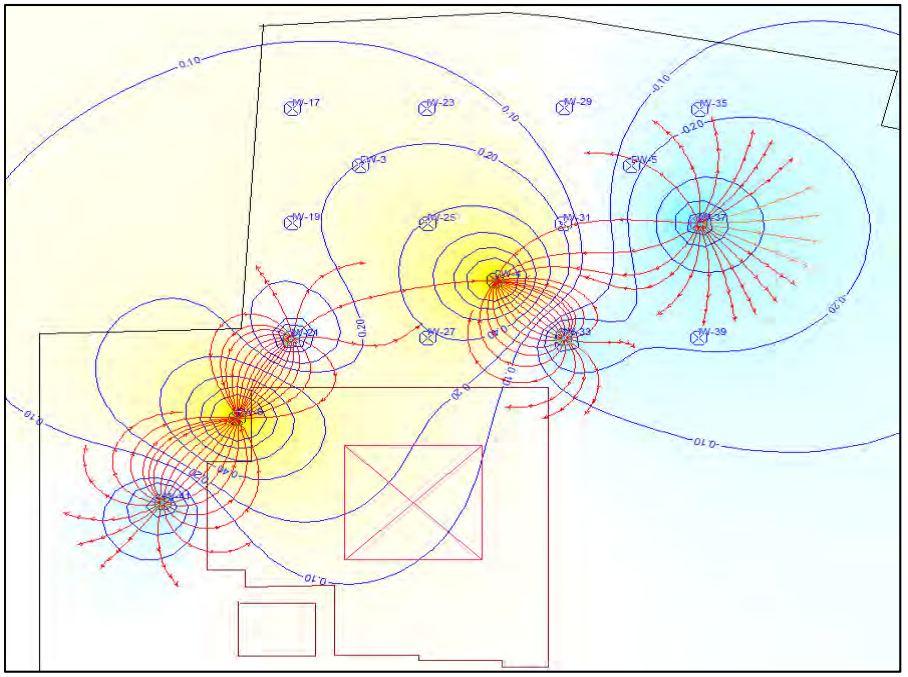


Particle Tracking Models for Cell 4-6-A

EW-4 and EW-6 at 7.5 GPM each



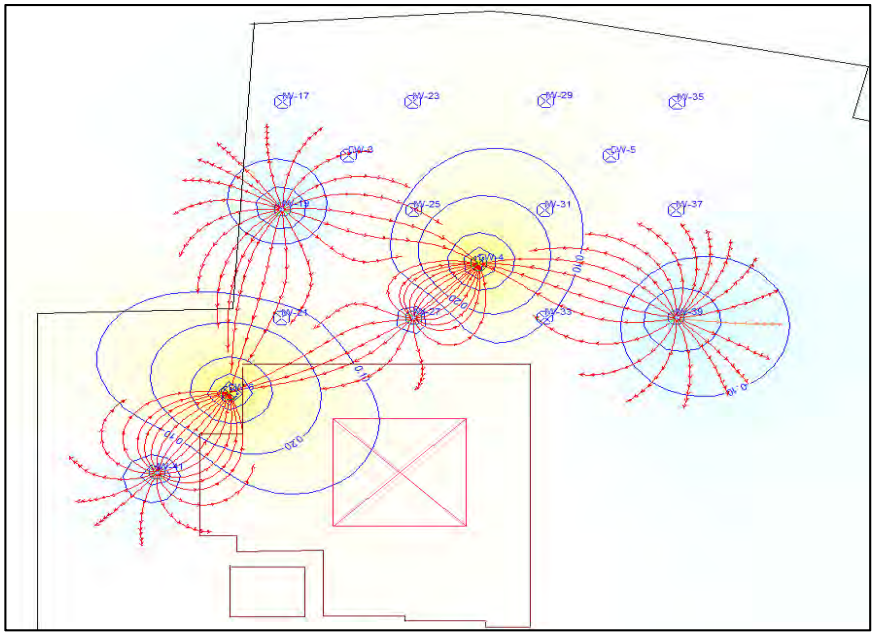
EW-4 and EW-6 @ at 15 GPM each



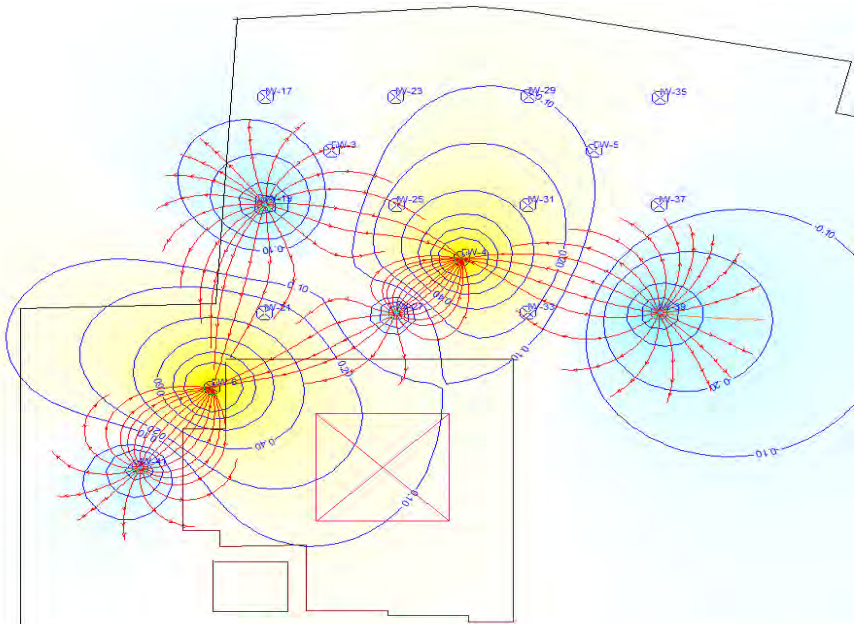
Particle Tracking Models for Cell 4-6-B

(Eight Injection Well Phase)

EW-4 and EW-6 at 7.5 GPM each



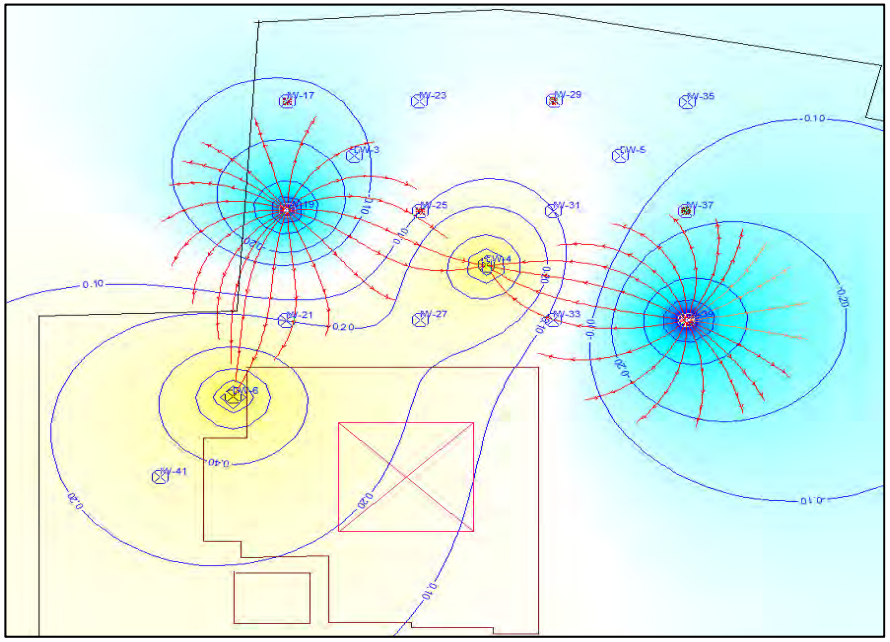
EW-4 and EW-6 @ at 15 GPM each



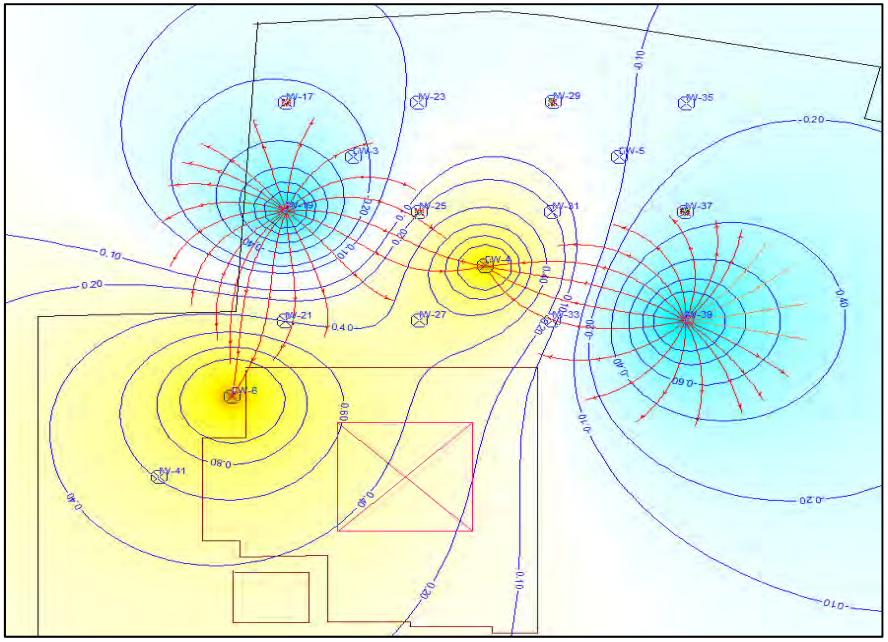
Particle Tracking Models for Cell 4-6-B

(Four Injection Well Phase)

EW-4 and EW-6 at 7.5 GPM each



EW-4 and EW-6 @ at 15 GPM each



Attachment E
Updated ISB SOPs and SDS for Remede 333

OPERATION PROCEDURES
STERICYCLE GEORGETOWN IN-SITU BIOREMEDIATION SYSTEM

Stericycle Georgetown Facility

Seattle, Washington

Prepared for:

Burlington Environmental, LLC
A wholly owned subsidiary of Stericycle Environmental Services, LLC
Kent, Washington

Prepared by:

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(206) 342-1760

February 2017

Project No. 0087700014.7088

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ATTACHMENTS

OPERATION PROCEDURES
STERICYCLE GEORGETOWN IN-SITU BIOREMEDIATION SYSTEM

Stericycle Georgetown Facility
Seattle, Washington

1.0 START-UP/SHUTDOWN PROCEDURES

OVERVIEW

Introduction

This procedure outlines start-up and shutdown procedures for routine In-situ Bioremediation (ISB) system operation.

Pre-requisites to Do This Procedure

To do this procedure you must:

- Be fully trained for treatment system operations or be with someone who has been fully trained.
- Be familiar with all aspects of this operating procedure.
- **Be HAZWOPER trained and be current with annual updates.**

In This Procedure

Following is a list of topics in this Procedure:

1.1 START-UP AND ROUTINE OPERATIONS

Start-up Information

The ISB system should be thoroughly inspected by on-site personnel for signs of component damage prior to start-up. On-site personnel should also verify that the system components have been connected properly and all appropriate valves are open. Fittings and hoses may need to be pressure-tested with potable water if field personnel notice any damage or deterioration to system components. When starting up the system pay close attention to the operation of the system to ensure all components are operating properly.

Procedure

Step	Start-Up and Routine Operations
1	Perform groundwater monitoring at the extraction well(s) which will be used for the recirculation cell. Measure field parameters (pH, DO, temperature, redox potential, and specific conductance) in accordance with the Long-Term Groundwater Monitoring Plan (EDR appendix D). Collect groundwater samples for total organic carbon, methane, nitrate/nitrite, bicarbonate alkalinity, sulfate/sulfide, ferrous/ferric iron, and VOCs for laboratory analysis. VOC samples should be taken per record sampling procedures and are not required for every injection round.. Turn off all stormwater pumps (or cover catch-basins) in the vicinity of the injection and extraction wells and hoses to be used. Check with the system engineer if you are uncertain which pumps (or catch-basins) to turn off (or cover).
2	Check with system engineer for appropriate pressure ranges, flow rates, substrate dosage, initial recirculation times, and total recirculation times for each treatment cell.
3	Place the Control Power ON/OFF and all “HAND-OFF-AUTO” switches in the “OFF” position. Mobilize the injection cart to the recirculation cell area. Depending on the cell configuration, the cart may need to be placed halfway between two extraction wells in order to ensure hose and electrical cord lengths are sufficient. All hoses should be connected prior to plugging in electrical cords or turning on the ISB power switch at the groundwater pre-treatment (GWPT) building. Hoses should be wound neatly and stacked out of the way of intended working paths.
4	Before starting the pump control unit, check to ensure that the ISB Skid manifold is connected to the correct injection well(s) for recirculation.

Procedure

Step	Start-Up and Routine Operations
5	Turn on the power to the ISB power receptacles at the GWPT breaker panel B. Check to ensure that all motor starter switches inside the ISB panel are turned on. Check that both extraction pumps are electrically connected to the ISB panel and that the ISB panel is connected to the ISB field power receptacles. The power box in use should be padlocked for security.
6	Close the ISB panel and turn the main red power handle to the "ON" position to connect ISB controls to the power supply.
7	Ensure that all flow control valves are fully open (including the valves on the influent side of the cart, before and after the pump, and to all injection wells). Record hours of run time.
8	Turn the submersible pump switch to "AUTO" mode. If two extraction pumps are in use, this will turn on both pumps. To run a single extraction pump, the motor starter of the unnecessary extraction pump should be turned to the off position.
9	Let system flow stabilize for five minutes. Monitor the total system flow at the combined stream influent flowmeter, IFI-C. . If the flow rate is higher than the target flow rate for the cell, use the CU-300 to reduce the pumping speed of the extraction pumps. If the flow rate is lower than target, turn on the centrifugal pump and adjust the bypass valves accordingly. Do not attempt to restrict flow at any system valves, as this will create high pressure conditions at the recirculation cart and influent hoses.
10	Attempt to set flow rates to treatment cell specifications (within 10%) between the injection wells by adjusting gate valves for each injection well. Watch pressures to ensure safe operating conditions under manual and automatic control. Record system readings (flow rates, pressure, runtime).
11	Continue recirculation for at least 4-6 hours. On 3 minute intervals, record the following for at least fifteen minutes: • Injection well flow and pressures • Water level at extraction well(s) • Influent system pressures and flow rates

Procedure

Step	Start-Up and Routine Operations
12	Attempt to set flow rates to treatment cell specifications (within 10%) between the injection wells by adjusting gate valves for each injection well. Watch pressures to ensure safe operating conditions under manual and automatic control. Record all system parameters every 5-15 minutes until all injection flow rates are within 10% of target and flow rates and pressures are stable.
13	Verify that the level of electron donor in the tank is adequate for substrate dosing requirements. Note starting level of substrate in holding tank.
14	Adjust the substrate flow rate to the pump frequency prescribed by the system engineer and turn on the metering pump. Record time and system readings.
16	Turn off substrate metering pump after substrate dosing is complete. Record time and note final level of substrate in holding tank. Record system readings.
17	Clean Substrate system. Close valve to substrate pump. Detach tubing from manifold and substrate tank. Clean substrate pump and tubing by re-circulating with tap water. Seal substrate container/tank.
18	Recirculation will continue with no substrate dosing for the time provided by the system engineer.
19	Once recirculation is complete, record system readings, and then perform groundwater monitoring. Extraction well samples can be collected from the sample port on the ISB system manifold if the pumps are run independently. Measure field parameters and collect a sample for analysis for offsite laboratory analysis. Collect a sample for TOC, methane, nitrate/nitrite, bicarbonate alkalinity, sulfate/sulfide, ferrous/ferric iron, and VOCs for offsite laboratory analysis.
20	Turn extraction well pump to “OFF.” Follow routine shutdown procedures.

Upon Completion

Follow good housekeeping practices.

Replace any tools or equipment used during this procedure. Remove any trash, etc. from the treatment facility area and place in proper receptacles for disposal.

1.2 ROUTINE SHUTDOWN AND SYSTEM CLEANING

Shutdown Information

Routine shutdown will be necessary in order to move the ISB skid between treatment cells.

Procedure

Step	Shutdown and System Cleaning
1	Prior to shutdown, record all system readings (flow, pressure, runtime meter). Fill two 275-gallon totes with at least 150 gallons of potable water and position the totes adjacent to the extraction wells or ISB cart.
2	Place all switches in the "OFF" position. Record the time of shutdown and the runtime meter reading.
3	Raise the extraction pump(s) so that they are not submerged in water. If they are removed from the well, place them in a 55-gallon containment drum.
4	Turn the centrifugal pump on briefly to drain groundwater from the influent side of the injection cart. Turn the centrifugal pump off as soon as the influent lines are empty.
5	Place the extraction pump(s) into the tote(s) of potable water. Turn the well pump switch to HAND to pump potable water into the injection system lines.
6	Allow the injection lines to drain into the injection wells (this may take a few hours). When finished, disconnect system hoses and transport all injection equipment into the GWPT building for additional cleaning.
7	If significant fouling is present at the system equipment or hoses, disassemble the system piping and spray down equipment inside the GWPT building. Consult the system engineer if potable water does not remove fouling from system equipment, as chemical dosing may be warranted.
8	Flush all system equipment with potable water, including the substrate metering system. Close valve to substrate pump. Detach tubing from manifold and substrate tank. Clean substrate pump and tubing by re-circulating with tap water. Seal substrate container/tank.
9	Turn all storm water pumps in the vicinity of the finished injection cell to the ON position, and/or uncover associated catch-basins.

Upon Completion

Follow good housekeeping practices.

Replace all tools and equipment used during this procedure. Remove any trash, etc. from the treatment facility area and place in proper receptacles for disposal.

1.3 EMERGENCY SHUTDOWN

Shutdown Information

An emergency shutdown is a rare occurrence. It could be necessary if a pipe is damaged or if there is damage to the electrical systems.

Procedure

Step	Emergency Shutdown
1	Turn off main power on the control panel.
2	Record time of shutdown and runtime meter reading.
3	Consult the system engineer. Close valves to isolate any leaking section of pipe or hose.
3	Drain necessary manifold or hose lengths into the wells, if possible. If necessary, drain to drums for characterization and proper disposal.
4	Clean the substrate metering system. Close valve to substrate pump. Detach tubing from manifold and substrate tank. Clean substrate pump and tubing by re-circulating with tap water. Seal substrate container/tank.

Upon Completion

Follow good housekeeping practices.

Replace all tools and equipment used during this procedure. Remove any trash, etc. from the treatment facility area and place in proper receptacles for disposal.

Update appropriate personnel of the emergency shutdown.

2.0 ALARMS

The ISB System is not equipped with an auto-dialer to notify personnel in the event of a system shutdown due to an alarm condition. However, a run-time meter is installed on the control panel to diagnose the exact time of shutdown. In addition, all system pumps contain an alarm light which will become illuminated if the associated system equipment shuts down prematurely. Because field personnel visit the site daily to balance system flows and inspect for system leaks, a shutdown will never go more than 24-hours without being observed and corrected. The ISB cart is equipped with high- and low-pressure switches; in automatic controls, the system will shut itself off if injection pressure drops too low (indicating a possible leak) or if the pressure gets too high (to prevent damage to piping, equipment, wells, or controls). Normal operations are conducted under automatic controls. During daily inspections, the system will be checked for alarm conditions. If a shutdown has occurred, the cause of the system shutdown will be recorded to assist in troubleshooting and optimizing the system. The total run time will be recorded to determine the exact time of shutdown. The system engineer will be consulted, and if the system can be safely operated, recirculation of the cell will be continued for the remaining circulation time.

An alarm light will indicate if any of the following occur:

- If the extraction pump fails;
- If the metering pump fails;
- If the injection wells or piping is plugged , a high pressure alarm will be triggered;
- If there is a leak in the piping, a low pressure alarm will be triggered; and
- If the system loses power.

The extraction well pump will be shut down in the event of any alarm, except metering pump failure. If an alarm condition occurs, the cause of the alarm will be identified, corrected, and the system restarted, if necessary.

3.0 PERFORMANCE MONITORING AND RECORD SAMPLING PROCEDURES

OVERVIEW

Introduction

This procedure outlines performance monitoring and record sampling for the ISB system.

Pre-requisites to Do This Procedure

To do this procedure you must:

- Be fully trained for treatment system operations, or be training in the area with someone who has been fully trained.
- Be familiar with all aspects of this operating procedure.
- **Be HAZWOPER trained and be current with annual updates.**

In This Procedure

Following is a list of topics in this Procedure:

3.1 STARTUP FLOW TESTING

Startup Testing Information

Prior to every injection event, field personnel should monitor recirculation for 4-6 hours to ensure stable groundwater levels prior to substrate injection. In cases of extreme drawdown, well redevelopment or reduced extraction flow rates may be necessary. Flow testing must be conducted in accordance with the startup operating procedures listed in Section 1.1 of this document.

3.2 PERFORMANCE MONITORING

Performance Monitoring Information

Injection events will consist of injection of substrate and recirculation of groundwater at each treatment cell for approximately 10-36 days, depending on the treatment cell specifications. It is anticipated that each treatment cell will be re-circulated for 4-6 hours or overnight prior to substrate injection. The substrate injection will be performed per treatment cell specifications, to ensure effective distribution across the flow path. Several periods of alternating substrate injection and recirculation without injection may be performed. During this time, the operator will adjust extraction and injection flow rates to meet targets and ensure effective substrate distribution. During recirculation, process data such as groundwater extraction rate, pressure, injection rate and injection pressure will be recorded on the ISB Process Data Form.

The goal of the system is to re-circulate the groundwater in each treatment cell in order to provide even distribution of substrate throughout the cell -- except nearest injection and extraction wells to protect from biofouling -- and thus create favorable redox conditions for anaerobic degradation of chlorinated ethenes.

Groundwater monitoring (for total organic carbon and field parameters, including pH, DO, temperature, redox potential, and specific conductance) at the extraction wells will be performed immediately before injection occurs, after completing injections, and in-between injection events. For the monitoring events in-between injection events, groundwater samples will be collected via the low-flow method following the procedures described in Long Term Groundwater Monitoring Plan of the EDR. For the monitoring events immediately before and immediately following each injection, the sample will be taken directly from the sample tap of the recirculation manifold. For all monitoring events, the field parameters will be recorded on the Groundwater Sampling form. These data will be used to determine if favorable conditions for reductive dechlorination are being created and maintained.

Additional parameters for monitoring favorable conditions for anaerobic remediation will be monitored semi-annually, during the in-between injection events only. Samples for methane, nitrate/nitrite, bicarbonate alkalinity, sulfate/sulfide, and ferrous/ferric iron will occur at each extraction well. Based on high initial concentrations of VOCs at EW-4 and EW-6, VOCs should also be sampled semi-annually at EW-4 and EW-6 only, though these samples will not be used for performance monitoring evaluation.

Performance monitoring sampling will be supplemented with TOC samples taken from wells that are adjacent to the injection wells used for each injection event. TOC samples will be collected after purging three well volumes from selected wells. The pressure and flow data, combined with measurements of TOC, should be sufficient to ensure even substrate distribution within the treatment cell. Supplemental TOC monitoring locations for new cell configurations will be discussed with Ecology and will be determined prior to injection at each recirculation cell.

3.3 RECORD SAMPLING

Record Sampling Information

Prior to the first injection round, initial groundwater sampling, baseline readings, and VOC record samples were collected. VOC samples were also collected following the first round of injections, and will be collected again after the last round of injections.

VOC record samples are taken in order to track subsurface concentrations of contaminants of concern before, during, and post treatment. A sample will be collected by the low flow method per the Long Term Groundwater Monitoring Plan from each of the extraction wells. The same wells will be retested (if possible) to allow for ongoing tracking of subsurface contaminants of concern in each area. The third record sample will be taken after Ecology has granted approval to decommission the ISB system, just prior to abandonment of the ISB wells.

Results from record sampling of VOCs will also be taken into consideration for optimization of substrate dose or substrate type. However, due to the constant mixing of site groundwater under ISB operations, VOC record sampling results may be hard to interpret. Evaluation of VOC record samples will not be used to determine if it should be operated longer (more years) or supplemented with additional wells.

3.4 ISB SYSTEM OPTIMIZATION GUIDE

Operational data collected during injection events will be reviewed to evaluate and optimize the ISB system. The table below lists some conditions that may require modifications in operational strategy of the ISB system.

