September 1, 2022

Sent via email

Mr. Michael Regan, EPA Administrator
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 Belle River Power Plant
Bottom Ash Basins Coal Combustion Residuals Unit
4505 King Road, China Township, Michigan

Dear Administrator Regan:

In accordance with 40 C.F.R. §257.71(d)(2)(ii)(A), the DTE Electric Company (DTE Electric) submitted an extension request to the U.S. Environmental Protection Agency (EPA) for approval on September 1, 2021, for the Belle River Power Plant Bottom Ash Basins, to extend the November 30, 2021, deadline to submit an alternate liner demonstration (ALD). A Preliminary ALD was submitted to EPA on November 30, 2021, using preliminary data, that concluded that the low permeability natural clay soils underlying the Belle River Power Plant Bottom Ash Basins are consistently present across the basin and have sufficiently low hydraulic conductivity to prevent groundwater contamination at the solid waste boundary through the active life of the unit. This letter is intended to provide an update to the extension request submitted September 1, 2021, using the most recent data and projected termination dates certified by the lab, to continue to extend the deadline to submit a final Alternate Liner Demonstration (ALD).

The enclosed memorandum, prepared by Geosyntec and Excel Geotechnical Testing laboratory, provides the information requested by the rule, a date by which termination criteria is anticipated to be achieved, how the anticipated dates are estimated, and a discussion of results. The memorandum demonstrates that 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

3011 W Grand Boulevard, Suite 301
Detroit, Michigan 48202
PH 313.209.5610
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Memorandum

Date:	September 1, 2022
To:	Michael Regan (USEPA)
Copies to:	Richard Huggins, Mary Jackson, Michelle Long, and Jason Mills (USEPA), Christopher Scieszka (DTE Electric Company), John Seymour, P.E., Mike Coram (Geosyntec Consultants)
From:	Clinton Carlson, Ph.D., P.E., Isaiah Vaught (Geosyntec Consultants), Nader Rad, Ph.D., P.E. (Excel Geotechnical Testing)
Subject:	Extension Request for Belle River Power Plant Bottom Ash Basins Alternative Liner Demonstration Geosyntec Project: GLP8017

This technical memorandum has been prepared to request an additional extension for the Alternative Liner Demonstration (ALD) of the Belle River Power Plant Bottom Ash Basins (BAB) on behalf of DTE Electric Company (DTE) and in accordance with 40 CFR Part 257 as amended on November 20, 2020 (CCR Rule). An initial extension request was sent on September 1, 2021, with expected completion date information. However, recent laboratory data show trends indicating the project reaching the required termination criteria beyond the original request for some of the samples. Therefore, this request is being made in accordance with 40 CFR Part 257.71(d)(2)(ii)(A) *Extension due to analytical limitations.* This memorandum updates the prior request and 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 submitted the BAB ALD application to the United States Environmental Protection Agency (USEPA) on November 30, 2020, in accordance with the CCR Rule. USEPA has not yet 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 testing program was initiated on March 15, 2021. An initial request for *Extension due*

to analytical limitations was submitted on September 1, 2021. The laboratory study is still underway and expected to last for the foreseeable future for four of six samples 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;
- Summary of test results as of August 12, 2022, and projected timeline for reaching termination criteria; and
- Laboratory certification.

FIELD AND LABORATORY INVESTIGATION TIMELINE

DTE 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 8, 2020, (only eight days after the ALD application was submitted to the USEPA) and it was completed on December 15, 2020. Soil samples collected during the field investigation were sent to Excel Geotechnical Testing (EGT) immediately and were registered by EGT on December 17, 2020. The chain of custody (proof of shipping and delivery) 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. Note that results do not include inflow versus outflow data because the project team decided to keep the inflow constant, which provides a more stable hydraulic gradient across the sample, more accurate estimation of hydraulic conductivity, faster testing, and more control in the testing procedure. It is our opinion that the inflow/outflow criterion would be reached by the time other criteria are reached.
- The hydraulic conductivity is considered steady if four or more consecutive hydraulic conductivity determinations fall within ±25 percent of the mean value for hydraulic conductivity, k, greater than or equal to 3.0E-08 centimeters per second (cm/s) or within ±50 percent for k less than 1.0E-08 cm/s, and a plot or tabulation of the hydraulic conductivity versus time shows no significant upward or downward trend;
- At least 2.0 pore volumes (PV) of flow has passed through the sample;
- pH of effluent is within 10 percent of that for the influent with no significant increasing or decreasing trends; and
- Electrical conductivity (EC) of effluent is within 10 % of that for the influent with no significant increasing or decreasing trends.

TEST RESULTS & PROJECTED TIMELINE FOR TERMINATION CRITERIA

Six samples from the Belle River Power Plant are being tested by EGT. Preliminary results as of August 12, 2022, are provided in **Appendix A** and summarized in **Tables 1** through **4**. In addition, figures are provided for each sample showing the following:

- PV of flow with time;
- hydraulic conductivity with time;
- hydraulic conductivity versus PV passed through the sample;
- pH of inflow and outflow with time; and
- EC of inflow and outflow with time.

Table 5 provides figure numbers for quick reference to the various plots listed above. Geosyntec notes the original batch of leachate from Belle River Power Plant used in the laboratory testing ran out after around 300 days of testing. Additional leachate was obtained and EGT switched to the new batch of leachate from Belle River Power Plant in January 2022. Switching the batch of leachate appeared to only affect the EC of the inflow.

Table 1 provides the sample ID, the start date for testing, amount of PV passed through the sample (total, prior to changing leachate, and after changing leachate), and hydraulic conductivity (k) measurements. Overall, the average k values of samples range from 7.0E-09 to 2.1E-08 cm/s. Hydraulic conductivity values have been stable or slightly decreased since the beginning of testing. The total PV of flow that has passed through the samples ranges from 2.33 to 7.42. Prior to changing the batch of leachate, all but one sample had 2.0 PV passed through the sample. Two samples have not passed an additional 2.0 PV passed through the sample since changing the batch of leachate. As of June 10, 2022, all samples have reached the criterion of passing a total of 2.0 PV through the sample.

pH values are provided in **Table 2**. The average pH of inflow ranges from 8.2 to 8.4, and the average pH of outflow ranges from 8.1 to 8.4. The pH values of the outflow are within 10 percent of the pH values of the inflow for all samples, so the termination criterion for pH has been achieved.

EC values are provided in **Table 3**. In general, the average EC of inflow ranges from 977 to 1016, and the average EC of outflow ranges from 825 to 1484. The EC values of outflow were not within 10 percent of the inflow as required for the EC termination criterion for all but sample B4-ST-3 prior to changing the leachate. After changing the leachate, samples B1-ST-1 and B4-ST-3 have

met the EC termination criterion. B2-ST-1, B2-ST-4, B3-ST-5, and B5-ST-5 have not achieved the EC termination criterion. For the four samples (B2-ST-1, B2-ST-4, B3-ST-5, and B5-ST-5) that have not met the EC termination criterion, the EC of the outflow are projected to meet the termination criterion (i.e., within 10 percent of the EC of the inflow) by January 2023. The estimated date range for achieving this criterion is based on the convergence of linear extrapolations for the inflow and outflow EC to within 10 percent.

Table 4 summarizes if samples have reached the termination criteria for PV, pH, and EC, and if not, the approximate projected date for reaching the termination criteria. For the EC, **Table 4** presents if the sample reached the termination criterion before and after the batch of leachate was changed. As summarized in **Table 4**, two of the samples have reached all the termination criteria. Based on available data, Geosyntec and EGT expect the last two samples to reach all the termination criteria by January 2023.

DISCUSSION

The length of testing for the samples to reach the termination criteria is longer than anticipated. EGT has indicated in their experience hydraulic conductivity compatibility tests are typically completed after passing approximately 3.0 PV through the samples. EGT has noted the laboratory test equipment is starting to exhibit signs of deterioration (e.g., cell water becoming cloudier, discoloration of the latex membranes encapsulating the samples) due to the length of testing time. Geosyntec and EGT are uncertain of the cause(s) for the long testing time required to reach the termination criteria. Possible causes could be the low hydraulic conductivity of the samples, a reaction with the leachate, a reaction within the soil samples, or a combination of these possible causes.

Although all the samples have not met the termination criteria, it is Geosyntec's professional opinion that the laboratory testing has demonstrated the alternate liner is not expected to deteriorate (i.e., increase in hydraulic conductivity) for the remaining active life of the unit and the post-closure care period, because of the following observations.

- The hydraulic conductivity values of the samples are low (average values between 7.0E-09 and 2.1E-08 cm/s) and have remained constant or slightly decreased for the 18 months of testing.
- The average pore volume passed through the samples is 5.5, with minimum and maximum PV passed of 2.3 and 7.2. Only 2.0 PV passed through the samples is required for the termination criterion.

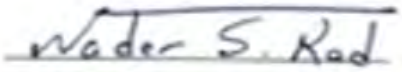
On behalf of DTE, Geosyntec is requesting an additional extension for the laboratory testing of four samples (B2-ST1, B2-ST-4, B3-ST-5, and B5-ST-5) for the ALD demonstration until January 2023. The projected termination dates are based on the latest estimated date to reach the EC termination criterion. As noted, laboratory test equipment may begin to fail prior to January 2023. Testing will continue until termination criteria are reached or the laboratory test equipment fails due to deterioration. Laboratory testing on samples B1-ST-1 and B4-ST-3 is considered complete because the termination criteria have been met; testing on these samples will be terminated.

CONCLUSIONS

Considering the data presented above, an extension of the ALD demonstration is requested for the Belle River Power Plant Bottom Ash Basins until January 2023 for samples B2-ST-1, B2-ST-4, B3-ST-5, and B5-ST-5. Testing will continue until termination criteria are reached or the laboratory test equipment fails due to deterioration, in which case, test results up to the failure of the equipment will be presented in the ALD report. However, it is Geosyntec's professional opinion that the laboratory testing up to this point has demonstrated the alternate liner is not expected to deteriorate (i.e., increase in hydraulic conductivity) within the remaining active life and post-closure care period of the Belle River Power Plant Bottom Ash Basins. Samples B1-ST-1 and B4-ST-3 have reached all the termination criteria, so testing on these samples will be terminated.

LABORATORY CERTIFICATION

The hydraulic conductivity compatibility testing for the Belle River Power Plant Bottom Ash Basin samples is projected to last through January 2023, based on results as of August 12, 2022, to meet termination criteria. If the extension is granted, DTE will submit the completed demonstration within 45 days of January 1, 2023, in accordance with §257.71(d)(2)(ii)(B).



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

TABLES

Table 1. Summary of Hydraulic Conductivity and Pore Volume Passed

ID	Date	Days After Injection	Hydraulic Conductivity (cm/s)	Pore Volumes Passed After Injection	PV Passed Prior to Changing Leachate	PV Passed After Changing Leachate
B1-ST-1 (7-9')	March 15, 2021	0	1.2E-08	0.0000		
	August 12, 2022	515	7.4E-09	2.3298	1.3225	1.0073
B2-ST-1 (1-3')	March 15, 2021	0	1.8E-08	0.0000		
	August 12, 2022	515	1.1E-08	4.4858	2.7043	1.7815
B2-ST-4 (47-49')	March 15, 2021	0	2.4E-08	0.0000		
	August 12, 2022	515	2.3E-08	6.0187	3.4825	2.5362
B3-ST-5 (77-79')	March 15, 2021	0	2.2E-08	0.0000		
	August 12, 2022	515	2.2E-08	7.4223	4.2351	3.1872
B4-ST-3 (47-49')	March 15, 2021	0	2.7E-08	0.0000		
	August 12, 2022	515	2.9E-08	7.2214	4.1689	3.0525
B5-ST-5 (87-89')	March 15, 2021	0	1.7E-08	0.0000		
	August 12, 2022	515	1.5E-08	6.0977	3.5431	2.5546

Table 1. Summary of pH Results

Sample ID	Parameter	pH Inflow	pH Outflow	Is pH of outflow within termination boundaries?
B1-ST-1 (7-9')	Min	7.8	8.1	Yes
	Max	9.3	9.3	
	Average	8.4	8.4	
B2-ST-1 (1-3')	Min	7.8	7.9	Yes
	Max	9.2	9.1	
	Average	8.3	8.3	
B2-ST-4 (47-49')	Min	7.7	7.8	Yes
	Max	9.8	9.4	
	Average	8.3	8.3	
B3-ST-5 (77-79')	Min	7.5	7.6	Yes
	Max	9.1	8.9	
	Average	8.3	8.1	
B4-ST-3 (47-49')	Min	7.7	7.7	Yes
	Max	9.2	8.8	
	Average	8.2	8.2	
B5-ST-5 (87-89')	Min	7.7	7.7	Yes
	Max	9.5	9.2	
	Average	8.3	8.2	

Table 3. Electrical Conductivity Results

Sample ID	Parameter	EC Inflow (µs/cm)	EC Outflow (µs/cm)	Was EC of Outflow within Termination Criterion Prior to Changing Leachate?	Is EC of Outflow within Termination Criterion After Changing Leachate?	Approximate Projected Termination Date
B1-ST-1 (7-9')	Min	622	1141	No	Yes	Reached Termination Criterion After Changing Leachate -
	Max	1315	1614			
	Average	1016	1313			
B2-ST-1 (1-3')	Min	560	856	No	No	September 26, 2022
	Max	1345	3050			
	Average	996	1484			
B2-ST-4 (47-49')	Min	523	720	No	No	October 15, 2022
	Max	1289	1771			
	Average	993	967			
B3-ST-5 (77-79')	Min	579	672	No	No	January 1, 2023
	Max	1294	1118			
	Average	977	851			
B4-ST-3 (47-49')	Min	518	597	Yes	Yes	Reached Termination Criterion Prior to and After Changing Leachate
	Max	1282	1637			
	Average	986	825			
B5-ST-5 (87-89')	Min	555	655	No	No	September 1, 2022
	Max	1291	2010			
	Average	992	963			

