September 1, 2021

Sent via email

Mr. Michael Regan, EPA Administrator
The United States Environmental Protection Agency
1200 Pennsylvania Avenue, NW
Mail Code 50304-P
Washington DC, 20460

RE: Alternate Liner Demonstration Extension Request Due to Analytical Limitations
DTE Electric Company Monroe Power Plant
Fly Ash Basin Coal Combustion Residuals Unit
7955 East Dunbar Road, Monroe, Michigan

Dear Administrator Regan:

In accordance with 40 C.F.R. §257.71(d)(2)(ii)(A) the DTE Electric Company (DTE Electric) is submitting this extension request to the U.S. Environmental Protection Agency (EPA) for approval. Specifically, this request is to extend the November 30, 2021, deadline to submit an Alternate Liner Demonstration for the Monroe Power Plant Fly Ash Basin due to analytical limitations.

The enclosed memorandum prepared by Geosyntec and Excel Geotechnical Testing laboratory provides the information requested by the rule, a date by which termination criteria are anticipated to be achieved, along with a discussion of results, and how the anticipated dates are estimated. The memorandum demonstrates how DTE Electric qualifies for and should be granted the requested extension to submit an Alternate Liner Demonstration after November 30, 2021.

Electronic files were submitted to Richard Huggins, Mary Jackson, Michelle Long, and Jason Mills via email. If you have any questions regarding this submittal, please contact me at 313.235.0153 or christopher.scieszka@dteenergy.com

Sincerely,

Christopher Scieszka
Project Manager, Environmental Management and Safety, DTE Energy

Enclosure

cc: Richard Huggins, Mary Jackson, Michelle Long, and Jason Mills

2100 Commonwealth Avenue, Suite 100
Ann Arbor, Michigan 48105
PH 734.332.8004
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# Memorandum

| | |
|---|---|
| Date: | September 1, 2021 |
| To: | Michael Regan (USEPA) |
| Copies to: | Richard Huggins, Mary Jackson, Michelle Long, and Jason Mills (USEPA), Christopher Scieszka (DTE Electric Company), John Seymour (Geosyntec Consultants) |
| From: | Omer Bozok, P.E. (Geosyntec Consultants), Nader Rad, P.E. (Excel Geotechnical Testing) |
| Subject: | Extension Request for Monroe Power Plant Fly Ash Basin Alternative Liner Demonstration<br>Geosyntec Project: GLP8014 |

This technical memorandum has been prepared to request an extension for the Alternative Liner Demonstration (ALD) of the Monroe Fly Ash Basin in accordance with 40 CFR Part 257 (CCR Rule) as amended on November 20, 2020. Specifically, this request is being made in accordance with 40 CFR Part 257.71(d)(2)(ii)(A) *Extension due to analytical limitations.* This memorandum provides the basis and information required by the CCR Rule for the extension request and serves as the written certification from the lab.

## BACKGROUND

DTE Electric Company (DTE) submitted the ALD application to the United States Environmental Protection Agency (USEPA) on November 30, 2020, in accordance with the CCR Rule. USEPA has not commented on the ALD application.

DTE took an expeditious approach and initiated the field and laboratory investigation to support the ALD in December 2020. The field investigation was completed in December 2020. The laboratory study is still underway and expected to last for the foreseeable future until the requirements of the CCR Rule are met, as demonstrated in this extension request.

The CCR Rule requires that representative samples from the site are tested for hydraulic conductivity with site-specific contact water and that the tests last until chemical equilibrium is

reached. If chemical equilibrium is not reached within a reasonable time to complete the ALD, it is considered an "analytical limitation" and the CCR Rule gives the ALD applicant the right to request an extension.

The CCR Rule [§257.71(d)(2)(ii)(A)] states:

"*Extension due to analytical limitations. If the owner or operator cannot meet the demonstration deadline due to analytical limitations related to the measurement of hydraulic conductivity, the owner or operator must submit a request for an extension no later than September 1, 2021, that includes a summary of the data that have been analyzed to date for the samples responsible for the delay and an alternate timeline for completion that has been certified by the laboratory. The extension request must include all of the following:*

*(1) A timeline of fieldwork to confirm that samples were collected expeditiously;*

*(2) A chain of custody documenting when samples were sent to the laboratory;*

*(3) Written certification from the lab identifying how long it is projected for the tests to reach the relevant termination criteria related to solution chemistry, and*

*(4) Documentation of the progression towards all test termination metrics to date.*"

The remainder of this memorandum provides the information necessary to address the CCR Rule extension requirements. The following are provided:

- Field and laboratory investigation timeline and chain of custody;
- Termination criteria used for hydraulic conductivity testing;
- Documentation of test results as of August 20, 2021, and projected timeline for reaching termination criteria; and
- Laboratory certification.

## FIELD AND LABORATORY INVESTIGATION TIMELINE

DTE Electric Company retained Geosyntec to develop and implement a detailed field and laboratory investigation plan soon after the ALD application was submitted to USEPA. The field investigation portion of the study started on December 1, 2020, one day after the ALD application was submitted to USEPA, and was completed on December 8, 2020. Soil samples collected during the field investigation were sent to Excel Geotechnical Testing (EGT) immediately, and samples

were registered by EGT on December 10, 2020. The chain of custody (proof of shipping and delivery) documenting when samples were sent to the laboratory is provided in Appendix A. Sample identification was provided to EGT at the time of shipment. Testing details for each sample were provided to EGT after Geosyntec reviewed the field investigation results in more detail. The testing program is provided in Appendix B.

## TERMINATION CRITERIA FOR HYDRAULIC CONDUCTIVITY TESTING

Hydraulic conductivity testing is being conducted in general accordance with ASTM D7100 - Standard Test Method for Hydraulic Conductivity Compatibility Testing of Soils with Aqueous Solutions, using site-specific contact water. The use of ASTM D7100 is discussed in the preamble of the CCR Rule and deemed appropriate by USEPA.

ASTM D7100 termination criteria require the following conditions:

- The ratio of outflow to inflow is between 0.75 and 1.25. The hydraulic conductivity is considered steady if four or more consecutive hydraulic conductivity determinations fall within ±25 % or better of the mean value for hydraulic conductivity, $k \geq 3 \times 10\text{-}8$ cm/s or within ±50 % or better for $k < 1 \times 10\text{-}8$ cm/s, and a plot or tabulation of the hydraulic conductivity versus time shows no significant upward or downward trend;
- At least 2 pore volumes (PV) of flow has passed through the sample; and
- pH and electrical conductivity of effluent are within 10 % of that for the influent with no significant increasing or decreasing trends.

## TEST RESULTS & PROJECTED TIMELINE FOR TERMINATION CRITERIA

Preliminary results as of August 20, 2021, are provided in **Appendix A** and summarized in **Table 1**. The table provides the sample ID, the start date for testing, amount of flow passed through a sample for a given duration of time, hydraulic conductivity values, and projected date for completing 2 PV of flow. The information further demonstrates the laboratory testing was initiated expeditiously.

In addition, a set of figures created for each sample provide insight into the progression of:

- PV of flow with time;
- hydraulic conductivity with time;
- hydraulic conductivity with PV;
- pH of inflow and outflow with time; and

- Electrical conductivity (EC) with time.

Overall, the hydraulic conductivity, *k* value of samples range between 3.5E-09 and 1.4E-08 (cm/s). The amount of PV of flow that has passed through the samples ranges from 0.49 to 3.30. As of August 20, 2021, three of the samples have reached the 2 PV criterion. The remaining samples are projected to reach 2 PV between in the beginning of September 2021 and early March 2023; this is based on linear extrapolations between the PV that has passed through the sample at known dates and assumes *k* stays essentially constant, which is the current case.

**Table 2** provides figure numbers for quick access to the various plots listed above.

Overall, the PV of flow is progressing steadily towards the 2 PV criterion. Hydraulic conductivity values are generally stable and can be considered steady. pH values are provided in **Table 3.** In general, the average pH of inflow ranges from 12.7 to 12.8, and the average pH of outflow ranges from 8.3 to 8.6. The pH values of outflow are not within the 10 percent of inflow; they are projected to meet the termination criterion between July 2022 and November 2023. These dates are based on the convergence of linear extrapolations of the data. Consequently, a request for an extension is being made.

EC values are provided in **Table 4.** In general, the average EC of inflow ranges from 4,522 to 4,840, and the average EC of outflow ranges from 1,126 to 2,059. The EC values of outflow are not within the 10 percent of inflow. Data is scattered such that the date for termination criteria is not predictable.

**Table 5** summarizes if the sample has reached the termination criterion for PV, pH, EC, and the approximate projected date for reaching the termination criteria. As summarized in the table, samples have not reached all the termination criteria. The projected termination dates are based on the latest extrapolated date from PV and pH criteria. An accurate termination date cannot be predicted due to variation in EC. Note that results do not include inflow vs outflow data. The main reason is that the project team had decided to keep the inflow constant, which provides a more stable hydraulic gradient across the sample, more accurate estimation of *k*, faster testing, and more control in the testing procedure. It is our judgment that the inflow/outflow criterion would be reached by the time other criteria are reached.

## CONCLUSION

Considering the data presented above, we are requesting an extension until November 2, 2023. This date may or may not capture the EC termination criterion.

It is Geosyntec's opinion that chemical diffusion is the driving mechanism for contaminant transport, not advective flow, based on the fate and transport analyses we conducted as part of the ongoing ALD. The test data indicate stable hydraulic conductivities for all samples. Therefore, to examine the potential effects of a degraded (increased) hydraulic conductivity, Geosyntec performed a sensitivity analysis, where the Darcy velocity values were increased by an order magnitude over the baseline value to assess the impact on the fate and transport analyses. The baseline Darcy velocity was calculated utilizing a hydraulic conductivity value of 1.4E-08 cm/s, which is the sample from this study with the highest hydraulic conductivity. The model yielded groundwater concentrations that were between one to four orders of magnitude less than the groundwater protection standards. Consequently, the preliminary data and modeling indicate that there is no reasonable probability that continued operation of the surface impoundment will result in adverse effects to human health or the environment even using elevated Darcy velocities/hydraulic conductivities.

## LABORATORY CERTIFICATION

The hydraulic conductivity compatibility testing for the Monroe Power Plant Fly Ash Basin samples is projected to last through November 2, 2023, based on results as of August 20, 2021, to meet termination criteria, with the exception of EC criterion as explained in the memorandum. If the extension is granted, DTE will submit the completed demonstration within 45 days of November 2, 2023, in accordance with §257.71(d)(2)(ii)(B).

Nader Rad, PhD., P.E. (LA)
President, Excel Geotechnical Testing

# TABLES

**Table 1.** Hydraulic Conductivity Summary

| ID | Date | Days After Injection | Permeability (cm/s) | Pore Volumes Passed After Injection | Days to Target Pore Volume | Date of Target PV Reached |
|---|---|---|---|---|---|---|
| B2-ST-1 (20-22') | February 19, 2021 | 0 | 5.9E-09 | 0.0000 | | |
| | August 20, 2021 | 182 | 5.4E-09 | 1.0116 | 178 | February 13, 2022 |
| B4-ST-2 (40-42') | February 26, 2021 | 7 | 3.6E-09 | 0.0176 | | |
| | August 20, 2021 | 182 | 3.5E-09 | 0.4894 | 560 | March 3, 2023 |
| B4-ST-4 (70-72.5') | February 26, 2021 | 7 | 1.4E-08 | 0.1220 | | |
| | August 20, 2021 | 182 | 1.1E-08 | 2.7318 | Complete | July 2, 2021 |
| B6-ST-1 (25-27') | February 19, 2021 | 0 | 9.7E-09 | 0.0000 | | |
| | August 20, 2021 | 182 | 7.6E-09 | 1.2755 | 103 | December 1, 2021 |
| B6-ST-3 (55-57.5') | February 19, 2021 | 0 | 1.2E-08 | 0.0000 | | |
| | August 20, 2021 | 182 | 9.8E-09 | 1.8601 | 14 | September 2, 2021 |
| B6-ST-4 (65-67.5') | February 26, 2021 | 7 | 1.3E-08 | 0.1209 | | |
| | August 20, 2021 | 182 | 1.0E-08 | 2.5584 | Complete | July 12, 2021 |
| B9-ST-2 (40-42') | February 19, 2021 | 0 | 1.1E-08 | 0.0000 | | |
| | August 20, 2021 | 182 | 1.1E-08 | 1.8013 | 20 | September 9, 2021 |
| B9-ST-3 (55-57') | March 19, 2021 | 28 | 1.7E-08 | 0.5500 | | |
| | August 20, 2021 | 182 | 1.4E-08 | 3.3033 | Complete | June 10, 2021 |

**Table 2:** Summary of Figures for Submitted Graphical Displays

| ID | PV of flow with Time | Hydraulic Conductivity with Time | Hydraulic Conductivity with PV | pH of inflow and outflow with time | Electrical conductivity (EC) with time |
|---|---|---|---|---|---|
| B2-ST-1 (20-22') | Figure 1 | Figure 2 | Figure 3 | Figure 4 | Figure 5 |
| B4-ST-2 (40-42') | Figure 6 | Figure 7 | Figure 8 | Figure 9 | Figure 10 |
| B4-ST-4 (70-72.5') | Figure 11 | Figure 12 | Figure 13 | Figure 14 | Figure 15 |
| B6-ST-1 (25-27') | Figure 16 | Figure 17 | Figure 18 | Figure 19 | Figure 20 |
| B6-ST-3 (55-57.5') | Figure 21 | Figure 22 | Figure 23 | Figure 24 | Figure 25 |
| B6-ST-4(65.67.5') | Figure 26 | Figure 27 | Figure 28 | Figure 29 | Figure 30 |
| B9-ST-2(40-42') | Figure 31 | Figure 32 | Figure 33 | Figure 34 | Figure 35 |
| B9-ST-3(55-57') | Figure 36 | Figure 37 | Figure 38 | Figure 39 | Figure 40 |

**Table 3**: Summary of pH Results

| Sample ID | Parameter | pH Inflow | pH Outflow | Is pH of outflow within termination boundaries? | Approximate Projected Termination Date |
|---|---|---|---|---|---|
| B2-ST-1 (20-22') | Min | 12.3 | 8.2 | No | November 2, 2023 |
| | Max | 12.9 | 8.9 | | |
| | Average | 12.7 | 8.5 | | |
| B4-ST-2 (40-42') | Min | 12.4 | 8.2 | No | March 29, 2023 |
| | Max | 12.9 | 8.6 | | |
| | Average | 12.7 | 8.5 | | |
| B5-ST-4 (70-72.5') | Min | 12.3 | 8.0 | No | May 4, 2023 |
| | Max | 13.1 | 8.9 | | |
| | Average | 12.7 | 8.6 | | |
| B6-ST-1 (25-27') | Min | 12.4 | 8.2 | No | December 5, 2022 |
| | Max | 13.2 | 8.9 | | |
| | Average | 12.8 | 8.5 | | |
| B6-ST-3 (55-57.5') | Min | 12.4 | 8.0 | No | July 2, 2022 |
| | Max | 13.0 | 8.9 | | |
| | Average | 12.7 | 8.5 | | |
| B6-ST-4(65.67.5') | Min | 12.3 | 7.8 | No | November 1, 2022 |
| | Max | 13.0 | 8.7 | | |
| | Average | 12.7 | 8.3 | | |
| B9-ST-2(40-42') | Min | 12.3 | 7.9 | No | October 10, 2022 |
| | Max | 13.0 | 9.0 | | |
| | Average | 12.7 | 8.6 | | |
| B9-ST-3(55-57') | Min | 12.2 | 7.9 | No | June 14, 2023 |
| | Max | 13.2 | 9.0 | | |
| | Average | 12.7 | 8.5 | | |

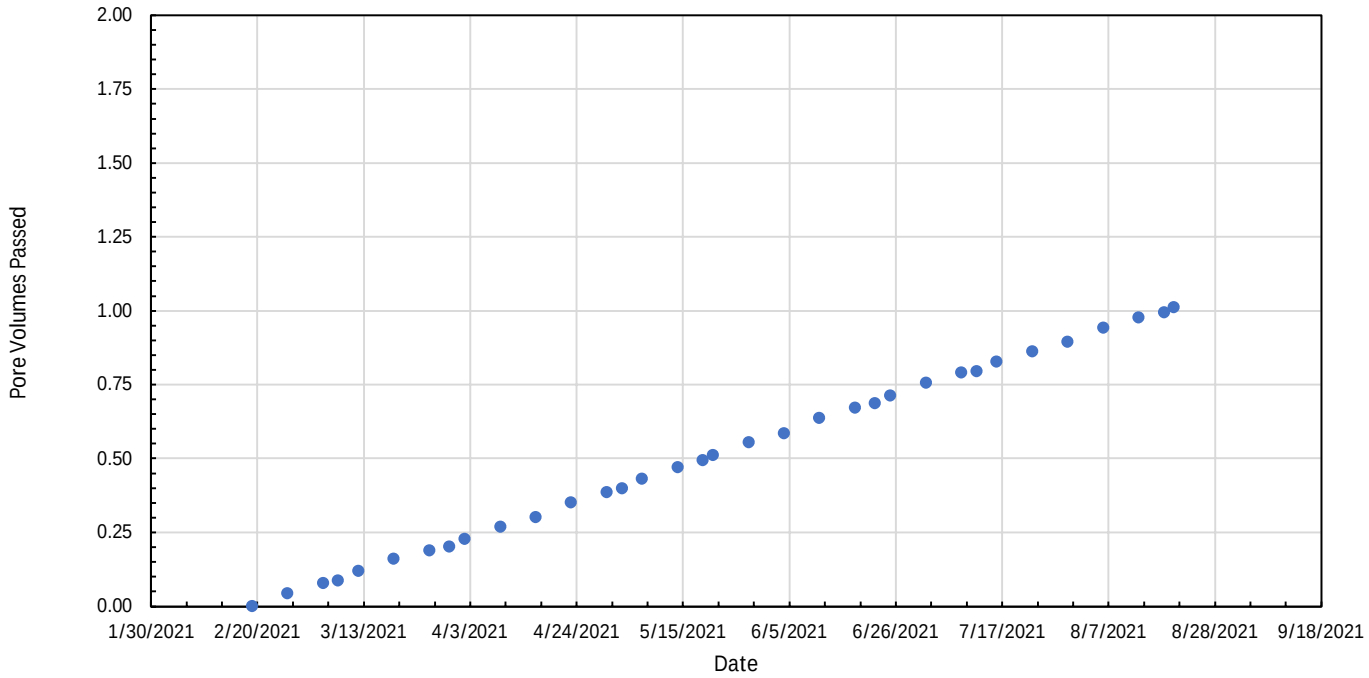
**Table 4.** Electrical Conductivity Results

| Sample ID | Parameter | EC Inflow (µs/cm) | EC Outflow (µs/cm) | Is EC of outflow within termination boundaries? | Approximate Projected Termination Date |
|---|---|---|---|---|---|
| B2-ST-1 (20-22') | Min | 4300 | 1434 | No | N/A |
| | Max | 4800 | 3000 | | |
| | Average | 4553 | 2059 | | |
| B4-ST-2 (40-42') | Min | 4840 | 1126 | No | N/A |
| | Max | 4840 | 1126 | | |
| | Average | 4840 | 1126 | | |
| B5-ST-4 (70-72.5') | Min | 4120 | 1082 | No | N/A |
| | Max | 5230 | 1534 | | |
| | Average | 4650 | 1211 | | |
| B6-ST-1 (25-27') | Min | 4370 | 1000 | No | N/A |
| | Max | 5040 | 1614 | | |
| | Average | 4735 | 1384 | | |
| B6-ST-3 (55-57.5') | Min | 4350 | 1128 | No | N/A |
| | Max | 4900 | 1683 | | |
| | Average | 4730 | 1342 | | |
| B6-ST-4(65.67.5') | Min | 3970 | 963 | No | N/A |
| | Max | 5090 | 1708 | | |
| | Average | 4522 | 1201 | | |
| B9-ST-2(40-42') | Min | 4380 | 1025 | No | N/A |
| | Max | 4940 | 1796 | | |
| | Average | 4692 | 1232 | | |
| B9-ST-3(55-57') | Min | 4230 | 885 | No | N/A |
| | Max | 5080 | 2430 | | |
| | Average | 4811 | 1378 | | |

**Table 5.** Summary of Termination Criteria

| | Termination Criterion Reached | | | | |
|---|---|---|---|---|---|
| Sample ID | Pore Volumes Passed, PV | pH | Electrical Conductivity, EC | Approximate Projected Termination Date | Date Based On |
| B2-ST-1 (20-22') | No | No | No | November 2, 2023 | pH |
| B4-ST-2 (40-42') | No | No | No | March 29, 2023 | pH |
| B4-ST-4 (70-72.5') | Yes | No | No | May 15, 2023 | pH |
| B6-ST-1 (25-27') | No | No | No | December 5, 2022 | pH |
| B6-ST-3 (55-57.5') | No | No | No | July 2, 2022 | pH |
| B6-ST-4(65.67.5') | Yes | No | No | November 1, 2022 | pH |
| B9-ST-2(40-42') | No | No | No | October 10, 2022 | pH |
| B9-ST-3(55-57') | Yes | No | No | March 19, 2023 | pH |