Condition Requiring Optimization	Probable Cause	Potential Impacts to Performance	Potential Actions to Optimize Performance
Total organic carbon concentration is insufficient or not as predicted at extraction well.	Low total organic carbon: Poor soil permeability, insufficient dose of substrate Substrate is being adsorbed by formation soils High total organic carbon: Too concentrated dose of substrate Short circuiting of flow paths	Low total organic carbon: Longer recirculation times, slower biodegradation rates high total organic carbon: increases chance of fouling increases chance of pH depression poor substrate distribution	• Readjust flow rates • Consider use of alternate treatment cells • Check for pressures/flows indicative of short-circuiting/clogged wells • Increase/decrease substrate dose • Increase injection/recirculation time • Evaluate use of alternate substrate • Use TOC field test kits

Condition Requiring Optimization	Probable Cause	Potential Impacts to Performance	Potential Actions to Optimize Performance
Injection pressures/flows are inconsistent between wells in treatment cells	Preferential flow paths or formation heterogeneities	Longer recirculation times, Inability to effectively treat specific areas of the site.	• Readjust flow rates • Seal preferential pathways, if possible • Redevelop high pressure injection wells • Check for short-circuiting • Increase injection/recirculation time based on lowest flow rate. • Add TOC monitoring at injection wells between injection events
Good REDOX conditions have been created in some but not all wells	Treatment completed in some areas of the site	Inability to effectively treat specific areas of the site, slower biodegradation rates.	• Consider use of alternate treatment cells • Increase recirculation time • Increase substrate dose to affected wells • Evaluate alternative substrate
pH levels are depressed	Substrate used was un-buffered and formation buffering capacity lower than expected	Slower biodegradation rates	• Consider different substrate • Consider addition of buffering chemicals • Reduce substrate dose
Injection pressures increase significantly from baseline values	Chemical or biological fouling of wells	Longer recirculation times, Inability to effectively treat specific areas of the site.	• Investigate affected wells • Consider use of alternate treatment cells • Redevelop affected wells (follow procedure for well fouling)
Poor groundwater recovery from extraction wells	Formation heterogeneities, Chemical or biological fouling of wells	Longer recirculation times, Inability to effectively treat specific areas of the site.	• Investigate affected wells. Redevelop affected wells (follow procedure for well fouling) • Increase

Condition Requiring Optimization	Probable Cause	Potential Impacts to Performance	Potential Actions to Optimize Performance
			injection/recirculation time
DO concentrations are elevated	Incorrect sampling technique Injection of aerated water stormwater infiltration	Less favorable reducing conditions	• Check/correct sampling technique • Check injection system for air leaks • Check water levels /groundwater pretreatment system flow data and assess for infiltration
Well Fouling	Substrate dose is too high. Air leak in piping	Inability to effectively treat specific areas of the site.	• Investigate cause of fouling (chemical or biological) • Re-develop well with biocide for biological fouling and with acid for chemical fouling • Re-evaluate substrate dosage • Evaluate use of another substrate • Check for air leaks

4.0 ROUTINE MAINTENANCE

OVERVIEW

Introduction

Periodic maintenance tasks and their frequency are provided in the General Maintenance Schedule Table. During each site visit process data is to be collected on Process Data Collection Form to track the progress of the remediation system and to ensure proper operation of the system. ISB System Inspection form will also be completed. Additional observations should be noted including physical condition of equipment and piping

Pre-requisites to Do This Procedure

To do this procedure you must:

- Be fully trained for treatment system operations, or be training in the area with someone who has been fully trained.
- Be familiar with all aspects of this operating procedure.
- Be HAZWOPER trained and be current with annual updates.

4.1 GENERAL MAINTENANCE SCHEDULE

ISB System Component	Task	Frequency
ISB Extraction and Injection Wells	Inspect ISB Wells and connections Redevelop extraction and injection wells	Prior to injection events As needed
Extraction well pump	Inspect operation of pump in Hand/Off/Auto mode	During each injection event
ISB Skid Manifold	Monitor pressure gauges. Inspect operation of flow instrumentation Inspect for leaks	During each injection event During each injection event During each injection event
Metering Pump	Inspect operation of metering pump Manually check flow rate	During each injection event During each injection event
Electron Donor Tank	Check level of electron donor	Every day during injection event
Electrical	Inspect the electrical system for loose wiring, overheating, or unusual conditions.	During each injection event
ISB System Piping and Tubing	Check Piping and Tubing for signs of aging, cracking, etc. Check piping and tubing for leaks	Prior to injection event During each injection event

ATTACHMENT A

ISB System Inspection Form

Visual Inspection (Perform Daily during Injection Event)

Item	Date				
	Condition (Cracks, leaks, non-operational gauges, connections, etc.)				
Wells					
Pumps & Controls					
Substrate Tank					
Meters & Gauges					
Piping & Tubing					

System Operation Measurements

Manifold Location	Well ID	PI psi	FI gpm	FI total gal	PI psi	FI gpm	FI total gal	PI psi	FI gpm	FI total gal	PI psi	FI gpm	FI total gal	PI psi	FI gpm	FI total gal
Extraction 1	EW-															
Extraction 2	EW-															
Combined Extraction Stream, IPI-C and IFI-C																
Injection 1	IW-															
Injection 2	IW-															
Injection 3	IW-															
Injection 4	IW-															
Injection 5	IW-															
Injection 6	IW-															
Injection 7	IW-															
Injection 8	IW-															

Inspection continues on back of page

Control Panel & Dosing Status/Inspection

Item	Date				
Extraction Pump Switch	H / O / A	H / O / A	H / O / A	H / O / A	H / O / A
Centrifugal Pump Switch	H / O / A	H / O / A	H / O / A	H / O / A	H / O / A
Substrate Pump Switch	H / O / A	H / O / A	H / O / A	H / O / A	H / O / A
Substrate VFD Setting (0-60 Hz)					
HFCS drawdown since startup (in)					
Calculated HFCS dose rate (ml/min)					
Pump Runtime (hours)					
Inspection time					
Inspector Initials					

Water Level Tracking

Well ID	feet BTOC	feet BTOC	feet BTOC	feet BTOC	feet BTOC
Extraction Well, EW-					
Extraction Well, EW-					

Operational Notes

REDUX TECHNOLOGY®

Division of Azure Water Services, LLC

Material Safety Data Sheet

Product Name: Redux 333 **Effective date: 12/15/2007**
MSDS #: 18 **Page** 1 of 6

SECTION 1 -- CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

IDENTIFICATION

Product Name Redux 333
Chemical Name Aqueous Blended Deposit Control Agent
Chemical Family
Formula
Synonym

COMPANY IDENTIFICATION

Redux Technology
Division of Azure Water Services, LCC
550 VT Rte. 30, P.O. Box 331
Newfane, VT 05345
Phone: 802-365-7200
Fax: 802-365-4652
Email: info@reduxtech.com

EMERGENCY TELEPHONE NUMBER

24 hours a day: CHEMTREC 1-800-424-9300.
Number for non-emergency questions concerning MSDS: (802) 365-7200

SECTION 2 -- COMPOSITION / INFORMATION ON INGREDIENTS

Component	CAS #	Amount (%W/W)
Water	7732-18-5	~76%
Dispersing Copolymer	Not Hazardous	~3%
Organic Phosphorous Compound	Proprietary	~11%
Other Ingredients	Proprietary	~10%

SECTION 3 -- HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW	**Eye and skin irritant. Material may cause burns on exposed tissues. Eye contact may cause corneal injury, which may result in permanent impairment of vision, or even blindness. Prolonged or repeated skin may cause irritation or even a burn.**

POTENTIAL HEALTH EFFECTS	
INGESTION.....	Corrosive and causes severe and permanent damages to mouth throat and stomach. May be fatal if swallowed.
INHALATION.....	Damages airways and lungs, depending upon amount and duration of exposure. Effects can vary from irritation to bronchitis or pneumonia.
EYE CONTACT.....	Severely corrosive to the eyes, and may cause permanent damage, including blindness.
SKIN CONTACT.....	Corrosive; causes severe skin burns. Harmful contact may not cause immediate pain.

SECTION 4 -- FIRST AID MEASURES

INGESTION	If swallowed, DO NOT induce vomiting. Immediately drink a large quantity of water. If available, give large quantities of milk. Never give anything by mouth to an unconscious person. **Get medical attention immediately.** If vomiting occurs spontaneously, keep airway clear.
INHALATION	Get person out of contaminated area to fresh air. If breathing has stopped, resuscitate and administer oxygen if readily available. **Get medical attention immediately.**
EYE CONTACT	Immediately flush eye with plenty of cool, running water. Remove contact lenses if applicable and continue flushing for at least 15 minutes, holding eyelids apart to ensure thorough rinsing of the entire eye. **Get medical attention immediately.**
SKIN CONTACT	Immediately flush skin with plenty of cool running water for at least 15 minutes. Wash with soap and water. If irritation develops or persists, get medical attention. Remove contaminated clothing and shoes; wash before reuse.
NOTE TO PHYSICIAN	Information pertaining to ingestion toxicology, therapy, symptomatology and treatment can be found in Clinical Toxicology of Commercial Products, authored by Gosselin, Smith and Hodge and published by Williams & Wilkins, Baltimore, Maryland.

SECTION 5 -- FIRE FIGHTING MEASURES

FLASH POINT / METHOD	None / N.A.	FLAMMABLE LIMITS	Not flammable or combustible
EXTINGUISHING MEDIA	Use extinguishing media appropriate for surrounding fire.		
SPECIAL FIRE FIGHTING PROCEDURES	Pressure demand self-contained respiratory protection and protective clothing should be worn by fire fighters.		
FIRE AND EXPLOSION HAZARDS	Not a fire or explosion hazard		

SECTION 6 -- ACCIDENTAL RELEASE MEASURES

RESPONSE TO SPILLS	Absorb with inert material such as vermiculite, shovel into closeable container for disposal. Thoroughly flush residual with water.

SECTION 7 -- HANDLING AND STORAGE

HANDLING PRECAUTIONS	Wear proper safety equipment. Mix only with water. Follow appropriate tank entry procedures (ANSI Z117) and OSHA Confined Space Regulations.
STORAGE PRECAUTIONS	Store in a cool, dry and well-ventilated place. Keep from freezing. Keep container tightly closed when not in use.

SECTION 8 -- EXPOSURE CONTROLS / PERSONAL PROTECTION

HYGIENIC PRACTICES	Observe label precautions; use personal protective equipment. Avoid breathing mists or vapors of this product.
ENGINEERING CONTROLS	**Facilities using this product must be equipped with an eyewash station.** Local Exhaust: None

PERSONAL PROTECTIVE EQUIPMENT

X	**RESPIRATOR**	NIOSH/MSHA approved respirator where mists or sprays may be generated.
X	**GOGGLES / FACE SHIELD**	Chemical splash goggles required; also use face shield if exposure is severe
X	**APRON**	Required; PVC, Neoprene or Vinyl acceptable
X	**GLOVES**	Required; use PVC, Neoprene or Nitrile with long gauntlet or protective cuff
X	**BOOTS**	Rubber

SECTION 9 -- PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE	Clear pale yellow liquid	BOILING POINT	> 212^{o} F
ODOR	Slight Odor	FREEZING POINT	< 32^{o} F
pH	Approx. 1.9	VAPOR PRESSURE	Similar to water
SPECIFIC GRAVITY	1.1	VAPOR DENSITY	Similar to water
SOLUBILITY IN WATER	Complete	EVAPORATION RATE	Similar to water

SECTION 10 -- STABILITY AND REACTIVITY

CHEMICAL STABILITY		**STABLE**	X		**UNSTABLE**	
CONDITIONS TO AVOID	Do not mix with anything but water.					
INCOMPATIBILITY	Do not mix with quaternay amines, acids, sulfides and strong oxidizers.					
HAZARDOUS PRODUCTS OF DECOMPOSITION	Carbon dioxide and carbon monoxide.					
POLYMERIZATION		**WILL NOT OCCUR**	X		**MAY OCCUR**	
CONDITIONS TO AVOID	Not applicable					

SECTION 11 -- TOXICOLOGICAL INFORMATION

Oral:	Rat LD50 = ~13,400 mg/kg
Dermal:	Rabbit LD50 = >43,000 mg/kg
Eye Irritation:	Corrosive
Skin irritation	Mild Irritant

CARCINOGENICITY

	THIS PRODUCT CONTAINS A KNOWN OR SUSPECTED CARCINOGEN
X	**THIS PRODUCT DOES NOT CONTAIN ANY KNOWN OR ANTICIPATED CARCINOGENS ACCORDING TO THE CRITERIA OF THE NTP ANNUAL REPORT ON CARCINOGENS AND OSHA 29 CFR 1910, Z**

OTHER EFFECTS

ACUTE	May be corrosive to all body tissues which it comes in contact.
CHRONIC	The chronic local effect may consist of multiple areas of superficial destruction of the skin or of primary irritant dermatitis. Similarly, inhalation of dust, spray, or mist may result in varying degrees of irritation or damage to the respiratory tract tissues and an increased susceptibility to respiratory illness.

SECTION 12 -- ECOLOGICAL INFORMATION

BIODEGRADABILITY		**CONSIDERED BIODEGRADABLE**	X		**NOT BIODEGRADABLE**	
BOD / COD VALUE	Not established					
ECOTOXICITY	Ceriodaphnia (ceriodaphnia dubia): 48 hr LD50 = 3100 mg/l NOAEL = 1600 mg/l Fathead Minnow (pimephales promelas): 96 hr LD50 = 3100 mg/l NOAEL = 1600 mg/l					

REDUX TECHNOLOGY

Material Safety Data Sheet

Product Name: Redux 333 **Effective date: 12/15/2007**
MSDS #: 18 **Page** 6 of 6

SECTION 13 -- DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHOD	Product that cannot be used according to the label must be disposed of as a hazardous waste at an approved hazardous waste management facility. Empty containers may be triple rinsed, then offered for recycling or reconditioning; or puncture and dispose of in a sanitary landfill.								
RCRA CLASSIFICATION	Hazardous, corrosive D002								
RECYCLE CONTAINER		**YES**	X		**CODE**	2 - HDPE		**NO**	

SECTION 14 -- TRANSPORT INFORMATION

DOT CLASSIFICATION		**HAZARDOUS**	x		**NOT HAZARDOUS**	
DESCRIPTION	Corrosive					

SECTION 15 -- REGULATORY INFORMATION

REGULATORY STATUS

	EPA REGISTERED (UNDER FIFRA)	
	FDA REGULATED	
	KOSHER	
	SARA TITLE III MATERIAL	
	USDA AUTHORIZED	
	NSF APPROVAL	

SECTION 16 -- OTHER INFORMATION

NFPA CLASSIFICATION

2	**BLUE**	HEALTH HAZARD
0	**RED**	FLAMMABILITY
1	**YELLOW**	REACTIVITY
C	**WHITE**	SPECIAL HAZARD

REDUX TECHNOLOGY®

Division of Azure Water Services, LLC

Material Safety Data Sheet

Product Name: Redux 620A **Effective date: 9/15/2010**
MSDS #: 56 **Page** 1 of 6

SECTION 1 -- CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

IDENTIFICATION

Product Name Redux 620A
Chemical Name Aqueous Blended Deposit Control Agent
Chemical Family
Formula
Synonym

COMPANY IDENTIFICATION

Redux Technology
Division of Azure Water Services, LLC
550 VT Rte. 30, P.O. Box 331
Newfane, VT 05345
Phone: 800-639-9506
Fax: 802-365-4652
Email: info@reduxtech.com

EMERGENCY TELEPHONE NUMBER

24 hours a day: CHEMTREC 1-800-424-9300.
Number for non-emergency questions concerning MSDS: (802) 365-7200

SECTION 2 -- COMPOSITION / INFORMATION ON INGREDIENTS

Component	CAS #	Amount (%W/W)
Water	7732-18-5	~68%
Acrylate Copolymer	Not Hazardous	~6%
Organic Phosphorous Compound	Proprietary	~6%
Sulfonated Phosphonium Salt	Proprietary	~20%

SECTION 3 -- HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW	**Eye and skin irritant. Prolonged or repeated skin may cause irritation.**

POTENTIAL HEALTH EFFECTS	
INGESTION.....	May cause severe and permanent damages to mouth throat and stomach. May be fatal if swallowed.
INHALATION.....	Damages airways and lungs, depending upon amount and duration of exposure. Effects can vary from irritation to bronchitis or pneumonia.
EYE CONTACT.....	May cause permanent damage, including blindness.
SKIN CONTACT.....	Harmful contact, but may not cause immediate pain.

SECTION 4 -- FIRST AID MEASURES

INGESTION	If swallowed, DO NOT induce vomiting. Immediately drink a large quantity of water. If available, give large quantities of milk. Never give anything by mouth to an unconscious person. **Get medical attention immediately.** If vomiting occurs spontaneously, keep airway clear.
INHALATION	Get person out of contaminated area to fresh air. If breathing has stopped, resuscitate and administer oxygen if readily available. **Get medical attention immediately.**
EYE CONTACT	Immediately flush eye with plenty of cool, running water. Remove contact lenses if applicable and continue flushing for at least 15 minutes, holding eyelids apart to ensure thorough rinsing of the entire eye. **Get medical attention immediately.**
SKIN CONTACT	Immediately flush skin with plenty of cool running water for at least 15 minutes. Wash with soap and water. If irritation develops or persists, get medical attention. Remove contaminated clothing and shoes; wash before reuse.
NOTE TO PHYSICIAN	Information pertaining to ingestion toxicology, therapy, symptomatology and treatment can be found in Clinical Toxicology of Commercial Products, authored by Gosselin, Smith and Hodge and published by Williams & Wilkins, Baltimore, Maryland.

SECTION 5 -- FIRE FIGHTING MEASURES

FLASH POINT / METHOD	None / N.A.	FLAMMABLE LIMITS	Not flammable or combustible
EXTINGUISHING MEDIA	Use extinguishing media appropriate for surrounding fire.		
SPECIAL FIRE FIGHTING PROCEDURES	Pressure demand self-contained respiratory protection and protective clothing should be worn by fire fighters.		
FIRE AND EXPLOSION HAZARDS	Not a fire or explosion hazard		

SECTION 6 -- ACCIDENTAL RELEASE MEASURES

RESPONSE TO SPILLS	Absorb with inert material such as vermiculite, shovel into closeable container for disposal. Thoroughly flush residual with water.

SECTION 7 -- HANDLING AND STORAGE

HANDLING PRECAUTIONS	Wear proper safety equipment. Mix only with water. Follow appropriate tank entry procedures (ANSI Z117) and OSHA Confined Space Regulations.
STORAGE PRECAUTIONS	Store in a cool, dry and well-ventilated place. Keep from freezing. Keep container tightly closed when not in use.

SECTION 8 -- EXPOSURE CONTROLS / PERSONAL PROTECTION

HYGIENIC PRACTICES	Observe label precautions; use personal protective equipment. Avoid breathing mists or vapors of this product.
ENGINEERING CONTROLS	**Facilities using this product must be equipped with an eyewash station.** Local Exhaust: None

PERSONAL PROTECTIVE EQUIPMENT

X	**RESPIRATOR**	NIOSH/MSHA approved respirator where mists or sprays may be generated.
X	**GOGGLES / FACE SHIELD**	Chemical splash goggles required; also use face shield if exposure is severe
X	**APRON**	Required; PVC, Neoprene or Vinyl acceptable
X	**GLOVES**	Required; use PVC, Neoprene or Nitrile with long gauntlet or protective cuff
X	**BOOTS**	Rubber

SECTION 9 -- PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE	Clear pale yellow liquid	BOILING POINT	> 212^{o} F
ODOR	Slight Odor	FREEZING POINT	< 32^{o} F
pH	Approx. 4.3	VAPOR PRESSURE	Similar to water
SPECIFIC GRAVITY	1.1	VAPOR DENSITY	Similar to water
SOLUBILITY IN WATER	Complete	EVAPORATION RATE	Similar to water

SECTION 10 -- STABILITY AND REACTIVITY

CHEMICAL STABILITY		**STABLE**	X		**UNSTABLE**	
CONDITIONS TO AVOID	Do not mix with anything but water.					
INCOMPATIBILITY	Do not mix with quaternay amines, acids, sulfides and strong oxidizers.					
HAZARDOUS PRODUCTS OF DECOMPOSITION	Carbon dioxide and carbon monoxide.					
POLYMERIZATION		**WILL NOT OCCUR**	X		**MAY OCCUR**	
CONDITIONS TO AVOID	Not applicable					

SECTION 11 -- TOXICOLOGICAL INFORMATION

Oral: Rat LD50 = 2,150 mg/kg
Dermal: Rat LD50 = 7,500 mg/kg
Eye Irritation: Corrosive
Skin irritation Mild Irritant

CARCINOGENICITY

	THIS PRODUCT CONTAINS A KNOWN OR SUSPECTED CARCINOGEN
X	**THIS PRODUCT DOES NOT CONTAIN ANY KNOWN OR ANTICIPATED CARCINOGENS ACCORDING TO THE CRITERIA OF THE NTP ANNUAL REPORT ON CARCINOGENS AND OSHA 29 CFR 1910, Z**

OTHER EFFECTS

ACUTE	May be corrosive to all body tissues which it comes in contact.
CHRONIC	The chronic local effect may consist of multiple areas of superficial destruction of the skin or of primary irritant dermatitis. Similarly, inhalation of dust, spray, or mist may result in varying degrees of irritation or damage to the respiratory tract tissues and an increased susceptibility to respiratory illness.

SECTION 12 -- ECOLOGICAL INFORMATION

BIODEGRADABILITY		**CONSIDERED BIODEGRADABLE**	X		**NOT BIODEGRADABLE**	
BOD / COD VALUE	Not established					
ECOTOXICITY	Rainbow trout: 96 hr LD50 = 450 mg/l Bluegill sunfish: 96 hr LD50 = 350 mg/l					

REDUX TECHNOLOGY

Material Safety Data Sheet

Product Name: Redux 620A **Effective date: 9/15/2010**
MSDS #: 56 **Page** 6 of 6

SECTION 13 -- DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHOD	Product that cannot be used according to the label must be disposed of per manufacturers recomendations. Empty containers may be triple rinsed, then offered for recycling or reconditioning; or puncture and dispose of in a sanitary landfill.									
RCRA CLASSIFICATION	Non-Hazardous									
RECYCLE CONTAINER		**YES**	X		**CODE**	2 - HDPE		**NO**		

SECTION 14 -- TRANSPORT INFORMATION

DOT CLASSIFICATION		**HAZARDOUS**			**NOT HAZARDOUS**	X
DESCRIPTION						

SECTION 15 -- REGULATORY INFORMATION

REGULATORY STATUS

	EPA REGISTERED (UNDER FIFRA)	
	FDA REGULATED	
	KOSHER	
	SARA TITLE III MATERIAL	
	USDA AUTHORIZED	
	NSF APPROVAL	

SECTION 16 -- OTHER INFORMATION

NFPA CLASSIFICATION

1	**BLUE**	HEALTH HAZARD
0	**RED**	FLAMMABILITY
1	**YELLOW**	REACTIVITY
C	**WHITE**	SPECIAL HAZARD

Attachment F
Data Validation and Laboratory Reports

Attachment G

Well Logs

PROJECT: Stericycle ISB Implementation Georgetown Facility	**Log of Well No. EW-1**
BORING LOCATION:	GROUND SURFACE ELEVATION AND DATUM:
DRILLING CONTRACTOR: Cascade Drilling, Inc.	DATE STARTED: 9/10/15 / DATE FINISHED: 10/9/15
DRILLING METHOD: Hollow-stem auger	TOTAL DEPTH (ft.): 35.5 / SCREEN INTERVAL (ft.): 15.48-34.92
DRILLING EQUIPMENT: CME 75	DEPTH TO WATER: FIRST 13.70 COMPL. / CASING: 6`` Schedule 40 PVC
SAMPLING METHOD: HSA	LOGGED BY: S. Welter
HAMMER WEIGHT: 300 DROP: 30	RESPONSIBLE PROFESSIONAL: JMB / REG. NO. 3003

DEPTH (feet)	SAMPLES Sample No.	SAMPLES Sample	SAMPLES Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
0					CONCRETE	Traffic Rated Well Box
1					PEA GRAVEL.	
2					CONCRETE	Portland Cement
			12	4.7	Sluff from coring.	
3			20		POORLY GRADED SAND WITH GRAVEL (SP): dark yellowish brown (10YR 3/4), moist, 80% medium dense fine to medium sand, 15% fine to coarse gravel, 5%	
			14			
4			3	11.3	nonplastic fines, with trace wood debris.	
			4		Silt Stringer.	
5			5		Coarse Sand Lens with burnt wood debris.	12`` diameter Borehole
			5	1.4	POORLY-GRADED SAND with SILT (SP-SM): very dark	
6			5		brown (10YR 2/2), moist, 85% loose, fine to medium	6`` Schedule 40 PVC Well Casing
			7		grain sand, 10% nonplastic fines, 5% fine gravel, with trace burnt wood debris.	
7			12	0.9	POORLY-GRADED SAND (SP): very dark brown	
			14		(10YR 2/2), moist, 95% loose, fine to medium grain	
8			17		sand, 5% non plastic fines.	Cetco Bentonite Medium Chips
			22	5.7	SAA but with trace gravel.	
9			10			
			11			
10			12	4.7		
			16		Silt Stringer.	
11			12			
			8	2.8		
12			6			
			7			
			78	1.1	Wet. Silt Stringer.	
13			14			
			4			Colorado Silica Sand 10/20
14			8	0.5	Silt Stinger. Silt Stinger.	
15			8			
			8		POORLY-GRADED SAND (SP): black (10YR 2/1),	
16			4	0.8	moist, 95% medium dense, fine to medium grain sand, 5% nonplastic fines.	
			9			
17			12			
			6	0.6		
18						

OAKWELLV (REV. 3/2015)

PROJECT: Stericycle ISB Implementation
Georgetown Facility

Log of Well No. EW-1 (cont'd)

DEPTH (feet)	SAMPLES Sample No.	SAMPLES Sample	SAMPLES Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
18			10			
			10			
19			10	0.1		
			12			
20			10			
			9	0		
21			10			
			8			
22			6	0	SAA but loose sand.	
			8			
23			9			
			7	0.1		
24			9			
			9			
25			10	0		6`` Schedule 40 PVC Vee Wire Screen with 0.010" slots
			10			
26			10			
			6	0		
27			6			
			7			
28			7	0		Colorado Silica Sand 8/12
			8		Silt stinger.	
29			10			
			10	0		
30			11		Silt stinger.	
			9			
31			10	0		
			14			
32			7		Silty Sand lens	
			12	0	Silt Stringer.	
33			16			
			17		Silt Stringer.	
34			10	0		
			12		Silt Stringer.	
35			9			6`` Schedule 40 PVC Endcap
					Bottom of boring at 35.5 feet.	
36						
37						
38						
39						

OAKWELLV (REV. 3/2015)