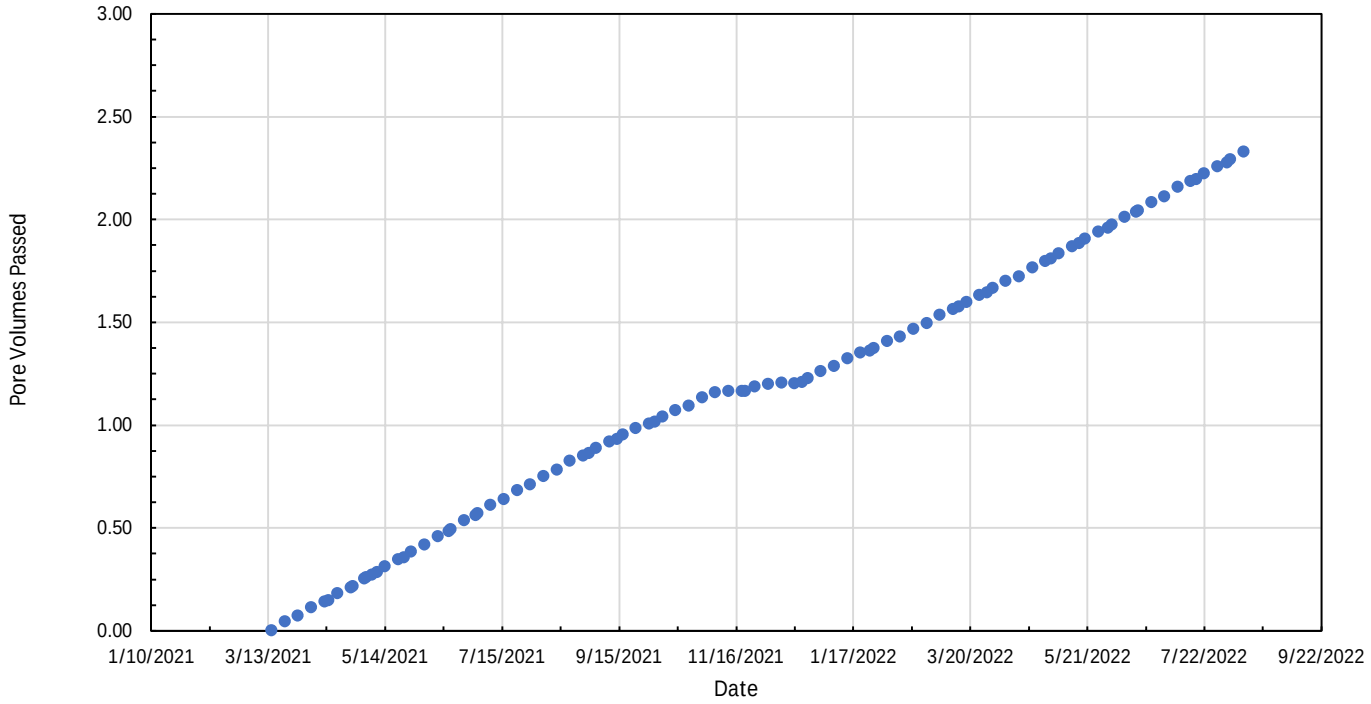
Table 4. Summary of Termination Criteria

	Termination Criterion Reached					
Sample ID	Pore Volumes Passed, PV	pH	EC Prior to Changing Leachate	EC After Changing Leachate	Approximate Projected Termination Date	Date Based On
B1-ST-1 (7-9')	Yes (Total)	Yes	No	Yes	Complete	Complete
B2-ST-1 (1-3')	Yes (Total)	Yes	No	No	September 26, 2022	EC
B2-ST-4 (47-49')	Yes	Yes	No	No	October 15, 2022	EC
B3-ST-5 (77-79')	Yes	Yes	No	No	January 1, 2023	EC
B4-ST-3 (47-49')	Yes	Yes	Yes	Yes	Complete	Complete
B5-ST-5 (87-89')	Yes	Yes	No	No	September 1, 2022	EC

Table 5. Summary of Figures

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
B1-ST-1 (7-9')	Figure 1	Figure 2	Figure 3	Figure 4	Figure 5
B2-ST-1 (1-3')	Figure 6	Figure 7	Figure 8	Figure 9	Figure 10
B2-ST-4 (47-49')	Figure 11	Figure 12	Figure 13	Figure 14	Figure 15
B3-ST-5 (77-79')	Figure 16	Figure 17	Figure 18	Figure 19	Figure 20
B4-ST-3 (47-49')	Figure 21	Figure 22	Figure 23	Figure 24	Figure 25
B5-ST-5 (87-89')	Figure 26	Figure 27	Figure 28	Figure 29	Figure 30

FIGURES



B1-ST-1 (7-9') PV of Flow with Time

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Figure 1

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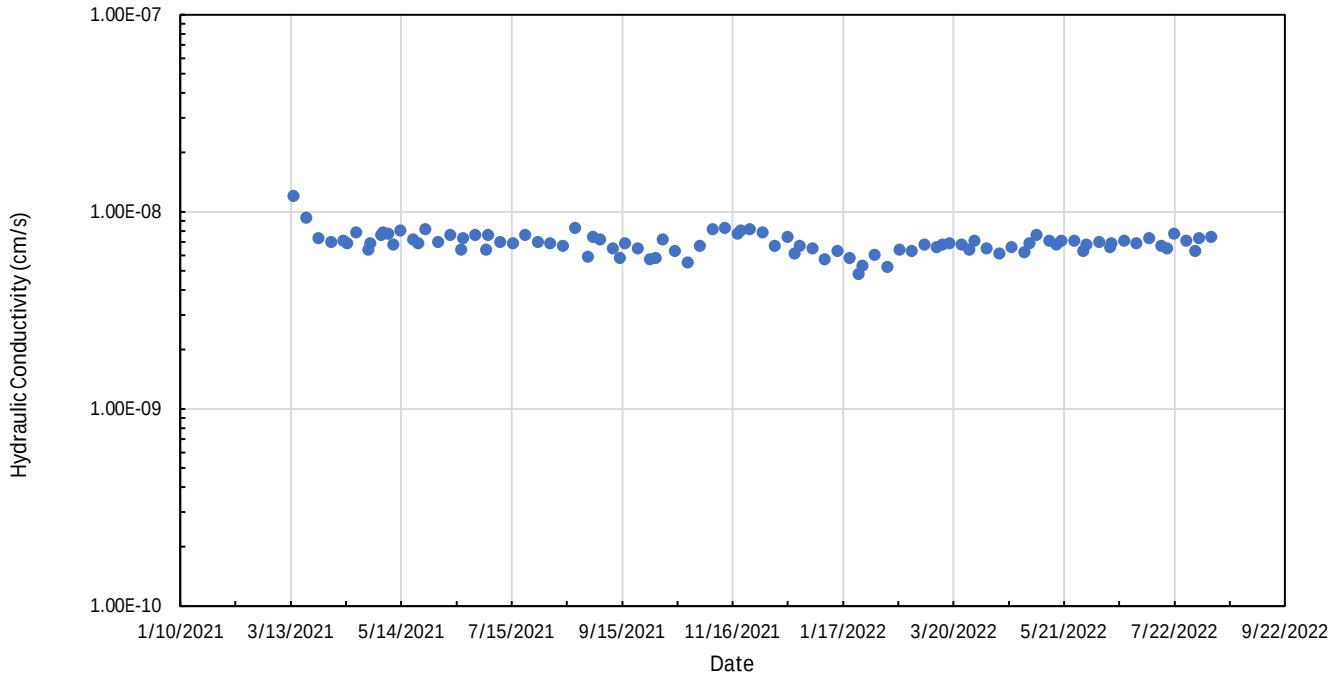

B1-ST-1 (7-9') Hydraulic Conductivity with Time

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EAST CHINA TOWNSHIP, MICHIGAN

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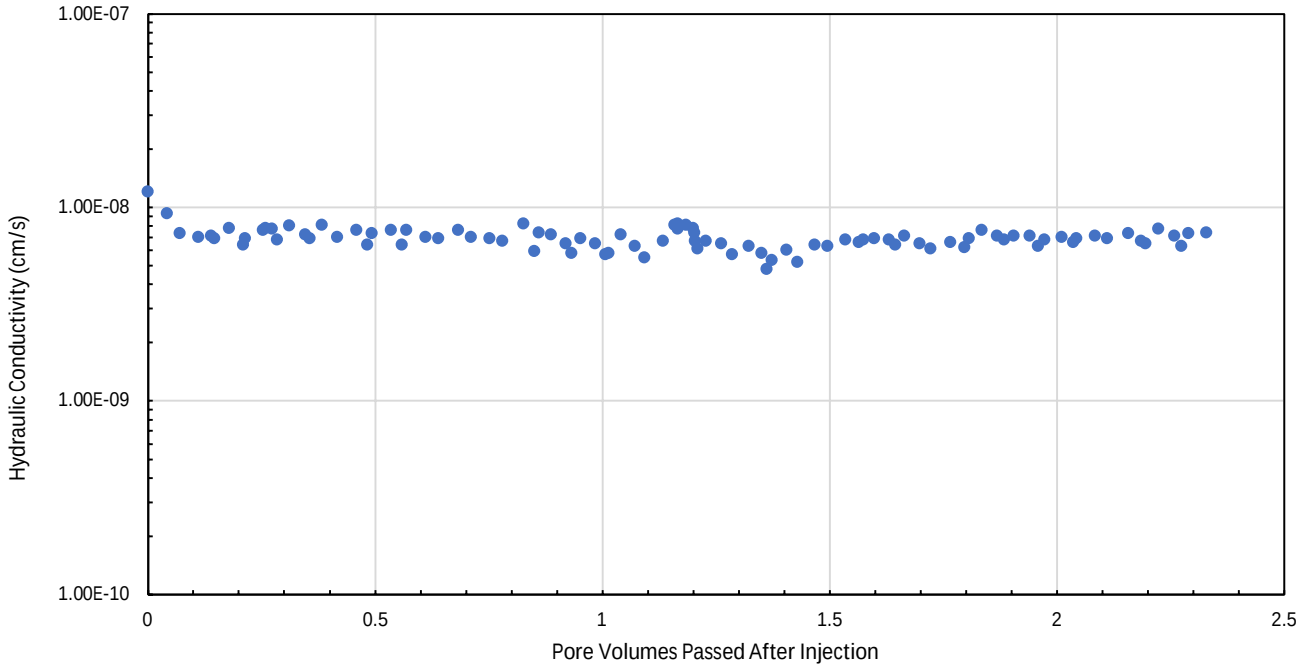
Figure 2



B1-ST-1 (7-9') Hydraulic Conductivity with PV

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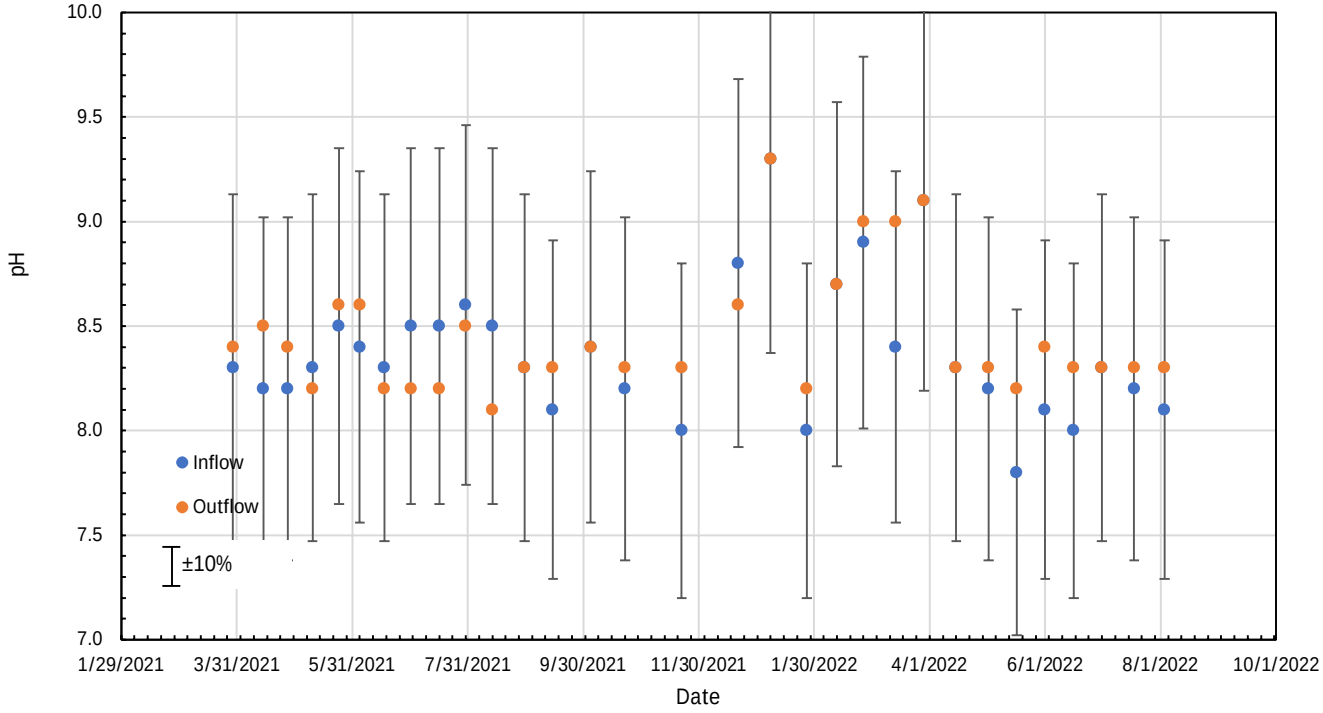
Figure 3



B1-ST-1 (7-9') pH of Inflow and Outflow with Time

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Figure

4

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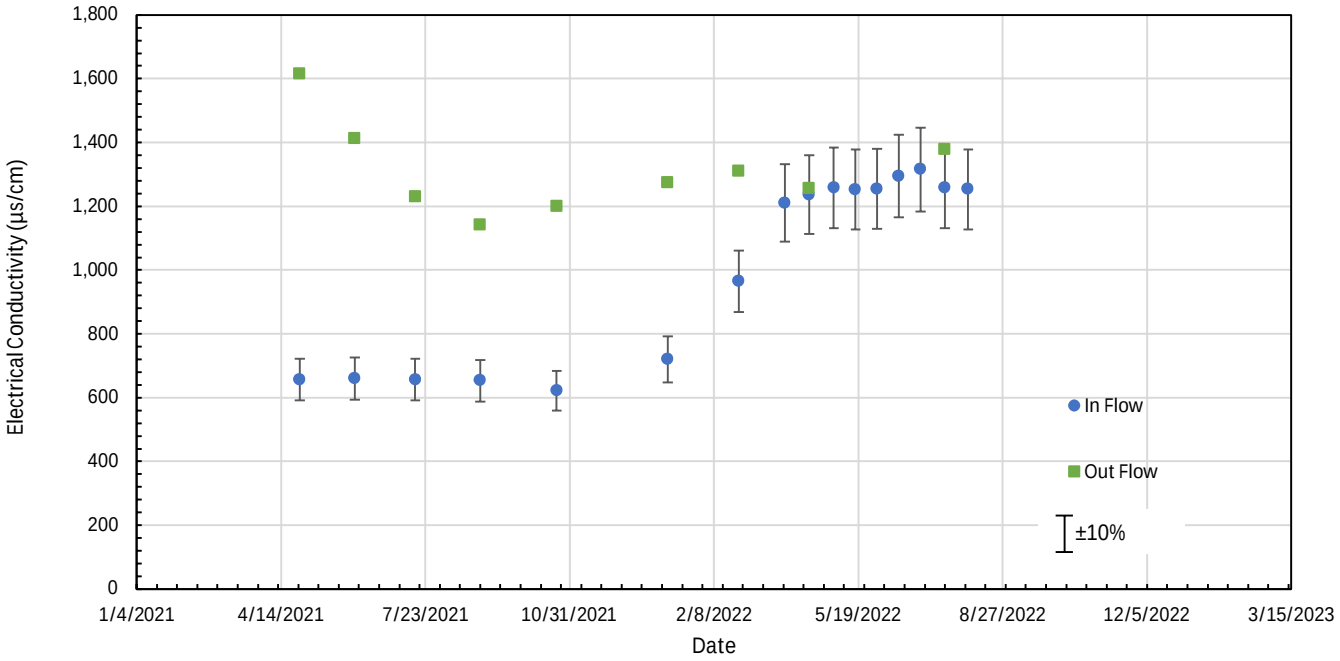