# FIGURES




**B2-ST-1 (20-22 ft bgs) PV of Flow with Time**

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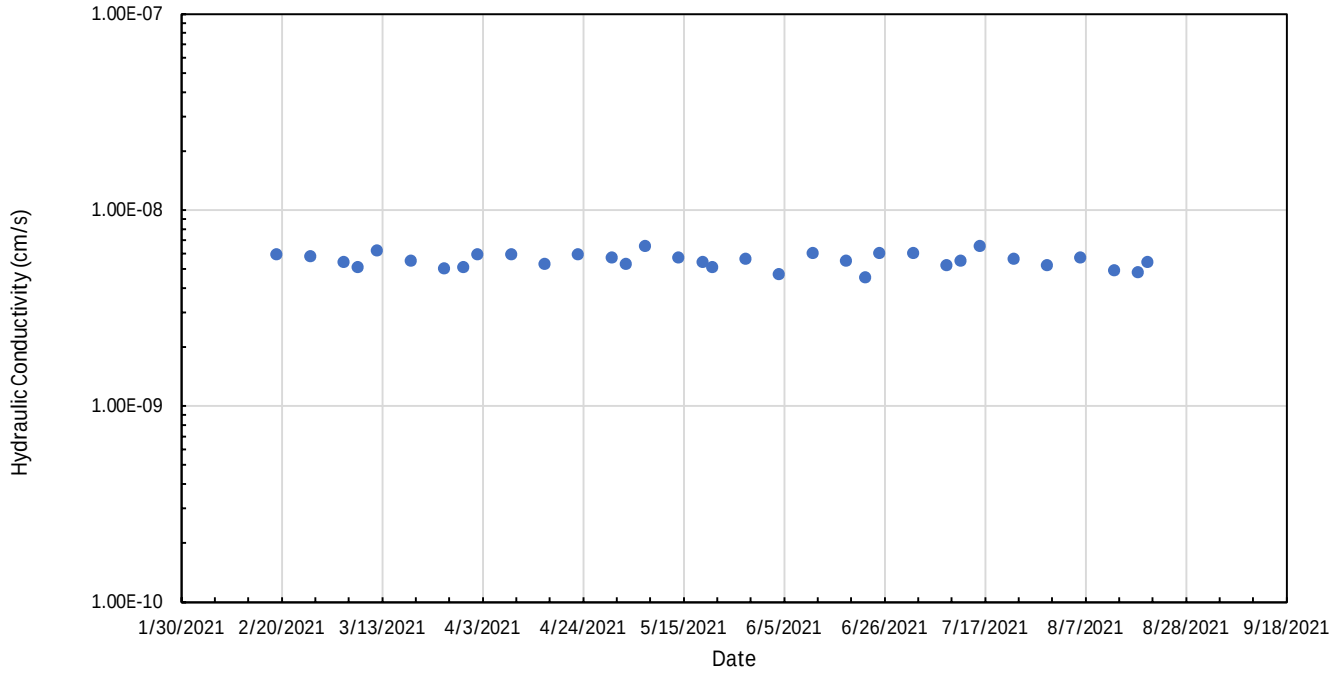
**Figure 1**




**B2-ST-1 (20-22 ft bgs) Hydraulic Conductivity with Time**

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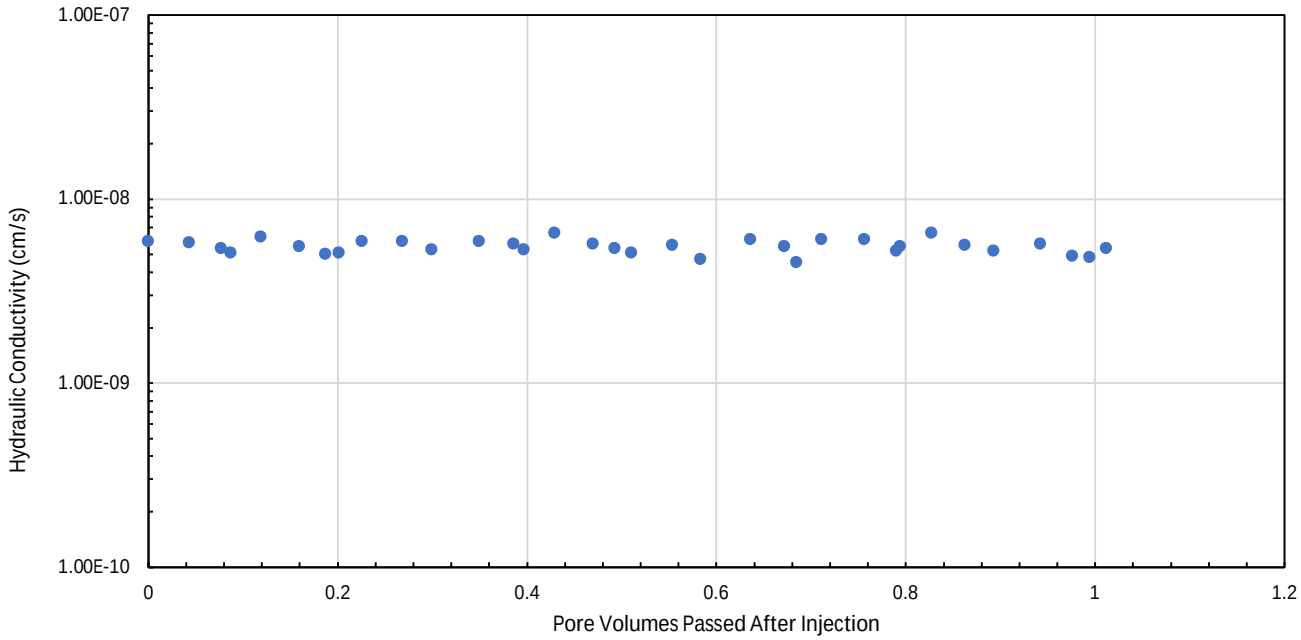
**Figure 2**




**B2-ST-1 (20-22 ft bgs) Hydraulic Conductivity with PV**

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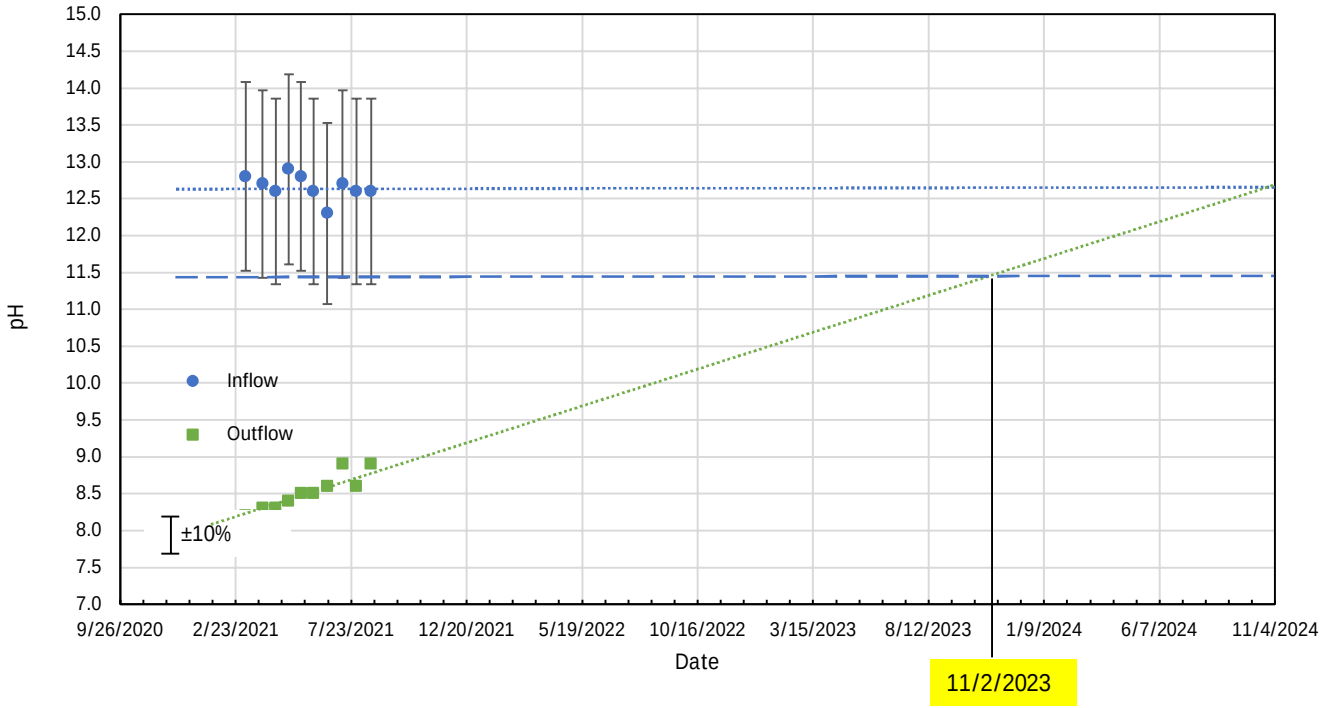
**Figure 3**




**B2-ST-1 (20-22 ft bgs) pH of Inflow and Outflow with Time**

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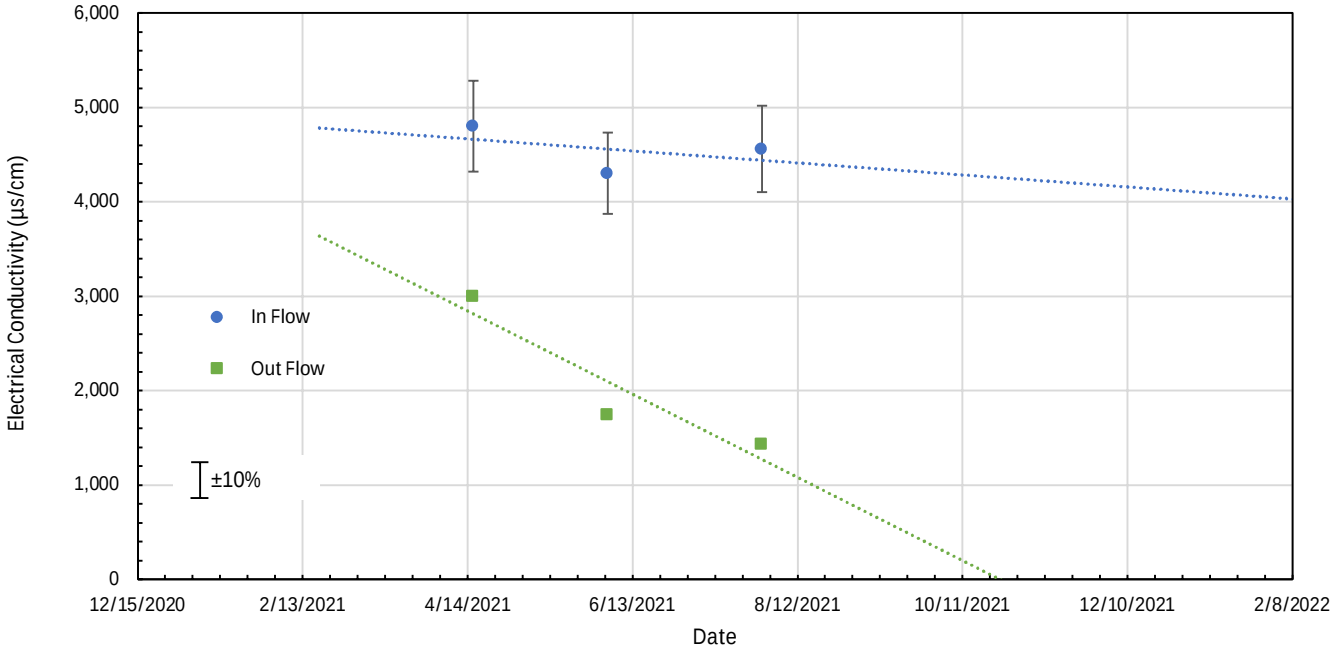
**Figure 4**




**B2-ST-1 (20-22 ft bgs) Electrical Conductivity (EC) with Time**

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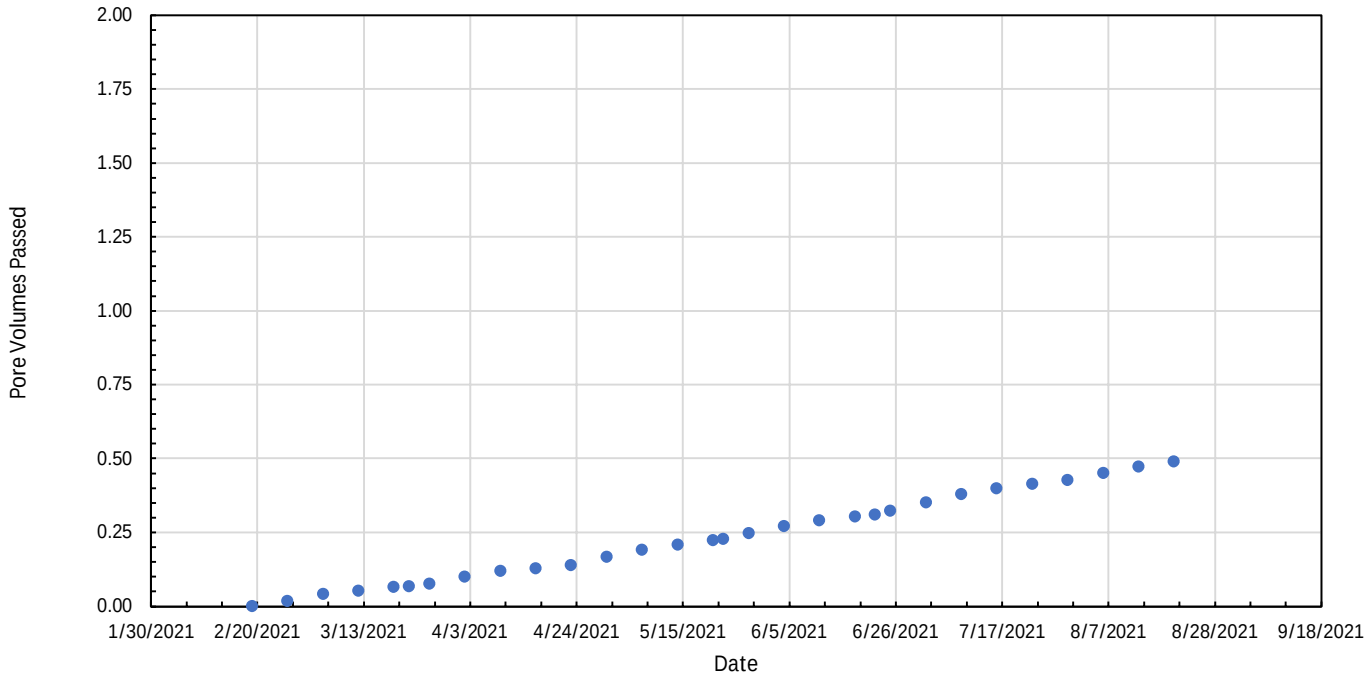
**Figure 5**




**B4-ST-2 (40-42 ft bgs) PV of Flow with Time**

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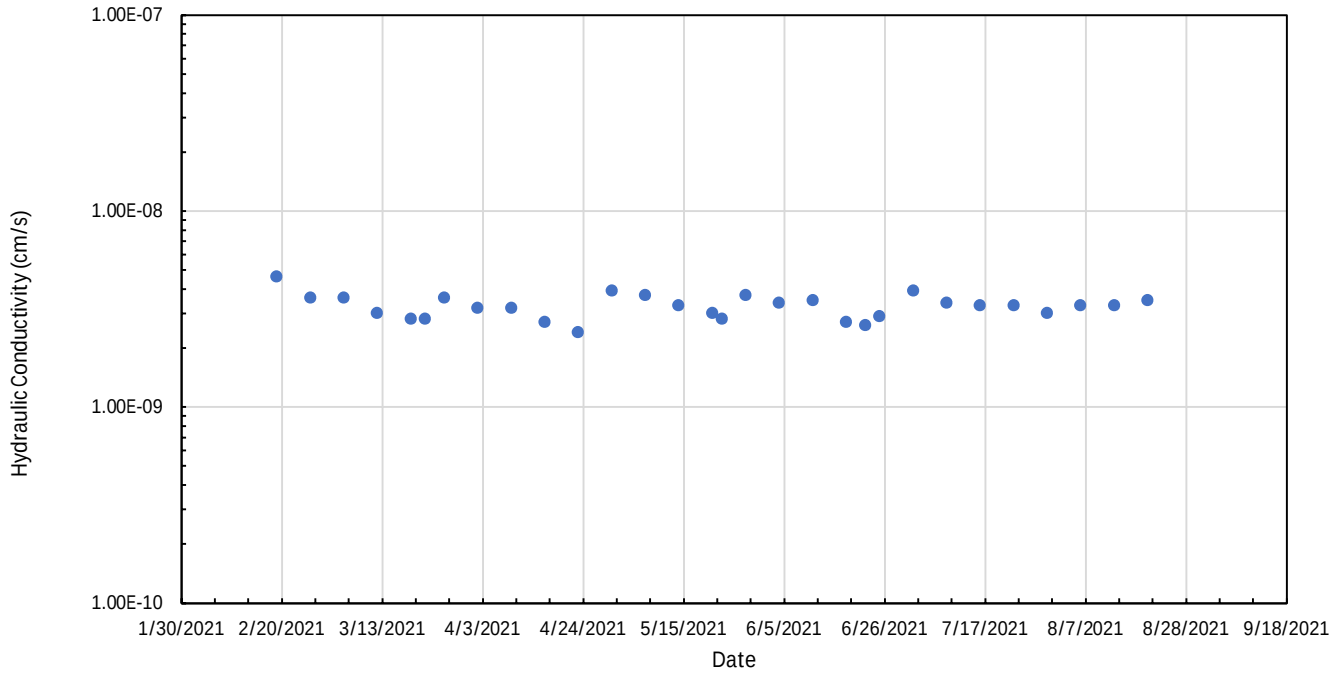
**Figure 6**




**B4-ST-2 (40-42 ft bgs) Hydraulic Conductivity with Time**

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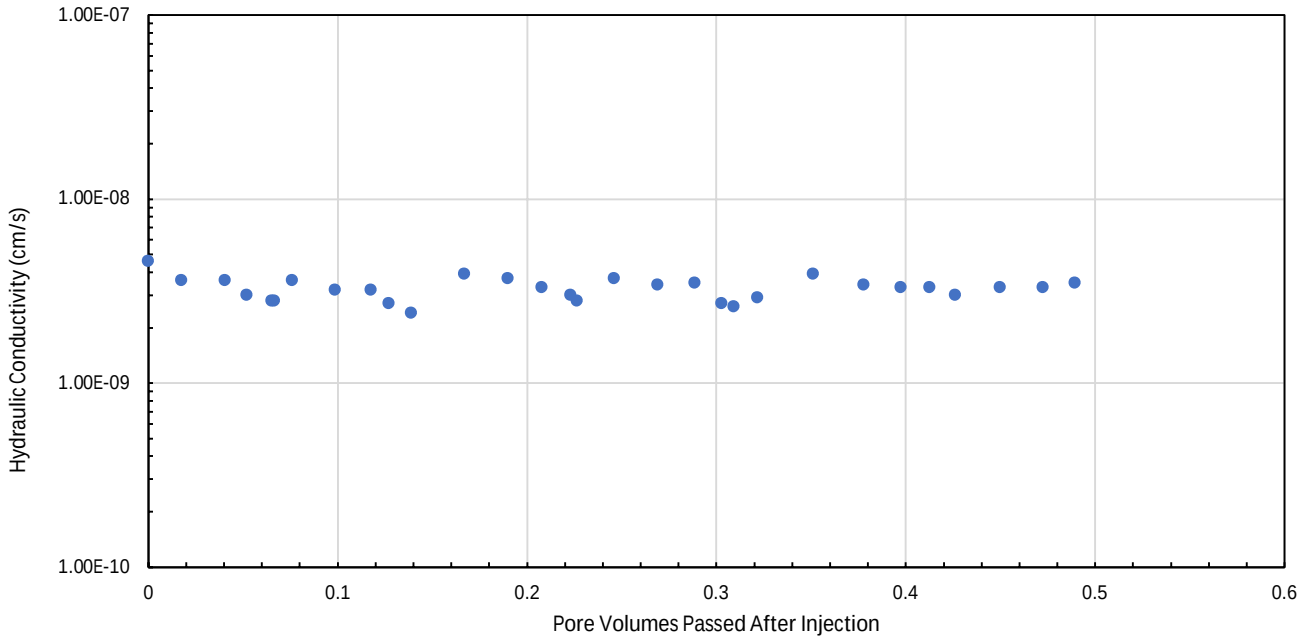
**Figure 7**