PROJECT: Stericycle ISB Implementation Georgetown Facility	**Log of Well No. EW-2**
BORING LOCATION:	GROUND SURFACE ELEVATION AND DATUM:
DRILLING CONTRACTOR: Cascade Drilling, Inc.	DATE STARTED: 9/9/15 / DATE FINISHED: 10/8/15
DRILLING METHOD: Hollow-stem auger	TOTAL DEPTH (ft.): 35.5 / SCREEN INTERVAL (ft.): 14.23-33.65
DRILLING EQUIPMENT: CME 75	DEPTH TO WATER: FIRST 13.31 COMPL. / CASING: 6`` Schedule 40 PVC
SAMPLING METHOD: HSA	LOGGED BY: S. Welter
HAMMER WEIGHT: 300 DROP: 30	RESPONSIBLE PROFESSIONAL: JMB / REG. NO. 3003

DEPTH (feet)	SAMPLES Sample No.	SAMPLES Sample	SAMPLES Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
0					CONCRETE	Traffic Rated Well Box
1					PEA GRAVEL	
2					CONCRETE	Portland Cement
3			15 13 15	14	POORLY GRADED SAND WITH GRAVEL (SP): very dark brown (10YR 2/2), moist, 80% medium dense fine to medium sand, 15% fine to coarse gravel, 5% nonplastic fines and burnt wood debris present. Silt Stringer intermixed with wood debris. Burnt Wood Debris and hydrocarbon-like odor.	
4			2 3	0.8		
5			4 4	3.9		12`` diameter Borehole
6			4 7			6`` Schedule 40 PVC Well Casing
7			6 6		Silt Lens.	
8			7 7	0.5	POORLY-GRADED SAND (SP): very dark brown (10YR 2/2), moist, 95% loose, fine to medium grain sand, 5% non plastic fines.	Cetco Bentonite Medium Chips
9			8 10			
10			7 10	1.8		
11			9 12	0.6		
12			14 14		POORLY-GRADED SAND (SP): very dark brown (10YR 2/2), moist, 90% loose, fine to coarse grain sand, 5% non plastic fines, 5% fine gravel.	
13			8 12	0	POORLY-GRADED SAND (SP): black (10YR 2/1), moist, 95% medium dense, fine to medium grain sand, 5% nonplastic fines.	
14			12 11	0		Colorado Silica Sand 10/20
15			10 10			
16			10 10	0		
17			12 11	0		
18						

PROJECT: Stericycle ISB Implementation
Georgetown Facility

Log of Well No. EW-2 (cont'd)

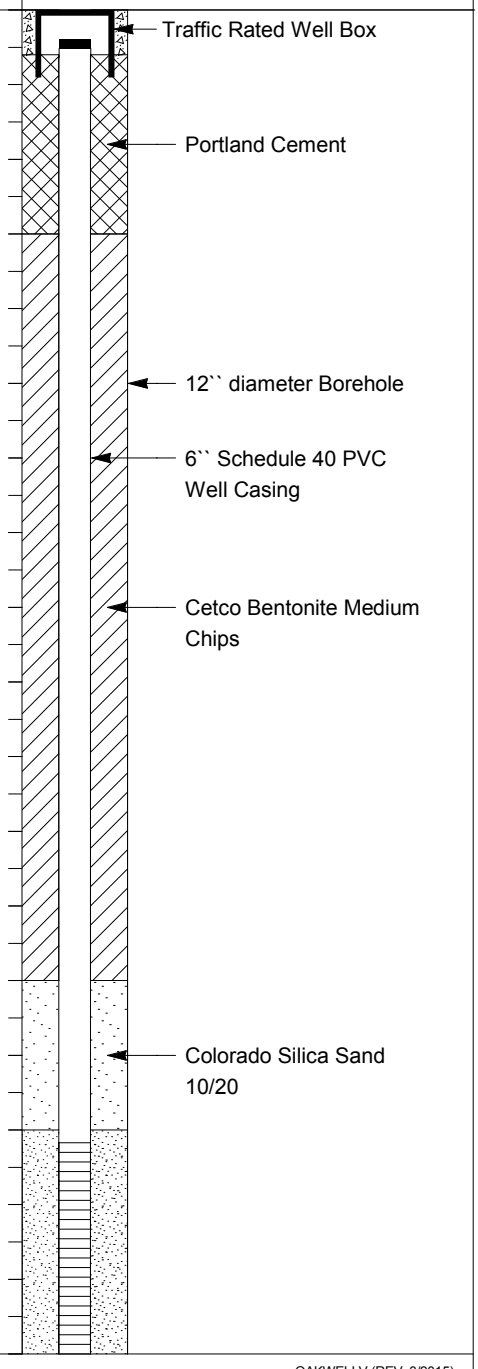
DEPTH (feet)	SAMPLES Sample No.	SAMPLES Sample	SAMPLES Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
18			12			
			13			
19			11	0		
			13			
20			10			
			10	0	Wet.	
21			10			
			20			
22			11	0		
			9		SAA but with wood debris intermixed.	
23			13			
			10	0	Silt stinger.	
24			11			6`` Schedule 40 PVC Vee Wire Screen with 0.010" slots
			15			
25			9	0		
			10			
26			10			
			9	0		
27			13			
			15			
28			11	0	Silt stinger.	Colorado Silica Sand 8/12
			10			
29			10		Silt stinger.	
			13	0	POORLY-GRADED SAND with SILT (SP-SM): black (10YR 2/1), wet, 90% medium dense, fine to medium grain sand, 10% nonplastic fines.	
30			11			
			14			
31			12	0	POORLY-GRADED SAND (SP): black (10YR 2/1), moist, 95% medium dense, fine to medium grain sand, 5% nonplastic fines.	
			12			
32			12			
			12	0		
33			14			
			14			
34			8	0		6`` Schedule 40 PVC Endcap
			12		SAA but with wood debris intermixed.	
35			11			
					Bottom of boring at 35.5 feet.	
36						
37						
38						
39						

OAKWELLV (REV. 3/2015)

PROJECT: Stericycle ISB Implementation Georgetown Facility	**Log of Well No. EW-3**
BORING LOCATION:	GROUND SURFACE ELEVATION AND DATUM:
DRILLING CONTRACTOR: Cascade Drilling, Inc.	DATE STARTED: 9/8/15 / DATE FINISHED: 9/18/15
DRILLING METHOD: Hollow-stem auger	TOTAL DEPTH (ft.): 36.5 / SCREEN INTERVAL (ft.): 15.17-34.58
DRILLING EQUIPMENT: CME 75	DEPTH TO WATER: FIRST 8.38 COMPL. / CASING: 6`` Schedule 40 PVC
SAMPLING METHOD: HSA	LOGGED BY: S. Welter
HAMMER WEIGHT: 300 DROP: 30	RESPONSIBLE PROFESSIONAL: JMB / REG. NO. 3003

DEPTH (feet)	SAMPLES Sample No.	Sample	Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:
0					CONCRETE
					PEA GRAVEL
1					CONCRETE
					PEA GRAVEL
2			7	2.7	
			7		POORLY-GRADED SAND with SILT (SP-SM): very dark brown (10YR 2/2), moist, 90% loose, fine to medium sand, 10% low plastic fines.
3			6		
			5	2.5	
4			5		
			5		Fine Gravel Lens
5			5	12	
			7		SAA but with strong petroleum hydrocarbon-like odor.
6			7		
			10	116	
7			12		
			13		
8			7	48	
			8		
9			8		POORLY-GRADED SAND (SP): very dark brown (10YR 2/2), wet, 95% loose, fine to medium sand, 5% non plastic fines.
			8	50	
10			9		
			9		
11			11	24	
			10		
12			10		
			9	1.1	
13			9		
			12		
14			10	0.8	
			9		
15			10		
			12	1.4	POORLY-GRADED SAND (SP): very dark brown (10YR 2/2), wet, 95% loose, fine to medium sand, 5% non plastic fines, wood debris intermixed.
16			11		
			9		
17			12	0.2	
			14		
18					

WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS



PROJECT: Stericycle ISB Implementation
Georgetown Facility

Log of Well No. EW-3 (cont'd)

DEPTH (feet)	SAMPLES Sample No.	SAMPLES Sample	SAMPLES Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
18			12			
			9	0.4	Silt Lens.	
19			14		POORLY-GRADED SAND (SP): black (10YR 2/1), wet,	
			16		95% loose, fine to medium sand, 5% non plastic fines.	
20			15	0.1		
			16			
21			12			
			5	0.2		
22			9			
			14			
23			9	0		
			10			
24			12			
			9	0.2	Silt Stringer.	
25			10		Silt Stinger.	6`` Schedule 40 PVC Vee Wire Screen with 0.010" slots
			17			
26			10	0		
			10			
27			15		SILTY SAND (SM): black (10YR 2/1), wet, 85% medium	
			11	0	dense, fine to medium sand, 15% non plastic fines.	
28			10		POORLY-GRADED SAND (SP): black (10YR 2/1), wet,	Colorado Silica Sand 8/12
			11		90% medium dense, fine to medium grain sand, 5%	
29			11	0	nonplastic fines, 5% fine gravel and trace shell	
			13		fragments.	
30			15			
			14	0		
31			11			
			14		POORLY-GRADED SAND intermixed with SILT (SP/ML):	
32			11	0	black (10YR 2/1), wet, 90% medium dense, fine to	
			14		medium grain sand, 5% nonplastic fines, 5% fine gravel	
33			17		and trace shell fragments intermixed with 100% low	
			13	0	plastic fines.	
34			15		POORLY-GRADED SAND (SP): black (10YR 2/1), wet,	
			119		90% medium dense, fine to medium grain sand, 5%	
35			13	0.2	nonplastic fines, 5% fine gravel and trace shell	6`` Schedule 40 PVC Endcap
			17		fragments.	
36			20			
					Bottom of Boring at 36.5 feet.	
37						
38						
39						

OAKWELLV (REV. 3/2015)

PROJECT: Stericycle ISB Implementation Georgetown Facility	**Log of Well No. EW-4**
BORING LOCATION:	GROUND SURFACE ELEVATION AND DATUM:
DRILLING CONTRACTOR: Cascade Drilling, Inc.	DATE STARTED: 9/9/15 / DATE FINISHED: 9/21/15
DRILLING METHOD: Hollow-stem auger	TOTAL DEPTH (ft.): 35.5 / SCREEN INTERVAL (ft.): 15.12-34.53
DRILLING EQUIPMENT: CME 75	DEPTH TO WATER: FIRST 9.1 COMPL. / CASING: 6`` Schedule 40 PVC
SAMPLING METHOD: HSA	LOGGED BY: S. Welter
HAMMER WEIGHT: 300 DROP: 30	RESPONSIBLE PROFESSIONAL: JMB / REG. NO. 3003

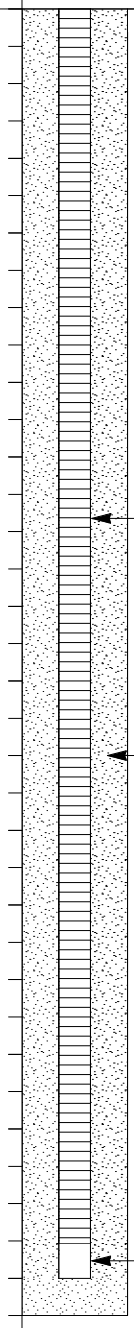
DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
0					CONCRETE	Traffic Rated Well Box
1					PEA GRAVEL	
					CONCRETE	Portland Cement
2					PEA GRAVEL	
					CONCRETE	
3					POORLY-GRADED SAND with SILT (SP-SM): very dark brown (10YR 2/2), moist, 90% loose, fine to medium grain sand, 10% low plastic fines.	
4					Silt Stringer.	
5					POORLY-GRADED SAND (SP): very dark brown (10YR 2/2), moist, 90% loose, fine to medium sand, 5% non plastic fines, 5% fine gravel.	12`` diameter Borehole
6						6`` Schedule 40 PVC Well Casing
7						
8						Cetco Bentonite Medium Chips
9					Wet.	
10						
11						
12						
13					POORLY-GRADED SAND (SP): black (10YR 2/1), wet, 95% medium dense, fine to medium sand, 5% non plastic fines.	
14						Colorado Silica Sand 10/20
15						
16						
17						
18						

OAKWELLV (REV. 3/2015)

PROJECT: Stericycle ISB Implementation
Georgetown Facility

Log of Well No. EW-4 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
18						
19						
20						
21						
22						
23						
24					Silt Stringer.	
25					POORLY-GRADED SAND (SP): black (10YR 2/1), wet, 95% medium dense, fine to medium sand, 5% non plastic fines, with trace wood debris.	6`` Schedule 40 PVC Vee Wire Screen with 0.010" slots
26						
27						
28						Colorado Silica Sand 8/12
29						
30						
31					SILT with SAND (ML): black (10YR 2/1), wet, 90% low plasticity fines, 10% fine to medium sand, with wood debris.	
32					POORLY-GRADED SAND (SP): black (10YR 2/1), wet, 95% medium dense, fine to medium sand, 5% non plastic fines, with trace wood debris.	
33						
34						
35					Silt stringer	6`` Schedule 40 PVC Endcap
36					Bottom of Boring at 35.5 feet.	
37						
38						
39						

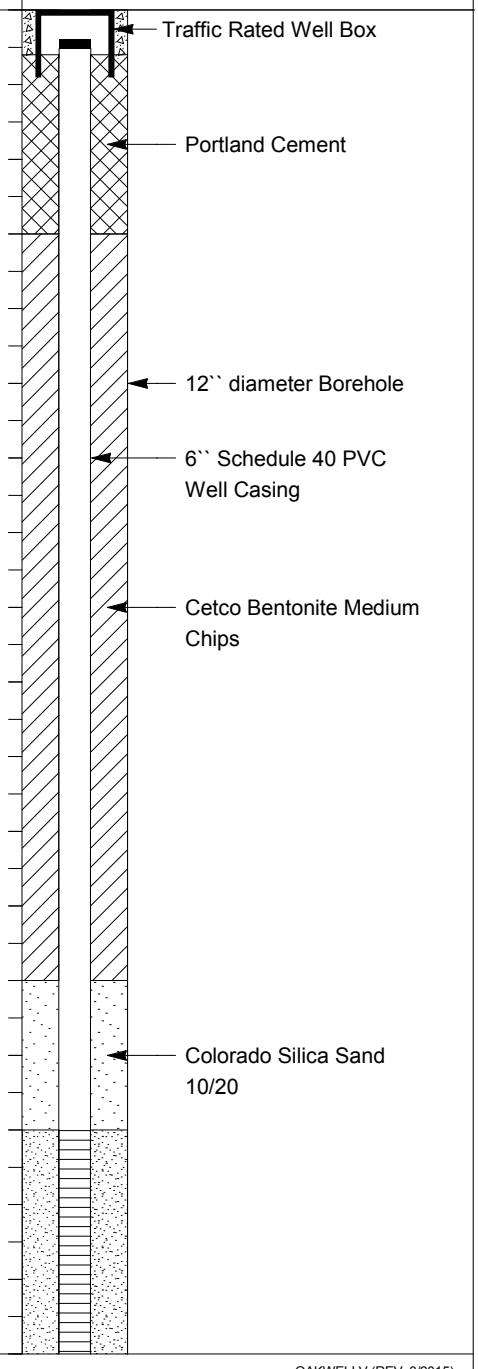


OAKWELLV (REV. 3/2015)

PROJECT: Stericycle ISB Implementation Georgetown Facility	**Log of Well No. EW-5**
BORING LOCATION:	GROUND SURFACE ELEVATION AND DATUM:
DRILLING CONTRACTOR: Cascade Drilling, Inc.	DATE STARTED: 9/8/15 / DATE FINISHED: 9/18/15
DRILLING METHOD: Hollow-stem auger	TOTAL DEPTH (ft.): 36.5 / SCREEN INTERVAL (ft.): 15.00-34.41
DRILLING EQUIPMENT: CME 75	DEPTH TO WATER: FIRST 9.49 COMPL. / CASING: 6`` Schedule 40 PVC
SAMPLING METHOD: HSA	LOGGED BY: S. Welter
HAMMER WEIGHT: 300 DROP: 30	RESPONSIBLE PROFESSIONAL: JMB / REG. NO. 3003

DEPTH (feet)	SAMPLES Sample No.	SAMPLES Sample	SAMPLES Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:
0					CONCRETE
					PEA GRAVEL
1					CONCRETE
2			9	0.5	POORLY-GRADED SAND (SP): gray (2.5Y 5/1), moist, 95% loose, fine to medium sand, 5% fine gravel.
			9		
3			10		
			6	0.2	
4			15		@ 4 feet plastic liner
			15		POORLY-GRADED SAND with SILT (SP-SM): very dark brown (10YR 2/2), moist, 85% medium dense, fine to coarse sand, 10% non plastic fines, 5% fine gravel.
5			12	8.6	
			15		
6			16		
			6	0.2	SAA but with wood debris.
7			9		
			10		
8			6	0.2	
			7		
9			7		
			4	0.1	Wet.
10			5		
			8		
11			6	0.2	
			10		
12			8		
			10	0.9	POORLY-GRADED SAND (SP): black (10YR 2/1), wet, 95% medium dense, fine to medium sand, 5% fine non plastic fines with trace wood debris.
13			12		
			12		
14			14	0.1	
			10		
15			13		
			10	0.2	
16			12		
			14		
17			6	0.2	
			6		
18					

WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS



PROJECT: Stericycle ISB Implementation
Georgetown Facility

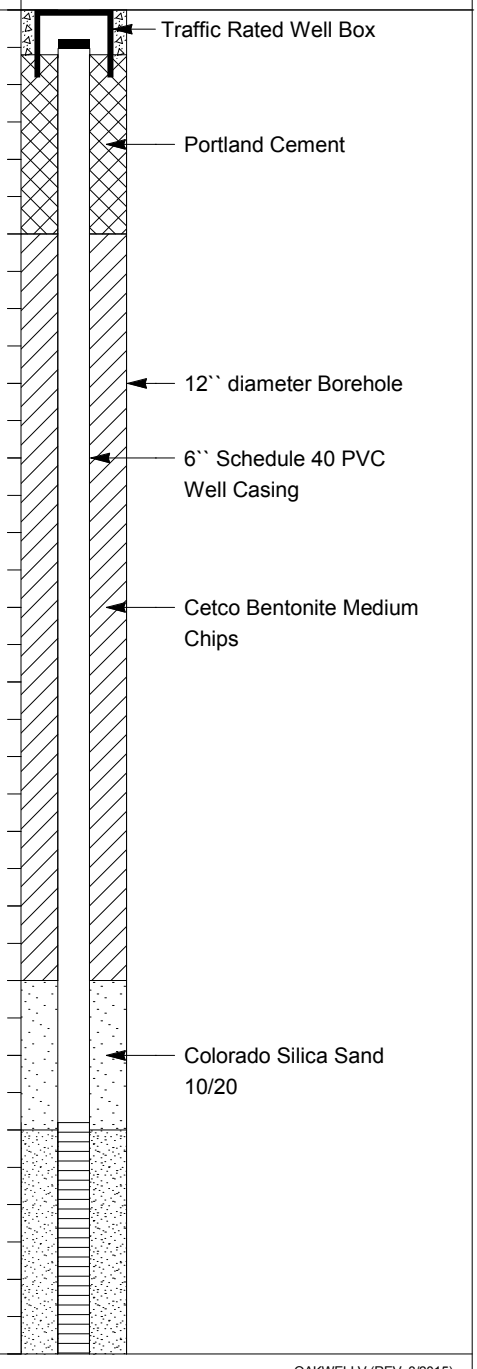
Log of Well No. EW-5 (cont'd)

DEPTH (feet)	SAMPLES Sample No.	SAMPLES Sample	SAMPLES Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
18			5			
			8	0	Silt Stringer.	
19			5			
			4			
20			6	0		
			8			
21			9		Silt Stringer.	
			8	0	Silt Stringer.	
22			8			
			8			
23			10	0		
			14			
24			13			
			10			
25			10			6`` Schedule 40 PVC Vee Wire Screen with 0.010" slots
			10			
26			12	0		
			12			
27			10			
			11	0		
28			14			Colorado Silica Sand 8/12
			9			
29			13	0		
			15			
30			11			
			13	0		
31			14			
			11			
32			7	0		
			12			
33			8		Silt Stringer.	
			9	0		
34			13			
			15			
35			13	0	Silt Stringer.	6`` Schedule 40 PVC Endcap
			15			
36			18			
					Bottom of Boring at 36.5 feet.	
37						
38						
39						

OAKWELLV (REV. 3/2015)

PROJECT: Stericycle ISB Implementation Georgetown Facility	**Log of Well No. EW-6**
BORING LOCATION:	GROUND SURFACE ELEVATION AND DATUM:
DRILLING CONTRACTOR: Cascade Drilling, Inc.	DATE STARTED: 9/10/15 / DATE FINISHED: 9/21/15
DRILLING METHOD: Hollow-stem auger	TOTAL DEPTH (ft.): 36.5 / SCREEN INTERVAL (ft.): 14.9-34.32
DRILLING EQUIPMENT: CME 75	DEPTH TO WATER: FIRST 11.76 COMPL. / CASING: 6`` Schedule 40 PVC
SAMPLING METHOD: HSA	LOGGED BY: S. Welter
HAMMER WEIGHT: 300 / DROP: 30	RESPONSIBLE PROFESSIONAL: JMB / REG. NO. 3003

DEPTH (feet)	SAMPLES Sample No.	SAMPLES Sample	SAMPLES Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.
					Surface Elevation:
0					Concrete Core 18`` diameter
1					Slough and Pea Gravel
			9	0.0	
2			10		
			9		POORLY-GRADED SAND (SP): very dark brown (10YR 2/2), Moist, No plasticity, 95% Medium to fine grain sand, loose 5% fines
3			3	0.0	
			4		
4			5		
			3	1.5	
5			4		POORLY-GRADED SAND with SILT (SP-SM): black (10YR 2/1), lens
			6		Silt Stringer
6			4	18.8	POORLY-GRADED SAND (SP): very dark brown (10YR 2/2), Moist, No plasticity, 95% Medium to fine grain sand, loose 5% fines
			5		
7			8		
			7	19.7	
8			7		
			8		
9			6	36.5	
			6		
10			7		
			5	158	
11			5		Strong Odor
			8		Silt Stringer
12			8	155.8	Silt Stringer
			6		black (10YR 2/1),
13			7		
			5	98	
14			7		Becomes wet
			9		
15			6	142	
			7		
16			7		
			7	120	
17			10		
			10		
18					



WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS

PROJECT: Stericycle ISB Implementation
Georgetown Facility

Log of Well No. EW-6 (cont'd)

DEPTH (feet)	SAMPLES Sample No.	SAMPLES Sample	SAMPLES Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
18			11	13	SAA with trace gravel	
			10			
19			12			
			9	10.1		
20			11			
			11			
21						
			6	16.8		
22			6			
			8	8.7		
23			5 7			
			7			
24			10	3.4	Silt Stringer	
			11			6`` Schedule 40 PVC Vee Wire Screen with 0.010" slots
25			9			
			8	1.3		
26			10			
			10			
27			10	1.8		
			11			
28			12			Colorado Silica Sand 8/12
			10	1.1	Fine Sand Stringer with Wood Debris	
29			10			
			12			
30			10	1.1		
			10			
31			10			
			8	0.4		
32			12			
			12			
33			8	0.2		
			9			
34			11			
			15	0.1		6`` Schedule 40 PVC Endcap
35			14		Wood Debris	
			11			
36					Bottom of Boring at 36 feet.	
37						
38						
39						

OAKWELLV (REV. 3/2015)

PROJECT: Stericycle ISB Implementation Georgetown Facility	**Log of Well No. IW-01**
BORING LOCATION:	GROUND SURFACE ELEVATION AND DATUM: GS
DRILLING CONTRACTOR: Cascade Drilling, Inc.	DATE STARTED: 10/1/15 / DATE FINISHED: 10/2/15
DRILLING METHOD: Hollow-stem auger	TOTAL DEPTH (ft.): 26.0 / SCREEN INTERVAL (ft.): 15.58-25.05
DRILLING EQUIPMENT: CME 75	DEPTH TO WATER: FIRST 13.07 COMPL. / CASING: 4" Schedule 40 PVC
SAMPLING METHOD: N/A	LOGGED BY: S. Behrouzi
HAMMER WEIGHT: N/A / DROP: N/A	RESPONSIBLE PROFESSIONAL: JMB / REG. NO. 3003

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
0					1st Concrete Core	Traffic Rated Well Box
1					Pea Gravel	
2					2nd Concrete Core See Well Log for EW-1 for Lithologic Description	Portland Cement
3						
4						
5						10`` diameter Borehole
6						4`` Schedule 40 PVC Well Casing
7						
8				20.0		Cetco Bentonite Medium Chips
9						
10						
11						
12						
13						
14						Colorado Silica Sand 10/20
15						
16						
17						
18						

PROJECT: Stericycle ISB Implementation
Georgetown Facility

Log of Well No. IW-01 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
18				11.2		Colorado Silica Sand 8/12
19						
20						4`` Schedule 40 PVC Vee Wire Screen with 0.010" slots
21						
22						
23						
24						
25						4`` Schedule 40 PVC Endcap
26					End of boring at 26 ft Ecology Well ID= BIX063	
27						
28						
29						
30						
31						
32						
33						
34						
35						
36						
37						
38						
39						

OAKWELLV (REV. 3/2015)