B1-ST-1 (7-9') Electrical Conductivity (EC) with Time

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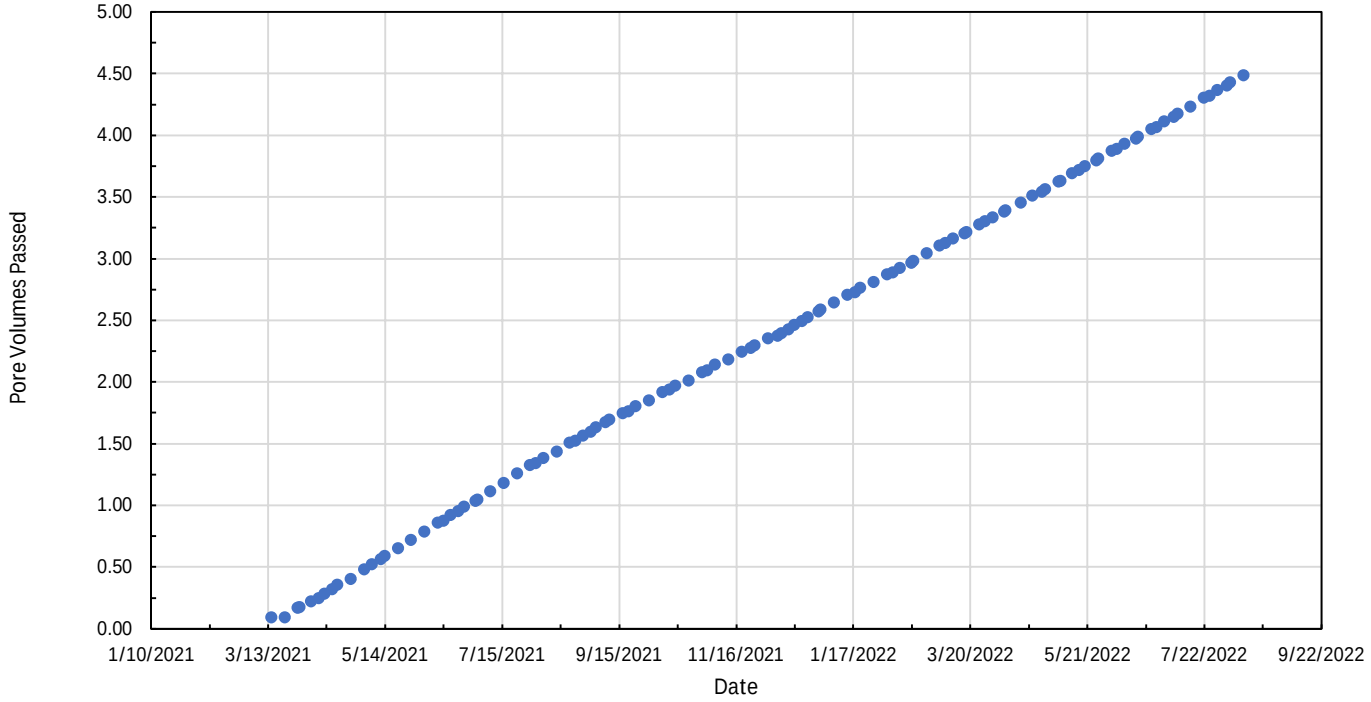
Figure 5



B2-ST-1 (1-3') PV of Flow with Time

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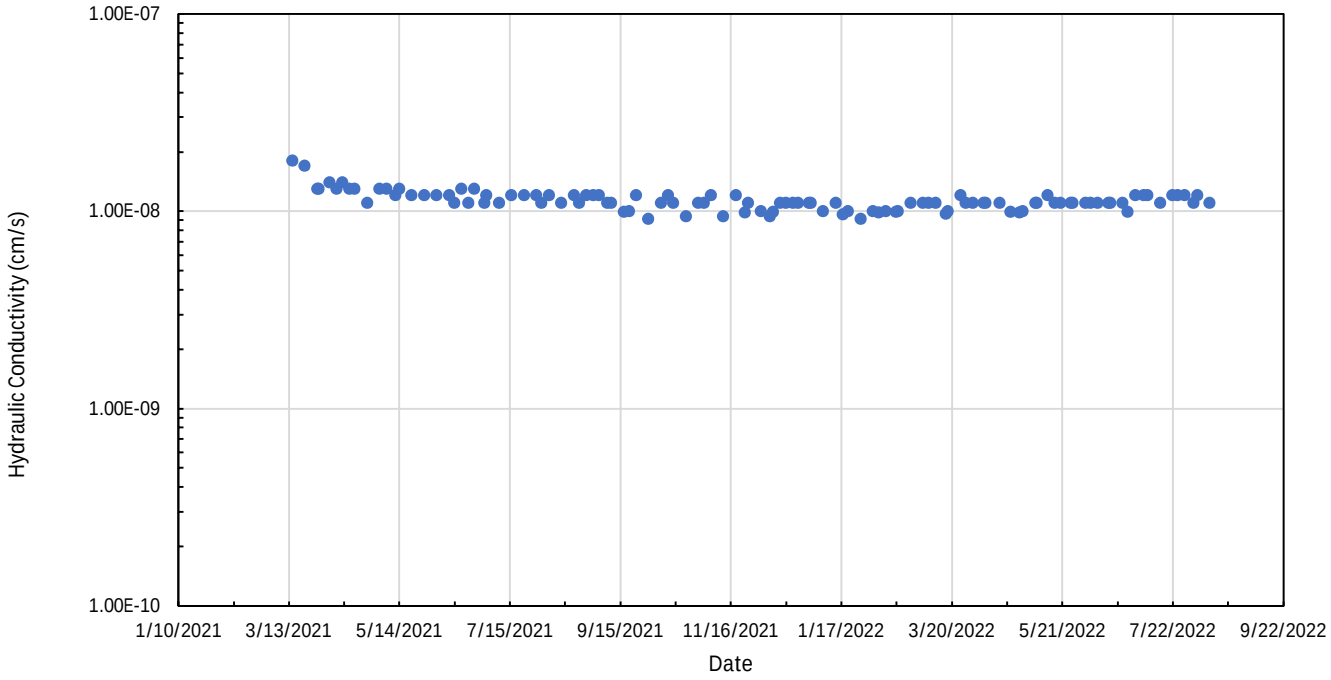
Figure 6



B2-ST-1 (1-3') Hydraulic Conductivity with Time

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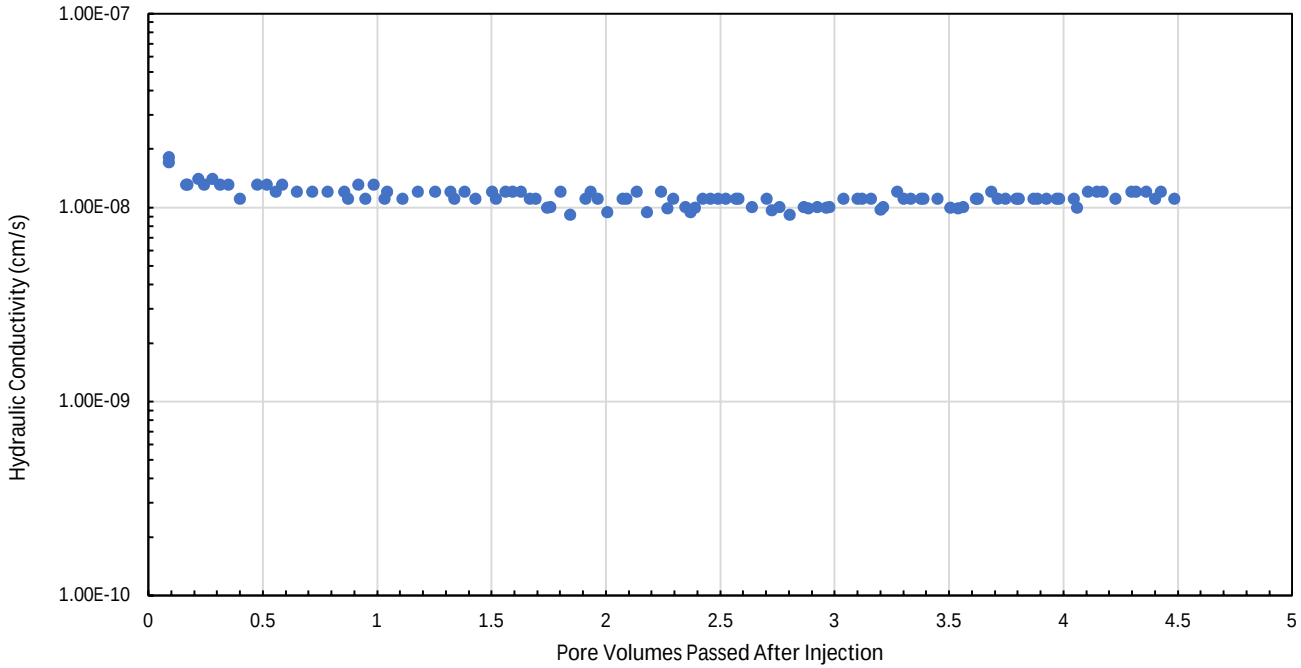
Figure 7



B2-ST-1 (1-3') Hydraulic Conductivity with PV

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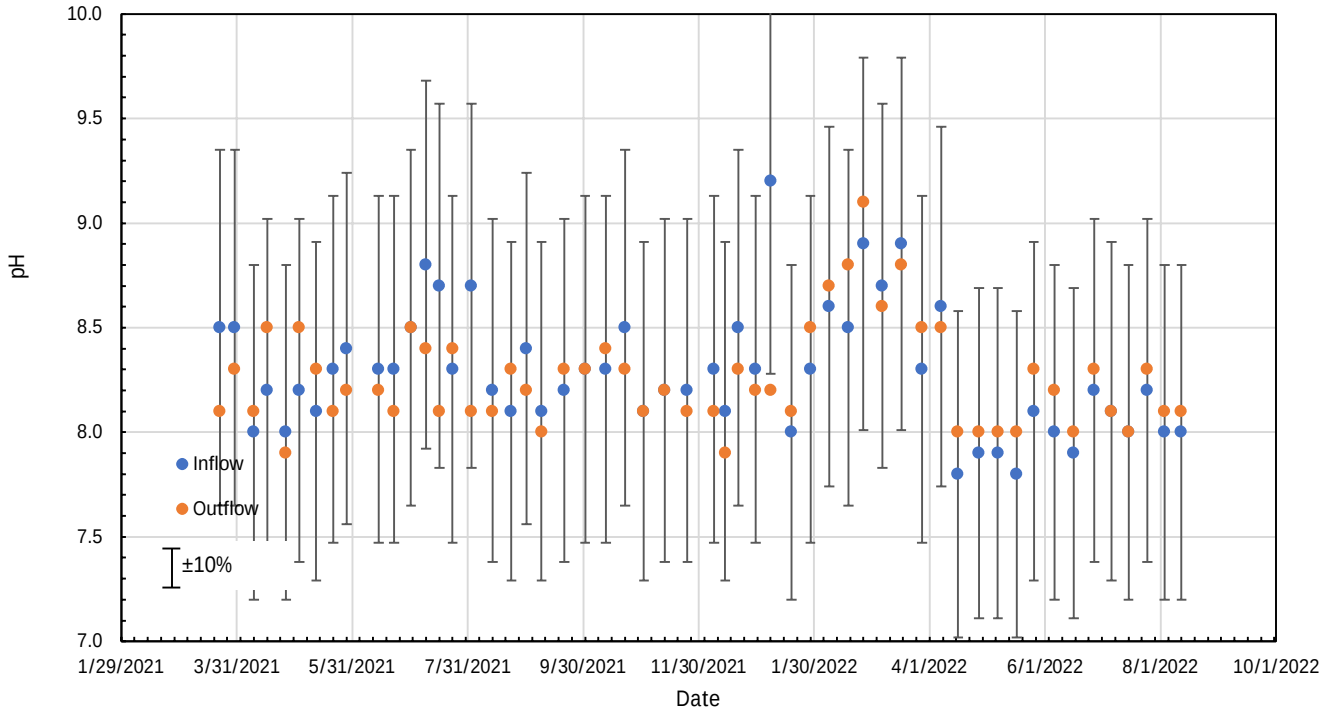
Figure 8



B2-ST-1 (1-3') pH of Inflow and Outflow with Time

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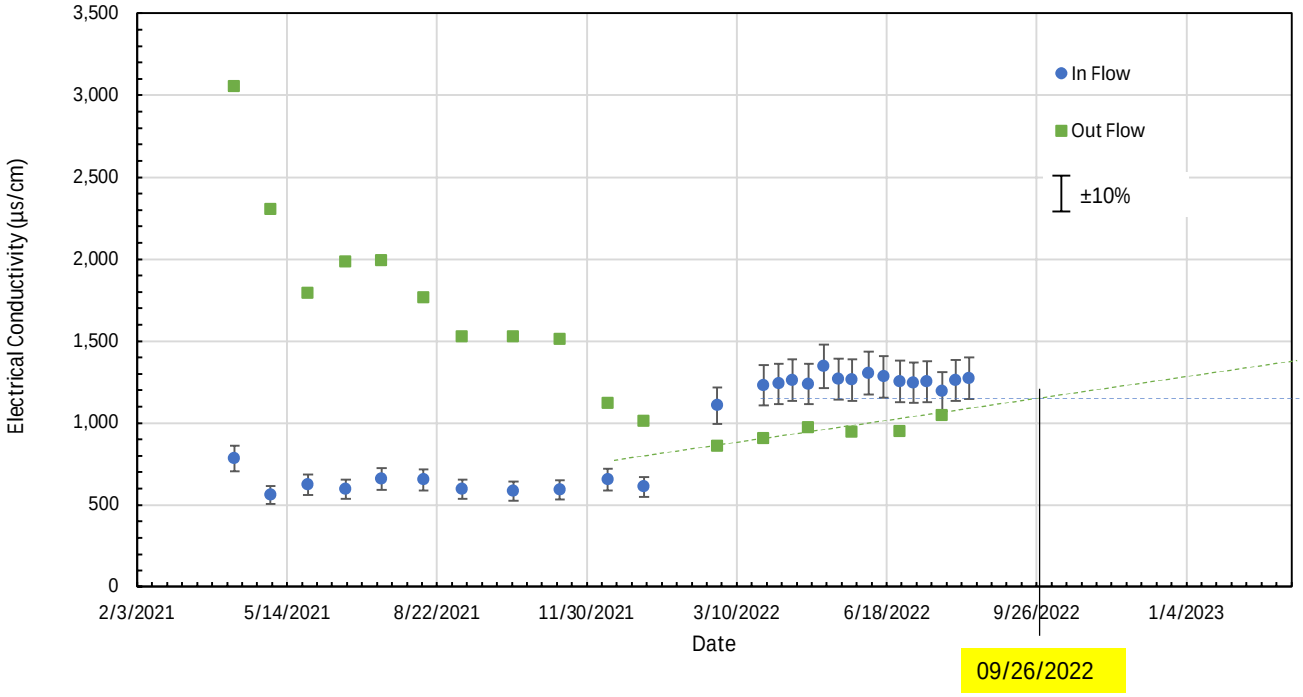
Figure 9