**B4-ST-2 (40-42 ft bgs) Hydraulic Conductivity with PV**

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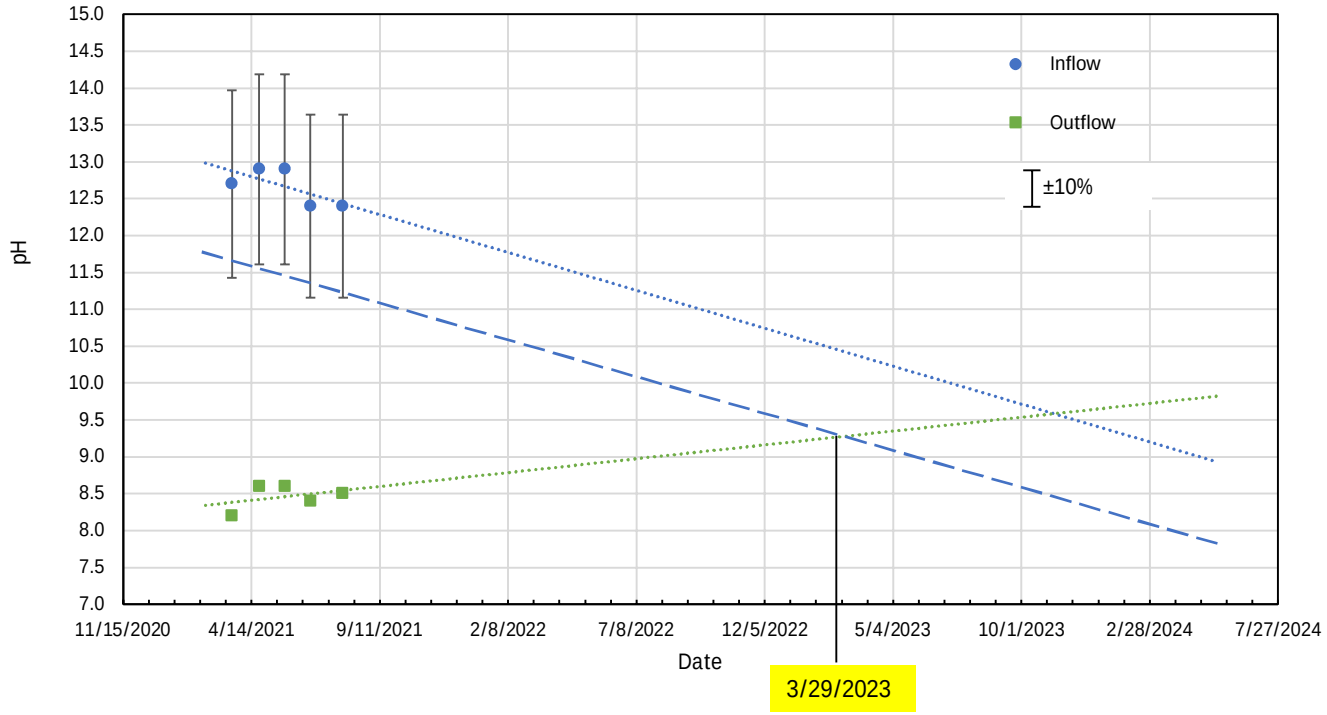
**Figure 8**




**B4-ST-2 (40-42 ft bgs) pH of Inflow and Outflow with Time**

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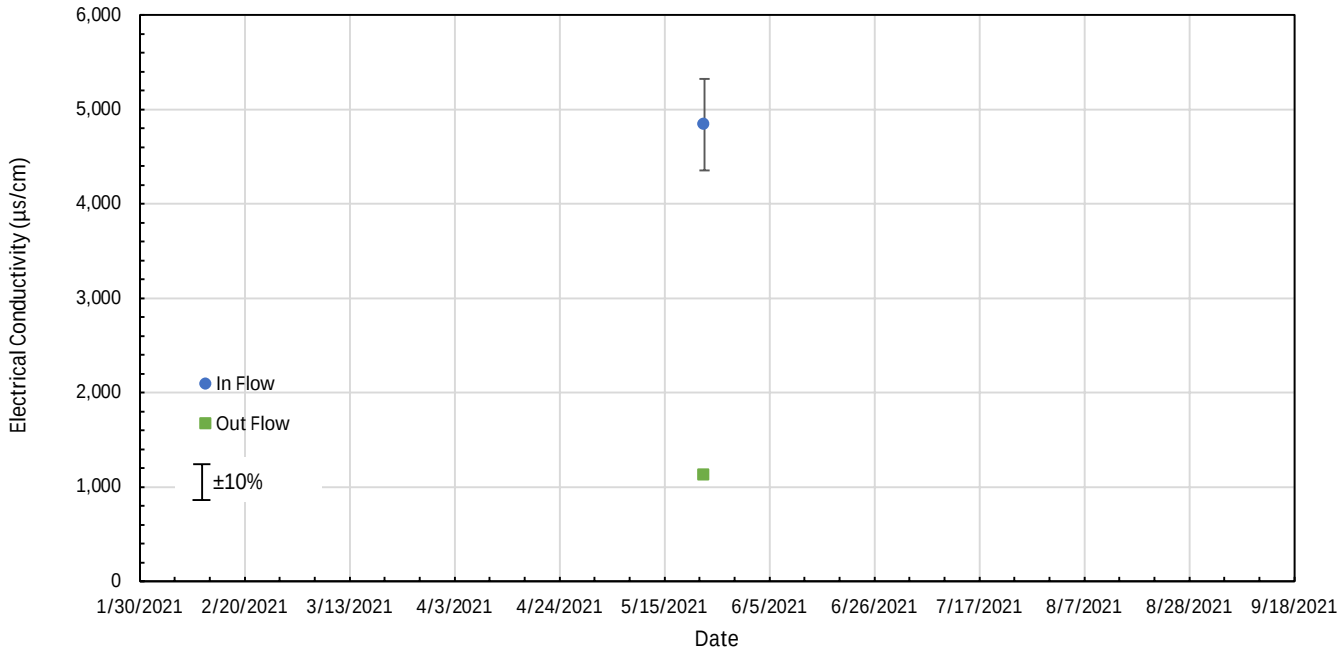
**Figure 9**




**B4-ST-2 (40-42 ft bgs) Electrical Conductivity (EC) with Time**

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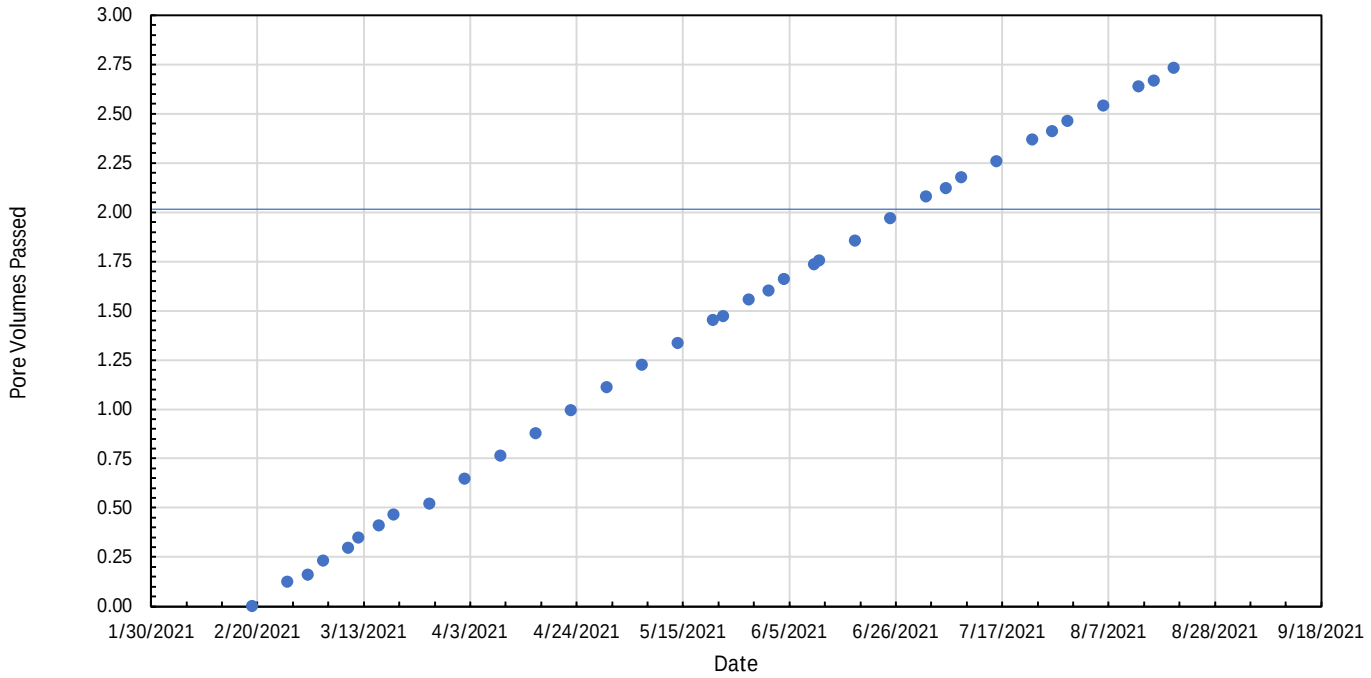
**Figure 10**




**B4-ST-4 (70-72.5 ft bgs) PV of Flow with Time**

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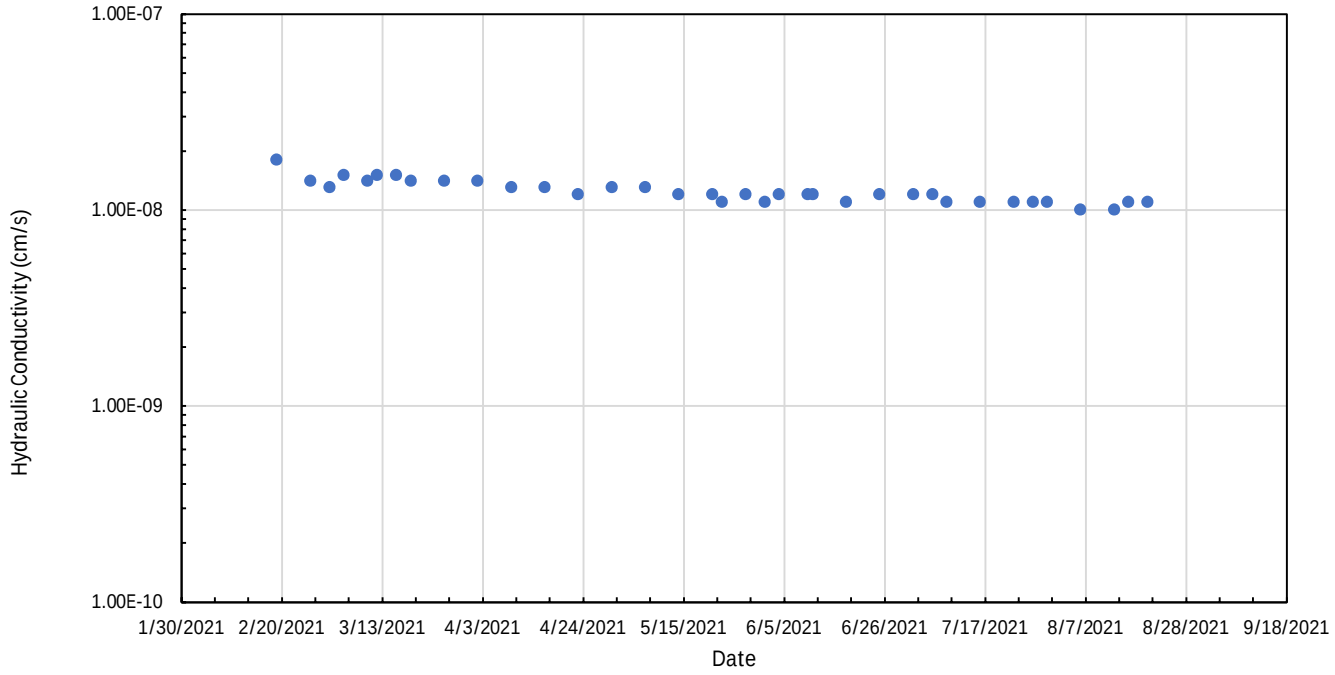
**Figure 11**




**B4-ST-4 (70-72.5 ft bgs) Hydraulic Conductivity with Time**

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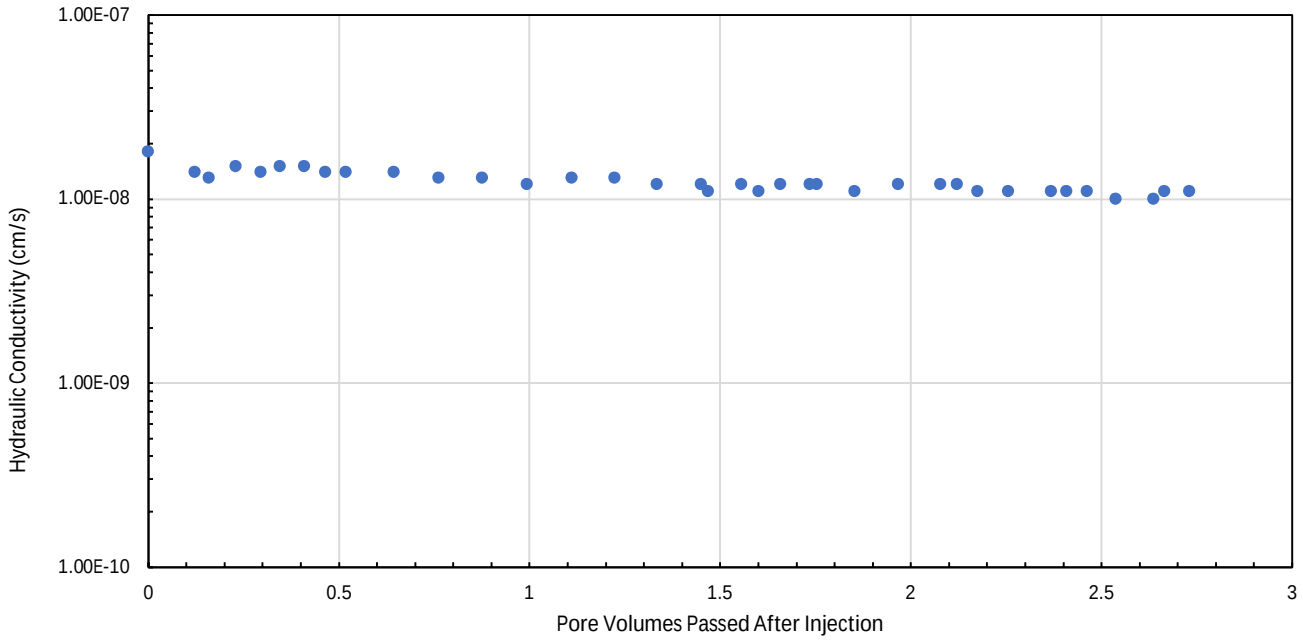
**Figure 12**




**B4-ST-4 (70-72.5 ft bgs) Hydraulic Conductivity with PV**

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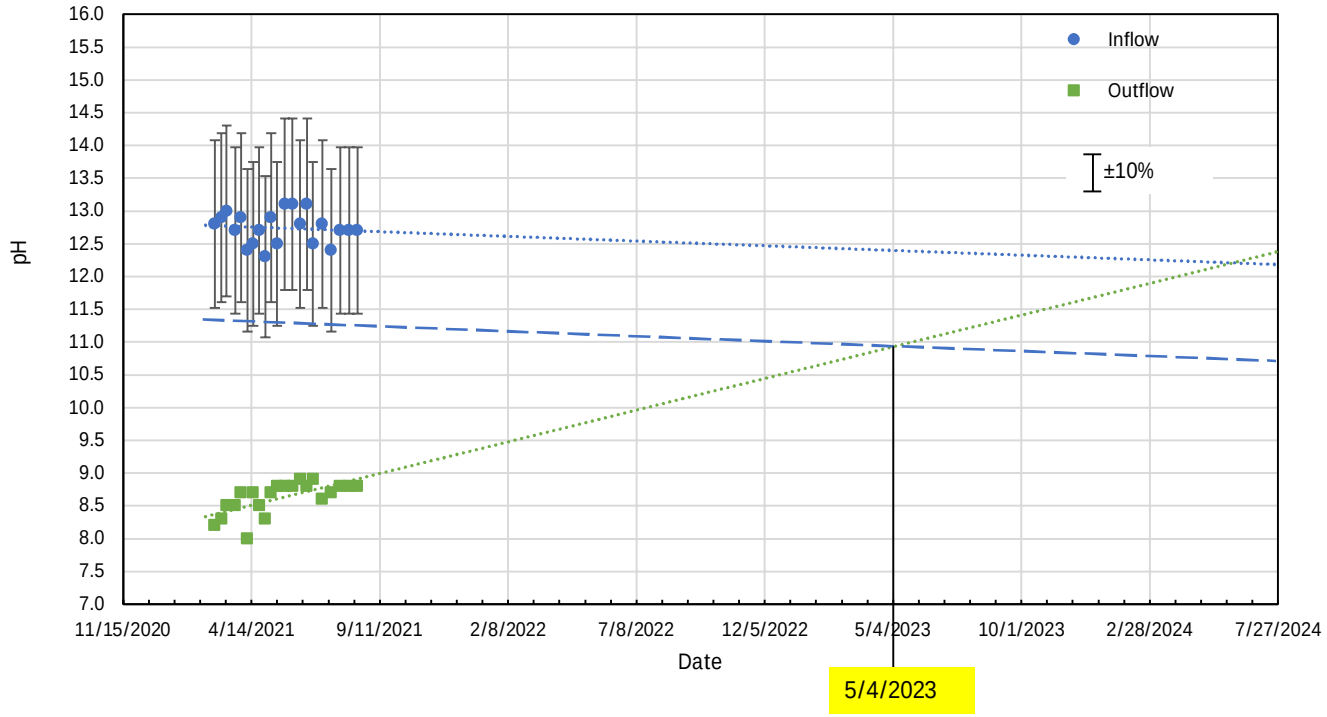
**Figure 13**




**B4-ST-4 (70-72.5 ft bgs) pH of Inflow and Outflow with Time**

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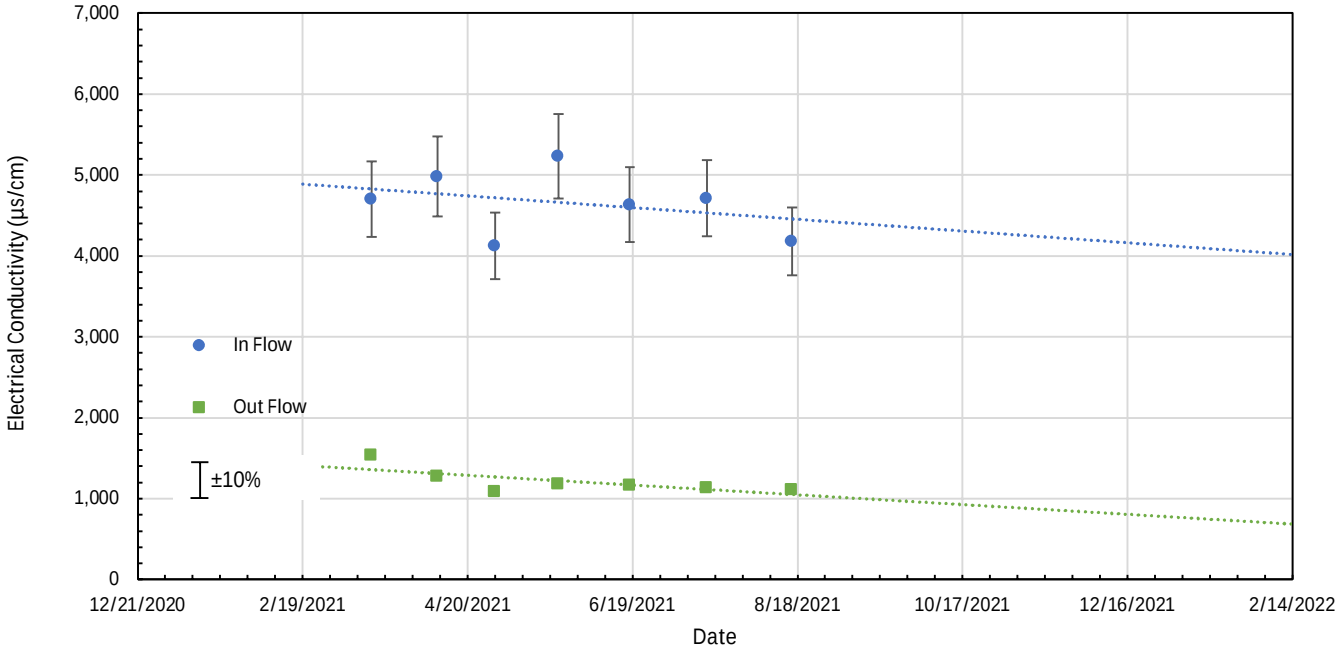
**Figure 14**




**B4-ST-4 (70-72.5 ft bgs) Electrical Conductivity (EC) with Time**

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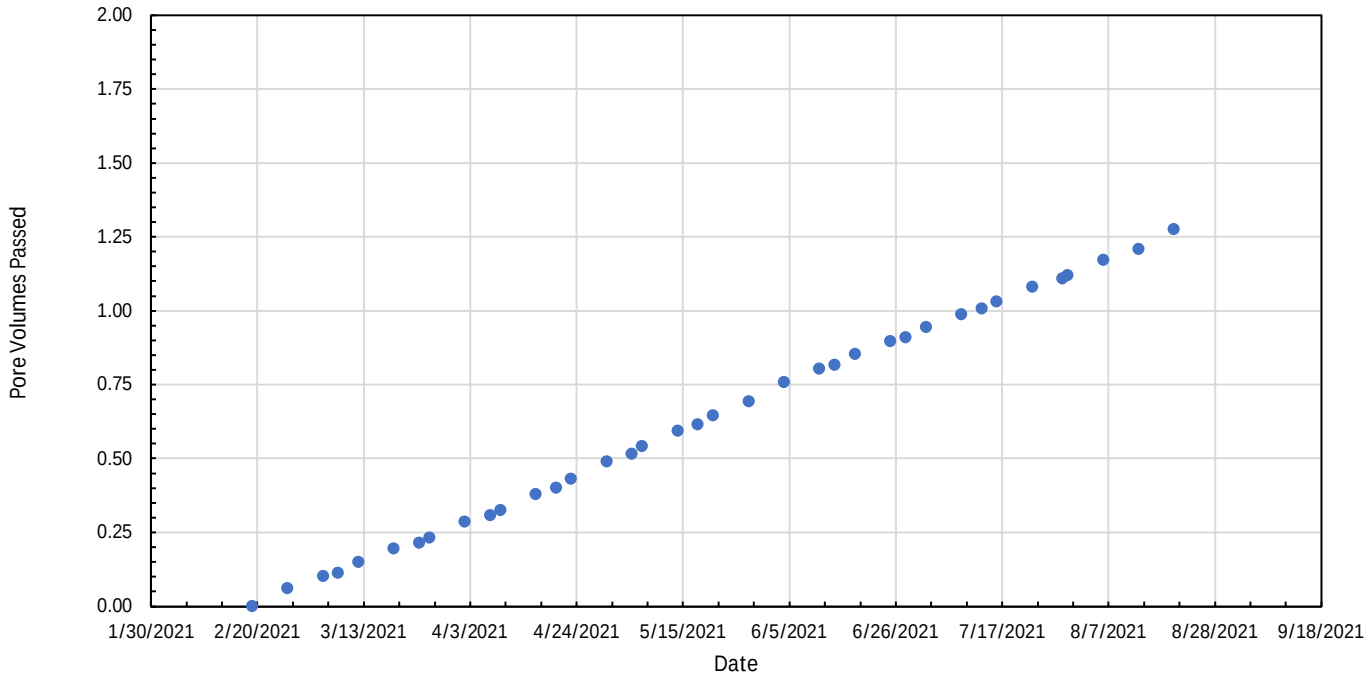
**Figure 15**