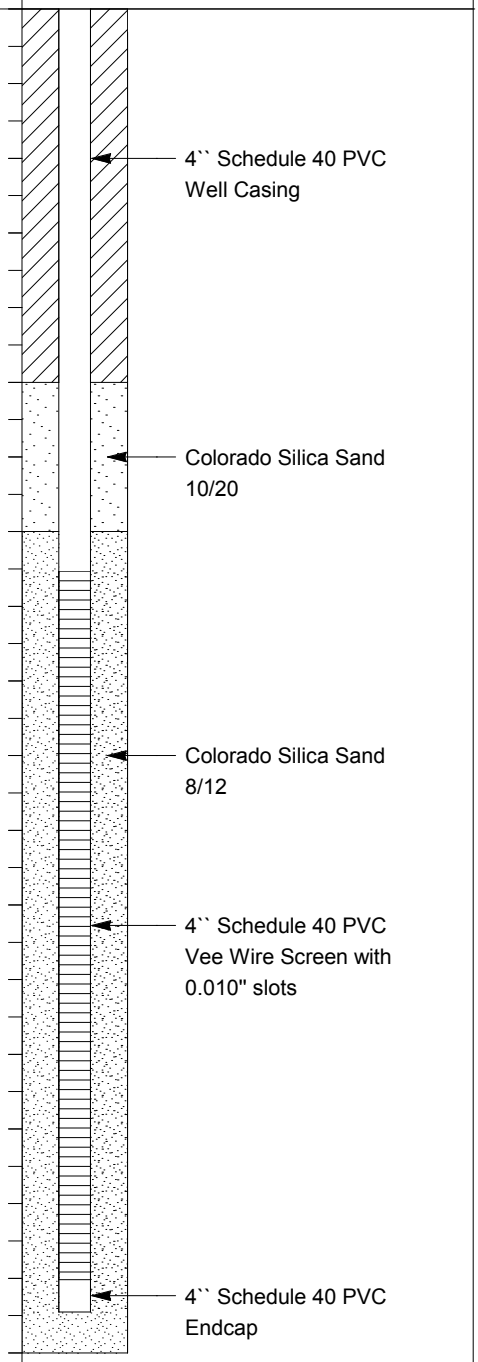
PROJECT: Stericycle ISB Implementation Georgetown Facility	**Log of Well No. IW-02**
BORING LOCATION:	GROUND SURFACE ELEVATION AND DATUM: GS
DRILLING CONTRACTOR: Cascade Drilling, Inc.	DATE STARTED: 10/1/15 / DATE FINISHED: 10/2/15
DRILLING METHOD: Hollow-stem auger	TOTAL DEPTH (ft.): 36.0 / SCREEN INTERVAL (ft.): 25.53-35.02
DRILLING EQUIPMENT: CME 75	DEPTH TO WATER: FIRST 13.24 COMPL. / CASING: 4" Schedule 40 PVC
SAMPLING METHOD: N/A	LOGGED BY: S. Behrouzi
HAMMER WEIGHT: N/A / DROP: N/A	RESPONSIBLE PROFESSIONAL: JMB / REG. NO. 3003

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
0					1st Concrete Core	Traffic Rated Well Box
1					Pea Gravel	
2					2nd Concrete Core See Well Log for EW-1 for Lithologic Description	Portland Cement
3						
4						
5						10`` diameter Borehole
6						
7						
8				0.2		4`` Schedule 40 PVC Well Casing
9						
10						
11						
12						
13						Cetco Bentonite Medium Chips
14						
15						
16						
17						
18						

PROJECT: Stericycle ISB Implementation
Georgetown Facility

Log of Well No. IW-02 (cont'd)

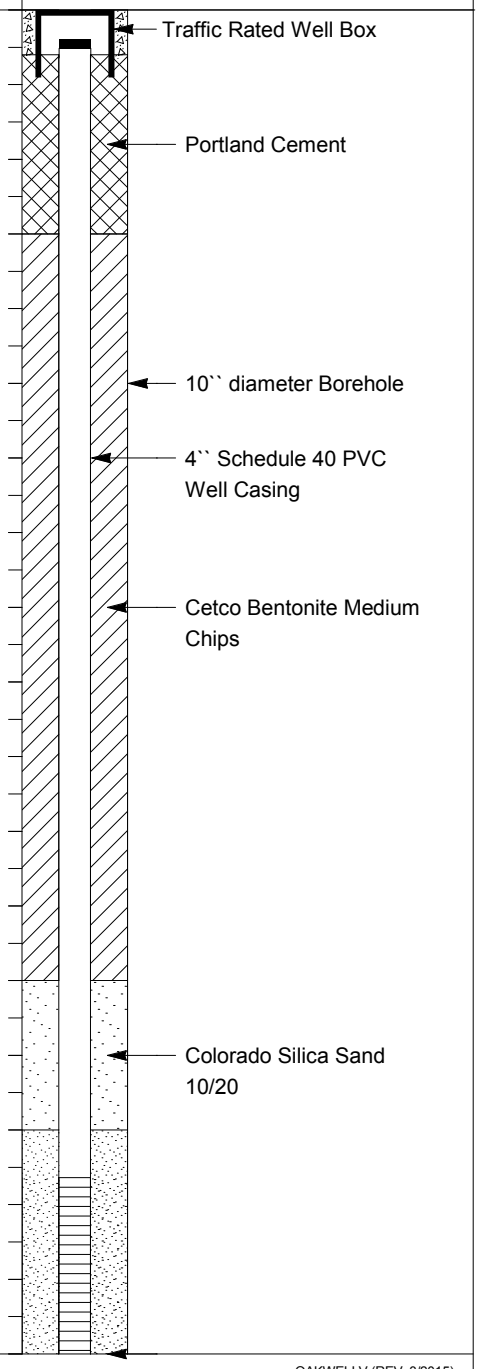
DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
18				0.3		
19						
20						4`` Schedule 40 PVC Well Casing
21						
22						
23						
24						Colorado Silica Sand 10/20
25						
26						
27						
28				0.1		Colorado Silica Sand 8/12
29						
30						4`` Schedule 40 PVC Vee Wire Screen with 0.010" slots
31						
32						
33						
34						
35						4`` Schedule 40 PVC Endcap
36					End of boring at 36 ft Ecology Well ID= BIX062	
37						
38						
39						



OAKWELLV (REV. 3/2015)

PROJECT: Stericycle ISB Implementation Georgetown Facility	**Log of Well No. IW-03**
BORING LOCATION:	GROUND SURFACE ELEVATION AND DATUM: GS
DRILLING CONTRACTOR: Cascade Drilling, Inc.	DATE STARTED: 10/8/15 / DATE FINISHED: 10/8/15
DRILLING METHOD: Hollow-stem auger	TOTAL DEPTH (ft.): 26.0 / SCREEN INTERVAL (ft.): 15.64-25.11
DRILLING EQUIPMENT: CME 75	DEPTH TO WATER: FIRST 13.57 COMPL. / CASING: 4" Schedule 40 PVC
SAMPLING METHOD: N/A	LOGGED BY: S. Behrouzi
HAMMER WEIGHT: N/A / DROP: N/A	RESPONSIBLE PROFESSIONAL: JMB / REG. NO. 3003

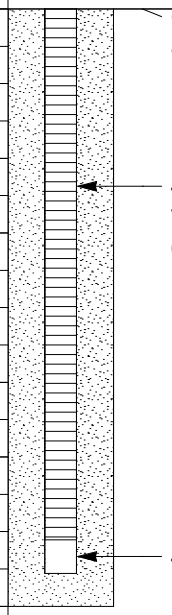
DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:
0					Asphalt
1					1st Concrete Core
2					Pea Gravel 2nd Concrete Core
3					See Well Log for EW-1 for Lithologic Description
4					
5					
6					
7					
8				0.0	
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					



PROJECT: Stericycle ISB Implementation
Georgetown Facility

Log of Well No. IW-03 (cont'd)

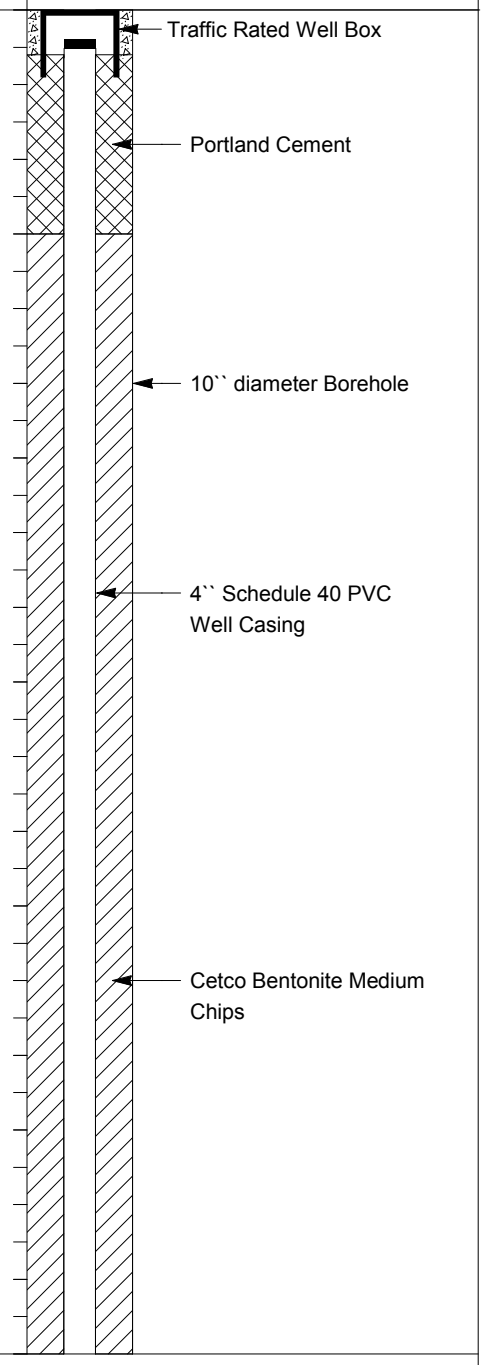
DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
18				0.0		Colorado Silica Sand 8/12
19						
20						4`` Schedule 40 PVC Vee Wire Screen with 0.010" slots
21						
22						
23						
24						
25						4`` Schedule 40 PVC Endcap
26					End of boring at 26 ft Ecology Well ID= BIX077	
27						
28						
29						
30						
31						
32						
33						
34						
35						
36						
37						
38						
39						



OAKWELLV (REV. 3/2015)

PROJECT: Stericycle ISB Implementation Georgetown Facility	**Log of Well No. IW-04**
BORING LOCATION:	GROUND SURFACE ELEVATION AND DATUM: GS
DRILLING CONTRACTOR: Cascade Drilling, Inc.	DATE STARTED: 10/7/15 / DATE FINISHED: 10/7/15
DRILLING METHOD: Hollow-stem auger	TOTAL DEPTH (ft.): 36.0 / SCREEN INTERVAL (ft.): 25.63-35.11
DRILLING EQUIPMENT: CME 75	DEPTH TO WATER: FIRST 13.68 / COMPL. / CASING: 4" Schedule 40 PVC
SAMPLING METHOD: N/A	LOGGED BY: S. Behrouzi
HAMMER WEIGHT: N/A / DROP: N/A	RESPONSIBLE PROFESSIONAL: JMB / REG. NO. 3003

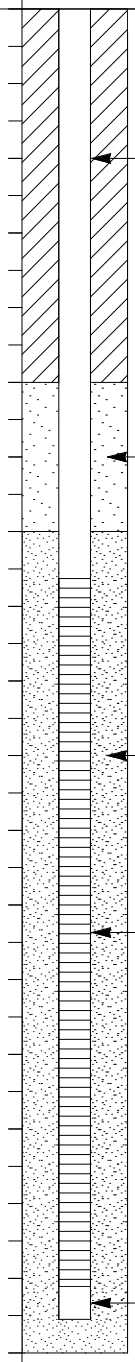
DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:
0					Asphalt
1					Concrete Core
2					See Well Log for EW-1 for Lithologic Description
3					
4					
5					
6					
7					
8				1.4	
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					



PROJECT: Stericycle ISB Implementation
Georgetown Facility

Log of Well No. IW-04 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
18				0.3		
19						
20						4`` Schedule 40 PVC Well Casing
21						
22						
23						
24						Colorado Silica Sand 10/20
25						
26						
27						
28				0.2		Colorado Silica Sand 8/12
29						
30						4`` Schedule 40 PVC Vee Wire Screen with 0.010" slots
31						
32						
33						
34						
35						4`` Schedule 40 PVC Endcap
36					End of boring at 36 ft Ecology Well ID= BIX076	
37						
38						
39						



OAKWELLV (REV. 3/2015)

PROJECT: Stericycle ISB Implementation Georgetown Facility	**Log of Well No. IW-05**
BORING LOCATION:	GROUND SURFACE ELEVATION AND DATUM: GS
DRILLING CONTRACTOR: Cascade Drilling, Inc.	DATE STARTED: 10/2/15 / DATE FINISHED: 10/6/15
DRILLING METHOD: Hollow-stem auger	TOTAL DEPTH (ft.): 26.0 / SCREEN INTERVAL (ft.): 15.57-25.05
DRILLING EQUIPMENT: CME 75	DEPTH TO WATER: FIRST 13.03 COMPL. / CASING: 4" Schedule 40 PVC
SAMPLING METHOD: N/A	LOGGED BY: S. Behrouzi
HAMMER WEIGHT: N/A / DROP: N/A	RESPONSIBLE PROFESSIONAL: JMB / REG. NO. 3003

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
0					1st Concrete Core	Traffic Rated Well Box
1					Pea Gravel	
					Asphalt	Portland Cement
2					2nd Concrete Core	
					See Well Log for EW-1 for Lithologic Description	
3						
4						
5						10`` diameter Borehole
6						4`` Schedule 40 PVC Well Casing
7						
8				2.6		Cetco Bentonite Medium Chips
9						
10						
11						
12						
13						
14						Colorado Silica Sand 10/20
15						
16						
17						
18						

PROJECT: Stericycle ISB Implementation
Georgetown Facility

Log of Well No. IW-05 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
18				3.6		Colorado Silica Sand 8/12
19						
20						4`` Schedule 40 PVC Vee Wire Screen with 0.010" slots
21						
22						
23						
24						
25						4`` Schedule 40 PVC Endcap
26					End of boring at 26 ft Ecology Well ID= BIX064	
27						
28						
29						
30						
31						
32						
33						
34						
35						
36						
37						
38						
39						

OAKWELLV (REV. 3/2015)

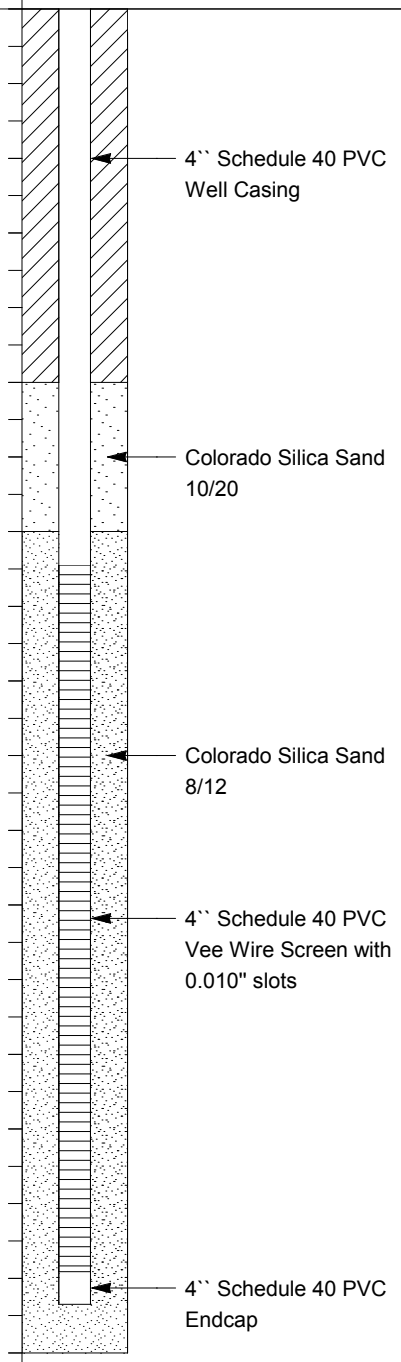
PROJECT: Stericycle ISB Implementation Georgetown Facility	**Log of Well No. IW-06**
BORING LOCATION:	GROUND SURFACE ELEVATION AND DATUM: GS
DRILLING CONTRACTOR: Cascade Drilling, Inc.	DATE STARTED: 10/2/15 / DATE FINISHED: 10/6/15
DRILLING METHOD: Hollow-stem auger	TOTAL DEPTH (ft.): 36.0 / SCREEN INTERVAL (ft.): 25.45-34.91
DRILLING EQUIPMENT: CME 75	DEPTH TO WATER: FIRST 13.36 / COMPL. / CASING: 4" Schedule 40 PVC
SAMPLING METHOD: N/A	LOGGED BY: S. Behrouzi
HAMMER WEIGHT: N/A / DROP: N/A	RESPONSIBLE PROFESSIONAL: JMB / REG. NO. 3003

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
0					1st Concrete Core	Traffic Rated Well Box
1					Pea Gravel	
					Asphalt	Portland Cement
2					2nd Concrete Core	
					See Well Log for EW-1 for Lithologic Description	
3						
4						
5						10`` diameter Borehole
6						
7						
8				0.7		4`` Schedule 40 PVC Well Casing
9						
10						
11						
12						
13						Cetco Bentonite Medium Chips
14						
15						
16						
17						
18						

PROJECT: Stericycle ISB Implementation
Georgetown Facility

Log of Well No. IW-06 (cont'd)

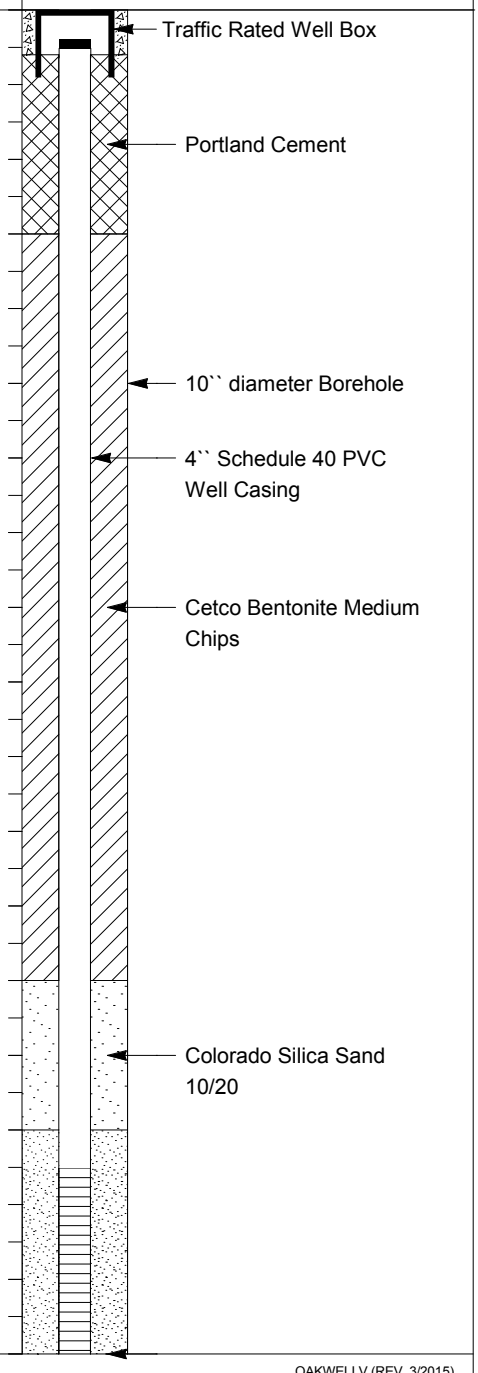
DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
18				8.4		
19						
20						4`` Schedule 40 PVC Well Casing
21						
22						
23						
24						Colorado Silica Sand 10/20
25						
26						
27						
28				0.2		Colorado Silica Sand 8/12
29						
30						4`` Schedule 40 PVC Vee Wire Screen with 0.010" slots
31						
32						
33						
34						
35						4`` Schedule 40 PVC Endcap
36					End of boring at 36 ft Ecology Well ID= BIX065	
37						
38						
39						



OAKWELLV (REV. 3/2015)

PROJECT: Stericycle ISB Implementation Georgetown Facility	**Log of Well No. IW-07**
BORING LOCATION:	GROUND SURFACE ELEVATION AND DATUM: GS
DRILLING CONTRACTOR: Cascade Drilling, Inc.	DATE STARTED: 10/7/15 / DATE FINISHED: 10/7/15
DRILLING METHOD: Hollow-stem auger	TOTAL DEPTH (ft.): 26.0 / SCREEN INTERVAL (ft.): 15.51-24.99
DRILLING EQUIPMENT: CME 75	DEPTH TO WATER: FIRST 13.22 COMPL. / CASING: 4" Schedule 40 PVC
SAMPLING METHOD: N/A	LOGGED BY: S. Behrouzi
HAMMER WEIGHT: N/A / DROP: N/A	RESPONSIBLE PROFESSIONAL: JMB / REG. NO. 3003

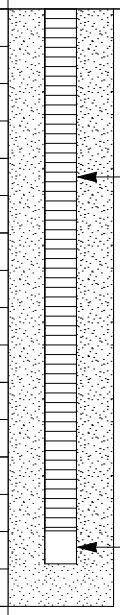
DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:
0					1st Concrete Core
1					Pea Gravel
					2nd Concrete Core
2					See Well Log for EW-1 for Lithologic Description
3					
4					
5					
6					
7					
8				0.9	
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					



PROJECT: Stericycle ISB Implementation
Georgetown Facility

Log of Well No. IW-07 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
18				0.1		Colorado Silica Sand 8/12
19						
20						4`` Schedule 40 PVC Vee Wire Screen with 0.010" slots
21						
22						
23						
24						
25						4`` Schedule 40 PVC Endcap
26					End of boring at 26 ft Ecology Well ID= BIX075	
27						
28						
29						
30						
31						
32						
33						
34						
35						
36						
37						
38						
39						



OAKWELLV (REV. 3/2015)

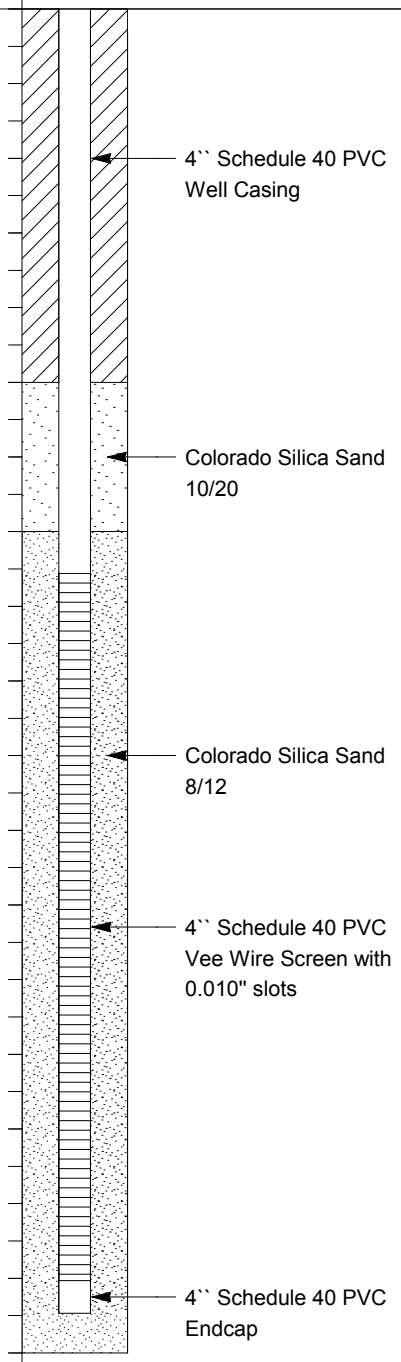
PROJECT: Stericycle ISB Implementation Georgetown Facility	**Log of Well No. IW-08**
BORING LOCATION:	GROUND SURFACE ELEVATION AND DATUM: GS
DRILLING CONTRACTOR: Cascade Drilling, Inc.	DATE STARTED: 10/7/15 / DATE FINISHED: 10/7/15
DRILLING METHOD: Hollow-stem auger	TOTAL DEPTH (ft.): 36.0 / SCREEN INTERVAL (ft.): 25.56-35.03
DRILLING EQUIPMENT: CME 75	DEPTH TO WATER: FIRST 13.11 / COMPL. / CASING: 4" Schedule 40 PVC
SAMPLING METHOD: N/A	LOGGED BY: S. Behrouzi
HAMMER WEIGHT: N/A / DROP: N/A	RESPONSIBLE PROFESSIONAL: JMB / REG. NO. 3003

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					Surface Elevation:	
0					Concrete Core	Traffic Rated Well Box
1					See Well Log for EW-1 for Lithologic Description	
2						Portland Cement
3						
4						
5						10`` diameter Borehole
6						
7						
8				3.7		4`` Schedule 40 PVC Well Casing
9						
10						
11						
12						
13						Cetco Bentonite Medium Chips
14						
15						
16						
17						
18						

PROJECT: Stericycle ISB Implementation
Georgetown Facility

Log of Well No. IW-08 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
18				0.2		
19						
20						4`` Schedule 40 PVC Well Casing
21						
22						
23						
24						Colorado Silica Sand 10/20
25						
26						
27						
28				0.7		Colorado Silica Sand 8/12
29						
30						4`` Schedule 40 PVC Vee Wire Screen with 0.010" slots
31						
32						
33						
34						
35						4`` Schedule 40 PVC Endcap
36					End of boring at 36 ft Ecology Well ID= BIX074	
37						
38						
39						



OAKWELLV (REV. 3/2015)