B2-ST-1 (1-3') Electrical Conductivity (EC) with Time

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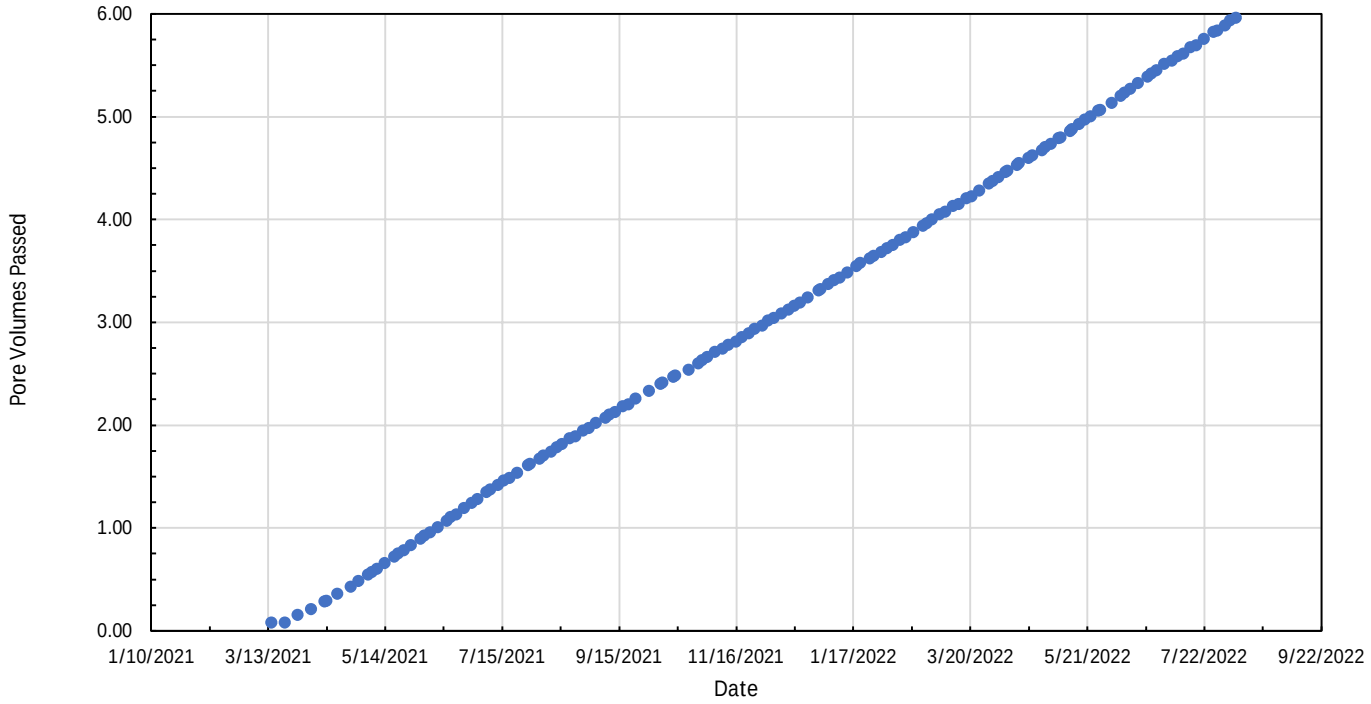
Figure 10



B2-ST-4 (47-49') PV of Flow With Time

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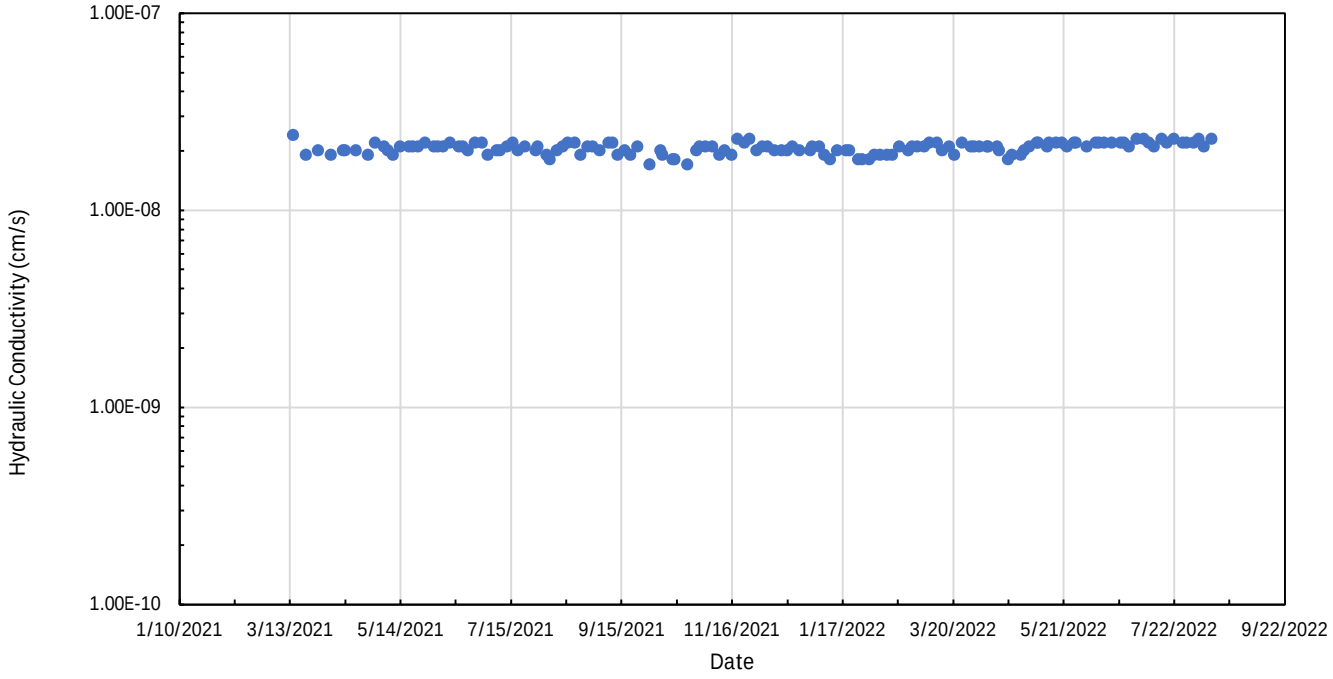
Figure

11

8/1/2022	October 2021



B2-ST-4 (47-49') Hydraulic Conductivity with Time

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EAST CHINA TOWNSHIP, MICHIGAN

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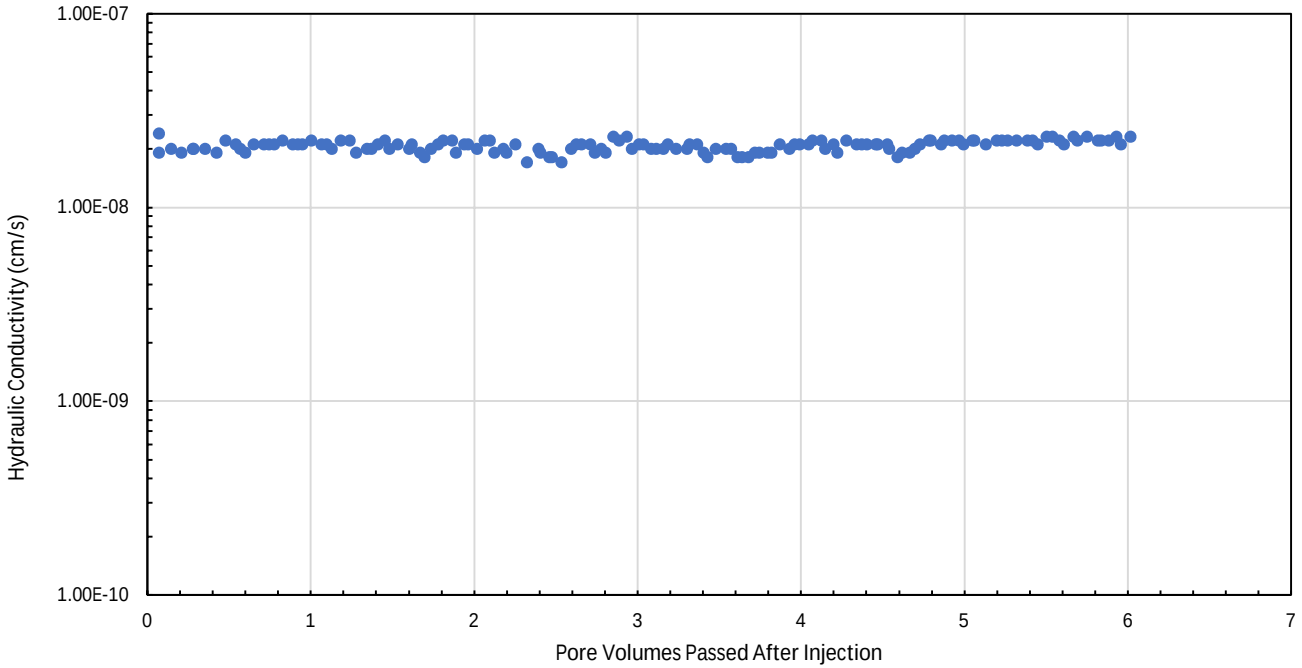
Figure 12



B2-ST-4 (47-49') Hydraulic Conductivity with PV

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Figure

13

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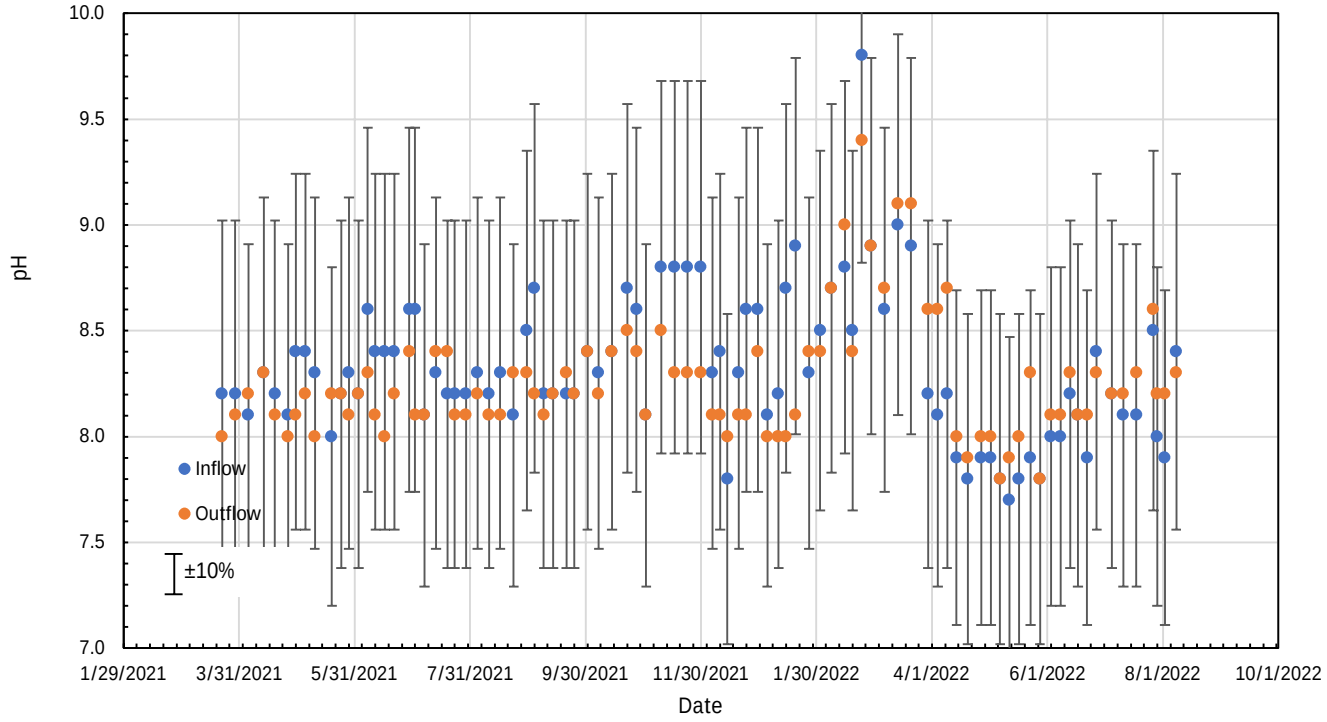

B2-ST-4 (47-49') pH of Inflow and Outflow with Time

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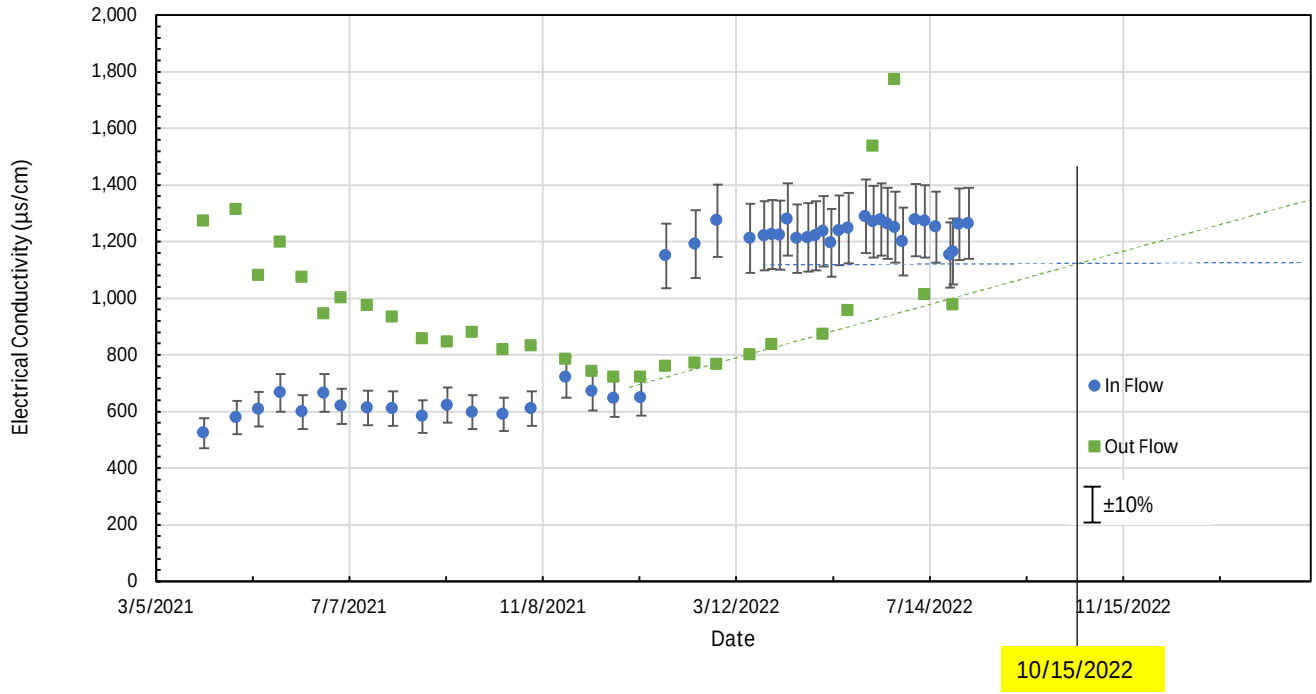
Figure 14