**B6-ST-1 (25-27 ft bgs) PV of Flow with Time**

MONROE POWER PLANT
MONROE, MICHIGAN

Geosyntec consultants

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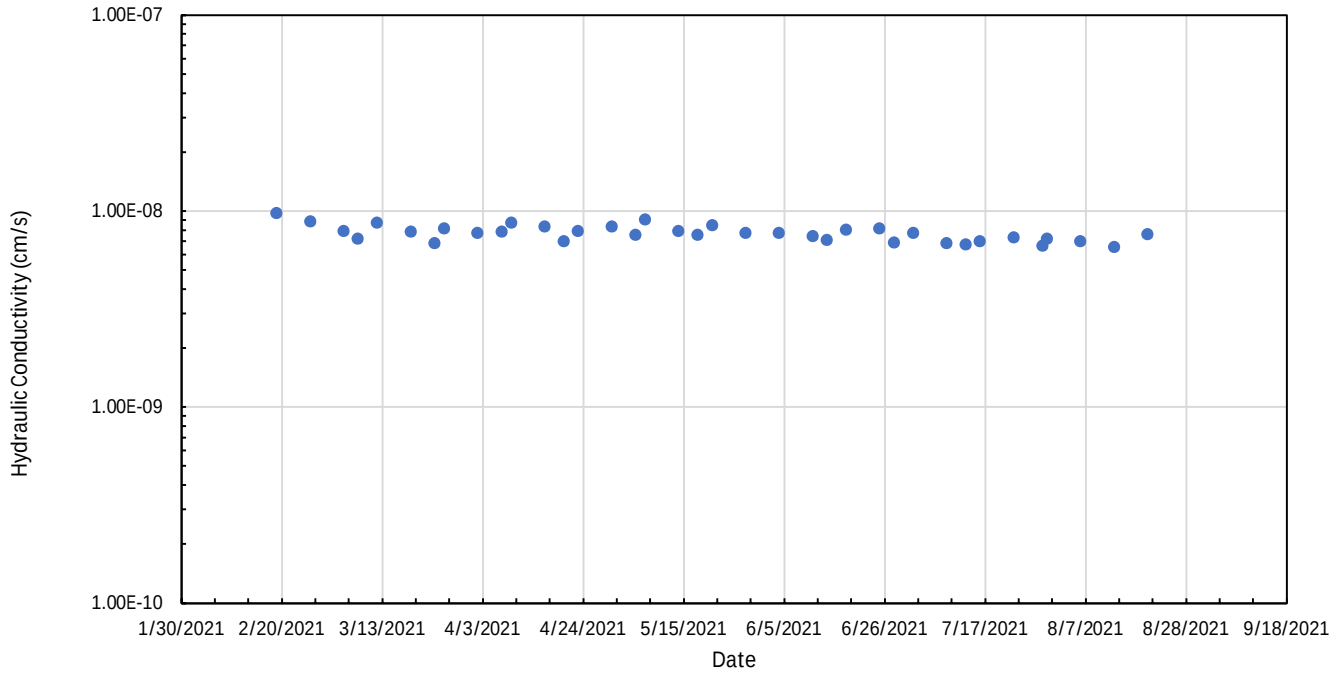
**Figure 16**




**B6-ST-1 (25-27 ft bgs) Hydraulic Conductivity with Time**

MONROE POWER PLANT
MONROE, MICHIGAN

Geosyntec consultants

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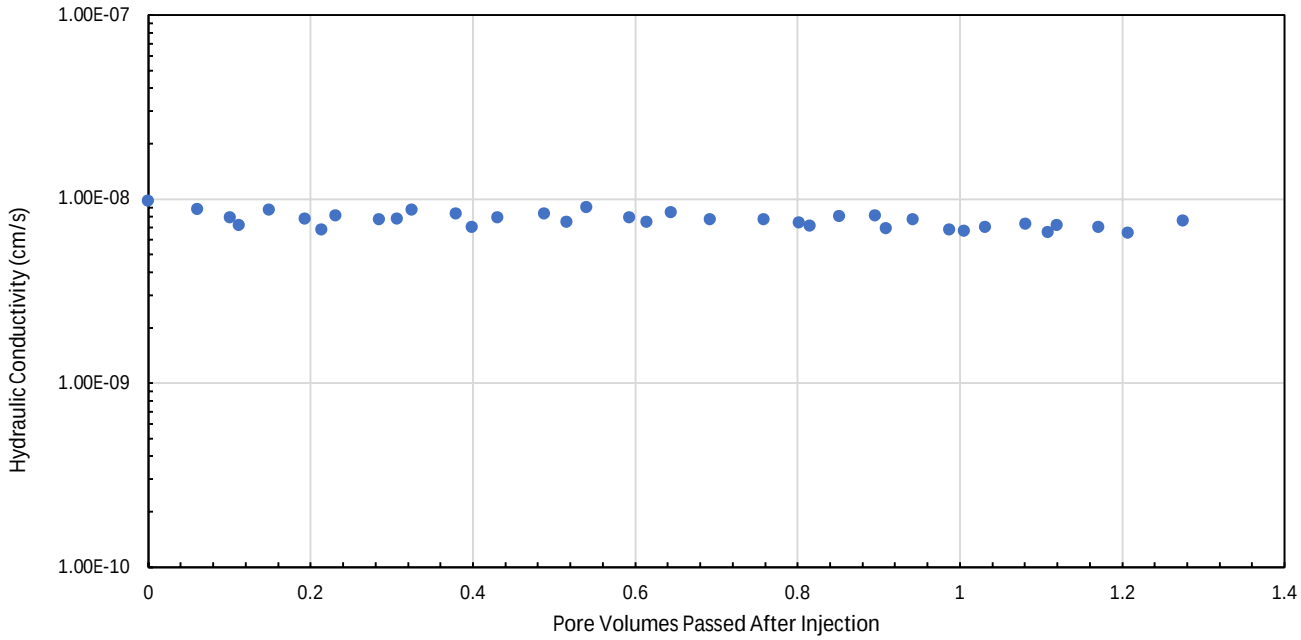
**Figure 17**




**B6-ST-1 (25-27 ft bgs) Hydraulic Conductivity with PV**

MONROE POWER PLANT
MONROE, MICHIGAN

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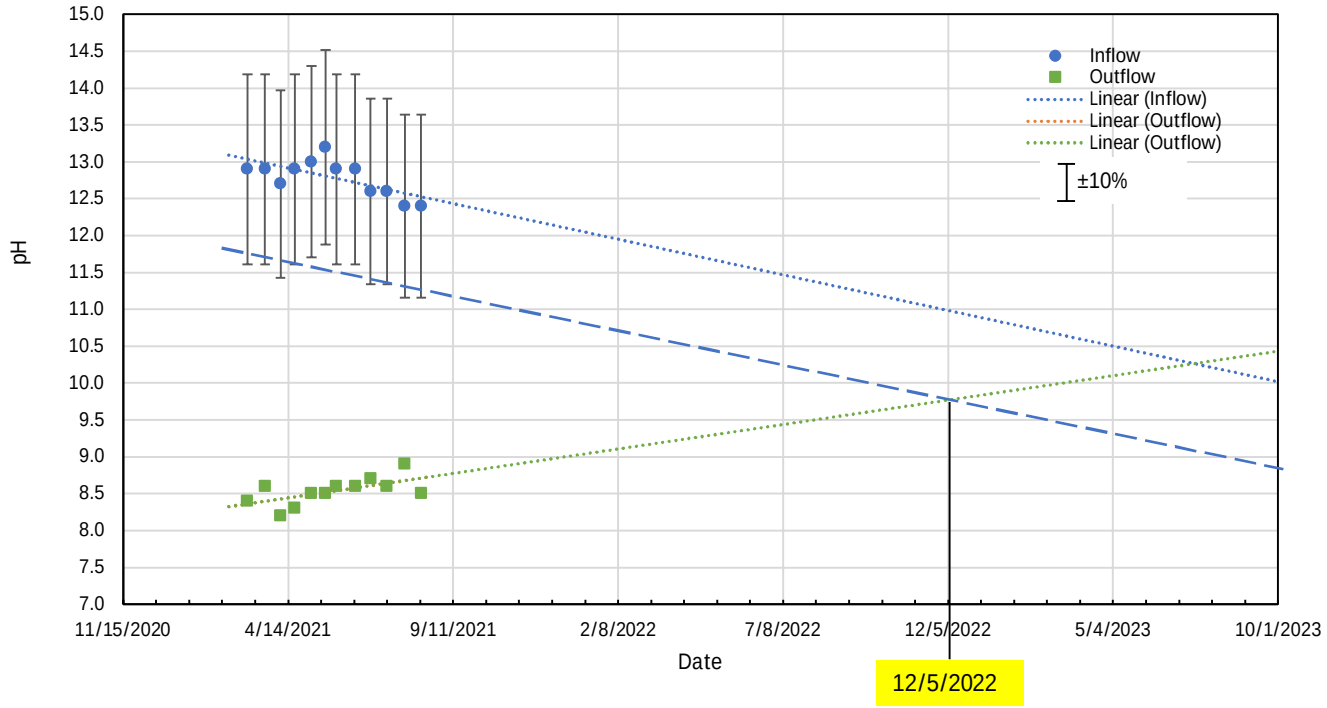
**Figure 18**




**B6-ST-1 (25-27 ft bgs) pH of Inflow and Outflow with Time**

MONROE POWER PLANT
MONROE, MICHIGAN

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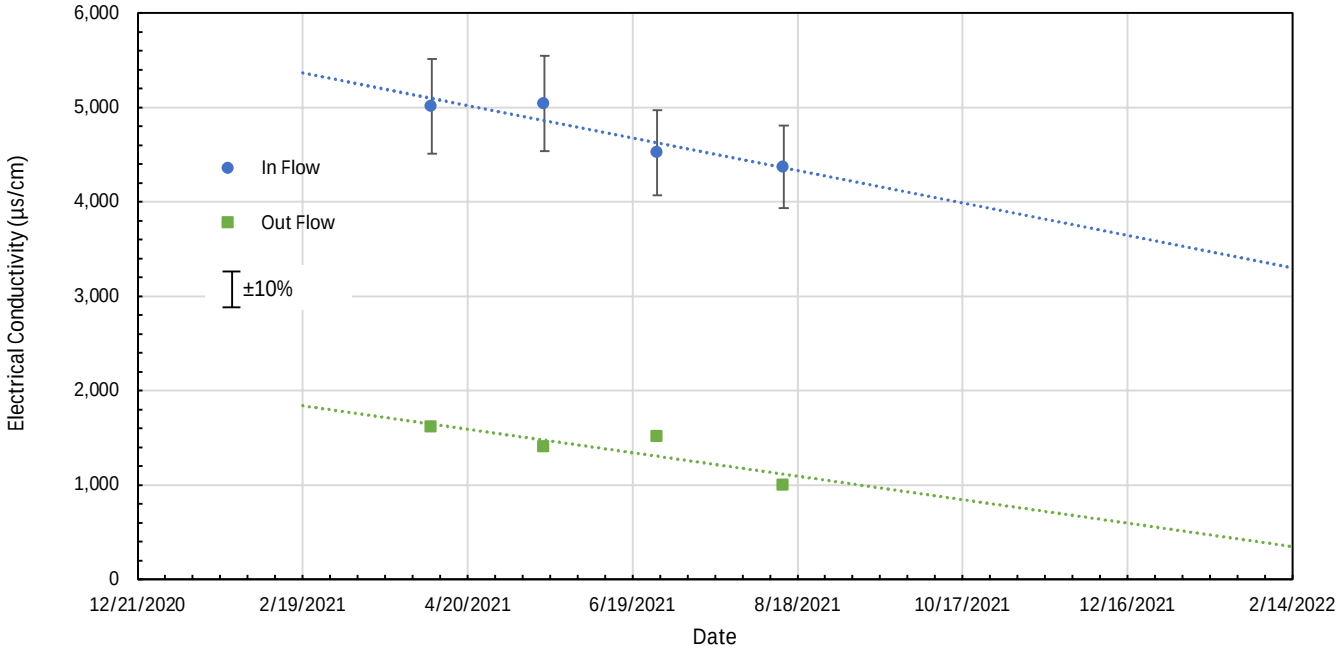
**Figure 19**




**B6-ST-1 (25-27 ft bgs) Electrical Conductivity (EC) with Time**

MONROE POWER PLANT
MONROE, MICHIGAN

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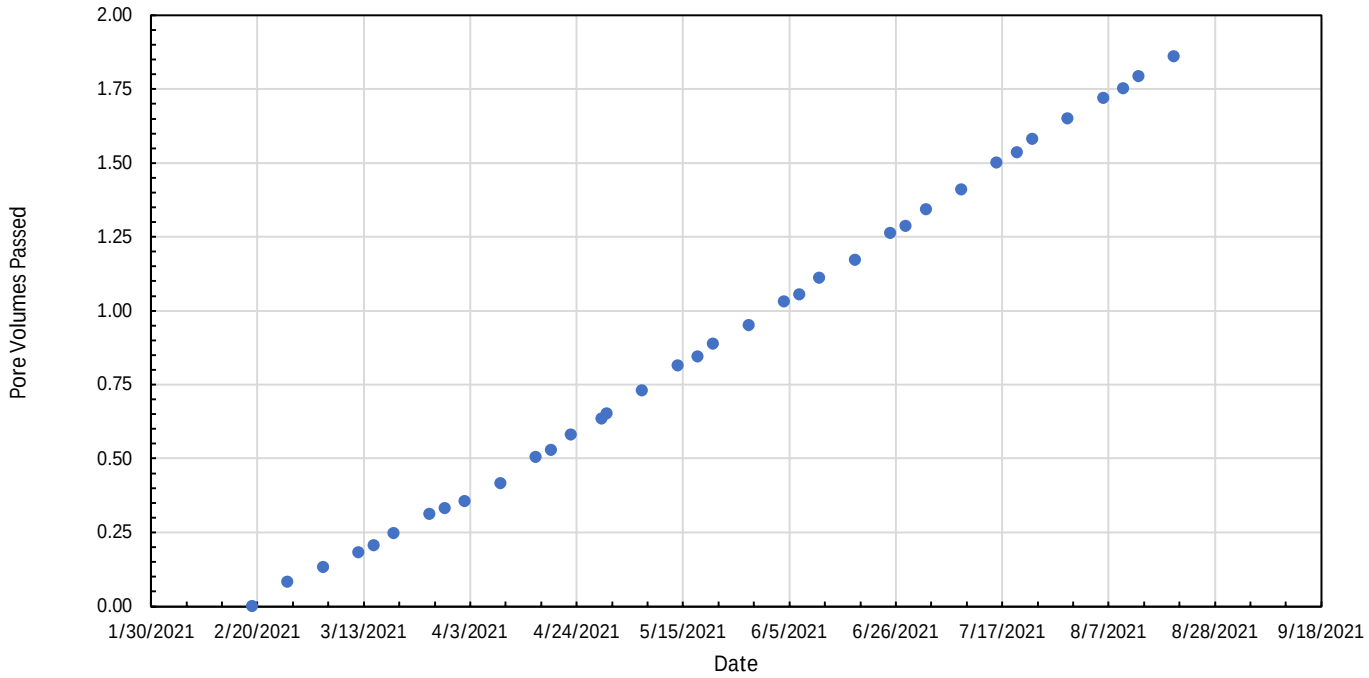
**Figure 20**




**B6-ST-3 (55-57.5 ft bgs) PV of Flow with Time**

MONROE POWER PLANT
MONROE, MICHIGAN

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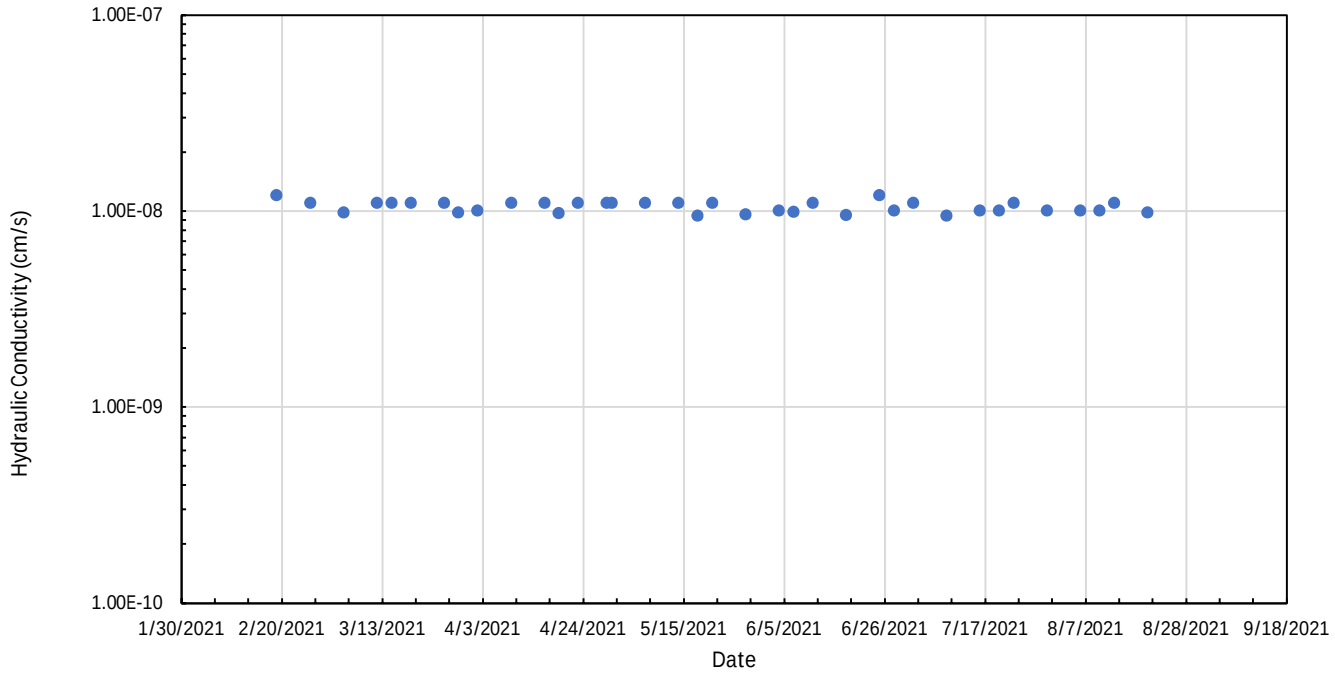
**Figure 21**




**B6-ST-3 (55-57.5 ft bgs) Hydraulic Conductivity with Time**

MONROE POWER PLANT
MONROE, MICHIGAN

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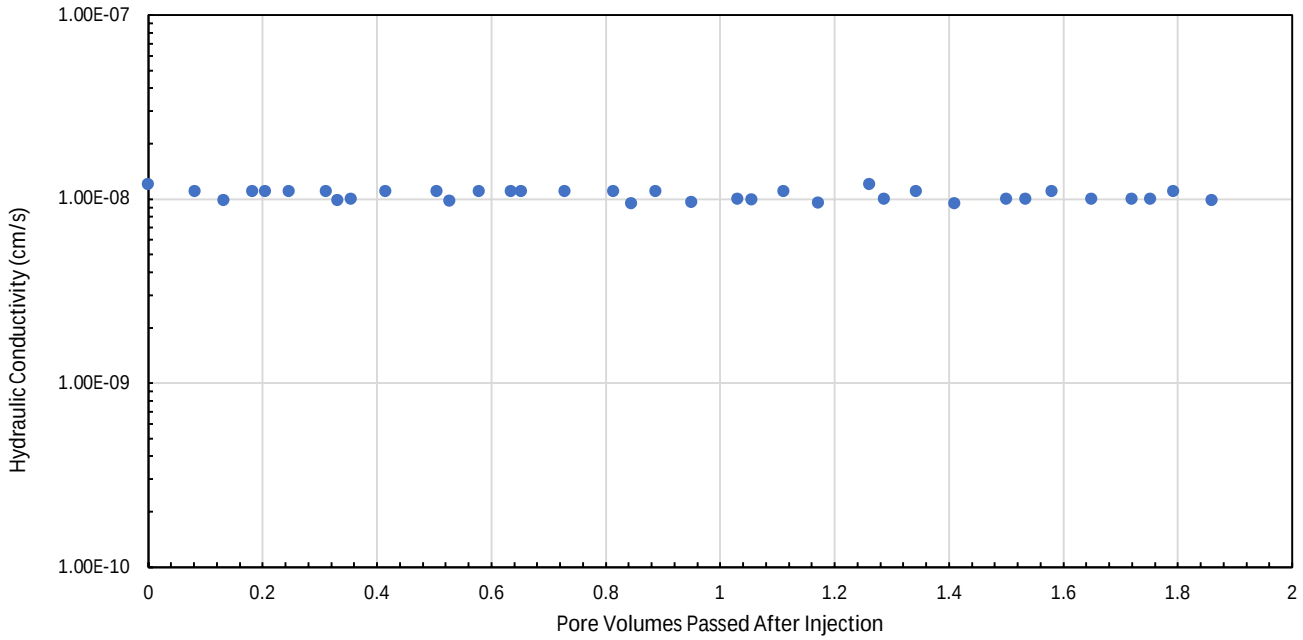
**Figure 22**