PROJECT: Stericycle ISB Implementation Georgetown Facility	**Log of Well No. IW-09**
BORING LOCATION:	GROUND SURFACE ELEVATION AND DATUM: GS
DRILLING CONTRACTOR: Cascade Drilling, Inc.	DATE STARTED: 10/5/15 / DATE FINISHED: 10/8/15
DRILLING METHOD: Hollow-stem auger	TOTAL DEPTH (ft.): 26.0 / SCREEN INTERVAL (ft.): 15.59-25.06
DRILLING EQUIPMENT: CME 75	DEPTH TO WATER: FIRST 13.51 COMPL. / CASING: 4" Schedule 40 PVC
SAMPLING METHOD: N/A	LOGGED BY: S. Behrouzi
HAMMER WEIGHT: N/A / DROP: N/A	RESPONSIBLE PROFESSIONAL: JMB / REG. NO. 3003

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
0					1st Concrete Core	Traffic Rated Well Box
1					Pea Gravel	
					Asphalt	Portland Cement
2					2nd Concrete Core	
					See Well Log for EW-2 for Lithologic Description	
3						
4						
5						10`` diameter Borehole
6						4`` Schedule 40 PVC Well Casing
7						
8				0.0		Cetco Bentonite Medium Chips
9						
10						
11						
12						
13						
14						Colorado Silica Sand 10/20
15						
16						
17						
18						

PROJECT: Stericycle ISB Implementation
Georgetown Facility

Log of Well No. IW-09 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
18				0.0		Colorado Silica Sand 8/12
19						
20						4`` Schedule 40 PVC Vee Wire Screen with 0.010" slots
21						
22						
23						
24						
25						4`` Schedule 40 PVC Endcap
26					End of boring at 26 ft Ecology Well ID= BIX067	
27						
28						
29						
30						
31						
32						
33						
34						
35						
36						
37						
38						
39						

OAKWELLV (REV. 3/2015)

PROJECT: Stericycle ISB Implementation Georgetown Facility	**Log of Well No. IW-10**
BORING LOCATION:	GROUND SURFACE ELEVATION AND DATUM: GS
DRILLING CONTRACTOR: Cascade Drilling, Inc.	DATE STARTED: 10/2/15 / DATE FINISHED: 10/6/15
DRILLING METHOD: Hollow-stem auger	TOTAL DEPTH (ft.): 36.0 / SCREEN INTERVAL (ft.): 25.62-35.11
DRILLING EQUIPMENT: CME 75	DEPTH TO WATER: FIRST 13.46 COMPL. / CASING: 4" Schedule 40 PVC
SAMPLING METHOD: N/A	LOGGED BY: S. Behrouzi
HAMMER WEIGHT: N/A / DROP: N/A	RESPONSIBLE PROFESSIONAL: JMB / REG. NO. 3003

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
0					1st Concrete Core	Traffic Rated Well Box
1					Pea Gravel	
					Asphalt	Portland Cement
2					2nd Concrete Core	
					See Well Log for EW-2 for Lithologic Description	
3						
4						
5						10`` diameter Borehole
6						
7						
8				0.3		4`` Schedule 40 PVC Well Casing
9						
10						
11						
12						
13						Cetco Bentonite Medium Chips
14						
15						
16						
17						
18						

PROJECT: Stericycle ISB Implementation
Georgetown Facility

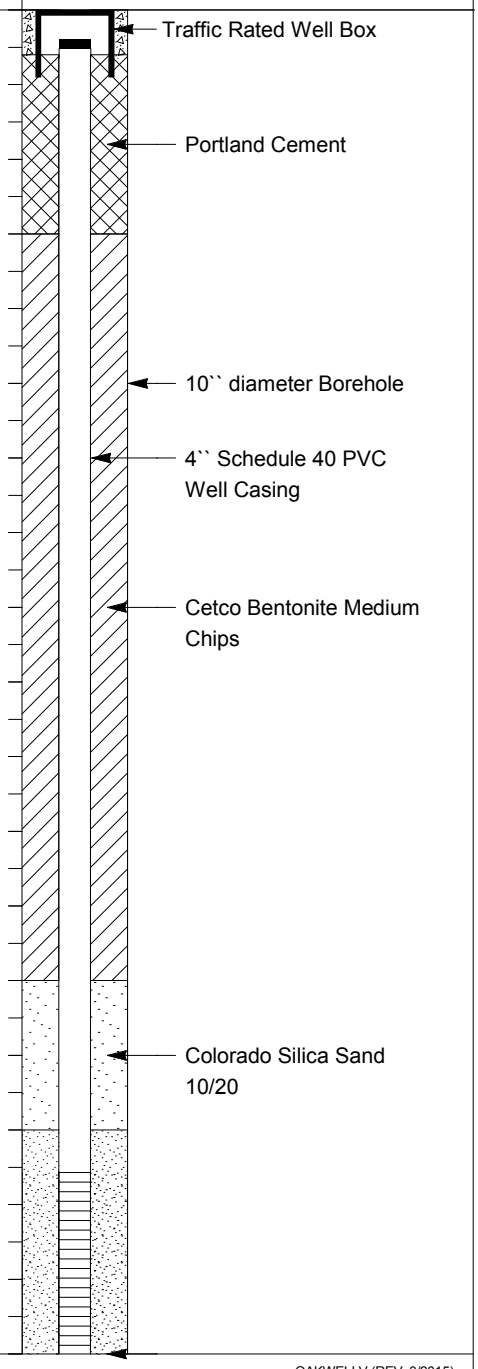
Log of Well No. IW-10 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
18				0.8		
19						
20						4`` Schedule 40 PVC Well Casing
21						
22						
23						
24						Colorado Silica Sand 10/20
25						
26						
27						
28				1.2		Colorado Silica Sand 8/12
29						
30						4`` Schedule 40 PVC Vee Wire Screen with 0.010" slots
31						
32						
33						
34						
35						4`` Schedule 40 PVC Endcap
36					End of boring at 36 ft Ecology Well ID= BIX066	
37						
38						
39						

OAKWELLV (REV. 3/2015)

PROJECT: Stericycle ISB Implementation Georgetown Facility	**Log of Well No. IW-11**
BORING LOCATION:	GROUND SURFACE ELEVATION AND DATUM: GS
DRILLING CONTRACTOR: Cascade Drilling, Inc.	DATE STARTED: 10/6/15 / DATE FINISHED: 10/6/15
DRILLING METHOD: Hollow-stem auger	TOTAL DEPTH (ft.): 26.0 / SCREEN INTERVAL (ft.): 15.57-25.06
DRILLING EQUIPMENT: CME 75	DEPTH TO WATER: FIRST 13.37 COMPL. / CASING: 4" Schedule 40 PVC
SAMPLING METHOD: N/A	LOGGED BY: S. Behrouzi
HAMMER WEIGHT: N/A / DROP: N/A	RESPONSIBLE PROFESSIONAL: JMB / REG. NO. 3003

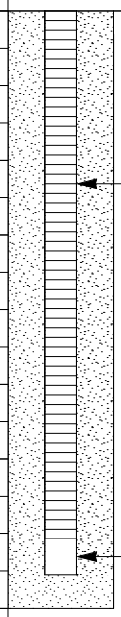
DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:
0					1st Concrete Core
1					Pea Gravel
2					See Well Log for EW-2 for Lithologic Description
3					
4					
5					
6					
7					
8				6.6	
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					



PROJECT: Stericycle ISB Implementation
Georgetown Facility

Log of Well No. IW-11 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
18				1.5		Colorado Silica Sand 8/12
19						
20						4`` Schedule 40 PVC Vee Wire Screen with 0.010" slots
21						
22						
23						
24						
25						4`` Schedule 40 PVC Endcap
26					End of boring at 26 ft Ecology Well ID= BIX073	
27						
28						
29						
30						
31						
32						
33						
34						
35						
36						
37						
38						
39						



OAKWELLV (REV. 3/2015)

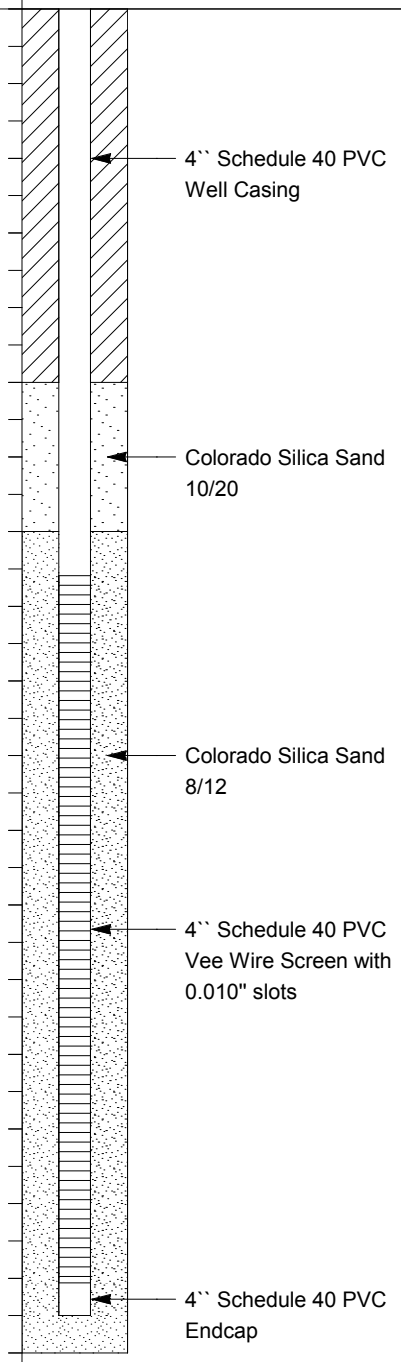
PROJECT: Stericycle ISB Implementation Georgetown Facility	**Log of Well No. IW-12**
BORING LOCATION:	GROUND SURFACE ELEVATION AND DATUM: GS
DRILLING CONTRACTOR: Cascade Drilling, Inc.	DATE STARTED: 10/6/15 / DATE FINISHED: 10/6/15
DRILLING METHOD: Hollow-stem auger	TOTAL DEPTH (ft.): 36.0 / SCREEN INTERVAL (ft.): 25.59-35.16
DRILLING EQUIPMENT: CME 75	DEPTH TO WATER: FIRST 13.42 / COMPL. / CASING: 4" Schedule 40 PVC
SAMPLING METHOD: N/A	LOGGED BY: S. Behrouzi
HAMMER WEIGHT: N/A / DROP: N/A	RESPONSIBLE PROFESSIONAL: JMB / REG. NO. 3003

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					Surface Elevation:	
0					Concrete Core	Traffic Rated Well Box
1					See Well Log for EW-2 for Lithologic Description	Portland Cement
2						
3						
4						
5						10`` diameter Borehole
6						
7						
8				6.0		4`` Schedule 40 PVC Well Casing
9						
10						
11						
12						
13						Cetco Bentonite Medium Chips
14						
15						
16						
17						
18						

PROJECT: Stericycle ISB Implementation
Georgetown Facility

Log of Well No. IW-12 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
18				2.2		
19						
20						4`` Schedule 40 PVC Well Casing
21						
22						
23						
24						Colorado Silica Sand 10/20
25						
26						
27						
28				0.1		Colorado Silica Sand 8/12
29						
30						4`` Schedule 40 PVC Vee Wire Screen with 0.010" slots
31						
32						
33						
34						
35						4`` Schedule 40 PVC Endcap
36					End of boring at 36 ft Ecology Well ID= BIX072	
37						
38						
39						



OAKWELLV (REV. 3/2015)

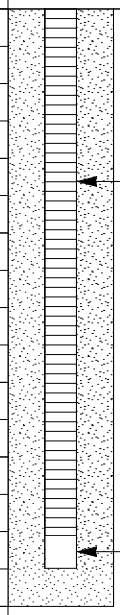
PROJECT: Stericycle ISB Implementation Georgetown Facility	**Log of Well No. IW-13**
BORING LOCATION:	GROUND SURFACE ELEVATION AND DATUM: GS
DRILLING CONTRACTOR: Cascade Drilling, Inc.	DATE STARTED: 10/5/15 / DATE FINISHED: 10/8/15
DRILLING METHOD: Hollow-stem auger	TOTAL DEPTH (ft.): 26.0 / SCREEN INTERVAL (ft.): 15.57-25.05
DRILLING EQUIPMENT: CME 75	DEPTH TO WATER: FIRST 13.19 COMPL. / CASING: 4" Schedule 40 PVC
SAMPLING METHOD: N/A	LOGGED BY: S. Behrouzi
HAMMER WEIGHT: N/A / DROP: N/A	RESPONSIBLE PROFESSIONAL: JMB / REG. NO. 3003

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
0					1st Concrete Core	Traffic Rated Well Box
1					Pea Gravel	
					Asphalt	Portland Cement
2					2nd Concrete Core	
					See Well Log for EW-2 for Lithologic Description	
3						
4						
5						10`` diameter Borehole
6						4`` Schedule 40 PVC Well Casing
7						
8				0.1		Cetco Bentonite Medium Chips
9						
10						
11						
12						
13						
14						Colorado Silica Sand 10/20
15						
16						
17						
18						

PROJECT: Stericycle ISB Implementation
Georgetown Facility

Log of Well No. IW-13 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
18				0.0		Colorado Silica Sand 8/12
19						
20						4`` Schedule 40 PVC Vee Wire Screen with 0.010" slots
21						
22						
23						
24						
25						4`` Schedule 40 PVC Endcap
26					End of boring at 26 ft Ecology Well ID= BIX069	
27						
28						
29						
30						
31						
32						
33						
34						
35						
36						
37						
38						
39						



OAKWELLV (REV. 3/2015)

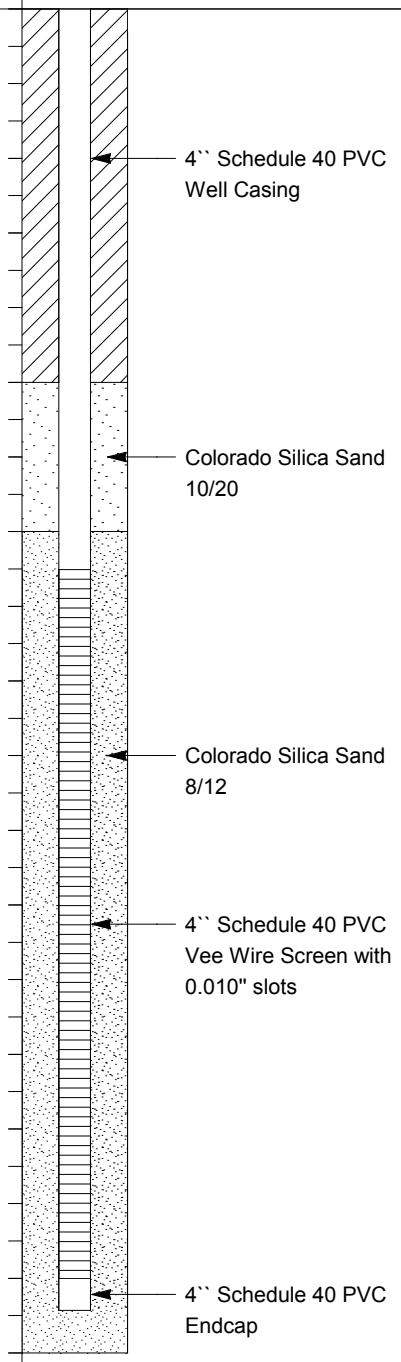
PROJECT: Stericycle ISB Implementation Georgetown Facility	**Log of Well No. IW-14**
BORING LOCATION:	GROUND SURFACE ELEVATION AND DATUM: GS
DRILLING CONTRACTOR: Cascade Drilling, Inc.	DATE STARTED: 10/5/15 / DATE FINISHED: 10/8/15
DRILLING METHOD: Hollow-stem auger	TOTAL DEPTH (ft.): 36.0 / SCREEN INTERVAL (ft.): 25.51-35.00
DRILLING EQUIPMENT: CME 75	DEPTH TO WATER: FIRST 13.29 / COMPL. / CASING: 4" Schedule 40 PVC
SAMPLING METHOD: N/A	LOGGED BY: S. Behrouzi
HAMMER WEIGHT: N/A / DROP: N/A	RESPONSIBLE PROFESSIONAL: JMB / REG. NO. 3003

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
0					1st Concrete Core	Traffic Rated Well Box
1					Pea Gravel	
					Asphalt	Portland Cement
2					2nd Concrete Core	
					See Well Log for EW-2 for Lithologic Description	
3						
4						
5						10`` diameter Borehole
6						
7						
8				3.4		4`` Schedule 40 PVC Well Casing
9						
10						
11						
12						
13						Cetco Bentonite Medium Chips
14						
15						
16						
17						
18						

PROJECT: Stericycle ISB Implementation
Georgetown Facility

Log of Well No. IW-14 (cont'd)

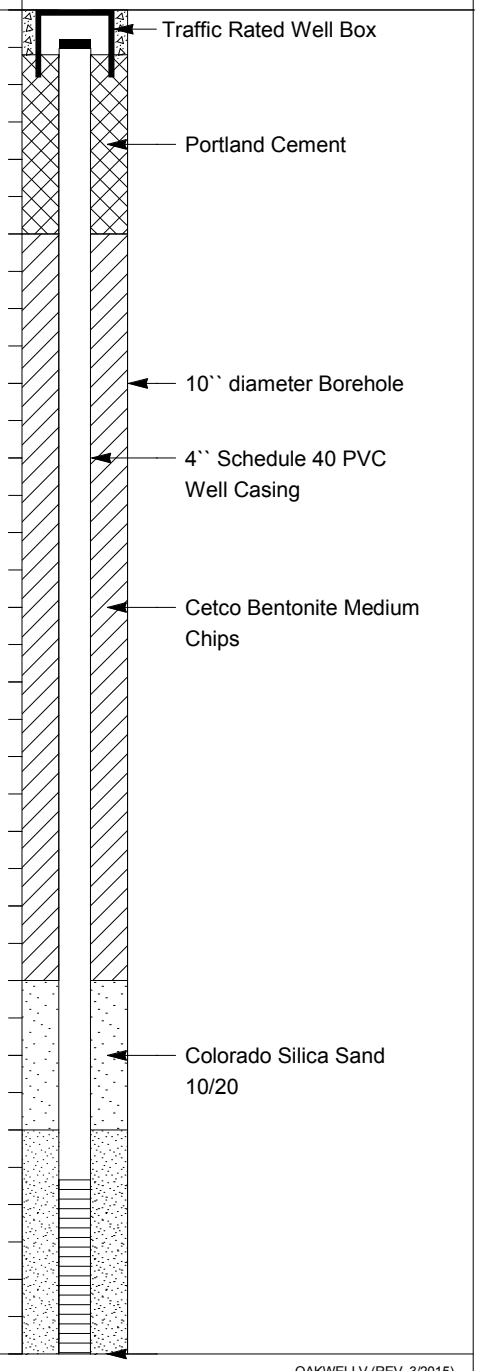
DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
18				0.3		
19						
20						4`` Schedule 40 PVC Well Casing
21						
22						
23						
24						Colorado Silica Sand 10/20
25						
26						
27						
28				0.2		Colorado Silica Sand 8/12
29						
30						4`` Schedule 40 PVC Vee Wire Screen with 0.010" slots
31						
32						
33						
34						
35						4`` Schedule 40 PVC Endcap
36					End of boring at 36 ft Ecology Well ID= BIX068	
37						
38						
39						



OAKWELLV (REV. 3/2015)

PROJECT: Stericycle ISB Implementation Georgetown Facility	**Log of Well No. IW-15**
BORING LOCATION:	GROUND SURFACE ELEVATION AND DATUM: GS
DRILLING CONTRACTOR: Cascade Drilling, Inc.	DATE STARTED: 10/6/15 / DATE FINISHED: 10/8/15
DRILLING METHOD: Hollow-stem auger	TOTAL DEPTH (ft.): 26.0 / SCREEN INTERVAL (ft.): 15.67-25.15
DRILLING EQUIPMENT: CME 75	DEPTH TO WATER: FIRST 13.03 / COMPL. / CASING: 4" Schedule 40 PVC
SAMPLING METHOD: N/A	LOGGED BY: S. Behrouzi
HAMMER WEIGHT: N/A / DROP: N/A	RESPONSIBLE PROFESSIONAL: JMB / REG. NO. 3003

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					Surface Elevation:	
0					Concrete Core	Traffic Rated Well Box
1					See Well Log for EW-2 for Lithologic Description	Portland Cement
2						
3						
4						
5						10`` diameter Borehole
6						4`` Schedule 40 PVC Well Casing
7						
8				2.6		Cetco Bentonite Medium Chips
9						
10						
11						
12						
13						
14						Colorado Silica Sand 10/20
15						
16						
17						
18						



OAKWELLV (REV. 3/2015)

PROJECT: Stericycle ISB Implementation
Georgetown Facility

Log of Well No. IW-15 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
18				1.6		Colorado Silica Sand 8/12
19						
20						4`` Schedule 40 PVC Vee Wire Screen with 0.010" slots
21						
22						
23						
24						
25						4`` Schedule 40 PVC Endcap
26					End of boring at 26 ft Ecology Well ID= BIX071	
27						
28						
29						
30						
31						
32						
33						
34						
35						
36						
37						
38						
39						

OAKWELLV (REV. 3/2015)

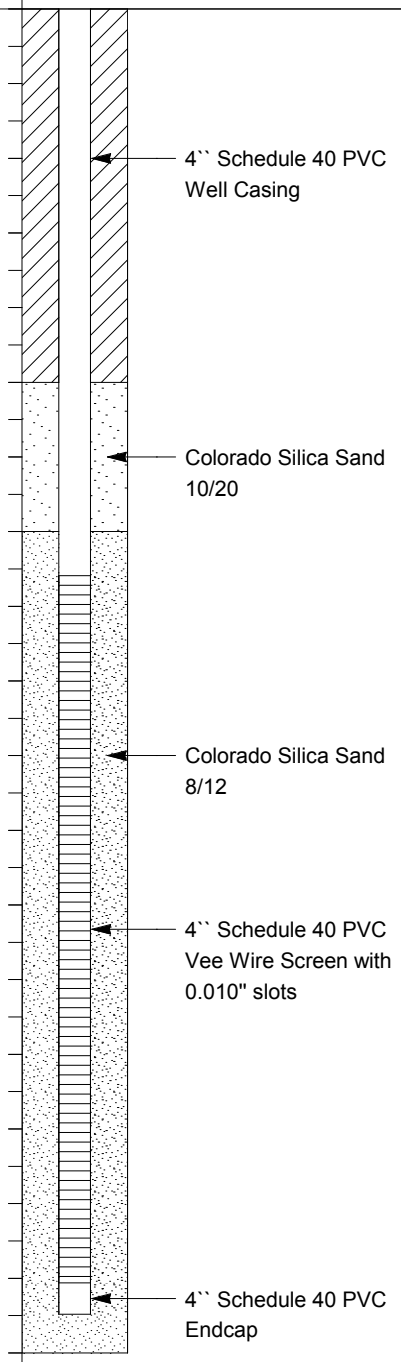
PROJECT: Stericycle ISB Implementation Georgetown Facility	**Log of Well No. IW-16**
BORING LOCATION:	GROUND SURFACE ELEVATION AND DATUM: GS
DRILLING CONTRACTOR: Cascade Drilling, Inc.	DATE STARTED: 10/6/15 / DATE FINISHED: 10/8/15
DRILLING METHOD: Hollow-stem auger	TOTAL DEPTH (ft.): 36.0 / SCREEN INTERVAL (ft.): 25.59-35.06
DRILLING EQUIPMENT: CME 75	DEPTH TO WATER: FIRST 13.10 COMPL. / CASING: 4" Schedule 40 PVC
SAMPLING METHOD: N/A	LOGGED BY: S. Behrouzi
HAMMER WEIGHT: N/A / DROP: N/A	RESPONSIBLE PROFESSIONAL: JMB / REG. NO. 3003

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
0					1st Concrete Core	Traffic Rated Well Box
1					Pea Gravel	
					Asphalt	Portland Cement
2					2nd Concrete Core	
					See Well Log for EW-2 for Lithologic Description	
3						
4						
5						10`` diameter Borehole
6						
7						
8				0.0		4`` Schedule 40 PVC Well Casing
9						
10						
11						
12						
13						Cetco Bentonite Medium Chips
14						
15						
16						
17						
18						

PROJECT: Stericycle ISB Implementation
Georgetown Facility

Log of Well No. IW-16 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
18				0.0		
19						
20						4`` Schedule 40 PVC Well Casing
21						
22						
23						
24						Colorado Silica Sand 10/20
25						
26						
27						
28				0.0		Colorado Silica Sand 8/12
29						
30						4`` Schedule 40 PVC Vee Wire Screen with 0.010" slots
31						
32						
33						
34						
35						4`` Schedule 40 PVC Endcap
36					End of boring at 36 ft Ecology Well ID= BIX070	
37						
38						
39						



OAKWELLV (REV. 3/2015)

PROJECT: Stericycle ISB Implementation Georgetown Facility	**Log of Well No. IW-17**
BORING LOCATION:	GROUND SURFACE ELEVATION AND DATUM: GS
DRILLING CONTRACTOR: Cascade Drilling, Inc.	DATE STARTED: 9/15/15 / DATE FINISHED: 9/15/15
DRILLING METHOD: Hollow-stem auger	TOTAL DEPTH (ft.): 26.0 / SCREEN INTERVAL (ft.): 15.52-25.00
DRILLING EQUIPMENT: CME 75	DEPTH TO WATER: FIRST 8.60 COMPL. / CASING: 4" Schedule 40 PVC
SAMPLING METHOD: N/A	LOGGED BY: S. Welter
HAMMER WEIGHT: N/A / DROP: N/A	RESPONSIBLE PROFESSIONAL: JMB / REG. NO. 3003