B2-ST-4 (47-49') Electrical Conductivity (EC) with Time

BELLE RIVER POWER PLANT
EAST CHINA TOWNSHIP, MICHIGAN

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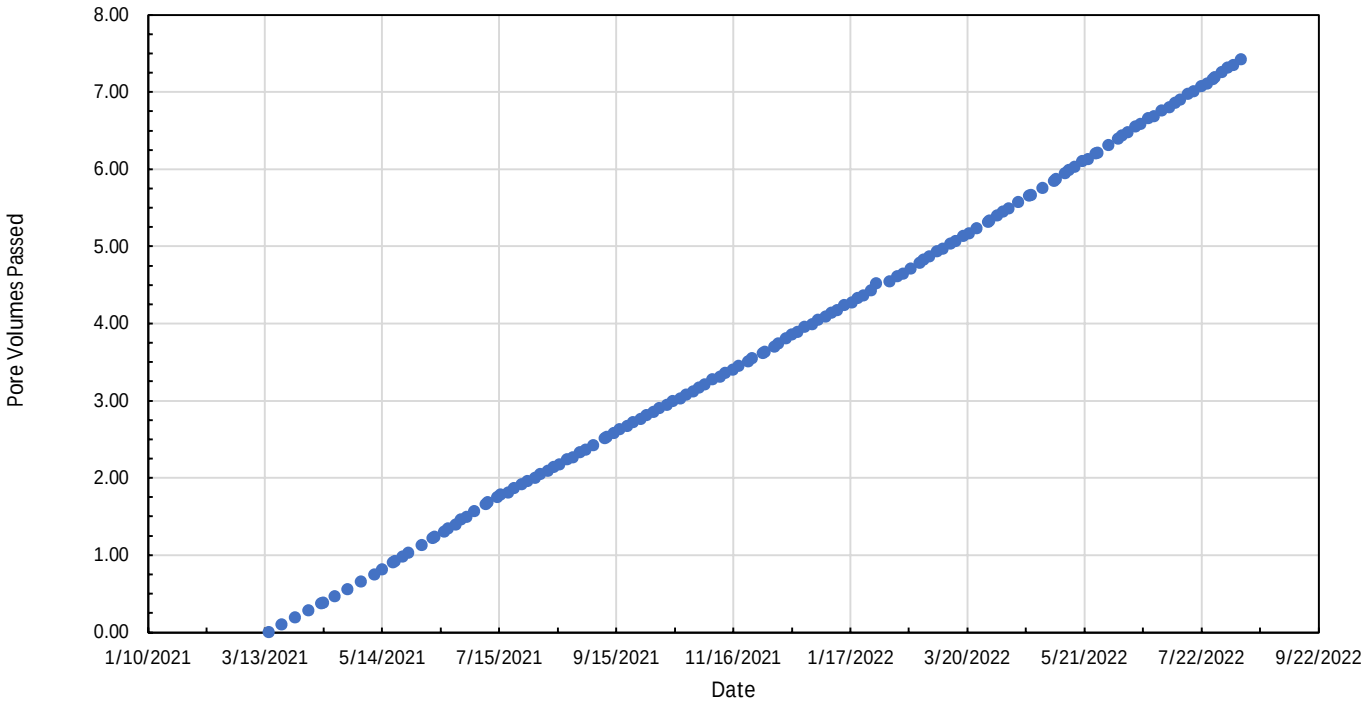
Figure 15



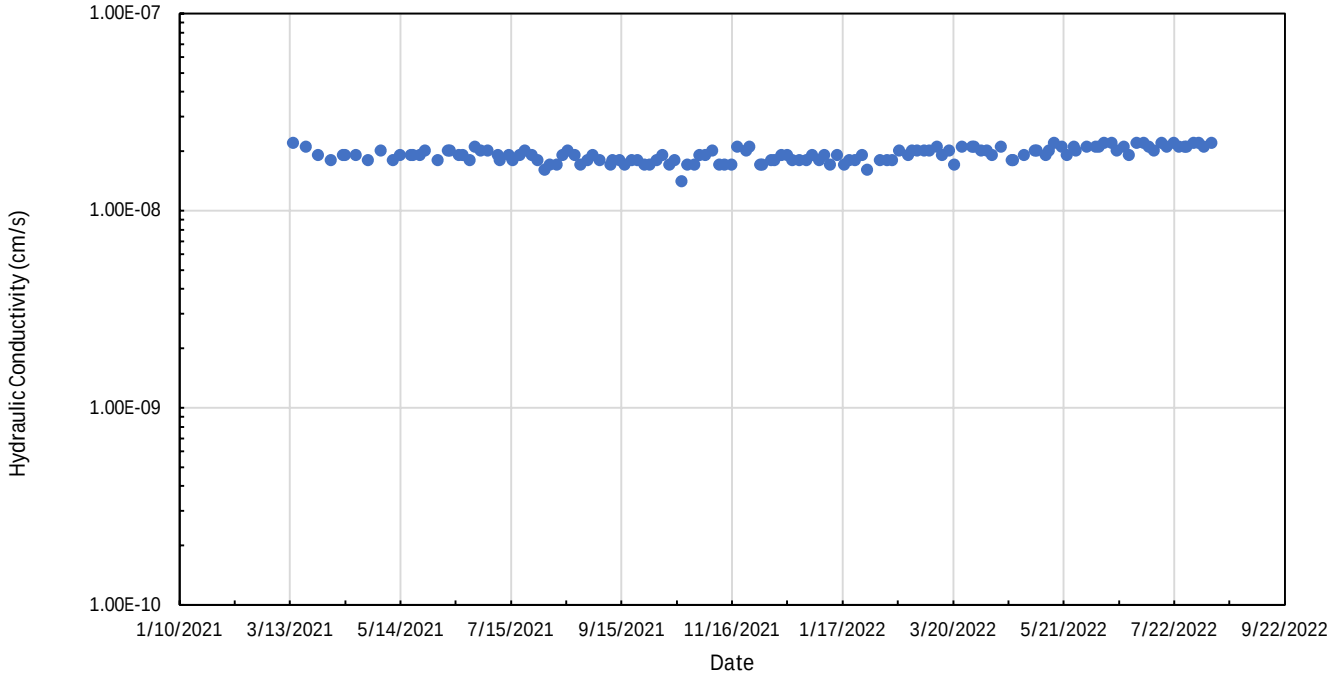
B3-ST-5 (77-79') PV of Flow with Time

BELLE RIVER POWER PLANT
EAST CHINA TOWNSHIP, MICHIGAN

Geosyntec consultants

Ann Arbor, MI | August 2022

Figure 16



B3-ST-5 (77-79') Hydraulic Conductivity with Time

BELLE RIVER POWER PLANT
EAST CHINA TOWNSHIP, MICHIGAN

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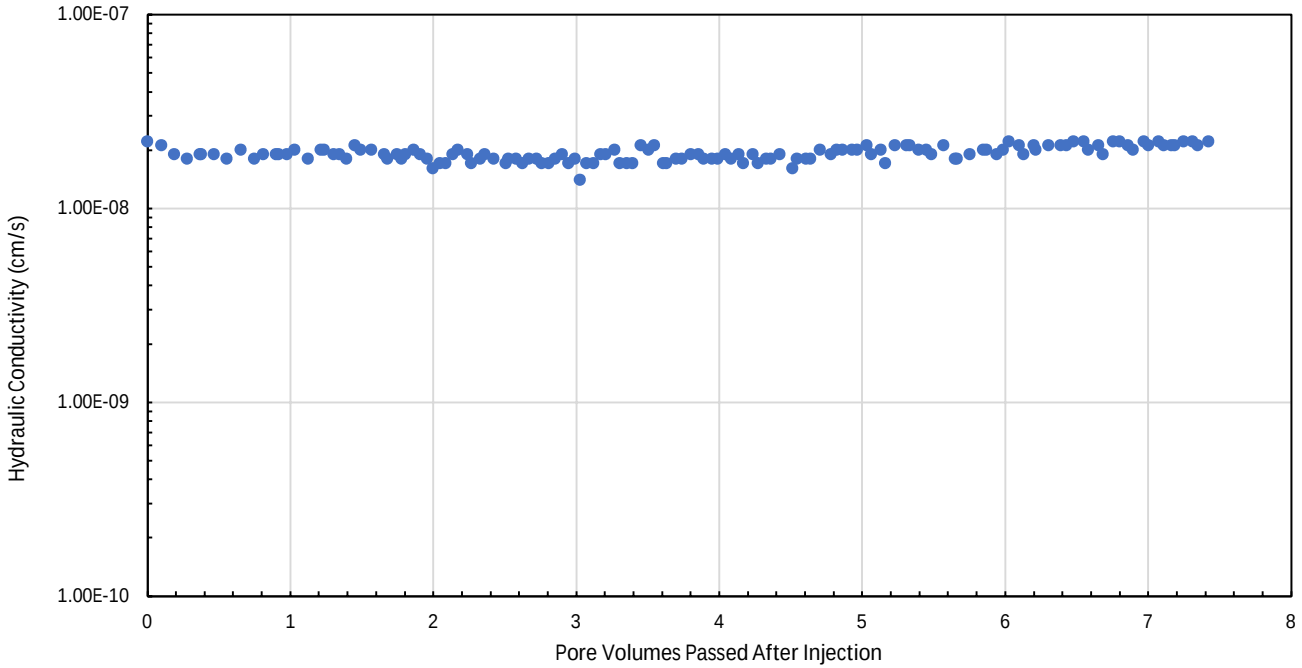
Figure 17



B3-ST-5 (77-79') Hydraulic Conductivity with PV

BELLE RIVER POWER PLANT
EAST CHINA TOWNSHIP, MICHIGAN

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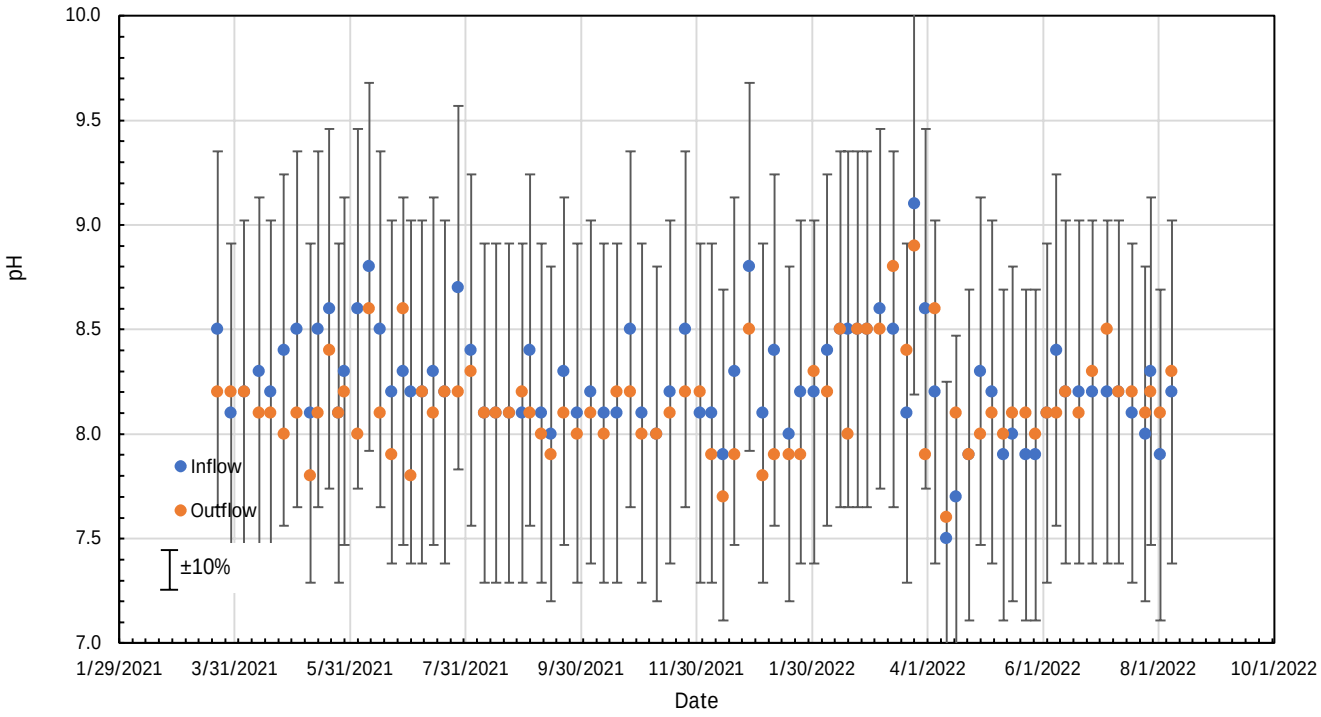
Ann Arbor, MI | August 2022