**B6-ST-3 (55-57.5 ft bgs) Hydraulic Conductivity with PV**

MONROE POWER PLANT
MONROE, MICHIGAN

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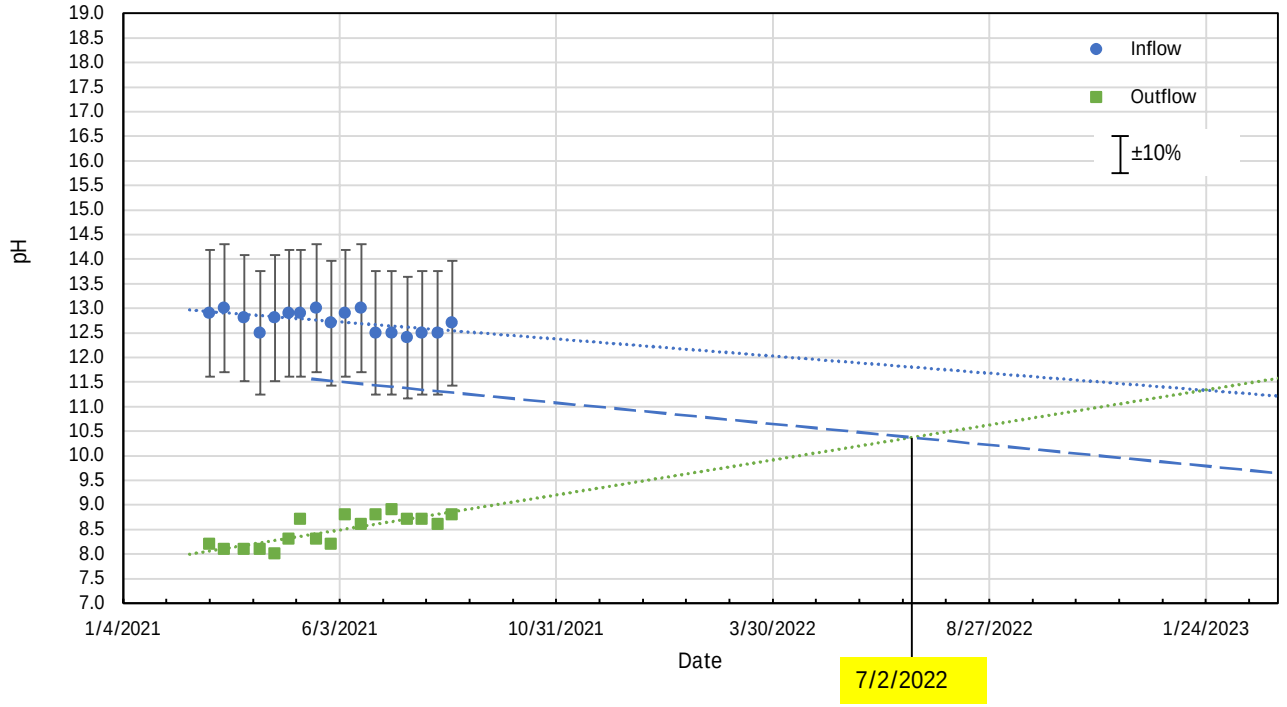
**Figure 23**




**B6-ST-3 (55-57.5 ft bgs) pH of Inflow and Outflow with Time**

MONROE POWER PLANT
MONROE, MICHIGAN

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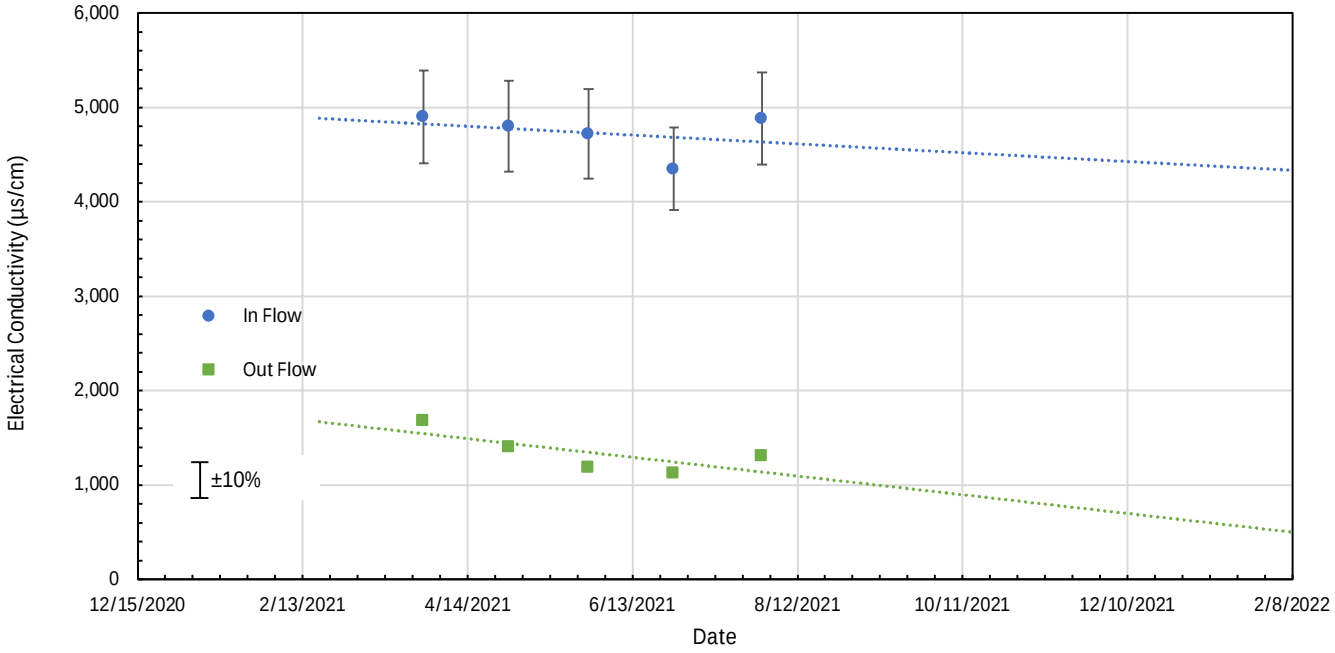
**Figure 24**




**B6-ST-3 (55-57.5 ft bgs) Electrical Conductivity (EC) with Time**

MONROE POWER PLANT
MONROE, MICHIGAN

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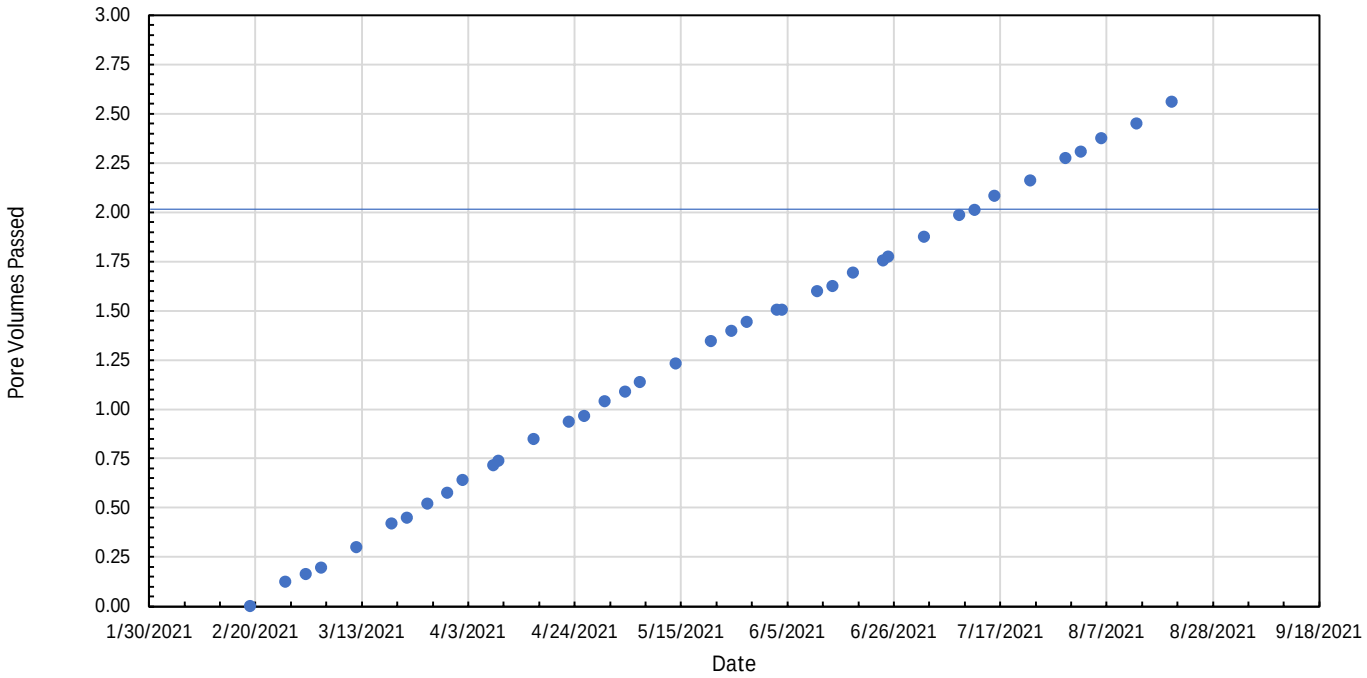
**Figure 25**




**B6-ST-4 (65-67.5 ft bgs) PV of Flow with Time**

MONROE POWER PLANT
MONROE, MICHIGAN

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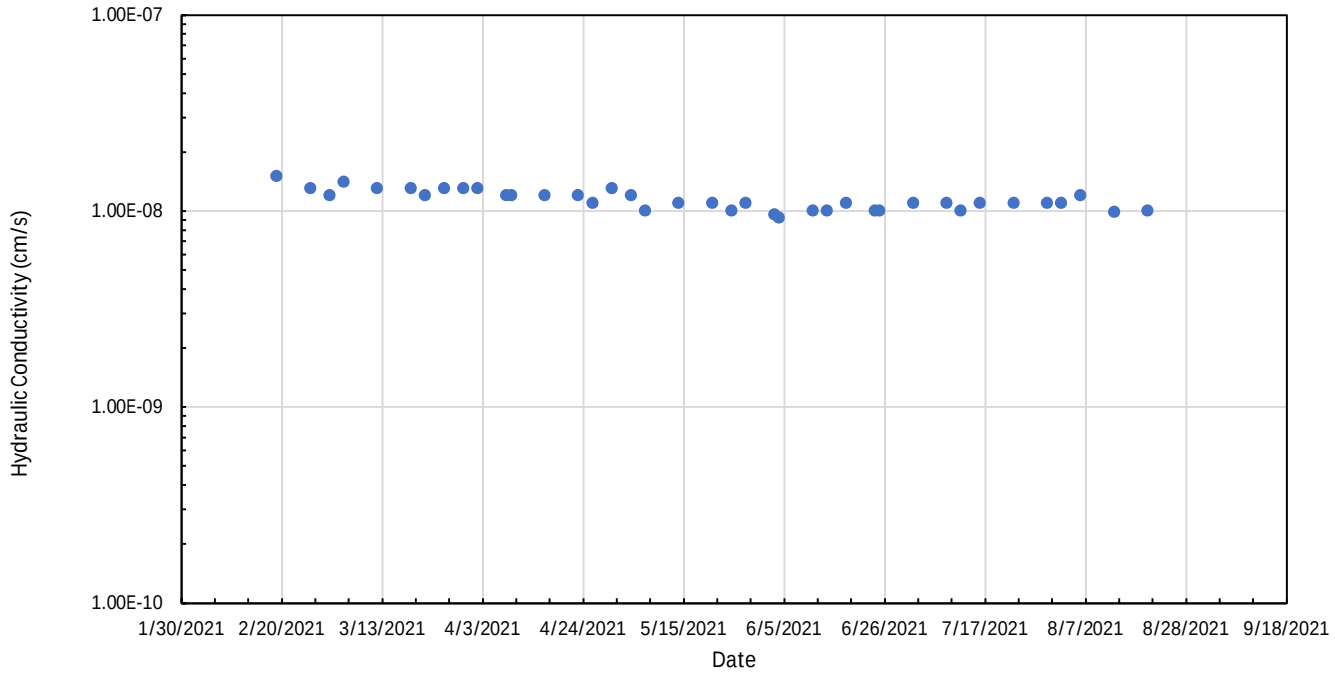
**Figure 26**




**B6-ST-4 (65-67.5 ft bgs) Hydraulic Conductivity with Time**

MONROE POWER PLANT
MONROE, MICHIGAN

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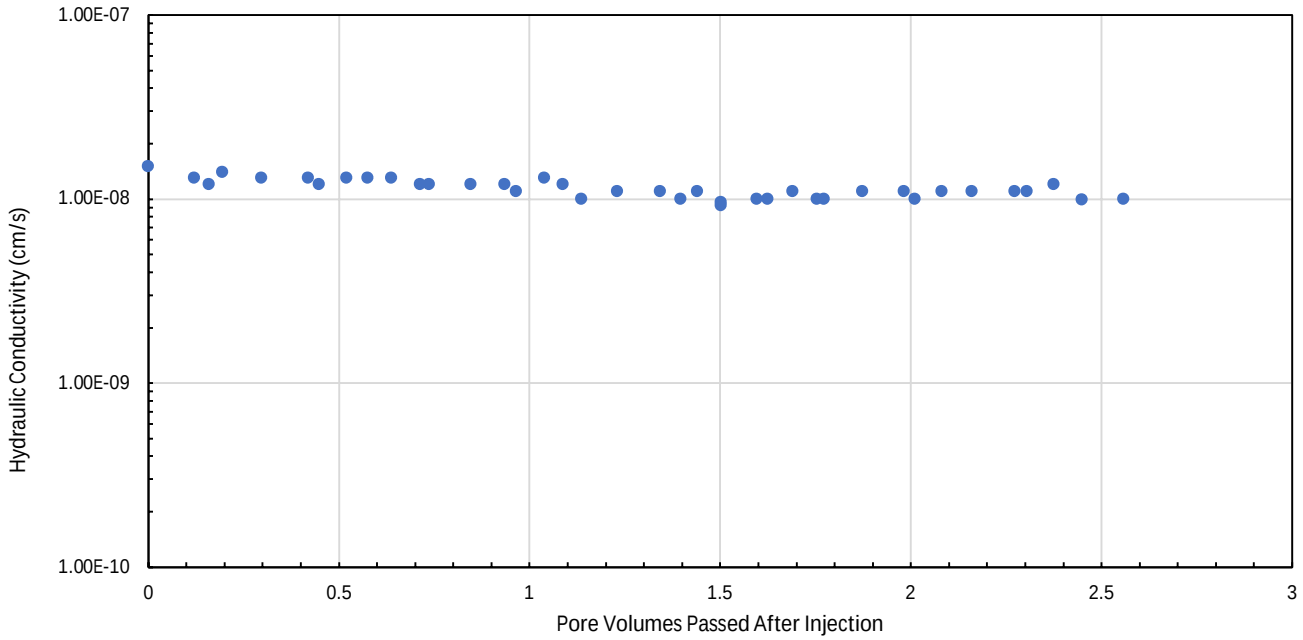
**Figure 27**




**B6-ST-4 (65-67.5 ft bgs) Hydraulic Conductivity with PV**

MONROE POWER PLANT
MONROE, MICHIGAN

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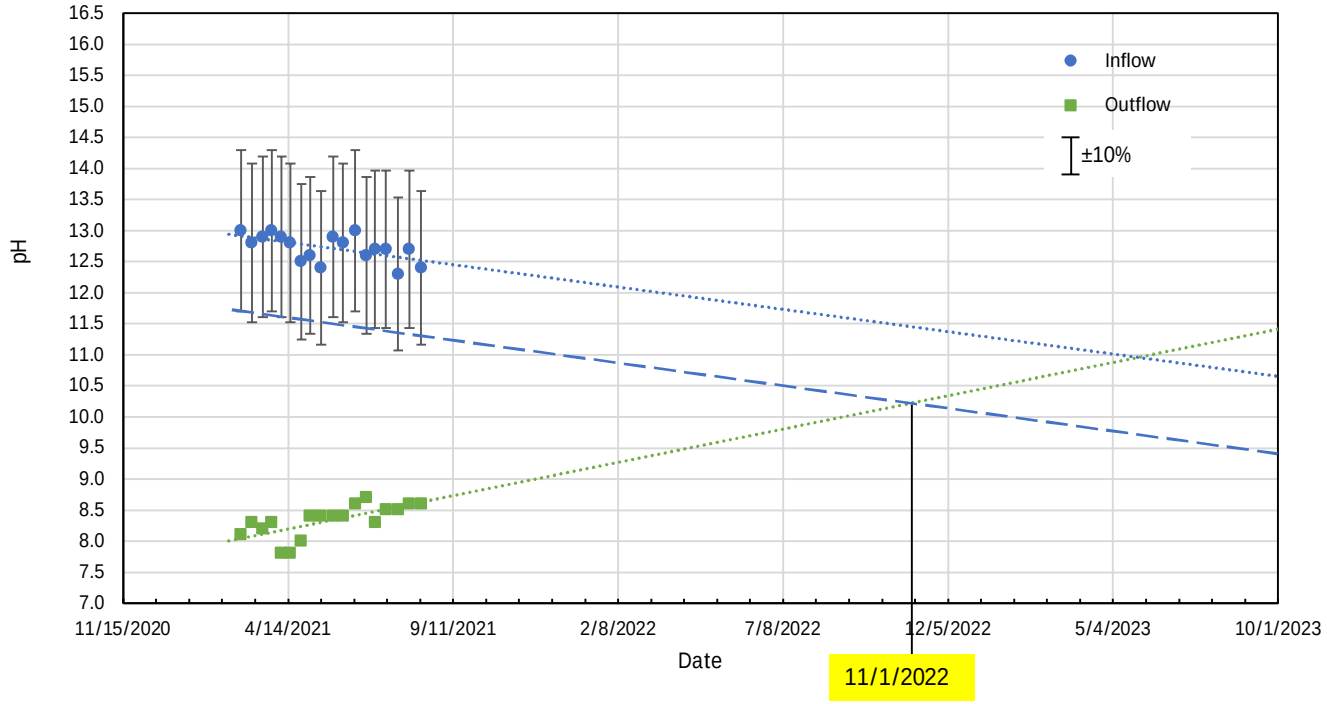
**Figure 28**




**B6-ST-4 (65-67.5 ft bgs) pH of Inflow and Outflow with Time**

MONROE POWER PLANT
MONROE, MICHIGAN

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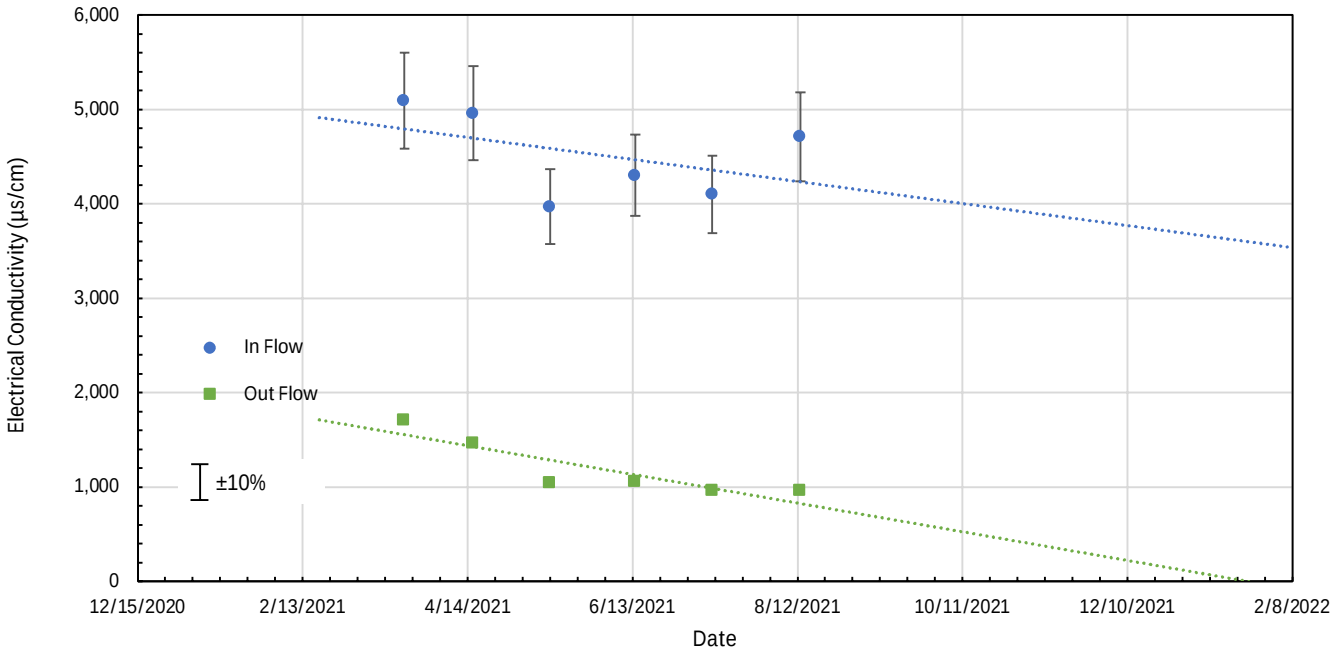
**Figure 29**