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					Surface Elevation:	
0					1st Concrete Core 16`` Diameter	Traffic Rated Well Box
1					Pea Gravel	
					2nd Concrete Core 14`` Diameter	Portland Cement
2					See Well Log for EW-3 for Lithologic Description	
3						
4						
5						10`` diameter Borehole
6						4`` Schedule 40 PVC Well Casing
7						
8				115		Cetco Bentonite Medium Chips
9						
10						
11						
12						
13						
14						Colorado Silica Sand 10/20
15						
16						
17						
18						

PROJECT: Stericycle ISB Implementation
Georgetown Facility

Log of Well No. IW-17 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
18				109		Colorado Silica Sand 8/12
19						
20						4`` Schedule 40 PVC Vee Wire Screen with 0.010" slots
21						
22						
23						
24						
25						4`` Schedule 40 PVC Endcap
26					End of boring at 26 ft Ecology Well ID= BIX036	
27						
28						
29						
30						
31						
32						
33						
34						
35						
36						
37						
38						
39						

OAKWELLV (REV. 3/2015)

PROJECT: Stericycle ISB Implementation Georgetown Facility				**Log of Well No. IW-18**
BORING LOCATION:				GROUND SURFACE ELEVATION AND DATUM: GS
DRILLING CONTRACTOR: Cascade Drilling, Inc.				DATE STARTED: 9/15/15 / DATE FINISHED: 9/15/15
DRILLING METHOD: Hollow-stem auger				TOTAL DEPTH (ft.): 36.0 / SCREEN INTERVAL (ft.): 25.57-35.04
DRILLING EQUIPMENT: CME 75				DEPTH TO WATER: FIRST 8.75 COMPL. / CASING: 4" Schedule 40 PVC
SAMPLING METHOD: N/A				LOGGED BY: S. Welter
HAMMER WEIGHT: N/A	DROP: N/A			RESPONSIBLE PROFESSIONAL: JMB / REG. NO. 3003

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					Surface Elevation:	
0					1st Concrete Core 16`` Diameter	Traffic Rated Well Box
1					Pea Gravel	
					2nd Concrete Core 14`` Diameter	Portland Cement
2					See Well Log for EW-3 for Lithologic Description	
3						
4						
5						10`` diameter Borehole
6						
7						
8				208		4`` Schedule 40 PVC Well Casing
9						
10						
11						
12						
13						Cetco Bentonite Medium Chips
14						
15						
16						
17						
18						

PROJECT: Stericycle ISB Implementation
Georgetown Facility

Log of Well No. IW-18 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
18				69		
19						
20						4`` Schedule 40 PVC Well Casing
21						
22						
23						
24						Colorado Silica Sand 10/20
25						
26						
27						
28				9		Colorado Silica Sand 8/12
29						
30						4`` Schedule 40 PVC Vee Wire Screen with 0.010" slots
31						
32						
33						
34						
35						4`` Schedule 40 PVC Endcap
36					End of boring at 36 ft Ecology Well ID= BIX037	
37						
38						
39						

OAKWELLV (REV. 3/2015)

PROJECT: Stericycle ISB Implementation Georgetown Facility	**Log of Well No. IW-19**
BORING LOCATION:	GROUND SURFACE ELEVATION AND DATUM: GS
DRILLING CONTRACTOR: Cascade Drilling, Inc.	DATE STARTED: 9/14/15 / DATE FINISHED: 9/15/15
DRILLING METHOD: Hollow-stem auger	TOTAL DEPTH (ft.): 26.0 / SCREEN INTERVAL (ft.): 15.28-24.78
DRILLING EQUIPMENT: CME 75	DEPTH TO WATER: FIRST 8.21 COMPL. / CASING: 4" Schedule 40 PVC
SAMPLING METHOD: N/A	LOGGED BY: S. Welter
HAMMER WEIGHT: N/A / DROP: N/A	RESPONSIBLE PROFESSIONAL: JMB / REG. NO. 3003

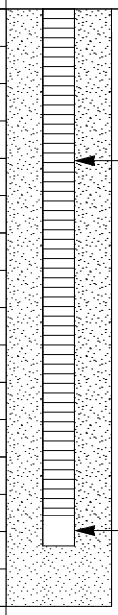
DEPTH (feet)	SAMPLES Sample No.	SAMPLES Sample	SAMPLES Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
0					1st Concrete Core 16`` Diameter	Traffic Rated Well Box
1					Pea Gravel	
					2nd Concrete Core 14`` Diameter	Portland Cement
2					3rd Concrete Core 14`` Diameter	
					See Well Log for EW-3 for Lithologic Description	
3						
4						
5						10`` diameter Borehole
6						4`` Schedule 40 PVC Well Casing
7						
8				260		Cetco Bentonite Medium Chips
9						
10						
11						
12						
13						
14						Colorado Silica Sand 10/20
15						
16						
17						
18						

OAKWELLV (REV. 3/2015)

PROJECT: Stericycle ISB Implementation
Georgetown Facility

Log of Well No. IW-19 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
18				76		Colorado Silica Sand 8/12
19						
20						4`` Schedule 40 PVC Vee Wire Screen with 0.010" slots
21						
22						
23						
24						
25						4`` Schedule 40 PVC Endcap
26					End of boring at 26 ft Ecology Well ID= BIX034	
27						
28						
29						
30						
31						
32						
33						
34						
35						
36						
37						
38						
39						



OAKWELLV (REV. 3/2015)

PROJECT: Stericycle ISB Implementation Georgetown Facility	**Log of Well No. IW-20**
BORING LOCATION:	GROUND SURFACE ELEVATION AND DATUM: GS
DRILLING CONTRACTOR: Cascade Drilling, Inc.	DATE STARTED: 9/14/15 / DATE FINISHED: 9/15/15
DRILLING METHOD: Hollow-stem auger	TOTAL DEPTH (ft.): 36.0 / SCREEN INTERVAL (ft.): 25.50-34.98
DRILLING EQUIPMENT: CME 75	DEPTH TO WATER: FIRST 8.30 / COMPL. / CASING: 4" Schedule 40 PVC
SAMPLING METHOD: N/A	LOGGED BY: S. Welter
HAMMER WEIGHT: N/A / DROP: N/A	RESPONSIBLE PROFESSIONAL: JMB / REG. NO. 3003

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					Surface Elevation:	
0					1st Concrete Core 16`` Diameter	Traffic Rated Well Box
1					Pea Gravel	
					2nd Concrete Core 14`` Diameter	Portland Cement
2					3rd Concrete Core 14`` Diameter	
					See Well Log for EW-3 for Lithologic Description	
3						
4						
5						10`` diameter Borehole
6						
7						
8				132		4`` Schedule 40 PVC Well Casing
9						
10						
11						
12						
13						Cetco Bentonite Medium Chips
14						
15						
16						
17						
18						

PROJECT: Stericycle ISB Implementation
Georgetown Facility

Log of Well No. IW-20 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
18				100		
19						
20						4`` Schedule 40 PVC Well Casing
21						
22						
23						
24						Colorado Silica Sand 10/20
25						
26						
27						
28				80		Colorado Silica Sand 8/12
29						
30						4`` Schedule 40 PVC Vee Wire Screen with 0.010" slots
31						
32						
33						
34						
35						4`` Schedule 40 PVC Endcap
36					End of boring at 36 ft Ecology Well ID= BIX035	
37						
38						
39						

OAKWELLV (REV. 3/2015)

PROJECT: Stericycle ISB Implementation Georgetown Facility	**Log of Well No. IW-21**
BORING LOCATION:	GROUND SURFACE ELEVATION AND DATUM: GS
DRILLING CONTRACTOR: Cascade Drilling, Inc.	DATE STARTED: 9/30/15 / DATE FINISHED: 10/1/15
DRILLING METHOD: Hollow-stem auger	TOTAL DEPTH (ft.): 26.0 / SCREEN INTERVAL (ft.): 15.51-25.00
DRILLING EQUIPMENT: CME 75	DEPTH TO WATER: FIRST 9.03 COMPL. / CASING: 4" Schedule 40 PVC
SAMPLING METHOD: N/A	LOGGED BY: S. Behrouzi
HAMMER WEIGHT: N/A / DROP: N/A	RESPONSIBLE PROFESSIONAL: JMB / REG. NO. 3003

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
0					Asphalt	Traffic Rated Well Box
1					piece of wood See Well Log for EW-6 for Lithologic Description	Portland Cement
2						
3						
4						
5						10`` diameter Borehole
6						4`` Schedule 40 PVC Well Casing
7						
8				0.2		Cetco Bentonite Medium Chips
9						
10						
11						
12						
13						
14						Colorado Silica Sand 10/20
15						
16						
17						
18						

PROJECT: Stericycle ISB Implementation
Georgetown Facility

Log of Well No. IW-21 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
18				0.4		Colorado Silica Sand 8/12
19						
20						4`` Schedule 40 PVC Vee Wire Screen with 0.010" slots
21						
22						
23						
24						
25						4`` Schedule 40 PVC Endcap
26					End of boring at 26 ft Ecology Well ID= BIX061	
27						
28						
29						
30						
31						
32						
33						
34						
35						
36						
37						
38						
39						

OAKWELLV (REV. 3/2015)

PROJECT: Stericycle ISB Implementation Georgetown Facility	**Log of Well No. IW-22**
BORING LOCATION:	GROUND SURFACE ELEVATION AND DATUM: GS
DRILLING CONTRACTOR: Cascade Drilling, Inc.	DATE STARTED: 9/30/15 / DATE FINISHED: 10/1/15
DRILLING METHOD: Hollow-stem auger	TOTAL DEPTH (ft.): 36.0 / SCREEN INTERVAL (ft.): 25.57-35.05
DRILLING EQUIPMENT: CME 75	DEPTH TO WATER: FIRST 9.00 / COMPL. / CASING: 4" Schedule 40 PVC
SAMPLING METHOD: N/A	LOGGED BY: S. Behrouzi
HAMMER WEIGHT: N/A / DROP: N/A	RESPONSIBLE PROFESSIONAL: JMB / REG. NO. 3003

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
0					Asphalt	Traffic Rated Well Box
1					See Well Log for EW-6 for Lithologic Description	Portland Cement
2						
3						
4						
5						10`` diameter Borehole
6						
7						
8				0.0		4`` Schedule 40 PVC Well Casing
9						
10						
11						
12						
13						Cetco Bentonite Medium Chips
14						
15						
16						
17						
18						

PROJECT: Stericycle ISB Implementation
Georgetown Facility

Log of Well No. IW-22 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
18				0.0		
19						
20						4`` Schedule 40 PVC Well Casing
21						
22						
23						
24						Colorado Silica Sand 10/20
25						
26						
27						
28				0.0		Colorado Silica Sand 8/12
29						
30						4`` Schedule 40 PVC Vee Wire Screen with 0.010" slots
31						
32						
33						
34						
35						4`` Schedule 40 PVC Endcap
36					End of boring at 36 ft Ecology Well ID= BIX053	
37						
38						
39						

OAKWELLV (REV. 3/2015)

PROJECT: Stericycle ISB Implementation Georgetown Facility	**Log of Well No. IW-23**
BORING LOCATION:	GROUND SURFACE ELEVATION AND DATUM: GS
DRILLING CONTRACTOR: Cascade Drilling, Inc.	DATE STARTED: 9/16/15 / DATE FINISHED: 9/16/15
DRILLING METHOD: Hollow-stem auger	TOTAL DEPTH (ft.): 26.0 / SCREEN INTERVAL (ft.): 15.66-25.14
DRILLING EQUIPMENT: CME 75	DEPTH TO WATER: FIRST 8.96 / COMPL. / CASING: 4" Schedule 40 PVC
SAMPLING METHOD: N/A	LOGGED BY: S. Welter
HAMMER WEIGHT: N/A / DROP: N/A	RESPONSIBLE PROFESSIONAL: JMB / REG. NO. 3003

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					Surface Elevation:	
0					1st Concrete Core 16`` Diameter	Traffic Rated Well Box
1					Pea Gravel	
					2nd Concrete Core 14`` Diameter	Portland Cement
2					See Well Log for EW-3 for Lithologic Description	
3						
4						
5						10`` diameter Borehole
6						4`` Schedule 40 PVC Well Casing
7						
8				3033		Cetco Bentonite Medium Chips
9						
10						
11						
12						
13						
14						Colorado Silica Sand 10/20
15						
16						
17						
18						

PROJECT: Stericycle ISB Implementation
Georgetown Facility

Log of Well No. IW-23 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
18				501.3		Colorado Silica Sand 8/12
19						
20						4`` Schedule 40 PVC Vee Wire Screen with 0.010" slots
21						
22						
23						
24						
25						4`` Schedule 40 PVC Endcap
26					End of boring at 26 ft Ecology Well ID= BIX038	
27						
28						
29						
30						
31						
32						
33						
34						
35						
36						
37						
38						
39						

OAKWELLV (REV. 3/2015)

PROJECT: Stericycle ISB Implementation Georgetown Facility	**Log of Well No. IW-24**
BORING LOCATION:	GROUND SURFACE ELEVATION AND DATUM: GS
DRILLING CONTRACTOR: Cascade Drilling, Inc.	DATE STARTED: 9/16/15 / DATE FINISHED: 9/16/15
DRILLING METHOD: Hollow-stem auger	TOTAL DEPTH (ft.): 36.0 / SCREEN INTERVAL (ft.): 25.54-35.01
DRILLING EQUIPMENT: CME 75	DEPTH TO WATER: FIRST 9.07 COMPL. / CASING: 4" Schedule 40 PVC
SAMPLING METHOD: N/A	LOGGED BY: S. Welter
HAMMER WEIGHT: N/A / DROP: N/A	RESPONSIBLE PROFESSIONAL: JMB / REG. NO. 3003

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
0					1st Concrete Core 16`` Diameter	Traffic Rated Well Box
1					Pea Gravel	
					2nd Concrete Core 14`` Diameter	Portland Cement
2					See Well Log for EW-3 for Lithologic Description	
3						
4						
5						10`` diameter Borehole
6						
7						
8				2735		4`` Schedule 40 PVC Well Casing
9						
10						
11						
12						
13						Cetco Bentonite Medium Chips
14						
15						
16						
17						
18						

PROJECT: Stericycle ISB Implementation
Georgetown Facility

Log of Well No. IW-24 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
18				1272		
19						
20						4`` Schedule 40 PVC Well Casing
21						
22						
23						
24						Colorado Silica Sand 10/20
25						
26						
27						
28				900		Colorado Silica Sand 8/12
29						
30						4`` Schedule 40 PVC Vee Wire Screen with 0.010" slots
31						
32						
33						
34						
35						4`` Schedule 40 PVC Endcap
36					End of boring at 36 ft Ecology Well ID= BIX039	
37						
38						
39						

OAKWELLV (REV. 3/2015)

PROJECT: Stericycle ISB Implementation Georgetown Facility	**Log of Well No. IW-25**
BORING LOCATION:	GROUND SURFACE ELEVATION AND DATUM: GS
DRILLING CONTRACTOR: Cascade Drilling, Inc.	DATE STARTED: 9/22/15 / DATE FINISHED: 9/22/15
DRILLING METHOD: Hollow-stem auger	TOTAL DEPTH (ft.): 26.0 / SCREEN INTERVAL (ft.): 15.61-25.08
DRILLING EQUIPMENT: CME 75	DEPTH TO WATER: FIRST 8.55 COMPL. / CASING: 4" Schedule 40 PVC
SAMPLING METHOD: N/A	LOGGED BY: S. Welter
HAMMER WEIGHT: N/A DROP: N/A	RESPONSIBLE PROFESSIONAL: JMB / REG. NO. 3003

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
0					1st Concrete Core 16`` Diameter	Traffic Rated Well Box
1					Pea Gravel	
					2nd Concrete Core 14`` Diameter	Portland Cement
2					Pea Gravel See Well Log for EW-3 for Lithologic Description	
3						
4						
5						10`` diameter Borehole
6						4`` Schedule 40 PVC Well Casing
7						
8				82.1		Cetco Bentonite Medium Chips
9						
10						
11						
12						
13						
14						Colorado Silica Sand 10/20
15						
16						
17						
18						

PROJECT: Stericycle ISB Implementation
Georgetown Facility

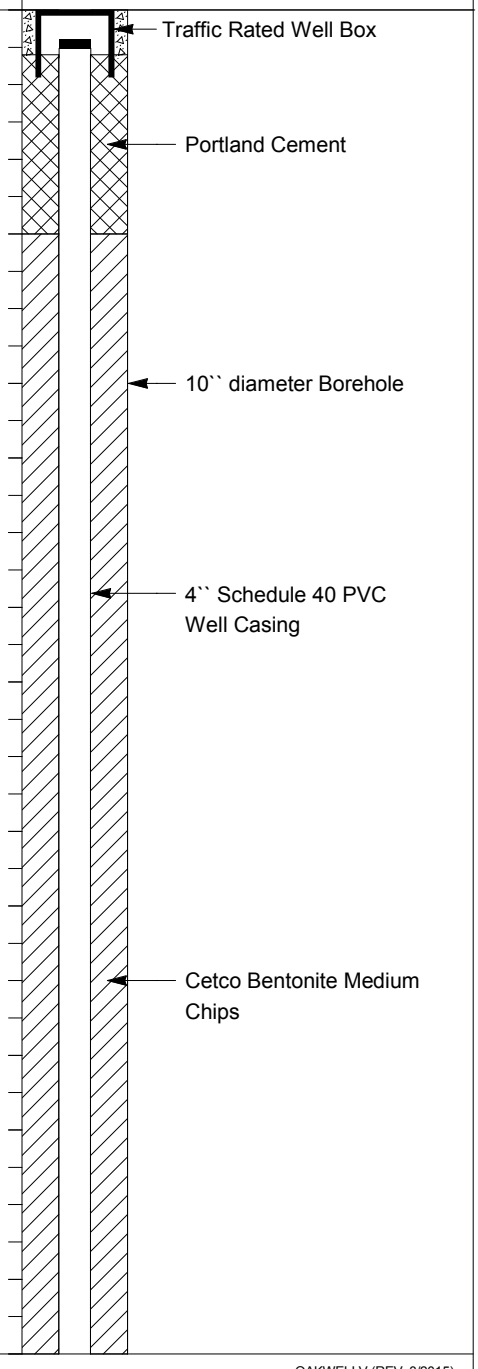
Log of Well No. IW-25 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
18				32.3		Colorado Silica Sand 8/12
19						
20						4`` Schedule 40 PVC Vee Wire Screen with 0.010" slots
21						
22						
23						
24						
25						4`` Schedule 40 PVC Endcap
26					End of boring at 26 ft Ecology Well ID= BIX044	
27						
28						
29						
30						
31						
32						
33						
34						
35						
36						
37						
38						
39						

OAKWELLV (REV. 3/2015)

PROJECT: Stericycle ISB Implementation Georgetown Facility	**Log of Well No. IW-26**
BORING LOCATION:	GROUND SURFACE ELEVATION AND DATUM: GS
DRILLING CONTRACTOR: Cascade Drilling, Inc.	DATE STARTED: 9/22/15 / DATE FINISHED: 9/22/15
DRILLING METHOD: Hollow-stem auger	TOTAL DEPTH (ft.): 36.0 / SCREEN INTERVAL (ft.): 25.65-35.13
DRILLING EQUIPMENT: CME 75	DEPTH TO WATER: FIRST 8.63 / COMPL. / CASING: 4" Schedule 40 PVC
SAMPLING METHOD: N/A	LOGGED BY: S. Welter
HAMMER WEIGHT: N/A / DROP: N/A	RESPONSIBLE PROFESSIONAL: JMB / REG. NO. 3003

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
0					1st Concrete Core 16`` Diameter	Traffic Rated Well Box
1					Pea Gravel	
					2nd Concrete Core 14`` Diameter	Portland Cement
2					Pea Gravel	
					3rd Concrete Core 14`` Diameter	
3					See Well Log for EW-3 for Lithologic Description	
4						
5						10`` diameter Borehole
6						
7						
8				82.5		4`` Schedule 40 PVC Well Casing
9						
10						
11						
12						
13						Cetco Bentonite Medium Chips
14						
15						
16						
17						
18						



OAKWELLV (REV. 3/2015)

PROJECT: Stericycle ISB Implementation
Georgetown Facility

Log of Well No. IW-26 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
18				12.3		
19						
20						4`` Schedule 40 PVC Well Casing
21						
22						
23						
24						Colorado Silica Sand 10/20
25						
26						
27						
28				7.5		Colorado Silica Sand 8/12
29						
30						4`` Schedule 40 PVC Vee Wire Screen with 0.010" slots
31						
32						
33						
34						
35						4`` Schedule 40 PVC Endcap
36					End of boring at 36 ft Ecology Well ID= BIX045	
37						
38						
39						

OAKWELLV (REV. 3/2015)

PROJECT: Stericycle ISB Implementation Georgetown Facility	**Log of Well No. IW-27**
BORING LOCATION:	GROUND SURFACE ELEVATION AND DATUM: GS
DRILLING CONTRACTOR: Cascade Drilling, Inc.	DATE STARTED: 9/29/15 / DATE FINISHED: 10/1/15
DRILLING METHOD: Hollow-stem auger	TOTAL DEPTH (ft.): 26.0 / SCREEN INTERVAL (ft.): 15.56-25.06
DRILLING EQUIPMENT: CME 75	DEPTH TO WATER: FIRST 9.30 / COMPL. / CASING: 4" Schedule 40 PVC
SAMPLING METHOD: N/A	LOGGED BY: S. Behrouzi
HAMMER WEIGHT: N/A / DROP: N/A	RESPONSIBLE PROFESSIONAL: JMB / REG. NO. 3003

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
0					Asphalt	Traffic Rated Well Box
1					See Well Log for EW-4 for Lithologic Description	Portland Cement
2						
3						
4						
5						10`` diameter Borehole
6						4`` Schedule 40 PVC Well Casing
7						
8				0.1		Cetco Bentonite Medium Chips
9						
10						
11						
12						
13						
14						Colorado Silica Sand 10/20
15						
16						
17						
18						

PROJECT: Stericycle ISB Implementation
Georgetown Facility

Log of Well No. IW-27 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
18				0.1		Colorado Silica Sand 8/12
19						
20						4`` Schedule 40 PVC Vee Wire Screen with 0.010" slots
21						
22						
23						
24						
25						4`` Schedule 40 PVC Endcap
26					End of boring at 26 ft Ecology Well ID= BIX058	
27						
28						
29						
30						
31						
32						
33						
34						
35						
36						
37						
38						
39						

OAKWELLV (REV. 3/2015)

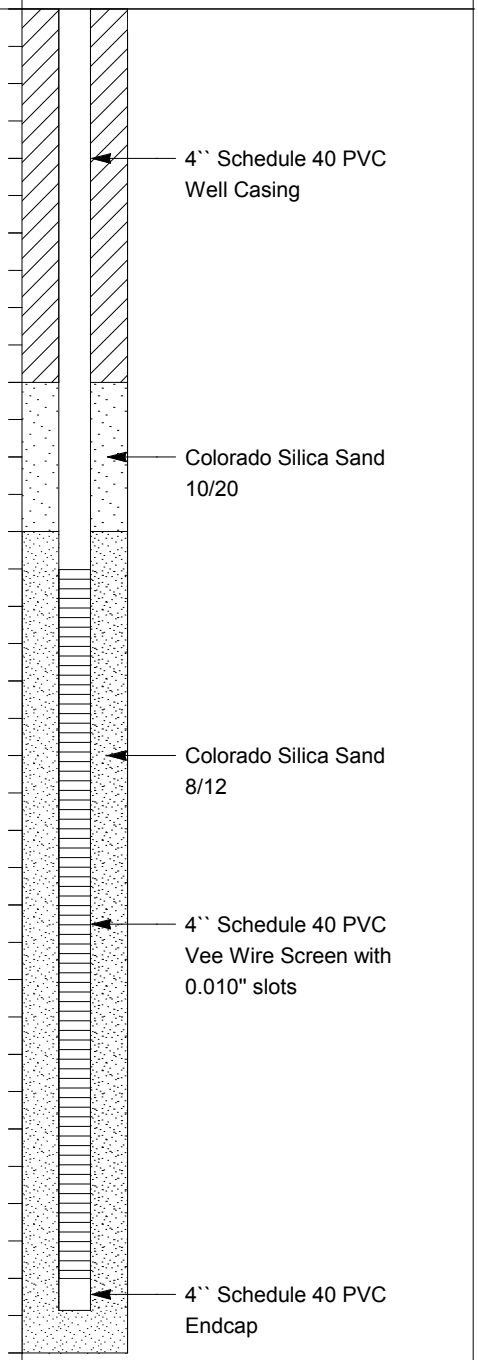
PROJECT: Stericycle ISB Implementation Georgetown Facility	**Log of Well No. IW-28**
BORING LOCATION:	GROUND SURFACE ELEVATION AND DATUM: GS
DRILLING CONTRACTOR: Cascade Drilling, Inc.	DATE STARTED: 9/29/15 / DATE FINISHED: 9/30/15
DRILLING METHOD: Hollow-stem auger	TOTAL DEPTH (ft.): 36.0 / SCREEN INTERVAL (ft.): 25.51-35.00
DRILLING EQUIPMENT: CME 75	DEPTH TO WATER: FIRST 9.30 COMPL. / CASING: 4" Schedule 40 PVC
SAMPLING METHOD: N/A	LOGGED BY: S. Behrouzi
HAMMER WEIGHT: N/A / DROP: N/A	RESPONSIBLE PROFESSIONAL: JMB / REG. NO. 3003