Figure 18



B3-ST-5 (77-79') pH of Inflow and Outflow with Time

BELLE RIVER POWER PLANT
EAST CHINA TOWNSHIP, MICHIGAN

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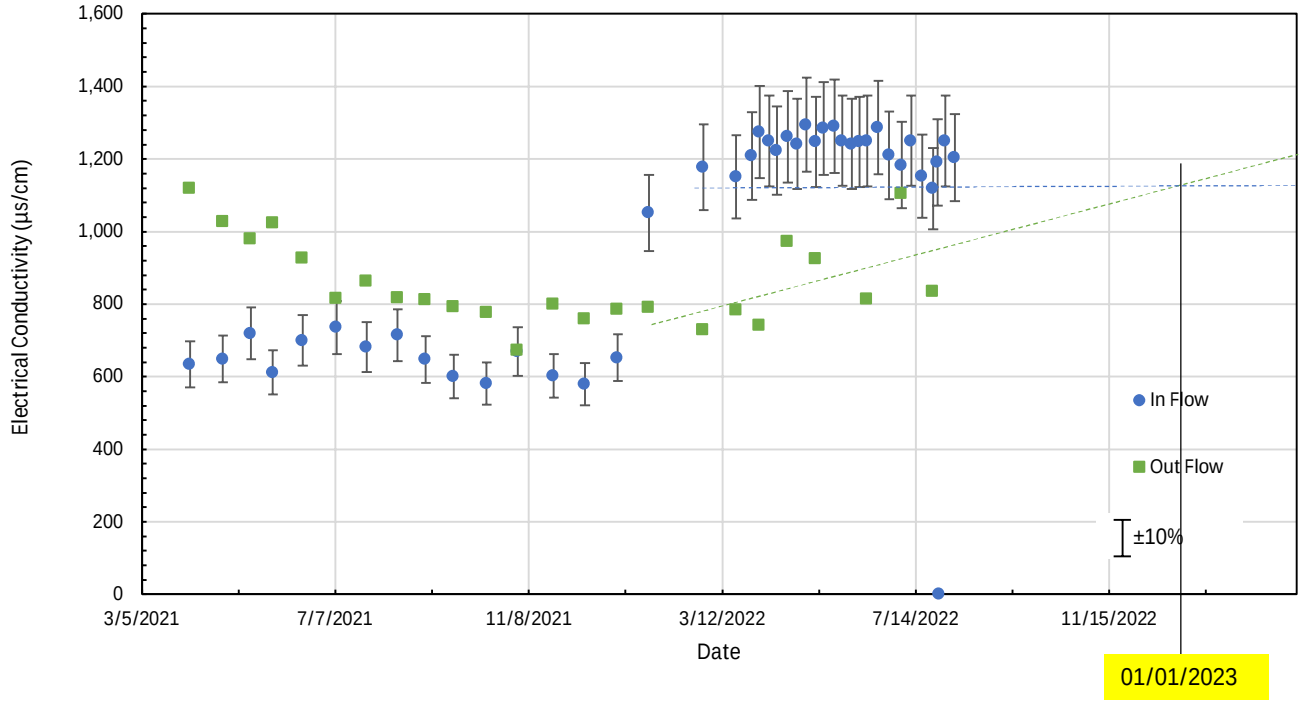
Figure 19



B3-ST-5 (77-79') Electrical Conductivity (EC) with Time

BELLE RIVER POWER PLANT
EAST CHINA TOWNSHIP, MICHIGAN

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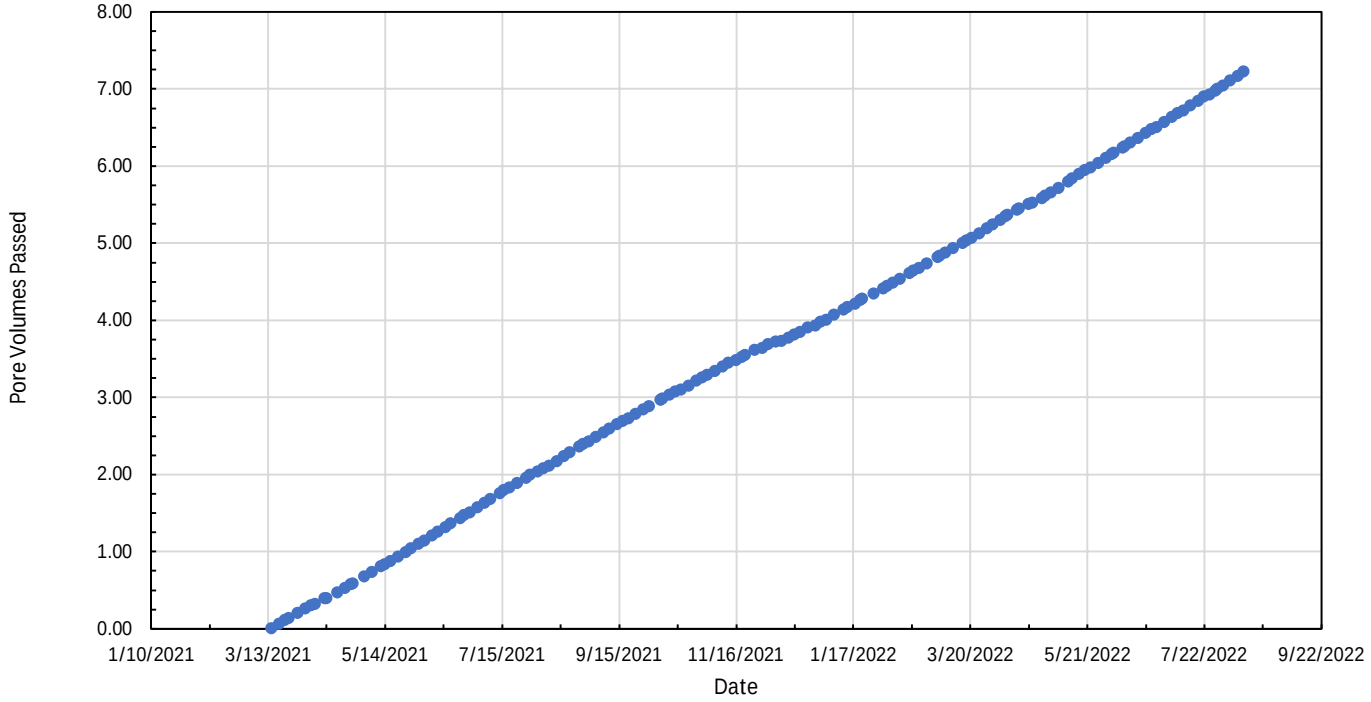
Figure 20



B4-ST-3 (47-49') PV of Flow With Time

BELLE RIVER POWER PLANT
EAST CHINA TOWNSHIP, MICHIGAN

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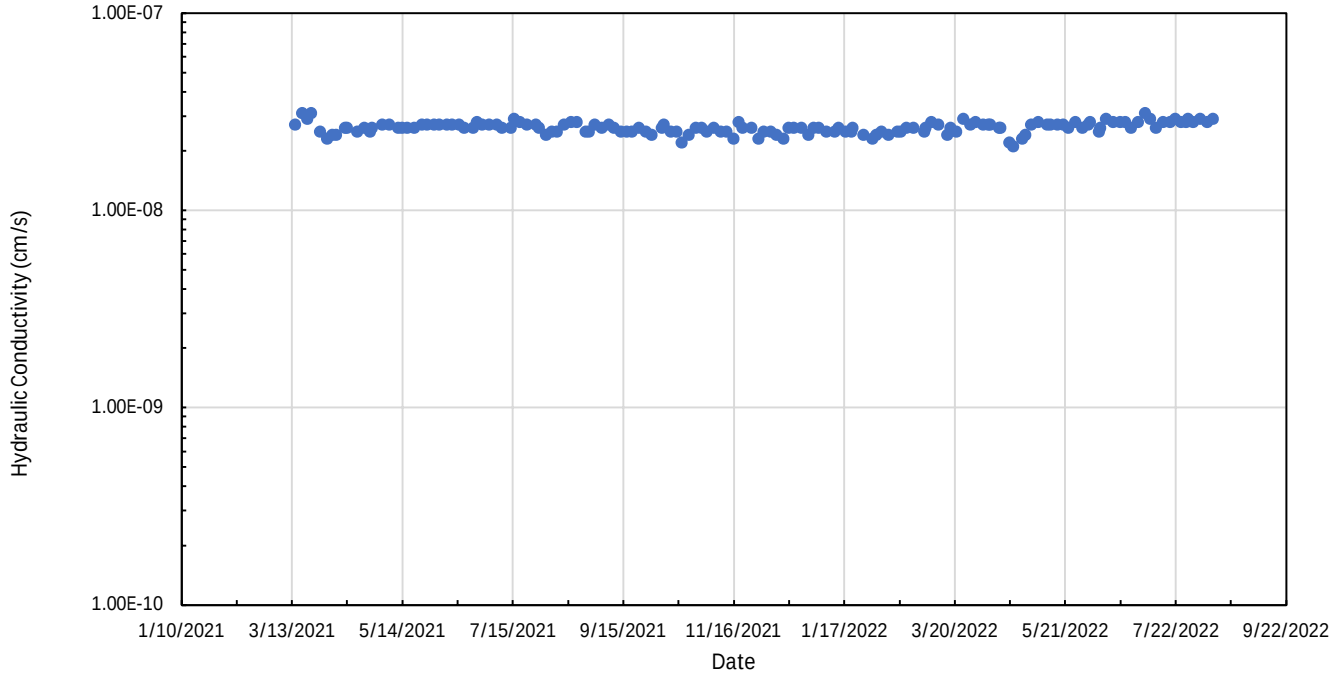
Figure 21



B4-ST-3 (47-49') Hydraulic Conductivity with Time

BELLE RIVER POWER PLANT
EAST CHINA TOWNSHIP, MICHIGAN

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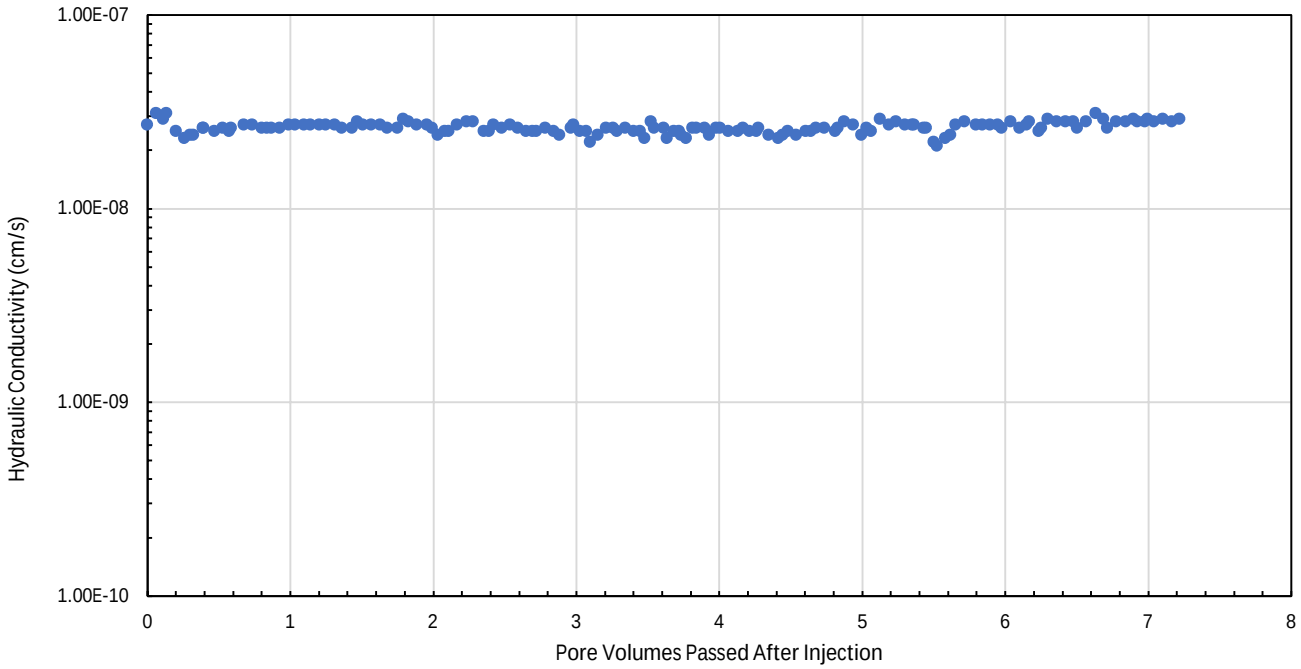
Figure 22



B4-ST-3 (47-49') Hydraulic Conductivity with PV

BELLE RIVER POWER PLANT
EAST CHINA TOWNSHIP, MICHIGAN

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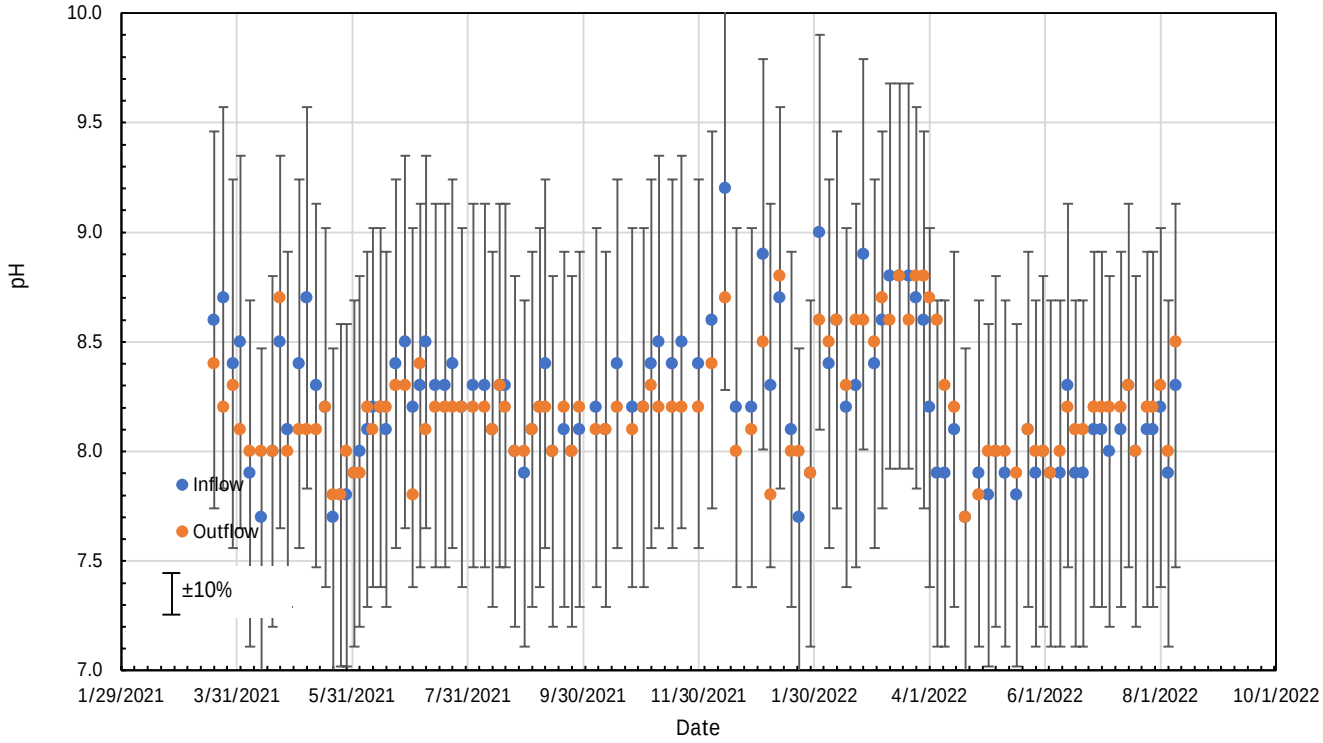
Ann Arbor, MI | August 2022