**B6-ST-4 (65-67.5 ft bgs) Electrical Conductivity (EC) with Time**

MONROE POWER PLANT
MONROE, MICHIGAN

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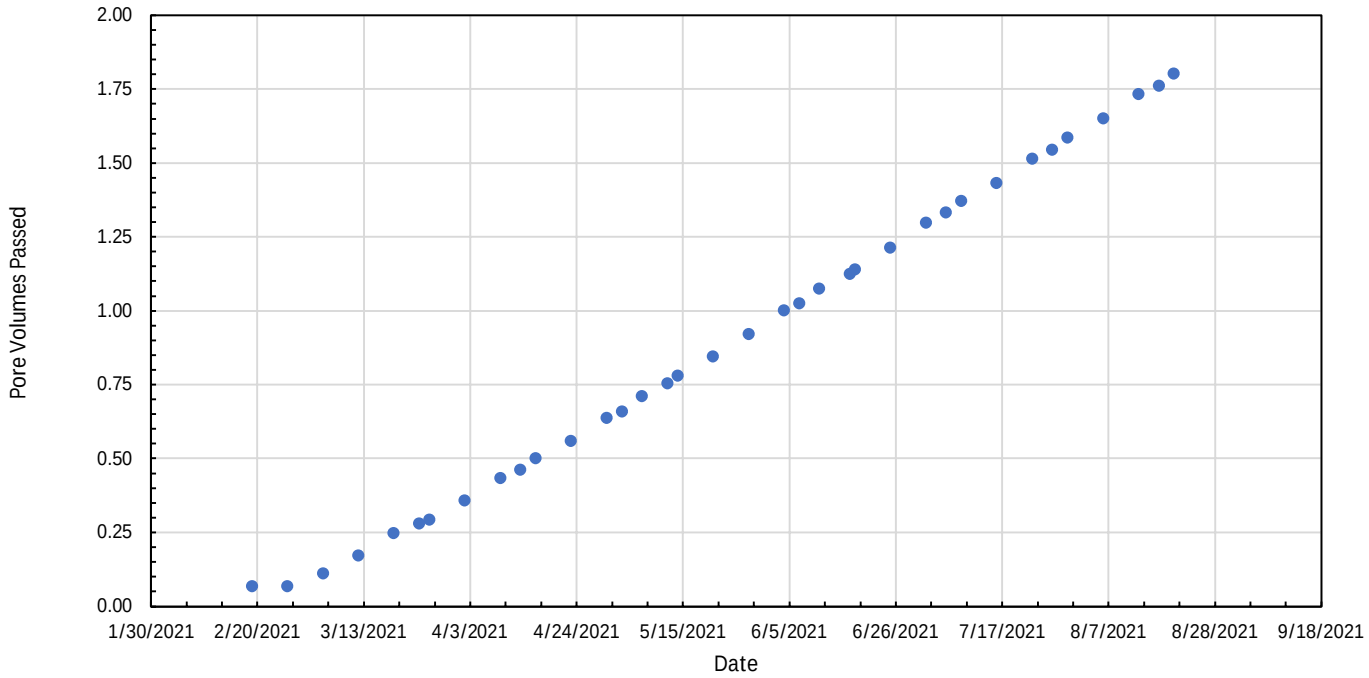
**Figure 30**




**B9-ST-2 (40-42 ft bgs) PV of Flow with Time**

MONROE POWER PLANT
MONROE, MICHIGAN

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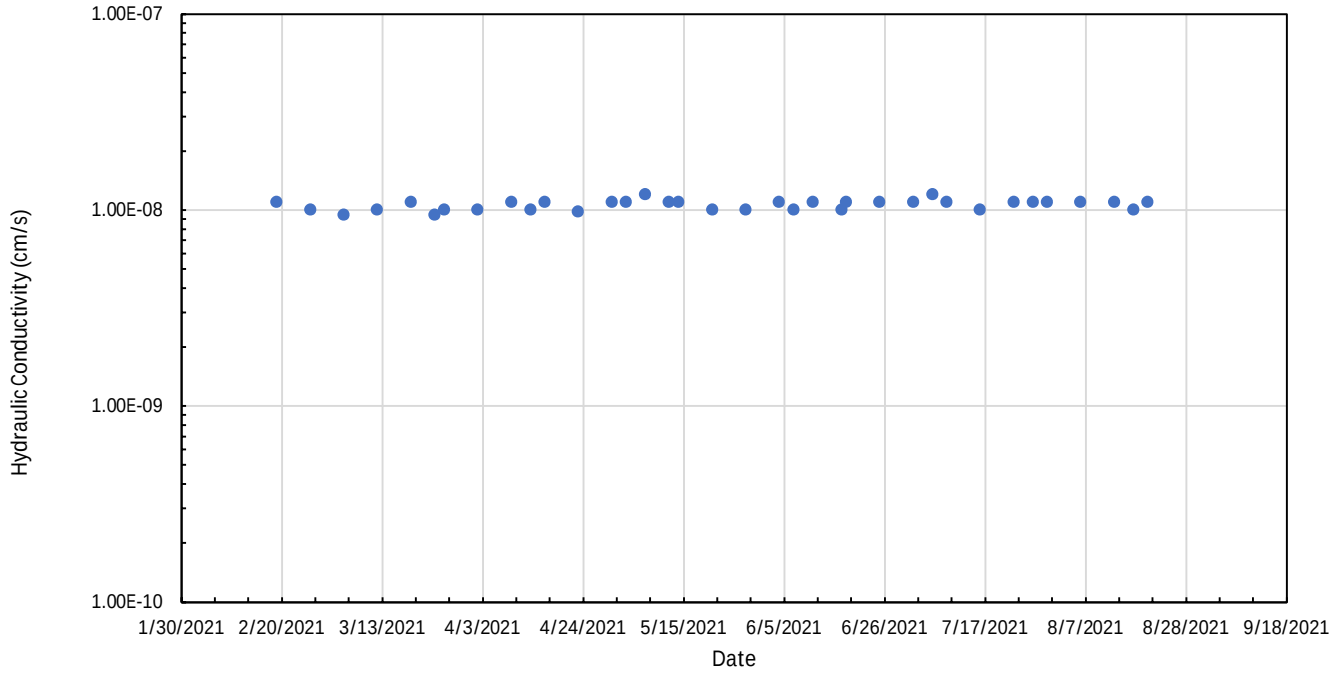
**Figure 31**




**B9-ST-2 (40-42 ft bgs) Hydraulic Conductivity with Time**

MONROE POWER PLANT
MONROE, MICHIGAN

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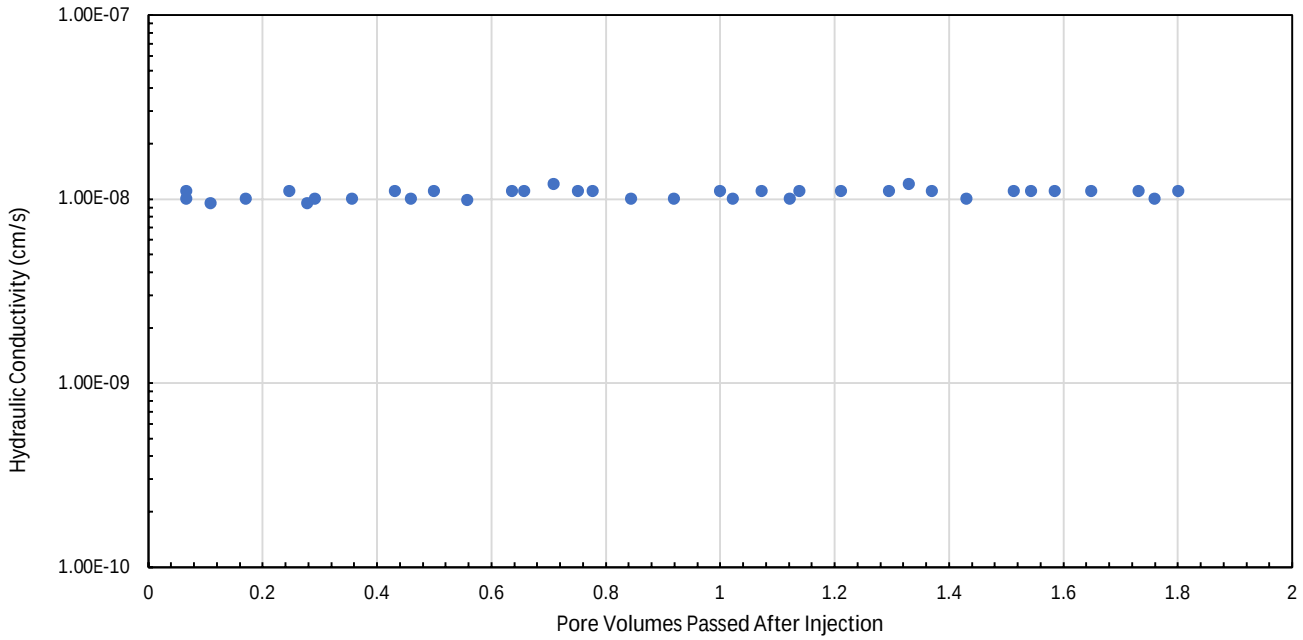
**Figure 32**




**B9-ST-2 (40-42 ft bgs) Hydraulic Conductivity with PV**

MONROE POWER PLANT
MONROE, MICHIGAN

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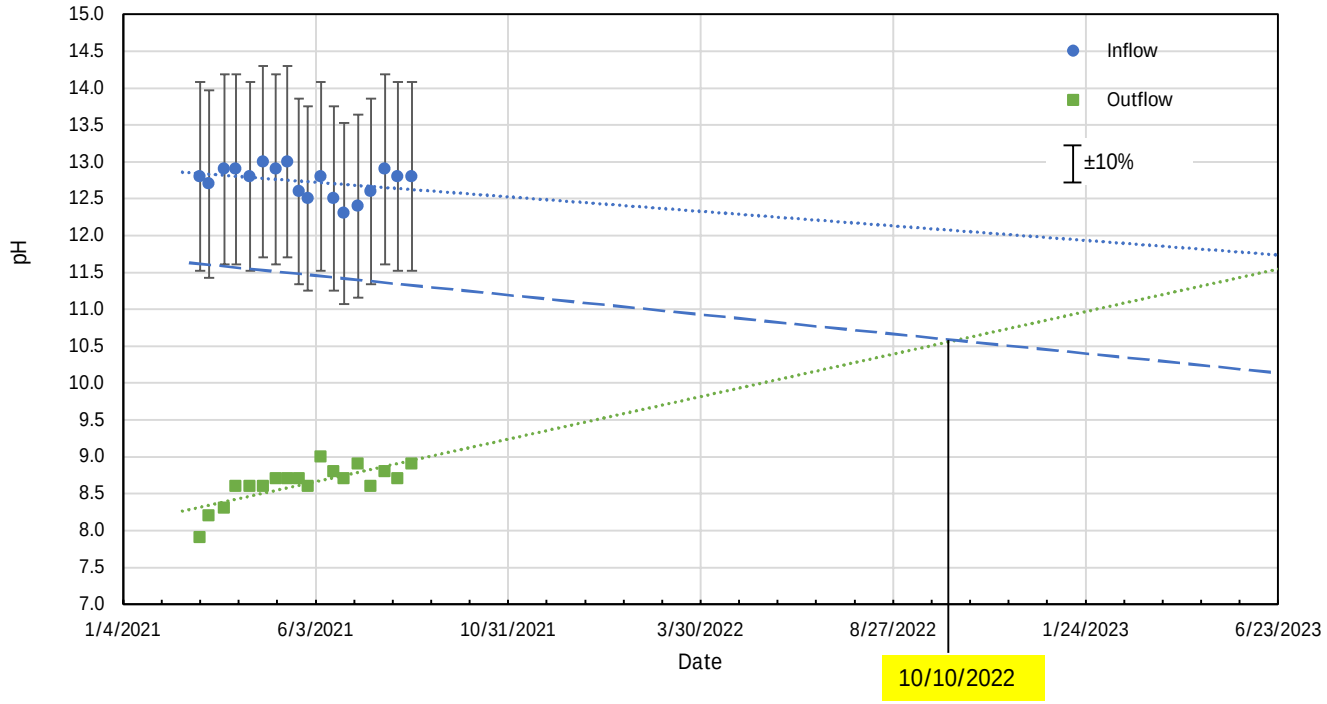
**Figure 33**




**B9-ST-2 (40-42 ft bgs) pH of Inflow and Outflow with Time**

MONROE POWER PLANT
MONROE, MICHIGAN

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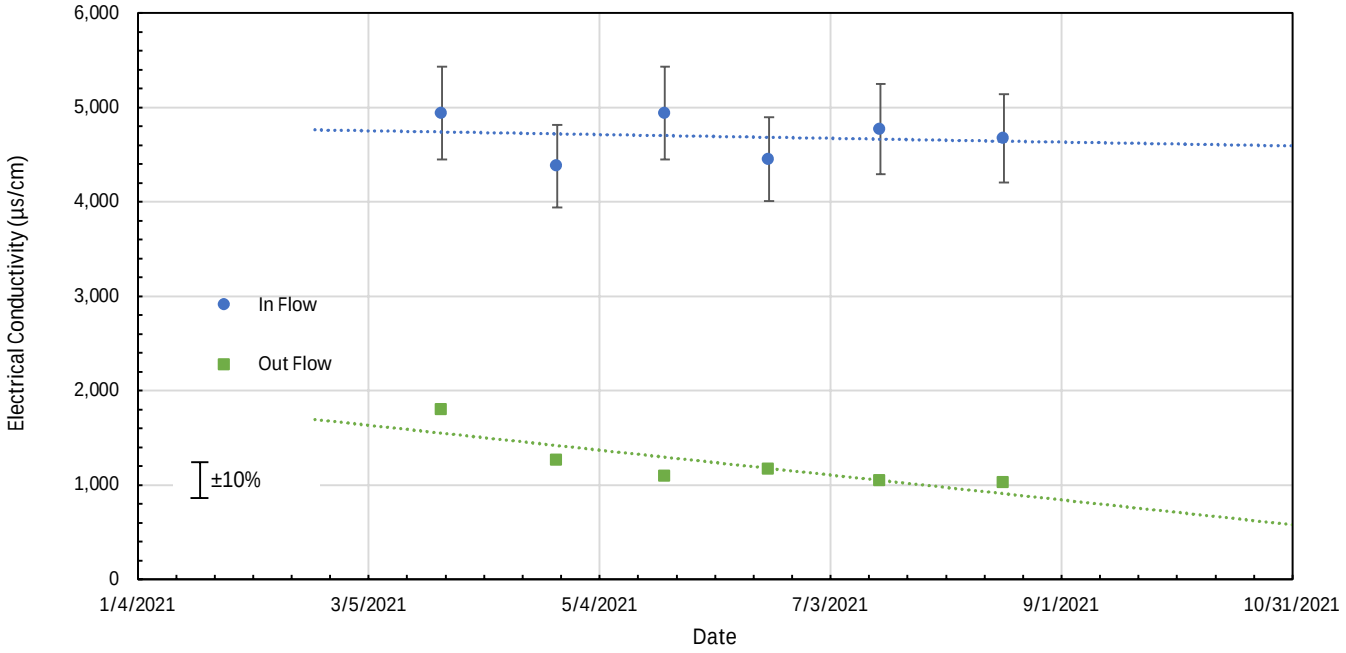
**Figure 34**




**B9-ST-2 (40-42 ft bgs) Electrical Conductivity (EC) with Time**

MONROE POWER PLANT
MONROE, MICHIGAN

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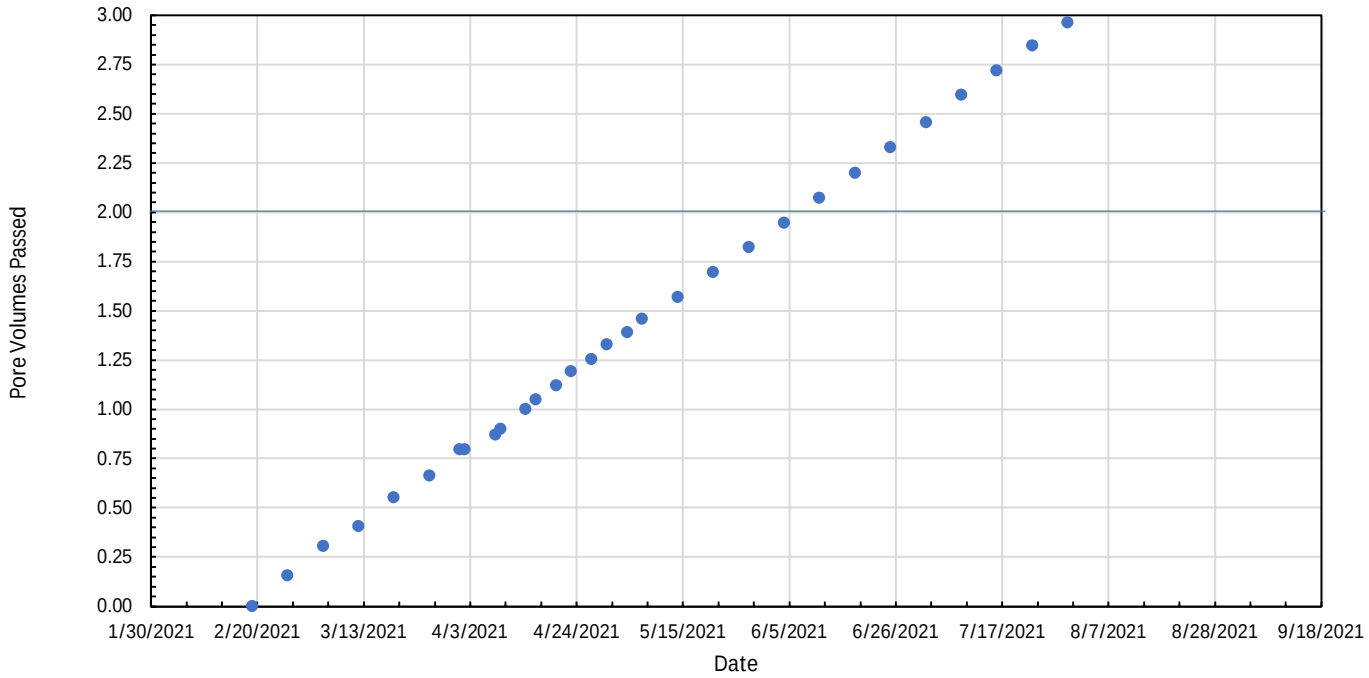
**Figure 35**




**B9-ST-3 (55-57 ft bgs) PV of Flow with Time**

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MONROE, MICHIGAN

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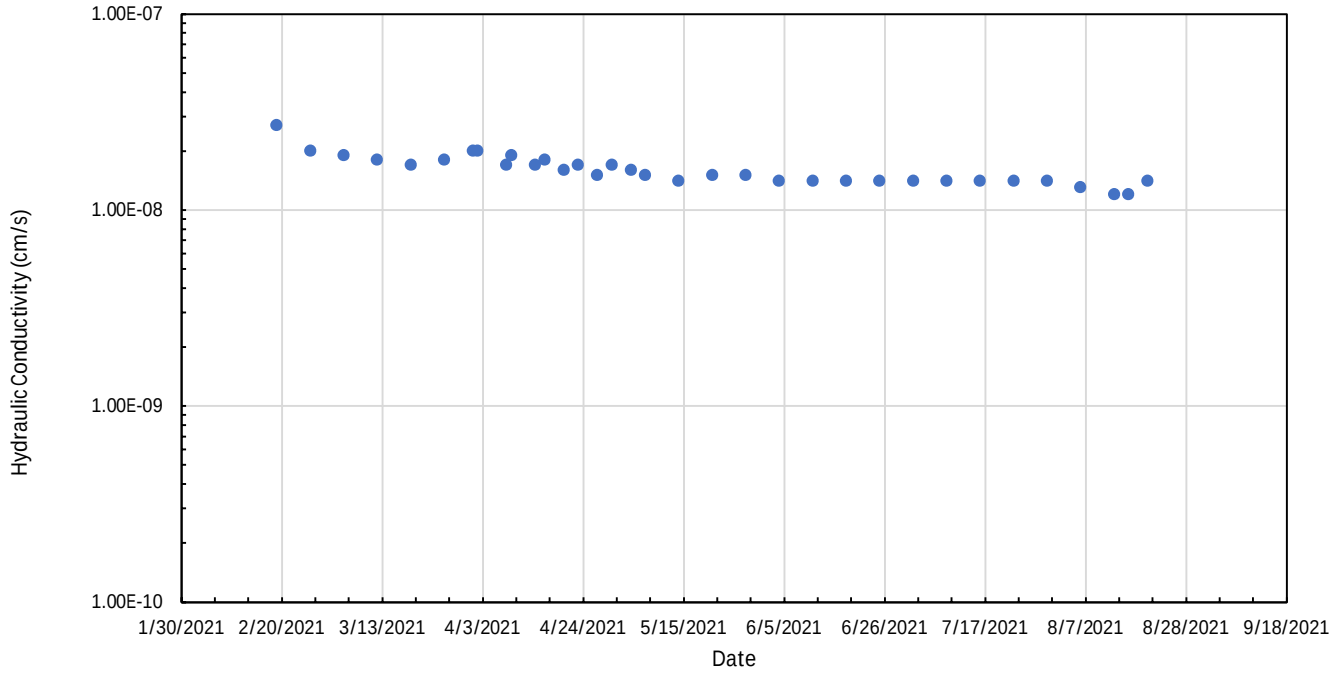
**Figure 36**