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
0					Asphalt	Traffic Rated Well Box
1					Piece of wood See Well Log for EW-4 for Lithologic Description	
2						Portland Cement
3						
4						
5						10`` diameter Borehole
6						
7						
8				0.4		4`` Schedule 40 PVC Well Casing
9						
10						
11						
12						
13						Cetco Bentonite Medium Chips
14						
15						
16						
17						
18						

PROJECT: Stericycle ISB Implementation
Georgetown Facility

Log of Well No. IW-28 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
18				0.3		
19						
20						
21						
22						
23						
24						
25						
26						
27						
28				0.2		
29						
30						
31						
32						
33						
34						
35						
36					End of boring at 36 ft Ecology Well ID= BIX059	
37						
38						
39						



OAKWELLV (REV. 3/2015)

PROJECT: Stericycle ISB Implementation Georgetown Facility	**Log of Well No. IW-29**
BORING LOCATION:	GROUND SURFACE ELEVATION AND DATUM: GS
DRILLING CONTRACTOR: Cascade Drilling, Inc.	DATE STARTED: 9/24/15 / DATE FINISHED: 9/25/15
DRILLING METHOD: Hollow-stem auger	TOTAL DEPTH (ft.): 26.0 / SCREEN INTERVAL (ft.): 15.47-24.94
DRILLING EQUIPMENT: CME 75	DEPTH TO WATER: FIRST 9.60 / COMPL. / CASING: 4" Schedule 40 PVC
SAMPLING METHOD: N/A	LOGGED BY: S. Welter
HAMMER WEIGHT: N/A / DROP: N/A	RESPONSIBLE PROFESSIONAL: JMB / REG. NO. 3003

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					Surface Elevation:	
0					1st Concrete Core 16`` Diameter	Traffic Rated Well Box
1					Pea Gravel	
					2nd Concrete Core 14`` Diameter	Portland Cement
2					See Well Log for EW-5 for Lithologic Description	
3						
4						
5						10`` diameter Borehole
6						4`` Schedule 40 PVC Well Casing
7						
8				325		Cetco Bentonite Medium Chips
9						
10						
11						
12						
13						
14						Colorado Silica Sand 10/20
15						
16						
17						
18						

PROJECT: Stericycle ISB Implementation
Georgetown Facility

Log of Well No. IW-29 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
18				505.8		Colorado Silica Sand 8/12
19						
20						4`` Schedule 40 PVC Vee Wire Screen with 0.010" slots
21						
22						
23						
24						
25						4`` Schedule 40 PVC Endcap
26					End of boring at 26 ft Ecology Well ID= BIX050	
27						
28						
29						
30						
31						
32						
33						
34						
35						
36						
37						
38						
39						

OAKWELLV (REV. 3/2015)

PROJECT: Stericycle ISB Implementation Georgetown Facility	**Log of Well No. IW-30**
BORING LOCATION:	GROUND SURFACE ELEVATION AND DATUM: GS
DRILLING CONTRACTOR: Cascade Drilling, Inc.	DATE STARTED: 9/24/15 / DATE FINISHED: 9/25/15
DRILLING METHOD: Hollow-stem auger	TOTAL DEPTH (ft.): 36.0 / SCREEN INTERVAL (ft.): 25.57-35.04
DRILLING EQUIPMENT: CME 75	DEPTH TO WATER: FIRST 9.72 COMPL. / CASING: 4" Schedule 40 PVC
SAMPLING METHOD: N/A	LOGGED BY: S. Welter
HAMMER WEIGHT: N/A / DROP: N/A	RESPONSIBLE PROFESSIONAL: JMB / REG. NO. 3003

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					Surface Elevation:	
0					1st Concrete Core 16`` Diameter	Traffic Rated Well Box
1					2nd Concrete Core- Drilled with Bulldog Bit	
2					See Well Log for EW-5 for Lithologic Description	Portland Cement
3						
4						
5						10`` diameter Borehole
6						
7						
8				517		4`` Schedule 40 PVC Well Casing
9						
10						
11						
12						
13						Cetco Bentonite Medium Chips
14						
15						
16						
17						
18						

PROJECT: Stericycle ISB Implementation
Georgetown Facility

Log of Well No. IW-30 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
18				217		
19						
20						4`` Schedule 40 PVC Well Casing
21						
22						
23						
24						Colorado Silica Sand 10/20
25						
26						
27						
28				143		Colorado Silica Sand 8/12
29						
30						4`` Schedule 40 PVC Vee Wire Screen with 0.010" slots
31						
32						
33						
34						
35						4`` Schedule 40 PVC Endcap
36					End of boring at 36 ft Ecology Well ID= BIX051	
37						
38						
39						

OAKWELLV (REV. 3/2015)

PROJECT: Stericycle ISB Implementation Georgetown Facility	**Log of Well No. IW-31**
BORING LOCATION:	GROUND SURFACE ELEVATION AND DATUM: GS
DRILLING CONTRACTOR: Cascade Drilling, Inc.	DATE STARTED: 9/22/15 / DATE FINISHED: 9/24/15
DRILLING METHOD: Hollow-stem auger	TOTAL DEPTH (ft.): 26.0 / SCREEN INTERVAL (ft.): 15.53-25.01
DRILLING EQUIPMENT: CME 75	DEPTH TO WATER: FIRST 9.30 COMPL. / CASING: 4" Schedule 40 PVC
SAMPLING METHOD: N/A	LOGGED BY: S. Welter
HAMMER WEIGHT: N/A / DROP: N/A	RESPONSIBLE PROFESSIONAL: JMB / REG. NO. 3003

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					Surface Elevation:	
0					1st Concrete Core 16`` Diameter	Traffic Rated Well Box
1					Pea Gravel	
					2nd Concrete Core 14`` Diameter	Portland Cement
2					Pea Gravel	
					3rd Concrete Core 14`` Diameter	
3					See Well Log for EW-5 for Lithologic Description	
4						
5						10`` diameter Borehole
6						4`` Schedule 40 PVC Well Casing
7						
8				10.1		Cetco Bentonite Medium Chips
9						
10						
11						
12						
13						
14						Colorado Silica Sand 10/20
15						
16						
17						
18						

PROJECT: Stericycle ISB Implementation
Georgetown Facility

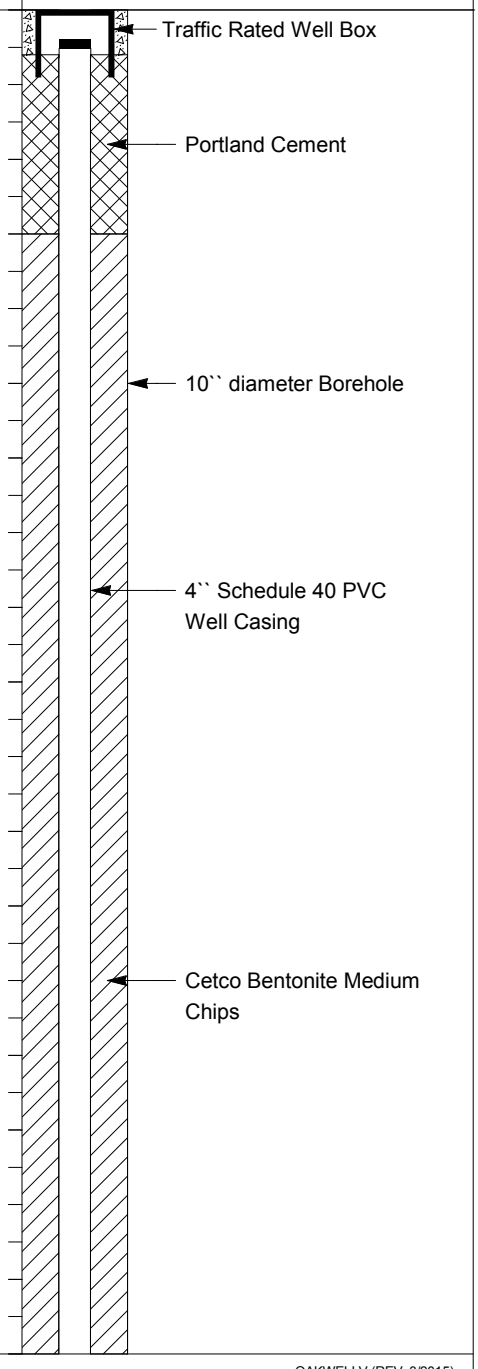
Log of Well No. IW-31 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
18				0.4		Colorado Silica Sand 8/12
19						
20						4`` Schedule 40 PVC Vee Wire Screen with 0.010" slots
21						
22						
23						
24						
25						4`` Schedule 40 PVC Endcap
26					End of boring at 26 ft Ecology Well ID= BIX046	
27						
28						
29						
30						
31						
32						
33						
34						
35						
36						
37						
38						
39						

OAKWELLV (REV. 3/2015)

PROJECT: Stericycle ISB Implementation Georgetown Facility	**Log of Well No. IW-32**
BORING LOCATION:	GROUND SURFACE ELEVATION AND DATUM: GS
DRILLING CONTRACTOR: Cascade Drilling, Inc.	DATE STARTED: 9/23/15 / DATE FINISHED: 9/24/15
DRILLING METHOD: Hollow-stem auger	TOTAL DEPTH (ft.): 36.0 / SCREEN INTERVAL (ft.): 25.52-35.00
DRILLING EQUIPMENT: CME 75	DEPTH TO WATER: FIRST 9.35 / COMPL. / CASING: 4" Schedule 40 PVC
SAMPLING METHOD: N/A	LOGGED BY: S. Welter
HAMMER WEIGHT: N/A / DROP: N/A	RESPONSIBLE PROFESSIONAL: JMB / REG. NO. 3003

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
0					1st Concrete Core 16`` Diameter	Traffic Rated Well Box
1					Pea Gravel	
					2nd Concrete Core 14`` Diameter	Portland Cement
2					Pea Gravel	
					3rd Concrete Core 14`` Diameter	
3					See Well Log for EW-5 for Lithologic Description	
4						
5						10`` diameter Borehole
6						
7						
8				0.9		4`` Schedule 40 PVC Well Casing
9						
10						
11						
12						
13						Cetco Bentonite Medium Chips
14						
15						
16						
17						
18						



OAKWELLV (REV. 3/2015)

PROJECT: Stericycle ISB Implementation
Georgetown Facility

Log of Well No. IW-32 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
18				1.1		
19						
20						4`` Schedule 40 PVC Well Casing
21						
22						
23						
24						Colorado Silica Sand 10/20
25						
26						
27						
28				0.3		Colorado Silica Sand 8/12
29						
30						4`` Schedule 40 PVC Vee Wire Screen with 0.010" slots
31						
32						
33						
34						
35						4`` Schedule 40 PVC Endcap
36					End of boring at 36 ft Ecology Well ID= BIX047	
37						
38						
39						

OAKWELLV (REV. 3/2015)

PROJECT: Stericycle ISB Implementation Georgetown Facility	**Log of Well No. IW-33**
BORING LOCATION:	GROUND SURFACE ELEVATION AND DATUM: GS
DRILLING CONTRACTOR: Cascade Drilling, Inc.	DATE STARTED: 9/28/15 / DATE FINISHED: 9/30/15
DRILLING METHOD: Hollow-stem auger	TOTAL DEPTH (ft.): 26.0 / SCREEN INTERVAL (ft.): 15.6-25.08
DRILLING EQUIPMENT: CME 75	DEPTH TO WATER: FIRST 9.21 / COMPL. / CASING: 4" Schedule 40 PVC
SAMPLING METHOD: N/A	LOGGED BY: S. Behrouzi
HAMMER WEIGHT: N/A / DROP: N/A	RESPONSIBLE PROFESSIONAL: JMB / REG. NO. 3003

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
0					Asphalt	Traffic Rated Well Box
1					See Well Log for EW-4 for Lithologic Description	Portland Cement
2						
3						
4						
5						10`` diameter Borehole
6						4`` Schedule 40 PVC Well Casing
7						
8				0.0		Cetco Bentonite Medium Chips
9						
10						
11						
12						
13						
14						Colorado Silica Sand 10/20
15						
16						
17						
18						

PROJECT: Stericycle ISB Implementation
Georgetown Facility

Log of Well No. IW-33 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
18				0.0		Colorado Silica Sand 8/12
19						
20						4`` Schedule 40 PVC Vee Wire Screen with 0.010" slots
21						
22						
23						
24						
25						4`` Schedule 40 PVC Endcap
26					End of boring at 26 ft Ecology Well ID= BIX056	
27						
28						
29						
30						
31						
32						
33						
34						
35						
36						
37						
38						
39						

OAKWELLV (REV. 3/2015)

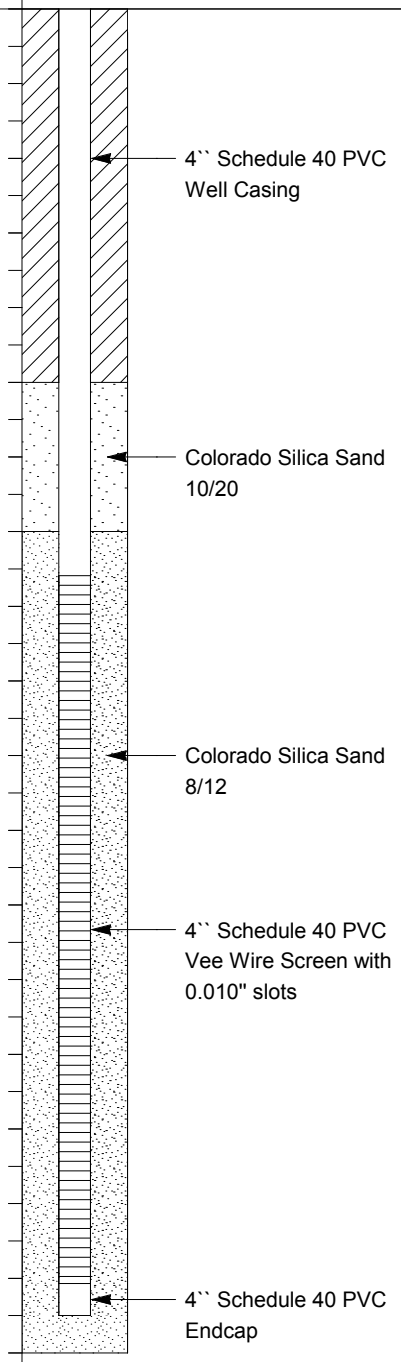
PROJECT: Stericycle ISB Implementation Georgetown Facility	**Log of Well No. IW-34**
BORING LOCATION:	GROUND SURFACE ELEVATION AND DATUM: GS
DRILLING CONTRACTOR: Cascade Drilling, Inc.	DATE STARTED: 9/29/15 / DATE FINISHED: 9/30/15
DRILLING METHOD: Hollow-stem auger	TOTAL DEPTH (ft.): 36.0 / SCREEN INTERVAL (ft.): 25.57-35.07
DRILLING EQUIPMENT: CME 75	DEPTH TO WATER: FIRST 9.23 / COMPL. / CASING: 4" Schedule 40 PVC
SAMPLING METHOD: N/A	LOGGED BY: S. Behrouzi
HAMMER WEIGHT: N/A / DROP: N/A	RESPONSIBLE PROFESSIONAL: JMB / REG. NO. 3003

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
0					Asphalt	Traffic Rated Well Box
1					See Well Log for EW-4 for Lithologic Description	
2						Portland Cement
3						
4						
5						10`` diameter Borehole
6						
7						
8				0.1		4`` Schedule 40 PVC Well Casing
9						
10						
11						
12						
13						Cetco Bentonite Medium Chips
14						
15						
16						
17						
18						

PROJECT: Stericycle ISB Implementation
Georgetown Facility

Log of Well No. IW-34 (cont'd)

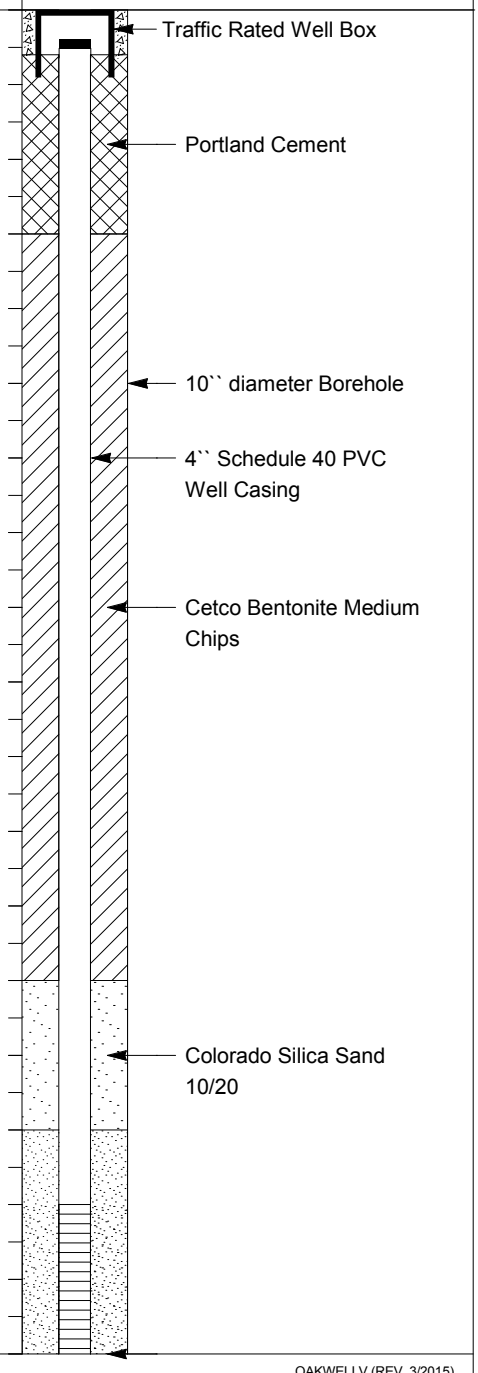
DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
18				0.2		
19						
20						4`` Schedule 40 PVC Well Casing
21						
22						
23						
24						Colorado Silica Sand 10/20
25						
26						
27						
28				0.3		Colorado Silica Sand 8/12
29						
30						4`` Schedule 40 PVC Vee Wire Screen with 0.010" slots
31						
32						
33						
34						
35						4`` Schedule 40 PVC Endcap
36					End of boring at 36 ft Ecology Well ID= BIX057	
37						
38						
39						



OAKWELLV (REV. 3/2015)

PROJECT: Stericycle ISB Implementation Georgetown Facility	**Log of Well No. IW-35**
BORING LOCATION:	GROUND SURFACE ELEVATION AND DATUM: GS
DRILLING CONTRACTOR: Cascade Drilling, Inc.	DATE STARTED: 9/25/15 / DATE FINISHED: 9/28/15
DRILLING METHOD: Hollow-stem auger	TOTAL DEPTH (ft.): 26.0 / SCREEN INTERVAL (ft.): 16.0-25.5
DRILLING EQUIPMENT: CME 75	DEPTH TO WATER: FIRST 9.18 COMPL. / CASING: 4" Schedule 40 PVC
SAMPLING METHOD: N/A	LOGGED BY: S. Behrouzi
HAMMER WEIGHT: N/A / DROP: N/A	RESPONSIBLE PROFESSIONAL: JMB / REG. NO. 3003

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
0					Single Concrete Core	Traffic Rated Well Box
1					See Well Log for EW-5 for Lithologic Description	Portland Cement
2						
3						
4						
5						10`` diameter Borehole
6						4`` Schedule 40 PVC Well Casing
7						
8				0.0		Cetco Bentonite Medium Chips
9						
10						
11						
12						
13						
14						Colorado Silica Sand 10/20
15						
16						
17						
18						



OAKWELLV (REV. 3/2015)

PROJECT: Stericycle ISB Implementation
Georgetown Facility

Log of Well No. IW-35 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
18				0.1		Colorado Silica Sand 8/12
19						
20						
21						4`` Schedule 40 PVC Vee Wire Screen with 0.010" slots
22						
23						
24						
25						
26					End of boring at 26 ft Ecology Well ID= BIX052	4`` Schedule 40 PVC Endcap
27						
28						
29						
30						
31						
32						
33						
34						
35						
36						
37						
38						
39						

OAKWELLV (REV. 3/2015)

PROJECT: Stericycle ISB Implementation Georgetown Facility	**Log of Well No. IW-36**
BORING LOCATION:	GROUND SURFACE ELEVATION AND DATUM: GS
DRILLING CONTRACTOR: Cascade Drilling, Inc.	DATE STARTED: 9/25/15 / DATE FINISHED: 9/28/15
DRILLING METHOD: Hollow-stem auger	TOTAL DEPTH (ft.): 36.0 / SCREEN INTERVAL (ft.): 25.3-34.99
DRILLING EQUIPMENT: CME 75	DEPTH TO WATER: FIRST 9.28 / COMPL. / CASING: 4" Schedule 40 PVC
SAMPLING METHOD: N/A	LOGGED BY: S. Behrouzi
HAMMER WEIGHT: N/A / DROP: N/A	RESPONSIBLE PROFESSIONAL: JMB / REG. NO. 3003

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
0					Concrete, Brick, & Debris	Traffic Rated Well Box
1					See Well Log for EW-5 for Lithologic Description	
2						Portland Cement
3						
4						
5						10`` diameter Borehole
6						
7						
8				0.2		4`` Schedule 40 PVC Well Casing
9						
10						
11						
12						
13						Cetco Bentonite Medium Chips
14						
15						
16						
17						
18						

PROJECT: Stericycle ISB Implementation
Georgetown Facility

Log of Well No. IW-36 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
18				0.2		
19						
20						4`` Schedule 40 PVC Well Casing
21						
22						
23						
24						Colorado Silica Sand 10/20
25						
26						
27						
28				0.2		Colorado Silica Sand 8/12
29						
30						4`` Schedule 40 PVC Vee Wire Screen with 0.010" slots
31						
32						
33						
34						
35						4`` Schedule 40 PVC Endcap
36					End of boring at 36 ft Ecology Well ID= BIX053	
37						
38						
39						

OAKWELLV (REV. 3/2015)

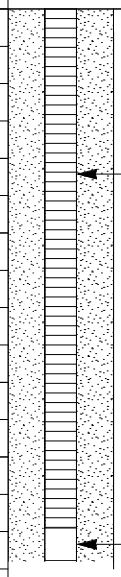
PROJECT: Stericycle ISB Implementation Georgetown Facility	**Log of Well No. IW-37**
BORING LOCATION:	GROUND SURFACE ELEVATION AND DATUM: GS
DRILLING CONTRACTOR: Cascade Drilling, Inc.	DATE STARTED: 9/23/15 / DATE FINISHED: 9/23/15
DRILLING METHOD: Hollow-stem auger	TOTAL DEPTH (ft.): 25.5 / SCREEN INTERVAL (ft.): 15.47-24.95
DRILLING EQUIPMENT: CME 75	DEPTH TO WATER: FIRST 9.73 COMPL. / CASING: 4" Schedule 40 PVC
SAMPLING METHOD: N/A	LOGGED BY: S. Welter
HAMMER WEIGHT: N/A DROP: N/A	RESPONSIBLE PROFESSIONAL: JMB / REG. NO. 3003

DEPTH (feet)	SAMPLES Sample No.	SAMPLES Sample	SAMPLES Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
0					1st Concrete Core 16`` Diameter	Traffic Rated Well Box
1					Pea Gravel	
2					2nd Concrete Core 14`` Diameter	Portland Cement
3					See Well Log for EW-5 for Lithologic Description	
4						
5						10`` diameter Borehole
6						4`` Schedule 40 PVC Well Casing
7						
8				1.0		Cetco Bentonite Medium Chips
9						
10						
11						
12						
13						
14						Colorado Silica Sand 10/20
15						
16						
17						
18						

PROJECT: Stericycle ISB Implementation
Georgetown Facility

Log of Well No. IW-37 (cont'd)

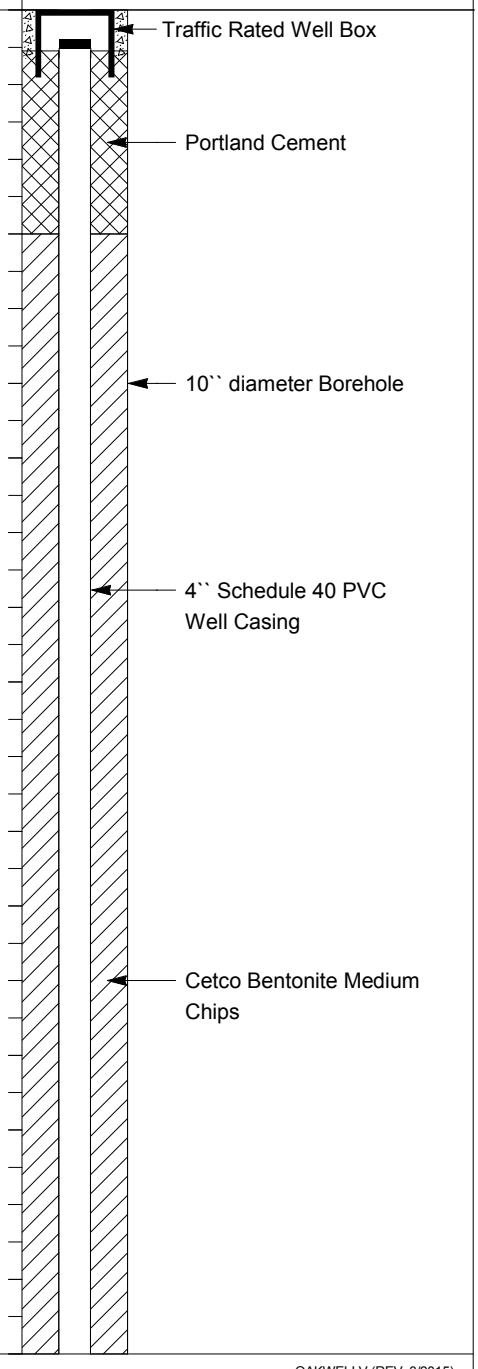
DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
18				1.1		Colorado Silica Sand 8/12
19						
20						4`` Schedule 40 PVC Vee Wire Screen with 0.010" slots
21						
22						
23						
24						
25						4`` Schedule 40 PVC Endcap
26					End of boring at 25.5 ft Ecology Well ID= BIX048	
27						
28						
29						
30						
31						
32						
33						
34						
35						
36						
37						
38						
39						