Figure 23



B4-ST-3 (47-49') pH of Inflow and Outflow with Time

BELLE RIVER POWER PLANT
EAST CHINA TOWNSHIP, MICHIGAN

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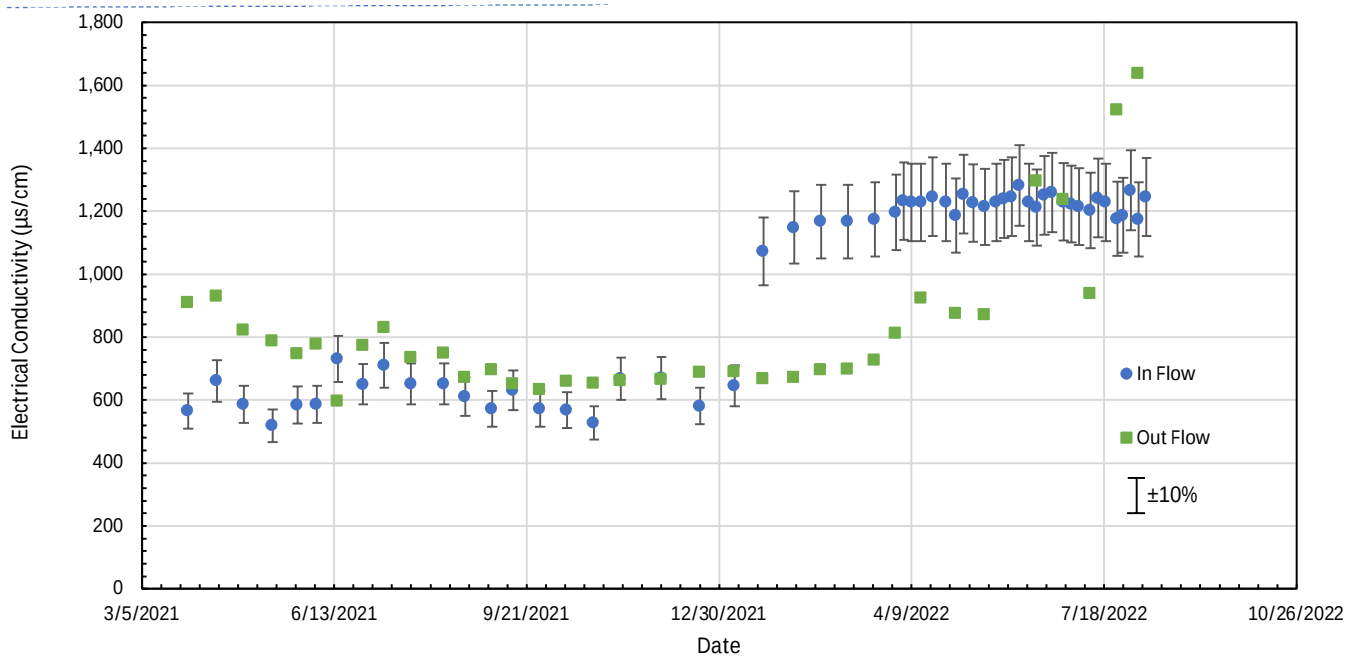
Figure 24



B4-ST-3 (47-49') Electrical Conductivity (EC) with Time

BELLE RIVER POWER PLANT
EAST CHINA TOWNSHIP, MICHIGAN

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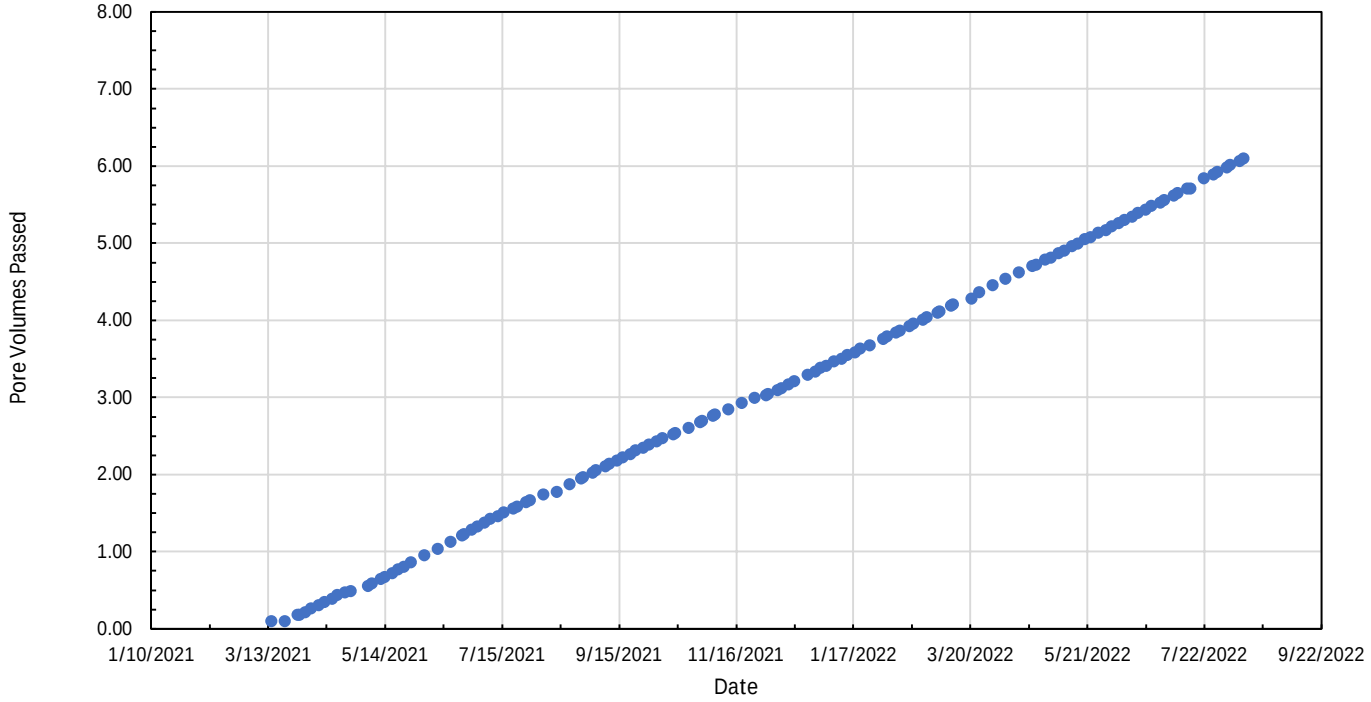
Figure 25



B5-ST-5 (87-89') PV of Flow with Time

BELLE RIVER POWER PLANT
EAST CHINA TOWNSHIP, MICHIGAN

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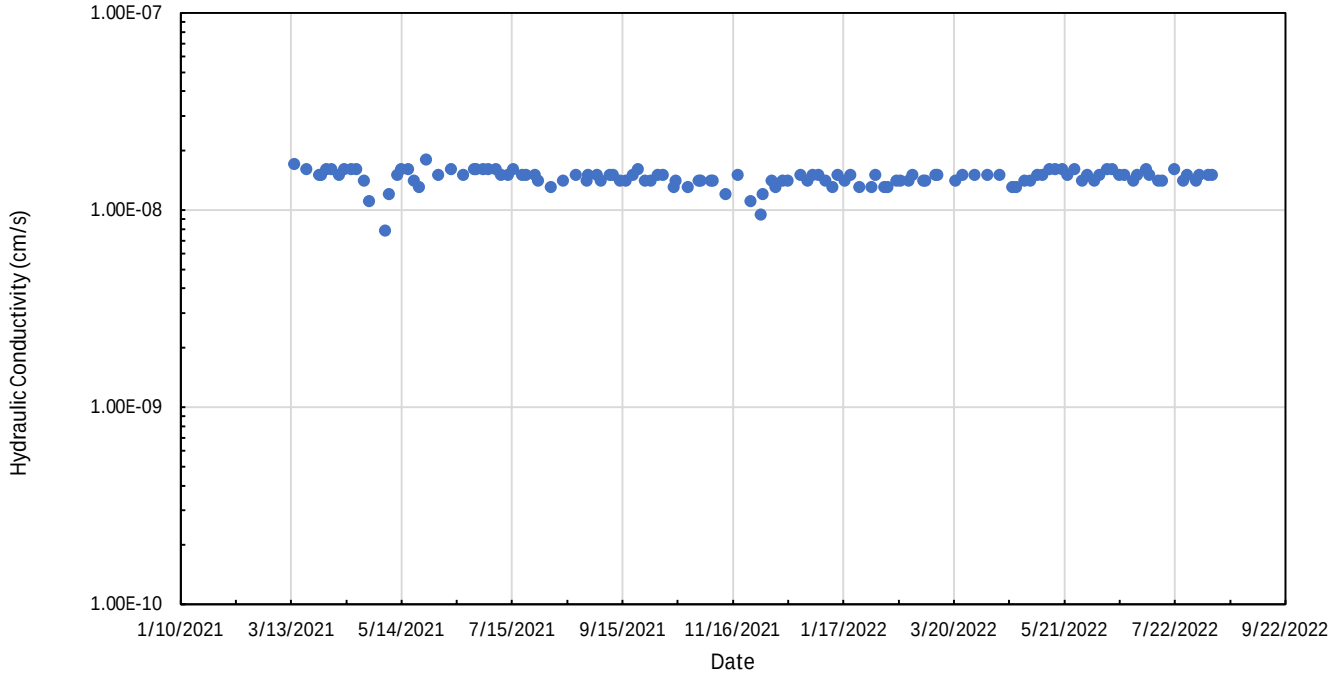
Ann Arbor, MI | August 2022