**B9-ST-3 (55-57 ft bgs) Hydraulic Conductivity with Time**

MONROE POWER PLANT
MONROE, MICHIGAN

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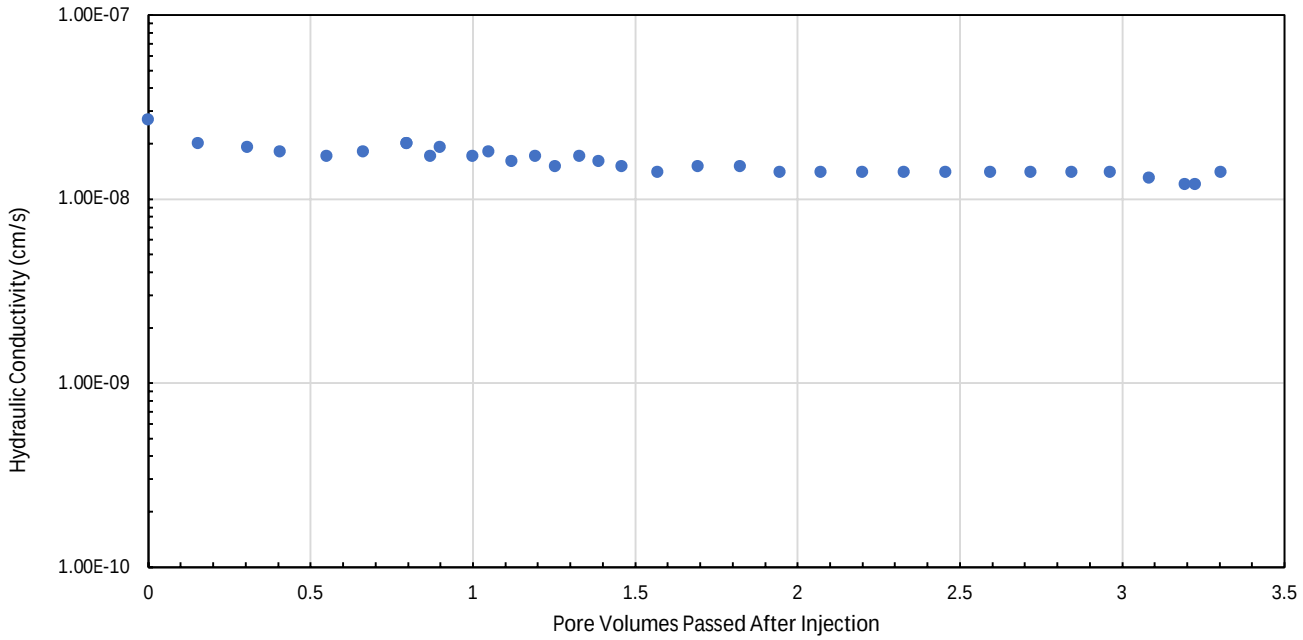
**Figure 37**




**B9-ST-3 (55-57 ft bgs) Hydraulic Conductivity with PV**

MONROE POWER PLANT
MONROE, MICHIGAN

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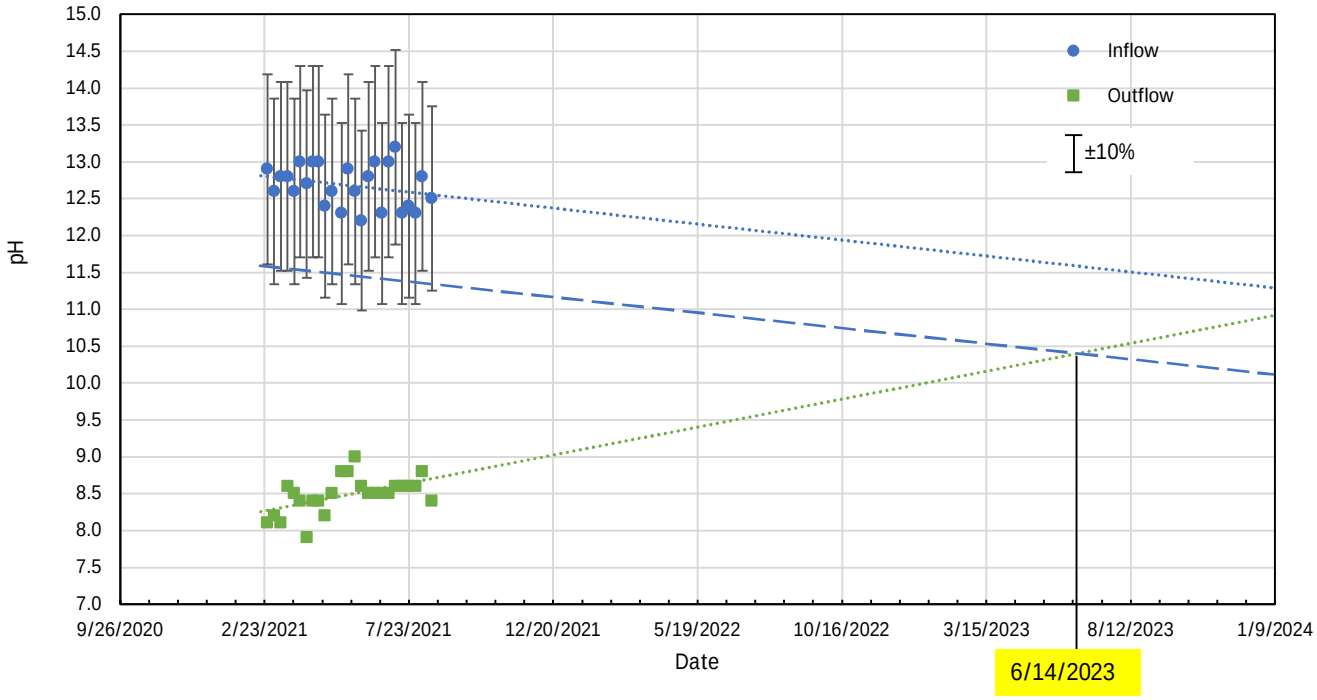
**Figure 38**




**B9-ST-3 (55-57 ft bgs) pH of Inflow and Outflow with Time**

MONROE POWER PLANT
MONROE, MICHIGAN

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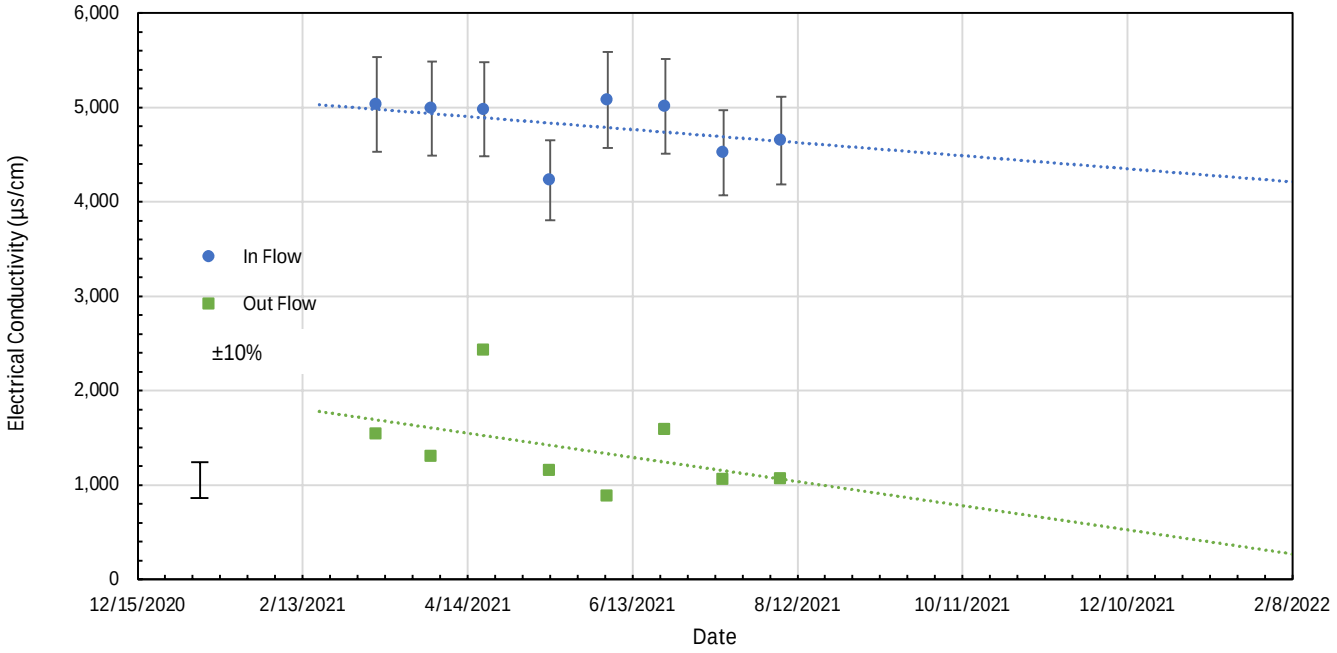
**Figure 39**




**B9-ST-3 (55-57 ft bgs) Electrical Conductivity (EC) with Time**

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**Figure 40**

# APPENDIX A

## FedEx Express Shipment Summary By Reference

**FedEx Express Shipments (Original)**

| Reference | Shipments | Rated Weight lbs | Transportation Charges | Special Handling Charges | Ret Chg/Tax Credits/Other | Discounts | Total Charges |
|---|---|---|---|---|---|---|---|
| NO REFERENCE INFORMATION | 9 | 682.0 | 3,979.46 | 302.50 | | -2,626.46 | 1,655.50 |
| FROM: ALICIA REVEZZO | 2 | 28.0 | 180.50 | 23.54 | | -119.13 | 84.91 |
| **Total FedEx Express** | **11** | **710.0** | **$4,159.96** | **$326.04** | | **-$2,745.59** | **$1,740.41** |

**TOTAL THIS INVOICE** **USD** **$1,740.41**

## FedEx Express Shipment Detail By Reference (Original)

**Ship Date:** Dec 09, 2020 **Cust. Ref.:** NO REFERENCE INFORMATION **Ref.#2:**
**Payor:** Third Party **Ref.#3:**

The Earned Discount for this ship date has been calculated based on a revenue threshold of $ 1120417.46
Fuel Surcharge - FedEx has applied a fuel surcharge of 4.50% to this shipment.
Distance Based Pricing, Zone 4
FedEx has audited this shipment for correct packages, weight, and service. Any changes made are reflected in the invoice amount.
We calculated your charges based on a dimensional weight of 71.0 lbs, 31 in x 21 in x 15 in, using a dimensional factor of 139.

| | | **Sender** | **Recipient** | |
|---|---|---|---|---|
| Automation | SSFO | | | |
| Tracking ID | 781132675820 | Sean Karoly | Nader S. Rad | |
| Service Type | FedEx Standard Overnight | Geosentec consultants | Excel Geotechnical Testing Inc | |
| Package Type | Customer Packaging | SUITE 100 | 953 Forrest Street | |
| Zone | 04 | ANN ARBOR MI 48105 US | ROSWELL GA 30075 US | |
| Packages | 1 | | | |
| Actual Weight | 57.0 lbs, 25.9 kgs | Transportation Charge | | 412.80 |
| Rated Weight | 71.0 lbs, 32.2 kgs | Discount | | -231.17 |
| Declared Value | USD 1.00 | Earned Discount | | -41.28 |
| Delivered | Dec 10, 2020 13:04 | Fuel Surcharge | | 7.62 |
| Svc Area | A1 | Declared Value Charge | | 0.00 |
| Signed by | N.RAD | Additional Handling Charge - Weight | | 24.00 |
| FedEx Use | 000000000/1327/_ | Peak - AHS Charge | | 4.90 |
| | | **Total Charge** | **USD** | **$176.87** |

**Ship Date:** Dec 09, 2020 **Cust. Ref.:** NO REFERENCE INFORMATION **Ref.#2:**
**Payor:** Third Party **Ref.#3:**

The Earned Discount for this ship date has been calculated based on a revenue threshold of $ 1120417.46
Fuel Surcharge - FedEx has applied a fuel surcharge of 4.50% to this shipment.
Distance Based Pricing, Zone 4
FedEx has audited this shipment for correct packages, weight, and service. Any changes made are reflected in the invoice amount.
We calculated your charges based on a dimensional weight of 71.0 lbs, 31 in x 21 in x 15 in, using a dimensional factor of 139.

| | | **Sender** | **Recipient** | | |
|---|---|---|---|---|---|
| Automation | SSFO | | | | |
| Tracking ID | 781132675830 | Sean Karoly | Nader S. Rad | | |
| Service Type | FedEx Standard Overnight | Geosentec consultants | Excel Geotechnical Testing Inc | | |
| Package Type | Customer Packaging | SUITE 100 | 953 Forrest Street | | |
| Zone | 04 | ANN ARBOR MI 48105 US | ROSWELL GA 30075 US | | |
| Packages | 1 | | | | |
| Actual Weight | 60.0 lbs, 27.2 kgs | Transportation Charge | | | 412.80 |
| Rated Weight | 71.0 lbs, 32.2 kgs | Discount | | | -231.17 |
| Declared Value | USD 1.00 | Earned Discount | | | -41.28 |
| Delivered | Dec 10, 2020 13:04 | Fuel Surcharge | | | 7.62 |
| Svc Area | A1 | Declared Value Charge | | | 0.00 |
| Signed by | N.RAD | Additional Handling Charge - Weight | | | 24.00 |
| FedEx Use | 000000000/1327/_ | Peak - AHS Charge | | | 4.90 |
| | | **Total Charge** | | **USD** | **$176.87** |

**Ship Date:** Dec 09, 2020 **Cust. Ref.:** NO REFERENCE INFORMATION **Ref.#2:**
**Payor:** Third Party **Ref.#3:**

The Earned Discount for this ship date has been calculated based on a revenue threshold of $ 1120417.46
Fuel Surcharge - FedEx has applied a fuel surcharge of 4.50% to this shipment.
Distance Based Pricing, Zone 4
FedEx has audited this shipment for correct packages, weight, and service. Any changes made are reflected in the invoice amount.
We calculated your charges based on a dimensional weight of 71.0 lbs, 31 in x 21 in x 15 in, using a dimensional factor of 139.

| | | **Sender** | **Recipient** | | |
|---|---|---|---|---|---|
| Automation | SSFO | | | | |
| Tracking ID | 781132675841 | Sean Karoly | Nader S. Rad | | |
| Service Type | FedEx Standard Overnight | Geosentec consultants | Excel Geotechnical Testing Inc | | |
| Package Type | Customer Packaging | SUITE 100 | 953 Forrest Street | | |
| Zone | 04 | ANN ARBOR MI 48105 US | ROSWELL GA 30075 US | | |
| Packages | 1 | | | | |
| Actual Weight | 61.0 lbs, 27.7 kgs | Transportation Charge | | | 412.80 |
| Rated Weight | 71.0 lbs, 32.2 kgs | Discount | | | -231.17 |
| Declared Value | USD 1.00 | Earned Discount | | | -41.28 |
| Delivered | Dec 10, 2020 13:04 | Fuel Surcharge | | | 7.62 |
| Svc Area | A1 | Declared Value Charge | | | 0.00 |
| Signed by | N.RAD | Additional Handling Charge - Weight | | | 24.00 |
| FedEx Use | 000000000/1327/_ | Peak - AHS Charge | | | 4.90 |
| | | **Total Charge** | | **USD** | **$176.87** |

**Ship Date:** Dec 09, 2020 **Cust. Ref.:** NO REFERENCE INFORMATION **Ref.#2:**
**Payor:** Third Party **Ref.#3:**

The Earned Discount for this ship date has been calculated based on a revenue threshold of $ 1120417.46
Fuel Surcharge - FedEx has applied a fuel surcharge of 4.50% to this shipment.
Distance Based Pricing, Zone 4
FedEx has audited this shipment for correct packages, weight, and service. Any changes made are reflected in the invoice amount.
We calculated your charges based on a dimensional weight of 71.0 lbs, 31 in x 21 in x 15 in, using a dimensional factor of 139.

| | | **Sender** | **Recipient** | | |
|---|---|---|---|---|---|
| Automation | SSFO | | | | |
| Tracking ID | 781132675852 | Sean Karoly | Nader S. Rad | | |
| Service Type | FedEx Standard Overnight | Geosentec consultants | Excel Geotechnical Testing Inc | | |
| Package Type | Customer Packaging | SUITE 100 | 953 Forrest Street | | |
| Zone | 04 | ANN ARBOR MI 48105 US | ROSWELL GA 30075 US | | |
| Packages | 1 | | | | |
| Actual Weight | 59.0 lbs, 26.8 kgs | Transportation Charge | | | 412.80 |
| Rated Weight | 71.0 lbs, 32.2 kgs | Discount | | | -231.17 |
| Declared Value | USD 1.00 | Earned Discount | | | -41.28 |
| Delivered | Dec 10, 2020 13:04 | Fuel Surcharge | | | 7.62 |
| Svc Area | A1 | Declared Value Charge | | | 0.00 |
| Signed by | N.RAD | Additional Handling Charge - Weight | | | 24.00 |
| FedEx Use | 000000000/1327/_ | Peak - AHS Charge | | | 4.90 |
| | | **Total Charge** | | **USD** | **$176.87** |

**Ship Date:** Dec 09, 2020 **Cust. Ref.:** NO REFERENCE INFORMATION **Ref.#2:**
**Payor:** Third Party **Ref.#3:**

The Earned Discount for this ship date has been calculated based on a revenue threshold of $ 1120417.46
Fuel Surcharge - FedEx has applied a fuel surcharge of 4.50% to this shipment.
Distance Based Pricing, Zone 4
FedEx has audited this shipment for correct packages, weight, and service. Any changes made are reflected in the invoice amount.
We calculated your charges based on a dimensional weight of 78.0 lbs, 42 in x 16 in x 16 in, using a dimensional factor of 139.

| | | **Sender** | **Recipient** | |
|---|---|---|---|---|
| Automation | SSFO | | | |
| Tracking ID | 781143770416 | Sean Koroly | Nader S. Rad | |
| Service Type | FedEx Standard Overnight | Geosyntec Consultants | Excel Geotechical Testing Inc. | |
| Package Type | Customer Packaging | SUITE 100 | 953 Forrest Street | |
| Zone | 04 | ANN ARBOR MI 48105 US | ROSWELL GA 30075 US | |
| Packages | 1 | | | |
| Actual Weight | 64.0 lbs, 29.0 kgs | Transportation Charge | | 457.62 |
| Rated Weight | 78.0 lbs, 35.4 kgs | Discount | | -256.27 |
| Declared Value | USD 1.00 | Earned Discount | | -45.76 |
| Delivered | Dec 10, 2020 13:04 | Fuel Surcharge | | 8.30 |
| Svc Area | A1 | Declared Value Charge | | 0.00 |
| Signed by | N.RAD | Additional Handling Charge - Weight | | 24.00 |
| FedEx Use | 000000000/1327/_ | Peak - AHS Charge | | 4.90 |
| | | **Total Charge** | **USD** | **$192.79** |

**Ship Date:** Dec 09, 2020 **Cust. Ref.:** NO REFERENCE INFORMATION **Ref.#2:**
**Payor:** Third Party **Ref.#3:**

The Earned Discount for this ship date has been calculated based on a revenue threshold of $ 1120417.46
Fuel Surcharge - FedEx has applied a fuel surcharge of 4.50% to this shipment.
Distance Based Pricing, Zone 4
FedEx has audited this shipment for correct packages, weight, and service. Any changes made are reflected in the invoice amount.

| | | **Sender** | **Recipient** | |
|---|---|---|---|---|
| Automation | SSFO | | | |
| Tracking ID | 781143770427 | Sean Koroly | Nader S. Rad | |
| Service Type | FedEx Standard Overnight | Geosyntec Consultants | Excel Geotechical Testing Inc. | |
| Package Type | Customer Packaging | SUITE 100 | 953 Forrest Street | |
| Zone | 04 | ANN ARBOR MI 48105 US | ROSWELL GA 30075 US | |
| Packages | 1 | | | |
| Rated Weight | 86.0 lbs, 39.0 kgs | Transportation Charge | | 497.78 |
| Declared Value | USD 1.00 | Discount | | -278.76 |
| Delivered | Dec 10, 2020 13:04 | Earned Discount | | -49.78 |
| Svc Area | A1 | Fuel Surcharge | | 8.92 |
| Signed by | N.RAD | Declared Value Charge | | 0.00 |
| FedEx Use | 000000000/1327/_ | Additional Handling Charge - Weight | | 24.00 |
| | | Peak - AHS Charge | | 4.90 |
| | | **Total Charge** | **USD** | **$207.06** |

**Ship Date:** Dec 09, 2020 **Cust. Ref.:** NO REFERENCE INFORMATION **Ref.#2:**
**Payor:** Third Party **Ref.#3:**

The Earned Discount for this ship date has been calculated based on a revenue threshold of $ 1120417.46
Fuel Surcharge - FedEx has applied a fuel surcharge of 4.50% to this shipment.
Distance Based Pricing, Zone 4
FedEx has audited this shipment for correct packages, weight, and service. Any changes made are reflected in the invoice amount.
We calculated your charges based on a dimensional weight of 78.0 lbs, 42 in x 16 in x 16 in, using a dimensional factor of 139.