OAKWELLV (REV. 3/2015)

PROJECT: Stericycle ISB Implementation Georgetown Facility	**Log of Well No. IW-38**
BORING LOCATION:	GROUND SURFACE ELEVATION AND DATUM: GS
DRILLING CONTRACTOR: Cascade Drilling, Inc.	DATE STARTED: 9/23/15 / DATE FINISHED: 9/23/15
DRILLING METHOD: Hollow-stem auger	TOTAL DEPTH (ft.): 35.5 / SCREEN INTERVAL (ft.): 25.62-35.09
DRILLING EQUIPMENT: CME 75	DEPTH TO WATER: FIRST 9.83 COMPL. / CASING: 4" Schedule 40 PVC
SAMPLING METHOD: N/A	LOGGED BY: S. Welter
HAMMER WEIGHT: N/A / DROP: N/A	RESPONSIBLE PROFESSIONAL: JMB / REG. NO. 3003

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
0					1st Concrete Core 16`` Diameter	Traffic Rated Well Box
1					Pea Gravel	
					2nd Concrete Core 14`` Diameter	Portland Cement
2					See Well Log for EW-5 for Lithologic Description	
3						
4						
5						10`` diameter Borehole
6						
7						
8				0.3		4`` Schedule 40 PVC Well Casing
9						
10						
11						
12						
13						Cetco Bentonite Medium Chips
14						
15						
16						
17						
18						



PROJECT: Stericycle ISB Implementation
Georgetown Facility

Log of Well No. IW-38 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
18				1.8		
19						
20						4`` Schedule 40 PVC Well Casing
21						
22						
23						
24						Colorado Silica Sand 10/20
25						
26						
27						
28				0.1		Colorado Silica Sand 8/12
29						
30						4`` Schedule 40 PVC Vee Wire Screen with 0.010" slots
31						
32						
33						
34						
35						4`` Schedule 40 PVC Endcap
36					End of boring at 35.5 ft Ecology Well ID= BIX049	
37						
38						
39						

OAKWELLV (REV. 3/2015)

PROJECT: Stericycle ISB Implementation Georgetown Facility	**Log of Well No. IW-39**
BORING LOCATION:	GROUND SURFACE ELEVATION AND DATUM: GS
DRILLING CONTRACTOR: Cascade Drilling, Inc.	DATE STARTED: 9/28/15 / DATE FINISHED: 9/30/15
DRILLING METHOD: Hollow-stem auger	TOTAL DEPTH (ft.): 25.5 / SCREEN INTERVAL (ft.): 15.54-25.02
DRILLING EQUIPMENT: CME 75	DEPTH TO WATER: FIRST 9.53 / COMPL. / CASING: 4" Schedule 40 PVC
SAMPLING METHOD: N/A	LOGGED BY: S. Behrouzi
HAMMER WEIGHT: N/A / DROP: N/A	RESPONSIBLE PROFESSIONAL: JMB / REG. NO. 3003

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
0					Asphalt	Traffic Rated Well Box
1					See Well Log for EW-4 for Lithologic Description	Portland Cement
2						
3						
4						
5						10`` diameter Borehole
6						4`` Schedule 40 PVC Well Casing
7						
8				0.1		Cetco Bentonite Medium Chips
9						
10						
11						
12						
13						
14						Colorado Silica Sand 10/20
15						
16						
17						
18						

PROJECT: Stericycle ISB Implementation
Georgetown Facility

Log of Well No. IW-39 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
18				0.1		Colorado Silica Sand 8/12
19						
20						4`` Schedule 40 PVC Vee Wire Screen with 0.010" slots
21						
22						
23						
24						
25						4`` Schedule 40 PVC Endcap
26					End of boring at 25.5 ft Ecology Well ID= BIX032	
27						
28						
29						
30						
31						
32						
33						
34						
35						
36						
37						
38						
39						

OAKWELLV (REV. 3/2015)

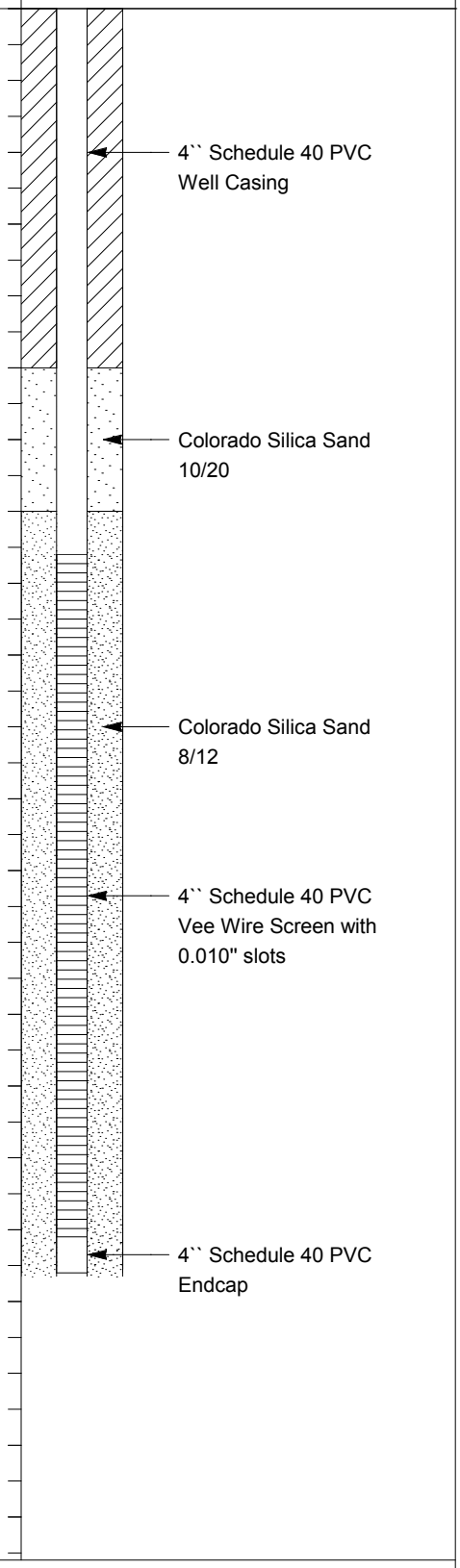
PROJECT: Stericycle ISB Implementation Georgetown Facility	**Log of Well No. IW-40**
BORING LOCATION:	GROUND SURFACE ELEVATION AND DATUM: GS
DRILLING CONTRACTOR: Cascade Drilling, Inc.	DATE STARTED: 9/28/15 / DATE FINISHED: 9/30/15
DRILLING METHOD: Hollow-stem auger	TOTAL DEPTH (ft.): 35.6 / SCREEN INTERVAL (ft.): 25.64-35.11
DRILLING EQUIPMENT: CME 75	DEPTH TO WATER: FIRST 9.56 / COMPL. / CASING: 4" Schedule 40 PVC
SAMPLING METHOD: N/A	LOGGED BY: S. Behrouzi
HAMMER WEIGHT: N/A / DROP: N/A	RESPONSIBLE PROFESSIONAL: JMB / REG. NO. 3003

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
0					Asphalt	Traffic Rated Well Box
1					See Well Log for EW-4 for Lithologic Description	Portland Cement
2						
3						
4						
5						10`` diameter Borehole
6						
7						
8				0.1		4`` Schedule 40 PVC Well Casing
9						
10						
11						
12						
13						Cetco Bentonite Medium Chips
14						
15						
16						
17						
18						

PROJECT: Stericycle ISB Implementation
Georgetown Facility

Log of Well No. IW-40 (cont'd)

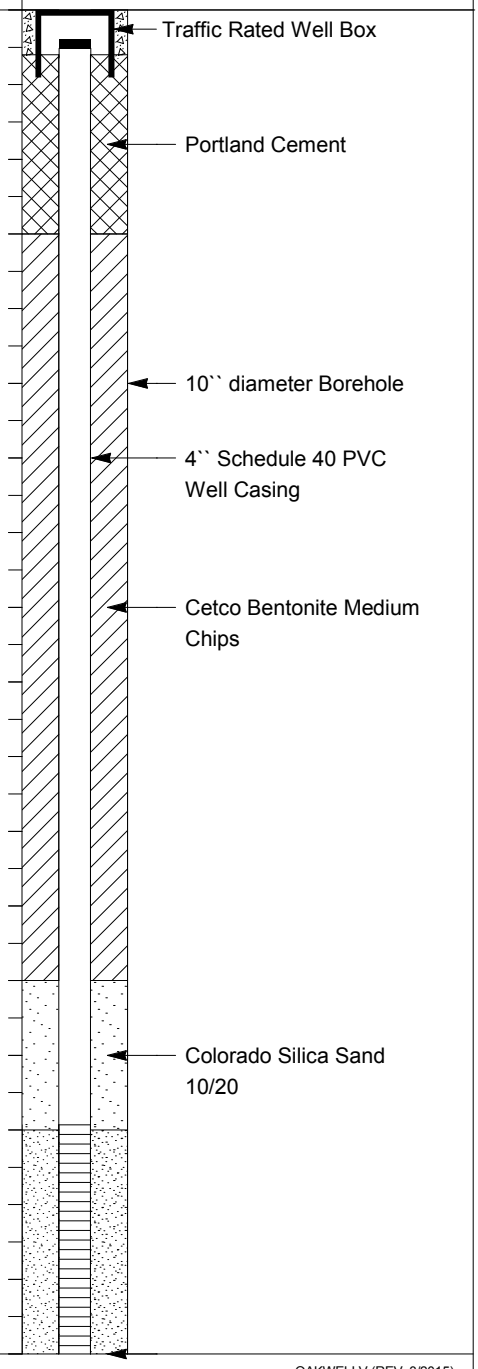
DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
18				0.2		
19						
20						4`` Schedule 40 PVC Well Casing
21						
22						
23						
24						Colorado Silica Sand 10/20
25						
26						
27						
28				0.3		Colorado Silica Sand 8/12
29						
30						4`` Schedule 40 PVC Vee Wire Screen with 0.010" slots
31						
32						
33						
34						
35						4`` Schedule 40 PVC Endcap
36					End of boring at 35.5 ft Ecology Well ID= BIX054	
37						
38						
39						



OAKWELLV (REV. 3/2015)

PROJECT: Stericycle ISB Implementation Georgetown Facility	**Log of Well No. IW-41**
BORING LOCATION:	GROUND SURFACE ELEVATION AND DATUM: GS
DRILLING CONTRACTOR: Cascade Drilling, Inc.	DATE STARTED: 9/11/15 / DATE FINISHED: 9/11/15
DRILLING METHOD: Hollow-stem auger	TOTAL DEPTH (ft.): 25.5 / SCREEN INTERVAL (ft.): 15.36-24.81
DRILLING EQUIPMENT: CME 75	DEPTH TO WATER: FIRST 11.58 / COMPL. / CASING: 4" Schedule 40 PVC
SAMPLING METHOD: N/A	LOGGED BY: S. Welter
HAMMER WEIGHT: N/A / DROP: N/A	RESPONSIBLE PROFESSIONAL: JMB / REG. NO. 3003

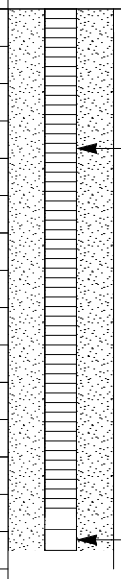
DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:
0					Single Concrete Core (18`` Diameter)
1					See Well Log for EW-6 for Lithologic Description
2					
3					
4					
5				0.0	
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					



PROJECT: Stericycle ISB Implementation
Georgetown Facility

Log of Well No. IW-41 (cont'd)

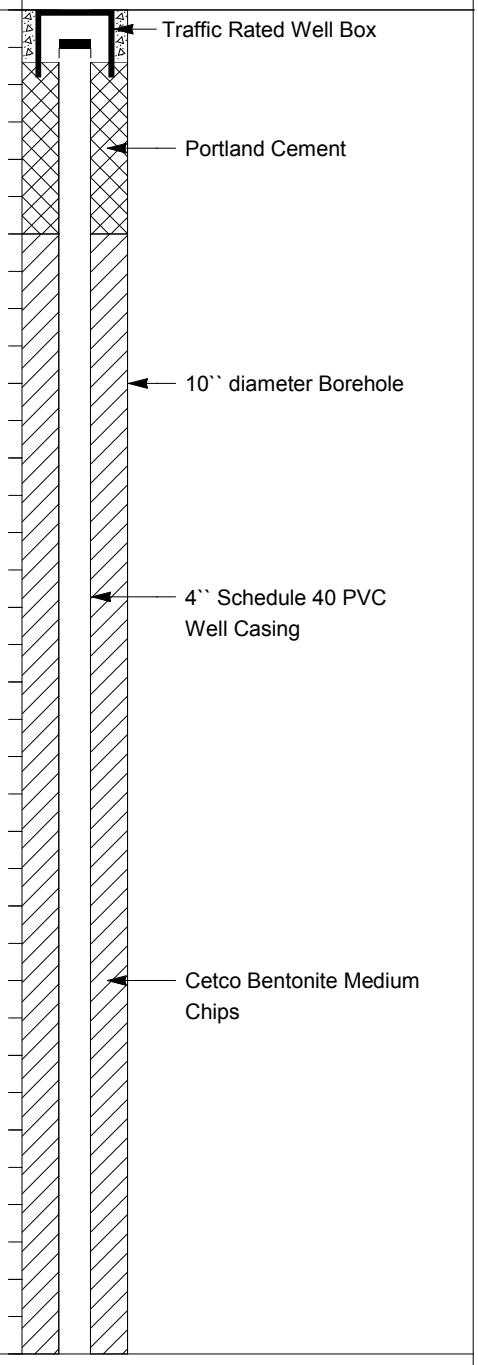
DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
18				1.1		Colorado Silica Sand 8/12
19						
20						4`` Schedule 40 PVC Vee Wire Screen with 0.010" slots
21						
22						
23						
24						
25						4`` Schedule 40 PVC Endcap
26					End of boring at 25.5 ft Ecology Well ID= BIX032	
27						
28						
29						
30						
31						
32						
33						
34						
35						
36						
37						
38						
39						



OAKWELLV (REV. 3/2015)

PROJECT: Stericycle ISB Implementation Georgetown Facility	**Log of Well No. IW-42**
BORING LOCATION:	GROUND SURFACE ELEVATION AND DATUM: GS
DRILLING CONTRACTOR: Cascade Drilling, Inc.	DATE STARTED: 9/14/15 / DATE FINISHED: 9/14/15
DRILLING METHOD: Hollow-stem auger	TOTAL DEPTH (ft.): 35.5 / SCREEN INTERVAL (ft.): 25.50-34.97
DRILLING EQUIPMENT: CME 75	DEPTH TO WATER: FIRST 11.48 COMPL. / CASING: 4" Schedule 40 PVC
SAMPLING METHOD: N/A	LOGGED BY: S. Welter
HAMMER WEIGHT: N/A / DROP: N/A	RESPONSIBLE PROFESSIONAL: JMB / REG. NO. 3003

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:
0					Single Concrete Core (18`` Diameter)
1					See Well Log for EW-6 for Lithologic Description
2					
3					
4					
5				0.9	
6					
7					
8					
9					
10					
11					
12					
13					
14					
15				0.3	
16					
17					
18					



WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS

PROJECT: Stericycle ISB Implementation
Georgetown Facility

Log of Well No. IW-42 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
18						
19						
20						4`` Schedule 40 PVC Well Casing
21						
22						
23						
24						Colorado Silica Sand 10/20
25				0.7		
26						
27						
28						Colorado Silica Sand 8/12
29						
30						4`` Schedule 40 PVC Vee Wire Screen with 0.010" slots
31						
32						
33						
34						
35						4`` Schedule 40 PVC Endcap
36					End of boring at 35.5 ft Ecology Well ID= BIX033	
37						
38						
39						

OAKWELLV (REV. 3/2015)

GOLDSMITH
LAND DEVELOPMENT SERVICES

November 10, 2015

AMEC Environmental & Infrastructure
600 University Street
One Union Square
Suite: 600
Seattle, WA 98101

Attention: Jennifer Bellamy, LG

Re: Philip Services Georgetown Facility (Monitor Well Locations)

Dear Jennifer,

At your request, we have obtained Y (northing), X (easting), and Z (elevation) coordinates for 48 monitor well locations at the Philip Services Georgetown Facility. The information was obtained on November 5 and 6, 2015 and reflects conditions at that time. The horizontal locations are to the center of the existing monitor well casing. The elevations shown reflect the casing lid (Z_1) of the monitor well and either the North rim of the PVC pipe in each extraction well or the top of fitting in each injection well (Z). It is our understanding that AMEC Foster Wheeler will apply their own vertical adjustment to the injection well top of fitting elevations to obtain the top of PVC elevation.

Monitor Well Designation	HGG Point Number	Northing (Y)	Easting (X)	Elevation (Z) (Top PVC Pipe or Top Fitting)	(Z_1) (Top Casing)
IW-2	50002	205696.0	1272495.3	22.18	22.04
IW-1	50003	205699.2	1272493.0	22.08	21.88
IW-5	50004	205659.4	1272527.3	22.23	22.06
IW-6	50005	205658.1	1272532.2	22.24	22.04
EW-1	50006	205666.0	1272492.6	22.70	22.07
IW-3	50007	205666.8	1272461.5	22.64	22.44
IW-4	50008	205663.5	1272465.0	22.66	22.50
IW-7	50009	205629.9	1272493.9	22.17	21.96
IW-8	50010	205627.8	1272498.8	22.05	21.86
IW-11	50011	205594.3	1272527.3	22.28	22.04
IW-12	50012	205591.4	1272532.7	22.24	22.03
EW-2	50013	205589.2	1272562.6	22.05	21.54
IW-15	50014	205555.0	1272562.8	21.82	21.59
IW-16	50015	205554.8	1272566.8	21.77	21.60
IW-14	50016	205577.1	1272595.4	21.97	21.80
IW-13	50017	205579.0	1272591.2	21.98	21.76
IW-10	50018	205621.9	1272566.1	22.30	22.09
IW-9	50019	205623.4	1272561.7	22.33	22.17
IW-36	50020	205803.3	1272585.1	18.34	18.17
IW-35	50021	205806.4	1272584.0	18.30	18.08
IW-38	50022	205786.5	1272550.8	18.89	18.74
IW-37	50023	205787.3	1272545.4	18.82	18.64

1215 114th Ave SE, Bellevue, WA 98004 | PO Box 3565, Bellevue, WA 98009
T: 425.462.1080 F: 425.462.7719 www.goldsmithengineering.com

Monitor Well Designation	HGG Point Number	Northing (Y)	Easting (X)	Elevation (Z) (Top PVC Pipe or Top Fitting)	(Z_1) (Top Casing)
EW-5	50024	205818.9	1272546.1	18.69	18.01
IW-30	50025	205854.9	1272552.5	18.76	18.62
IW-29	50026	205856.5	1272546.3	18.66	18.48
IW-32	50027	205820.7	1272516.5	18.44	18.28
IW-31	50028	205821.8	1272512.5	18.43	18.22
IW-39	50029	205761.8	1272501.7	18.52	18.34
IW-40	50030	205761.0	1272507.6	18.50	18.34
IW-34	50033	205786.4	1272480.9	18.20	18.06
IW-33	50034	205788.1	1272475.9	18.27	18.05
IW-28	50035	205822.1	1272444.9	18.41	18.18
IW-27	50036	205824.8	1272442.0	18.42	18.20
EW-4	50037	205823.1	1272476.3	18.26	17.56
IW-26	50038	205857.8	1272477.2	17.80	17.59
IW-25	50039	205859.5	1272477.5	17.78	17.52
IW-24	50040	205889.6	1272517.3	18.21	18.00
IW-23	50041	205893.0	1272513.5	18.13	17.86
IW-18	50042	205914.6	1272492.7	17.84	17.63
IW-17	50043	205915.1	1272490.4	17.80	17.54
EW-3	50044	205891.9	1272480.5	17.72	16.90
IW-20	50045	205882.2	1272450.0	17.40	17.18
IW-19	50046	205880.9	1272447.2	17.41	17.12
IW-22	50047	205862.2	1272406.6	18.16	17.90
IW-21	50048	205866.2	1272402.9	18.18	18.05
EW-6	50050	205852.4	1272358.9	20.84	20.32
IW-42	50051	205830.3	1272337.1	20.73	20.46
IW-41	50052	205827.8	1272334.5	20.76	20.52

For the purpose of this survey, we have utilized site benchmarks established by Goldsmith and Associates, Inc. in a prior survey. Enclosed with this letter is a copy of our letter (dated April 4, 2001) which discusses general control and datum utilized.

Should you have any questions regarding the nature of this survey, please do not hesitate to call.

Sincerely,

Mark A. Mauger

Mark A. Mauger, P.L.S. | GOLDSMITH

Sr. Survey Project Manager | 425.462.1080
mmauger@goldsmithengineering.com

Hugh G. Goldsmith & Associates, Inc.

MAME WINNER
1995 Best Community Land Use
1994 Community of the Year
1994 Best Community Land Use
1992 Best Community Land Use
1990 Environmental Award
1990 Best Planned Community
1989 Best Community Land Use Plan
1987 Best Community Land Use Plan

April 4, 2001

Philip Services Corp.
955 Powell Avenue S.W.
Renton, WA 98055

Attention: Carolyn Mayer

Re: Georgetown Facility

Dear Carolyn:

At your request, we have obtained Y (Northing), X (Easting), and Z (Elevation) coordinates for the monitoring wells and soil sample locations at your Georgetown Facility. The information was obtained in March 2001 and reflects conditions at that time. All horizontal locations are to the approximate center of the existing monitor well or a painted location provided by Philip Services personnel. The elevations shown were obtained at the north side of the PVC pipe or blue cap affixed to said pipe (Z) of the wells and to either the rim, asphalt or natural ground immediately adjacent (Z_1) of the wells and soil sample locations.

For the purposes of this survey, we have utilized City of Seattle GPS survey control to bring horizontal and vertical control to the site. Horizontal information shown on Exhibit A (HGG data) is based on Washington State Plane Coordinate System, North Zone (North American Datum 1983/91). The basis of position is an existing 4″ diameter concrete monument with a ⅜″ diameter pin in case at the intersection of S. Stacy Street and 1st Avenue S. Monument has a ½″ brass tag stamped 1547 and is designated "City of Seattle GPS Survey Control Point #803," with a published coordinate of North 215869.69 (grid), East 1270024.19 (grid), Elevation 16.63 feet (NAVD 88). Units are expressed in U.S. survey feet. The basis of bearing is GPS derived Washington State Plane Coordinate System based on occupation of the above mentioned basis of position and simultaneous occupation of control points adjacent to the project area. A combination factor of 0.999992700 was applied to all GPS measurements to establish project coordinates for two control points within the project area resulting in the following values. Note: Only the basis of position is, therefore, a true grid state plane coordinate.

PST-2 Found 2½″ square concrete monument with nail in case at intersection of Maynard Avenue S. and S. Lucille Street
North 205426.72, East 1271995.22, Elevation 19.25 feet (project coordinate)

PST-11 Set PK with flasher 8.0 southwest of southwest railroad tracks on southwest side E. Marginal Way S. and 7.0 northwest of southeast edge of pavement of drive to "J.A. Jack & Sons, Inc." approximately at the southwest corner of intersection of S. Brandon Street and E. Marginal Way
North 205737.80, East 1278999.16, Elevation 16.29 feet (project coordinate)

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Philip Services Corp.
Attention: Carolyn Mayer
April 4, 2001

The vertical information shown hereon is based on the North American Vertical Datum of 1988 (NAVD 88). The master benchmark utilized for this survey was the above noted City of Seattle GPS Survey Control Point #803.

A ground based traverse was then run through existing City of Seattle monumentation and HGG GPS Survey Control Points, at which time the monitor wells and soil sample locations were surveyed. Vertical information was obtained using trigonometric levels and a closed loop traversing method which resulted in closures within 0.1 foot vertically.

The information shown on Exhibit "B" (converted HDA data) was taken from a map labeled *"Chempro Georgetown Facility Well Locations"* by Horton Dennis & Associates (HDA) dated 4/07/95. For the purposes of this conversion we have accepted the monument found at the intersection of S. Lucille Street and Denver Avenue S. as the HDA Basis of Position (HDA coordinate value 10,000, 10,000). The Basis of Bearing was the monumented centerline of S. Lucille Street east of said Basis of Position, held as N 89°57'28" E per HDA. A separate vertical comparison to the HDA data was obtained by running levels to the benchmark shown on the above referenced plan. Nine wells were then relocated as a check by Hugh G. Goldsmith & Associates, Inc. (HGG) personnel on 3/28/01. This resulted in a translation between HDA data and HGG data of:

Delta Y = +195414.589'
Delta X = +1262434.125'
Delta Z = +9.14'

In addition, HDA data was Rotated + 01°37'39" to fit the HGG bearing system. As a result, all monitoring data (HGG and HDA) is now based on a common datum as described above.

If we can be of further assistance to you on this matter, please do not hesitate to call.

Very truly yours,

HUGH G. GOLDSMITH & ASSOCIATES, INC.

Mark A. Mauger, P.L.S.

Hugh G. Goldsmith & Associates, Inc.