| | | **Sender** | **Recipient** | |
|---|---|---|---|---|
| Automation | SSFO | | | |
| Tracking ID | 781143770438 | Sean Koroly | Nader S. Rad | |
| Service Type | FedEx Standard Overnight | Geosyntec Consultants | Excel Geotechical Testing Inc. | |
| Package Type | Customer Packaging | SUITE 100 | 953 Forrest Street | |
| Zone | 04 | ANN ARBOR MI 48105 US | ROSWELL GA 30075 US | |
| Packages | 1 | | | |
| Actual Weight | 64.0 lbs, 29.0 kgs | Transportation Charge | | 457.62 |
| Rated Weight | 78.0 lbs, 35.4 kgs | Discount | | -256.27 |
| Declared Value | USD 1.00 | Earned Discount | | -45.76 |
| Delivered | Dec 10, 2020 13:04 | Fuel Surcharge | | 8.30 |
| Svc Area | A1 | Declared Value Charge | | 0.00 |
| Signed by | N.RAD | Additional Handling Charge - Weight | | 24.00 |
| FedEx Use | 000000000/1327/_ | Peak - AHS Charge | | 4.90 |
| | | **Total Charge** | **USD** | **$192.79** |

**Ship Date:** Dec 09, 2020 **Cust. Ref.:** NO REFERENCE INFORMATION **Ref.#2:**
**Payor:** Third Party **Ref.#3:**

The Earned Discount for this ship date has been calculated based on a revenue threshold of $ 1120417.46
Fuel Surcharge - FedEx has applied a fuel surcharge of 4.50% to this shipment.
Distance Based Pricing, Zone 4
FedEx has audited this shipment for correct packages, weight, and service. Any changes made are reflected in the invoice amount.
We calculated your charges based on a dimensional weight of 78.0 lbs, 42 in x 16 in x 16 in, using a dimensional factor of 139.

| | | **Sender** | **Recipient** | | |
|---|---|---|---|---|---|
| Automation | SSFO | | | | |
| Tracking ID | 781143770449 | Sean Koroly | Nader S. Rad | | |
| Service Type | FedEx Standard Overnight | Geosyntec Consultants | Excel Geotechical Testing Inc. | | |
| Package Type | Customer Packaging | SUITE 100 | 953 Forrest Street | | |
| Zone | 04 | ANN ARBOR MI 48105 US | ROSWELL GA 30075 US | | |
| Packages | 1 | | | | |
| Actual Weight | 50.0 lbs, 22.7 kgs | | | | |
| Rated Weight | 78.0 lbs, 35.4 kgs | Transportation Charge | | | 457.62 |
| Declared Value | USD 1.00 | Discount | | | -256.27 |
| Delivered | Dec 10, 2020 13:04 | Earned Discount | | | -45.76 |
| Svc Area | A1 | Fuel Surcharge | | | 7.00 |
| Signed by | N.RAD | Declared Value Charge | | | 0.00 |
| FedEx Use | 000000000/1327/_ | **Total Charge** | | **USD** | **$162.59** |

**Ship Date:** Dec 09, 2020 **Cust. Ref.:** NO REFERENCE INFORMATION **Ref.#2:**
**Payor:** Third Party **Ref.#3:**

The Earned Discount for this ship date has been calculated based on a revenue threshold of $ 1120417.46
Fuel Surcharge - FedEx has applied a fuel surcharge of 4.50% to this shipment.
Distance Based Pricing, Zone 4
FedEx has audited this shipment for correct packages, weight, and service. Any changes made are reflected in the invoice amount.
We calculated your charges based on a dimensional weight of 78.0 lbs, 42 in x 16 in x 16 in, using a dimensional factor of 139.

| | | **Sender** | **Recipient** | | |
|---|---|---|---|---|---|
| Automation | SSFO | | | | |
| Tracking ID | 781143770450 | Sean Koroly | Nader S. Rad | | |
| Service Type | FedEx Standard Overnight | Geosyntec Consultants | Excel Geotechical Testing Inc. | | |
| Package Type | Customer Packaging | SUITE 100 | 953 Forrest Street | | |
| Zone | 04 | ANN ARBOR MI 48105 US | ROSWELL GA 30075 US | | |
| Packages | 1 | | | | |
| Actual Weight | 59.0 lbs, 26.8 kgs | Transportation Charge | | | 457.62 |
| Rated Weight | 78.0 lbs, 35.4 kgs | Discount | | | -256.27 |
| Declared Value | USD 1.00 | Earned Discount | | | -45.76 |
| Delivered | Dec 10, 2020 13:04 | Fuel Surcharge | | | 8.30 |
| Svc Area | A1 | Declared Value Charge | | | 0.00 |
| Signed by | N.RAD | Additional Handling Charge - Weight | | | 24.00 |
| FedEx Use | 000000000/1327/_ | Peak - AHS Charge | | | 4.90 |
| | | **Total Charge** | | **USD** | **$192.79** |

## NO REFERENCE INFORMATION Reference Subtotal USD $1,655.50

**Ship Date:** Dec 10, 2020 **Cust. Ref.:** FROM: ALICIA REVEZZO **Ref.#2:**
**Payor:** Third Party **Ref.#3:**

The Earned Discount for this ship date has been calculated based on a revenue threshold of $ 1120417.46
Fuel Surcharge - FedEx has applied a fuel surcharge of 4.50% to this shipment.
Distance Based Pricing, Zone 3

| | | **Sender** | **Recipient** | | |
|---|---|---|---|---|---|
| Automation | CAFE | | | | |
| Tracking ID | 102139850093 | GAIL GRAHAM | SAMPLES RECEIVING | | |
| Service Type | FedEx Standard Overnight | GS SHIPPING STORE & MORE, INC | ALS ENVIRONMENTAL | | |
| Package Type | Customer Packaging | 10952 N STRAITS HWY | 3352 128TH AVENUE | | |
| Zone | 03 | CHEBOYGAN MI 49721 US | HOLLAND MI 49424 US | | |
| Packages | 1 | | | | |
| Rated Weight | 20.0 lbs, 9.1 kgs | Transportation Charge | | | 85.69 |
| Delivered | Dec 11, 2020 09:46 | Discount | | | -47.99 |
| Svc Area | A4 | Earned Discount | | | -8.57 |
| Signed by | A.WIERENGA | Fuel Surcharge | | | 2.12 |
| FedEx Use | 000000000/1305/_ | Additional Handling Charge - Package | | | 13.00 |
| | | Third Party Billing | | | 1.23 |
| | | Peak - AHS Charge | | | 4.90 |
| | | **Total Charge** | | **USD** | **$50.38** |

**Ship Date:** Dec 10, 2020 **Cust. Ref.:** FROM: ALICIA REVEZZO **Ref.#2:**
**Payor:** Third Party **Ref.#3:**

The Earned Discount for this ship date has been calculated based on a revenue threshold of $ 1120417.46
Fuel Surcharge - FedEx has applied a fuel surcharge of 4.50% to this shipment.
Distance Based Pricing, Zone 4
We calculated your charges based on a dimensional weight of 8.0 lbs, 12 in x 10 in x 9 in, using a dimensional factor of 139.
Package Delivered to Recipient Address - Release Authorized

| | | | | | |
|---|---|---|---|---|---|
| Automation | CAFE | **Sender** | **Recipient** | | |
| Tracking ID | 102139850108 | GAIL GRAHAM | GEOSYNTEC CONSULTANTS | | |
| Service Type | FedEx Standard Overnight | GS SHIPPING STORE & MORE, INC | 930 HARVEST DRIVE | | |
| Package Type | Customer Packaging | 10952 N STRAITS HWY | BLUE BELL PA 19422 US | | |
| Zone | 04 | CHEBOYGAN MI 49721 US | | | |
| Packages | 1 | | | | |
| Actual Weight | 5.0 lbs, 2.3 kgs | Transportation Charge | | | 94.81 |
| Rated Weight | 8.0 lbs, 3.6 kgs | Discount | | | -53.09 |
| Delivered | Dec 11, 2020 12:24 | Earned Discount | | | -9.48 |
| Svc Area | A2 | Fuel Surcharge | | | 1.45 |
| Signed by | see above | Third Party Billing | | | 0.84 |
| FedEx Use | 000000000/1327/02 | **Total Charge** | | **USD** | **$34.53** |

| | | |
|---|---|---|
| **FROM: ALICIA REVEZZO Reference Subtotal** | **USD** | **$84.91** |
| **Total FedEx Express** | **USD** | **$1,740.41** |

# APPENDIX B

# ALTERNATE LINER DEMONSTRATION LABORATORY STUDY FOR MONROE ASH BASIN

| BORING NO | SAMPLE NO | Sample Interval (ft bgs) | Sample Layer | Moisture Content (ASTM D2216) | Grain Size - Sieve (ASTM D6913) | Grain Size - Hydrometer (ASTM D7928) | Specific Gravity (ASTM D854) | Atterberg (ASTM D4318) | Flex. Wall Permeability (ASTM D5084) | Flex. Wall Permeability / COMPATABILITY (ASTM D7100) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | B-1-1 | 0-6 | Embankment | 1 | | | | | | |
| | B-1-2 | 6-16 | | 1 | 1 | | | 1 | | |
| | B-1-3 | 16-20 | | 1 | | | | | | |
| | B-1-ST-1 | 20-22 | | 1 | 1 | | | 1 | 1 | |
| | B-1-4 | 22-26 | | 1 | | | | | | |
| | B-1-5 | 26-36 | | 1 | 1 | | | 1 | | |
| | B-1-6 | 36-40 | | 1 | | | | | | |
| | B-1-ST-2 | 40-42 | | 1 | 1 | | | 1 | 1 | |
| | B-1-7 | 42-46 | ~43 Native 1 | 1 | | | | | | |
| | B-1-8 | 46-56 | ~46 Native 2 | 1 | 1 | | | 1 | | |
| | B-1-9 | 56-60 | | 1 | | | | | | |
| | B-1-ST-3 | 60-62 | CPT refusal at 60 | 1 | 1 | | | 1 | 1 | |
| | B-1-10 | 62-66 | ~65 Native 3 | 1 | | | | | | |
| | B-1-11 | 66-76 | | 1 | 1 | | | 1 | | |
| 2 | B-2-1 | 0-6 | | 1 | | | | | | |
| | B-2-2 | 6-16 | | 1 | 1 | | | 1 | | |
| | B-2-3 | 16-20 | | 1 | | | | | | |
| | B-2-ST-1 | 20-22 | | 1 | 1 | | | 1 | 1 | 1 |
| | B-2-4 | 22-26 | | 1 | | | | | | |
| | B-2-5 | 26-36 | | 1 | | | | | | |
| | B-2-6 | 36-46 | | 1 | 1 | | | 1 | | |
| | B-2-7 | 46-56 | ~50 Native 2 | 1 | 1 | | | 1 | | |
| | B-2-8 | 56-66 | CPT Refusal at 60 | 1 | | | | | | |
| | B-2-9 | 66-76 | | 1 | 1 | | | 1 | | |
| 3 | B-3-1 | 0-10 | | 1 | 1 | | | 1 | | |
| | B-3-2 | 10-16 | | 1 | 1 | | | 1 | | |
| | B-3-3 | 16-26 | | 1 | 1 | | | 1 | | |
| | B-3-4 | 26-36 | | 1 | 1 | | | 1 | | |
| | B-3-5 | 36-46 | | 1 | 1 | | | 1 | | |
| | B-3-6 | 46-56 | Native 2 at ~48 | 1 | 1 | | | 1 | | |
| | B-3-7 | 56-66 | Native 3 at ~63 | 1 | 1 | | | 1 | | |
| | B-3-8 | 66-76 | | 1 | 1 | | | 1 | | |
| 4 | B-4-1 | 0-6 | | 1 | 1 | | | 1 | | |
| | B-4-2 | 6-15 | | 1 | | | | | | |
| | B-4-ST-1 | 15-17 | | 1 | 1 | | 1 | 1 | 1 | |
| | B-4-3 | 17-21 | | 1 | | | | | | |
| | B-4-4 | 21-26 | | 1 | 1 | | | 1 | | |
| | B-4-5 | 26-30 | | 1 | | | | | | |
| | B-4-6 | 30-35 | | 1 | 1 | | | 1 | | |

Note: The initial testing program was provided to EGT on December 16, 2020 and completed on February 10, 2021.

# ALTERNATE LINER DEMONSTRATION LABORATORY STUDY FOR MONROE ASH BASIN

Geosyntec consultants

| BORING NO | SAMPLE NO | Sample Interval (ft bgs) | Sample Layer | Moisture Content (ASTM D2216) | Grain Size - Sieve (ASTM D6913) | Grain Size - Hydrometer (ASTM D7928) | Specific Gravity (ASTM D854) | Atterberg (ASTM D4318) | Flex. Wall Permeability (ASTM D5084) | Flex. Wall Permeability / COMPATABILITY (ASTM D7100) |
|---|---|---|---|---|---|---|---|---|---|---|
| 4 | B-4-7 | 35-40 | | 1 | | | | | | |
| | B-4-ST-2 | 40-42 | 40 ft Native 1 | 1 | 1 | | 1 | 1 | 1 | 1 |
| | B-4-8 | 42-46 | | 1 | | | | | | |
| | B-4-9 | 46-51 | | 1 | 1 | | | 1 | | |
| | B-4-10 | 51-55 | ~52 Native 2 | 1 | | | | | | |
| | B-4-ST-3 | 55-57.5 | | 1 | 1 | | 1 | 1 | 1 | |
| | B-4-11 | 57.5-63 | ~62 Native 3 | 1 | | | | | | |
| | B-4-12 | 63-66 | | 1 | 1 | | | 1 | | |
| | B-4-13 | 66-70 | | 1 | | | | | | |
| | B-4-ST-4 | 70-72.5 | | 1 | 1 | | 1 | 1 | 1 | 1 |
| | B-4-14 | 72.5-76 | | 1 | | | | | | |
| 5 | B-5-1 | 0-6 | | 1 | | | | | | |
| | B-5-2 | 6-11 | | 1 | 1 | | | 1 | | |
| | B-5-3 | 11-16 | | 1 | | | | | | |
| | B-5-4 | 16-21 | | 1 | 1 | | | 1 | | |
| | B-5-5 | 21-26 | | 1 | | | | | | |
| | B-5-6 | 26-31 | | 1 | 1 | | | 1 | | |
| | B-5-7 | 31-36 | | 1 | | | | | | |
| | B-5-8 | 36-42 | | 1 | 1 | | | 1 | | |
| | B-5-9 | 42-46 | ~45 Native 1 | 1 | | | | | | |
| | B-5-10 | 46-51 | | 1 | 1 | | | 1 | | |
| | B-5-11 | 51-56 | ~50 Native 2 | 1 | 1 | | | 1 | | |
| | B-5-12 | 56-61 | | 1 | | | | | | |
| | B-5-13 | 61-66 | | 1 | 1 | | | 1 | | |
| | B-5-14 | 66-70 | CPT Refusal at 68 | 1 | | | | | | |
| | B-5-ST-1 | 73.5-76 | | 1 | 1 | | 1 | 1 | 1 | |
| 6 | B-6-1 | 0-6 | | 1 | | | | | | |
| | B-6-2 | 6-11 | | 1 | 1 | | | 1 | | |
| | B-6-3 | 11-16 | | 1 | | | | | | |
| | B-6-4 | 16-21 | | 1 | 1 | | | 1 | | |
| | B-6-5 | 21-25 | | 1 | | | | | | |
| | B-6-ST-1 | 25-27 | | 1 | 1 | | | 1 | 1 | 1 |
| | B-6-6 | 27-31 | | 1 | | | | | | |
| | B-6-7 | 31-36 | | 1 | 1 | | | 1 | | |
| | B-6-8 | 36-40 | | 1 | | | | | | |
| | B-6-ST-2 | 40-42.5 | | 1 | 1 | | 1 | 1 | 1 | |
| | B-6-9 | 42.5-45 | 45 Native 1 | 1 | | | | | | |
| | B-6-10 | 45-50 | | 1 | 1 | | | 1 | | |
| | B-6-11 | 50-55 | ~49 Native 2 | 1 | | | | | | |
| | B-6-ST-3 | 55-57.5 | | 1 | 1 | | | 1 | 1 | 1 |
| | B-6-12 | 57.5-60 | | 1 | | | | | | |

# ALTERNATE LINER DEMONSTRATION LABORATORY STUDY FOR MONROE ASH BASIN

Geosyntec consultants

| BORING NO | SAMPLE NO | Sample Interval (ft bgs) | Sample Layer | Moisture Content (ASTM D2216) | Grain Size - Sieve (ASTM D6913) | Grain Size - Hydrometer (ASTM D7928) | Specific Gravity (ASTM D854) | Atterberg (ASTM D4318) | Flex. Wall Permeability (ASTM D5084) | Flex. Wall Permeability / COMPATABILITY (ASTM D7100) |
|---|---|---|---|---|---|---|---|---|---|---|
| 6 | B-6-13 | 60-65 | ~60 Native 3 | 1 | 1 | | | 1 | | |
| | B-6-ST-4 | 65-67.5 | | 1 | 1 | | | 1 | 1 | 1 |
| | B-6-14 | 67.5-70 | | 1 | | | | | | |
| | B-6-15 | 70-76 | | 1 | 1 | | | 1 | | |
| 7 | B-7-1 | 0-6 | | 1 | 1 | | | 1 | | |
| | B-7-2 | 6-11 | | 1 | | | | | | |
| | B-7-3 | 11-16 | | 1 | 1 | | | 1 | | |
| | B-7-4 | 16-21 | | 1 | | | | | | |
| | B-7-5 | 21-26 | | 1 | 1 | | | 1 | | |
| | B-7-6 | 26-31 | Native 1 at 30 ft | 1 | | | | | | |
| | B-7-7 | 31-36 | | 1 | 1 | | | 1 | | |
| | B-7-8 | 36-41 | | 1 | | | | | | |
| | B-7-9 | 41-46 | | 1 | 1 | | | 1 | | |
| | B-7-10 | 46-51 | Native 2 at 49 ft | 1 | | | | | | |
| | B-7-11 | 51-56 | | 1 | | | | | | |
| | B-7-12 | 56-61 | | 1 | 1 | | | 1 | | |
| | B-7-13 | 61-65 | CPT Refusal at 60 ft | 1 | | | | | | |
| | B-7-ST-1 | 65-67.5 | | 1 | 1 | | | 1 | 1 | |
| | B-7-14 | 67.5-71 | | 1 | | | | | | |
| | B-7-15 | 71-76 | | 1 | 1 | | | 1 | | |
| 8 | B-8-1 | 0-6 | | 1 | | | | | | |
| | B-8-2 | 6-11 | | 1 | 1 | | | 1 | | |
| | B-8-3 | 11-16 | | 1 | | | | | | |
| | B-8-4 | 16-21 | | 1 | 1 | | | 1 | | |
| | B-8-5 | 21-26 | | 1 | | | | | | |
| | B-8-6 | 26-31 | | 1 | 1 | | | 1 | | |
| | B-8-7 | 31-36 | Native 1 at 35 | 1 | | | | | | |
| | B-8-8 | 36-41 | | 1 | 1 | | | 1 | | |
| | B-8-9 | 41-46 | | 1 | | | | | | |
| | B-8-10 | 46-51 | Native 2 at 50 | 1 | 1 | | | 1 | | |
| | B-8-11 | 51-56 | | 1 | | | | | | |
| | B-8-12 | 56-61 | Native 3 at 59 | 1 | 1 | | | 1 | | |
| | B-8-13 | 61-66 | | 1 | | | | | | |
| | B-8-14 | 66-71 | | 1 | 1 | | | 1 | | |
| | B-8-15 | 71-76 | | 1 | | | | | | |
| 9 | B-9-1 | 0-6 | | 1 | | | | | | |
| | B-9-2 | 6-11 | | 1 | | | | | | |
| | B-9-3 | 11-16 | | 1 | | | | | | |
| | B-9-4 | 16-21 | | 1 | 1 | | | 1 | | |
| | B-9-5 | 21-25 | | 1 | | | | | | |
| | B-9-ST-1 | 25-27 | | 1 | 1 | | | 1 | 1 | |

| BORING NO | SAMPLE NO | Sample Interval (ft bgs) | Sample Layer | Moisture Content (ASTM D2216) | Grain Size - Sieve (ASTM D6913) | Grain Size - Hydrometer (ASTM D7928) | Specific Gravity (ASTM D854) | Atterberg (ASTM D4318) | Flex. Wall Permeability (ASTM D5084) | Flex. Wall Permeability / COMPATABILITY (ASTM D7100) |
|---|---|---|---|---|---|---|---|---|---|---|
| 9 | B-9-6 | 27-30 | | 1 | | | | | | |
| | B-9-7 | 30-36 | | 1 | | | | | | |
| | B-9-8 | 36-40 | | 1 | 1 | | | 1 | | |
| | B-9-ST-2 | 40-42 | 41 Native 1 | 1 | 1 | | 1 | 1 | 1 | 1 |
| | B-9-9 | 42-46 | | 1 | | | | | | |
| | B-9-10 | 46-50 | | 1 | 1 | | | 1 | | |
| | B-9-11 | 50-55 | ~52 Native 2 | 1 | | | | | | |
| | B-9-ST-3 | 55-57 | | 1 | 1 | | 1 | 1 | 1 | 1 |
| | B-9-12 | 57-60 | CPT refusal at 59 | 1 | | | | | | |
| | B-9-13 | 60-65 | 59 Native 3 | 1 | | | | | | |
| | B-9-ST-4 | 65-67 | | 1 | 1 | | | 1 | 1 | |