Figure 26



B5-ST-5 (87-89') Hydraulic Conductivity with Time

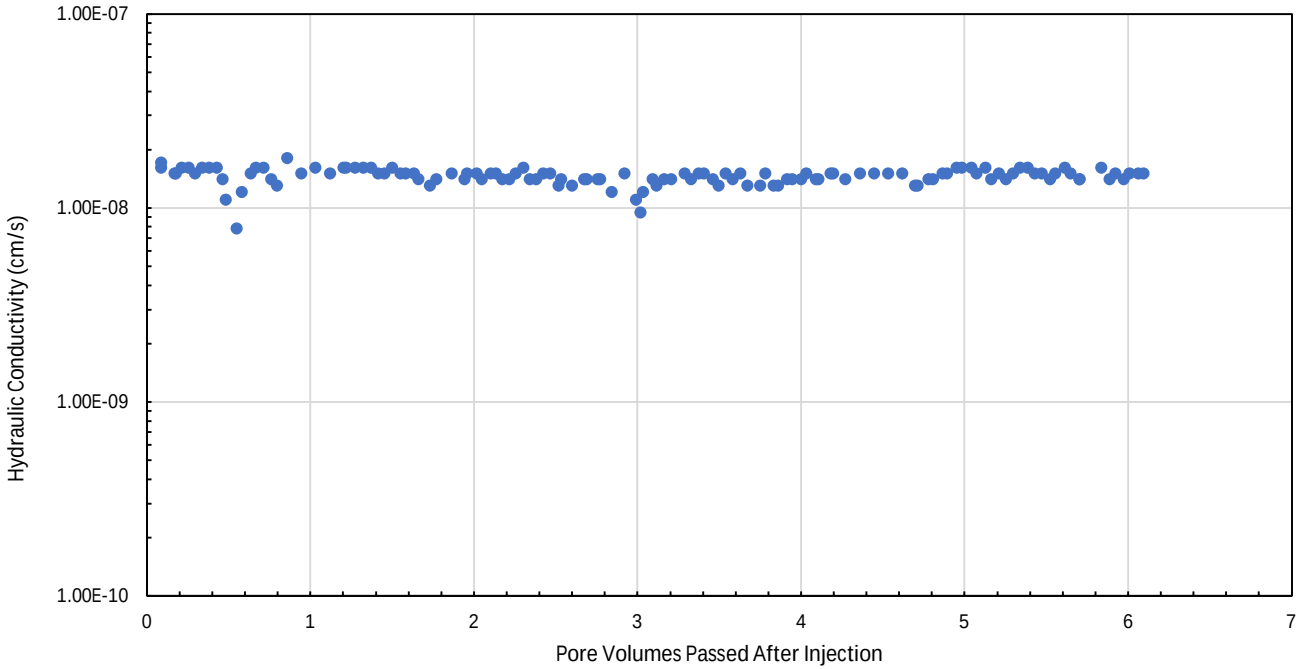
BELLE RIVER POWER PLANT
EAST CHINA TOWNSHIP, MICHIGAN

Geosyntec consultants

Figure

27

Ann Arbor, MI | August 2022



B5-ST-5 (87-89') Hydraulic Conductivity with PV

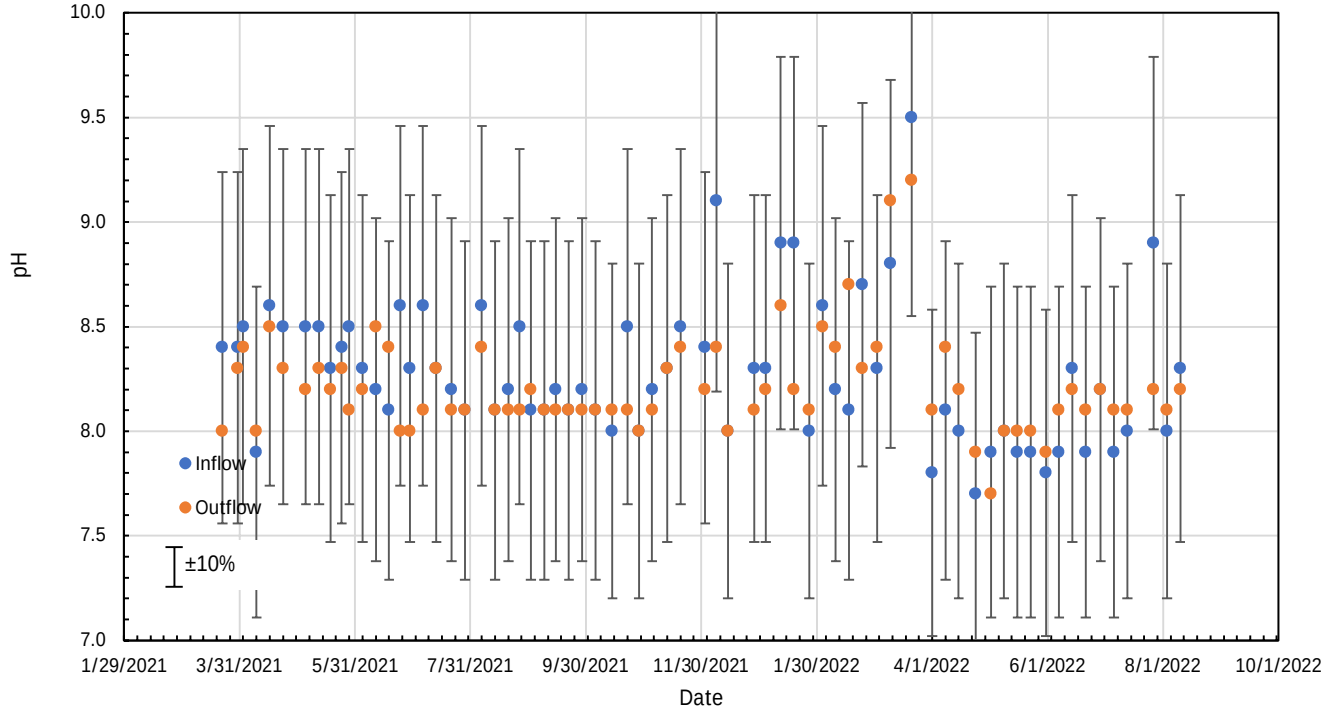
BELLE RIVER POWER PLANT
EAST CHINA TOWNSHIP, MICHIGAN

Geosyntec consultants

Figure

28

Ann Arbor, MI | August 2022



B5-ST-5 (87-89') pH of Inflow and Outflow with Time

BELLE RIVER POWER PLANT
EAST CHINA TOWNSHIP, MICHIGAN

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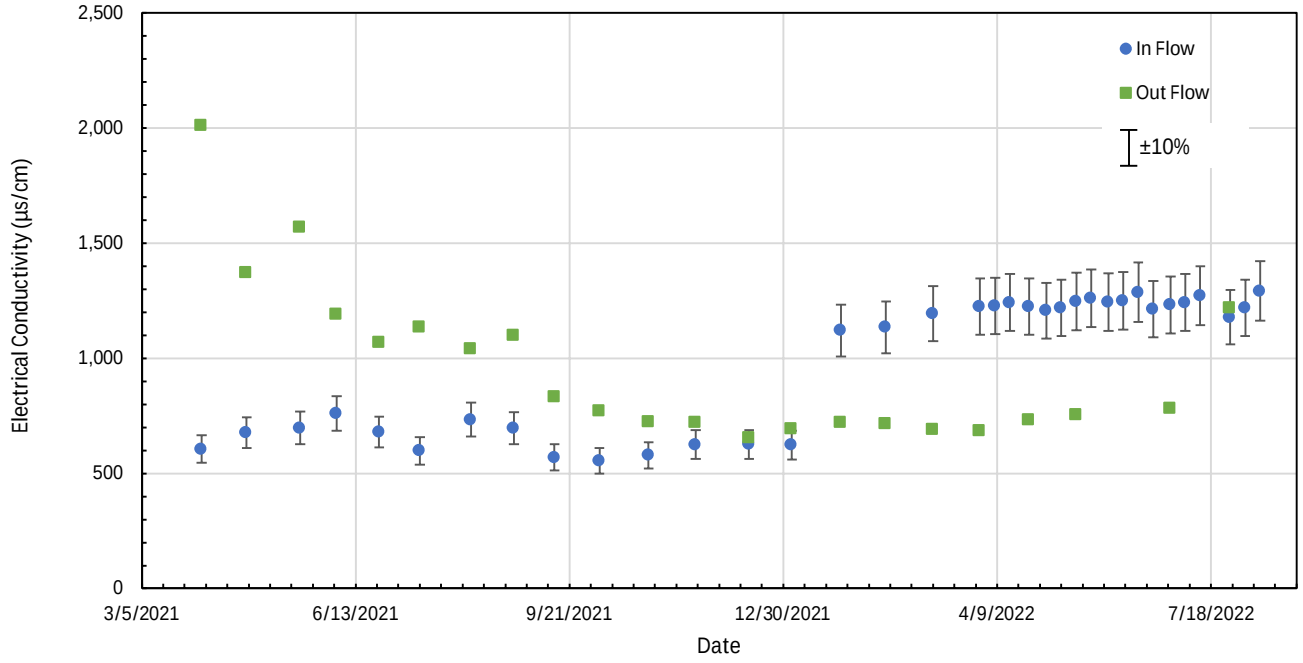
Ann Arbor, MI | August 2022

Figure 29



B5-ST-5 (87-89') Electrical Conductivity (EC) with Time

BELLE RIVER POWER PLANT
EAST CHINA TOWNSHIP, MICHIGAN

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Ann Arbor, MI | August 2022

Figure 30

APPENDIX A

Invoice Number	Invoice Date	Account Number	Page
7-221-87386	Dec 22, 2020	2970-2196-6	1 of 4

Billing Address:
GEOSYNTEC CONSULTANTS
SONYA BRIGGS
900 BROKEN SOUND PKWY STE 200
BOCA RATON FL 33487-3513

Shipping Address:
GEOSYNTEC CONSULTANTS
2100 COMMONWEALTH BLVD STE 100
ANN ARBOR MI 48105-1574

Invoice Questions?
Contact FedEx Revenue Services
Phone: 800.622.1147
M-F 7 AM to 8 PM CST
Sa 7 AM to 6 PM CST
Internet: fedex.com

Invoice Summary

FedEx Express Services

Total Charges	USD	$2,044.19
TOTAL THIS INVOICE	**USD**	**$2,044.19**

You saved $3,095.71 in discounts this period!

Shipments included in this invoice received an earned discount. If you would like to know how it was calculated, please go to the following URL: https://www.fedex.com/EarnedDiscounts/.
Other discounts may apply.

Detailed descriptions of surcharges can be located at fedex.com

To ensure proper credit, please return this portion with your payment to FedEx.
Please do not staple or fold.
Please make check payable to FedEx.

Invoice Number	Invoice Amount	Account Number
7-221-87386	USD $2,044.19	2970-2196-6

Remittance Advice

Your payment is due by Jan 06, 2021

7221873867000204419629702196690000000000000020441960

GEOSYNTEC CONSULTANTS
SONYA BRIGGS
900 BROKEN SOUND PKWY STE 200
BOCA RATON FL 33487-3513

FedEx
P.O. Box 660481
DALLAS TX 75266-0481

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	2	88.0	502.48	67.64		-331.63	238.49
Total	**2**	**88.0**	**$502.48**	**$67.64**		**-$331.63**	**$238.49**

FedEx Express Multiweight Shipments (Original)

Reference	Packages	Rated Weight lbs	Transportation Charges	Special Handling Charges	Ret Chg/Tax Credits/Other	Discounts	Total Charges
NO REFERENCE INFORMATION	11	698.0	4,188.00	381.78		-2,764.08	1,805.70
Total	**11**	**698.0**	**$4,188.00**	**$381.78**		**-$2,764.08**	**$1,805.70**

	Shipments	Rated Weight lbs	Transportation Charges	Special Handling Charges	Ret Chg/Tax Credits/Other	Discounts	Total Charges
Total FedEx Express	**13**	**786.0**	**$4,690.48**	**$449.42**		**-$3,095.71**	**$2,044.19**

TOTAL THIS INVOICE **USD** **$2,044.19**

FedEx Express Shipment Detail By Reference (Original)

Ship Date: Dec 17, 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 $ 1124632.95
Fuel Surcharge - FedEx has applied a fuel surcharge of 4.75% to this shipment.
Distance Based Pricing, Zone 2
Package sent from: 48170 zip code

		Sender	Recipient	
Automation	SSFO			
Tracking ID	781602453566	Mike Coram	ALS Enviornmental	
Service Type	FedEx Priority Overnight	SUITE 100	Attn: Recieving	
Package Type	Customer Packaging	ANN ARBOR MI 48105 US	3352 128th Ave	
Zone	02		HOLLAND MI 49424 US	
Packages	1			
Rated Weight	31.0 lbs, 14.1 kgs	Transportation Charge		82.15

Continued on next page

Tracking ID: 781602453566 continued

Declared Value	USD 500.00	Discount		-46.00
Delivered	Dec 18, 2020 10:10	Earned Discount		-8.22
Svc Area	A4	Fuel Surcharge		2.18
Signed by	A.WIERENGA	Direct Signature		0.00
FedEx Use	000000000/1486/_	Additional Handling Charge - Package		13.00
		Declared Value Charge		5.25
		Peak - AHS Charge		4.90
		Total Charge	**USD**	**$53.26**

Ship Date: Dec 17, 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 $ 1124632.95
Fuel Surcharge - FedEx has applied a fuel surcharge of 4.75% to this shipment.
Distance Based Pricing, Zone 6
Package sent from: 48170 zip code

		Sender	**Recipient**	
Automation	SSFO	Mike Coram	ALS Ft. Collins	
Tracking ID	781602649731	SUITE 100	Attn: Sample Recieving	
Service Type	FedEx Priority Overnight	ANN ARBOR MI 48105 US	225 Commerce Dr	
Package Type	Customer Packaging		FORT COLLINS CO 80524 US	
Zone	06			
Packages	1			
Rated Weight	57.0 lbs, 25.9 kgs	Transportation Charge		420.33
Declared Value	USD 500.00	Discount		-235.38
Delivered	Dec 18, 2020 12:04	Earned Discount		-42.03
Svc Area	A2	Fuel Surcharge		8.16
Signed by	T.YLER	Direct Signature		0.00
FedEx Use	000000000/1574/_	Declared Value Charge		5.25
		Additional Handling Charge - Weight		24.00
		Peak - AHS Charge		4.90
		Total Charge	**USD**	**$185.23**

NO REFERENCE INFORMATION Reference Subtotal USD $238.49

FedEx Express Multiweight - Third Party Detail (Original)

Ship Date: Dec 17, 2020 **Service Type:** FedEx Priority Overnight **Svc Area:** A1
Payor: Third Party **Rate Method:** Hundredwt **Rated Wgt:** 698.0 lbs, 316.6 kgs
Bundle ID: 2317461 **Zone:** 04 **# Packages:** 11
Package Type: Customer Packaging **Automation:** SSFO

Sender	**Recipient**
Sean Karoly	Nader S. Rad
Geosyntec Consultants	Excel Geotechnical Testing inc
SUITE 100	953 Forrest st
ANN ARBOR MI 48105 US	ROSWELL GA 30075 US

Tracking ID	Delivered/Signed By	Rated Weight/Actual Weight	Declared Value	FedEx Use	Cust. Ref./Ref.#2/Ref.#3/RMA #	Amount
781594706019	Dec 18, 2020 11:51 R.RAMINRY	69.0 lbs, 31.3 kgs	USD 1.00	000000000/1530/_	NO REFERENCE INFORMATION	177.75

The Earned Discount for this ship date has been calculated based on a revenue threshold of $ 1124632.95
Fuel Surcharge - FedEx has applied a fuel surcharge of 4.75% 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.

781594706030	Dec 18, 2020 11:51 R.RAMINRY	78.0 lbs, 35.4 kgs	USD 1.00	000000000/1530/_	NO REFERENCE INFORMATION	197.16

The Earned Discount for this ship date has been calculated based on a revenue threshold of $ 1124632.95
Fuel Surcharge - FedEx has applied a fuel surcharge of 4.75% 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.

781594705983	Dec 18, 2020 11:51 R.RAMINRY	71.0 lbs, 32.2 kgs	USD 1.00	000000000/1530/_	NO REFERENCE INFORMATION	182.06

The Earned Discount for this ship date has been calculated based on a revenue threshold of $ 1124632.95
Fuel Surcharge - FedEx has applied a fuel surcharge of 4.75% 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.

781594705961	Dec 18, 2020 11:51 R.RAMINRY	30.0 lbs, 13.6 kgs 24.0 lbs, 10.9 kgs	USD 1.00	000000000/1530/_	NO REFERENCE INFORMATION	84.62

The Earned Discount for this ship date has been calculated based on a revenue threshold of $ 1124632.95
Fuel Surcharge - FedEx has applied a fuel surcharge of 4.75% 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 30.0 lbs, 50 in x 9 in x 9 in, using a dimensional factor of 139.

781594705972	Dec 18, 2020 11:51 R.RAMINRY	64.0 lbs, 29.0 kgs	USD 1.00	000000000/1530/_	NO REFERENCE INFORMATION	166.97

The Earned Discount for this ship date has been calculated based on a revenue threshold of $ 1124632.95
Fuel Surcharge - FedEx has applied a fuel surcharge of 4.75% 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.

781594705994	Dec 18, 2020 11:51 R.RAMINRY	77.0 lbs, 34.9 kgs	USD 1.00	000000000/1530/_	NO REFERENCE INFORMATION	195.01

The Earned Discount for this ship date has been calculated based on a revenue threshold of $ 1124632.95
Fuel Surcharge - FedEx has applied a fuel surcharge of 4.75% 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.

781594706020	Dec 18, 2020 11:51 R.RAMINRY	64.0 lbs, 29.0 kgs	USD 1.00	000000000/1530/_	NO REFERENCE INFORMATION	166.97

The Earned Discount for this ship date has been calculated based on a revenue threshold of $ 1124632.95
Fuel Surcharge - FedEx has applied a fuel surcharge of 4.75% 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.

781594706008	Dec 18, 2020 11:51 R.RAMINRY	75.0 lbs, 34.0 kgs	USD 1.00	000000000/1530/_	NO REFERENCE INFORMATION	190.69

The Earned Discount for this ship date has been calculated based on a revenue threshold of $ 1124632.95
Fuel Surcharge - FedEx has applied a fuel surcharge of 4.75% 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.

781594706041	Dec 18, 2020 11:51 R.RAMINRY	65.0 lbs, 29.5 kgs	USD 1.00	000000000/1530/_	NO REFERENCE INFORMATION	169.13

The Earned Discount for this ship date has been calculated based on a revenue threshold of $ 1124632.95
Fuel Surcharge - FedEx has applied a fuel surcharge of 4.75% 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.

781594705950	Dec 18, 2020 11:51 R.RAMINRY	30.0 lbs, 13.6 kgs 24.0 lbs, 10.9 kgs	USD 1.00	000000000/1530/_	NO REFERENCE INFORMATION	84.62

The Earned Discount for this ship date has been calculated based on a revenue threshold of $ 1124632.95
Fuel Surcharge - FedEx has applied a fuel surcharge of 4.75% 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 30.0 lbs, 50 in x 9 in x 9 in, using a dimensional factor of 139.

781594706052	Dec 18, 2020 11:51 R.RAMINRY	75.0 lbs, 34.0 kgs	USD 1.00	000000000/1530/_	NO REFERENCE INFORMATION	190.72

The Earned Discount for this ship date has been calculated based on a revenue threshold of $ 1124632.95
Fuel Surcharge - FedEx has applied a fuel surcharge of 4.75% 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.

Transportation Charge		4188.00
Declared Value Charge		0.00
Fuel Surcharge		81.88
Discount		-2345.28
Earned Discount		-418.80
Additional Handling Charge - Weight		216.00
Additional Handling Charge - Dimensions		30.00
Peak - AHS Charge		53.90
Total Charge	**USD**	**$1,805.70**

Multiweight - Third Party Subtotal	**USD**	**$1,805.70**
Total FedEx Express	**USD**	**$2,044.19**

APPENDIX B

ALTERNATE LINER INVESTIGATION LABORATORY STUDY - BELLE RIVER

BORING NO	SAMPLE NO	Sample Interval (ft bgs)	Shelby Tube Recovery (ft)	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-ST-1	7-9	Full		1	1	1	1	1	1	1
	B-1-ST-2	19-21	Full		1						
	B-1-ST-3	36-38	1.5	soft	1	1			1	1	
	B-1-ST-4	57-59	1	med. Stiff	1						
	B-1-ST-5	80-82	0.5		1						
	B-1-ST-6	98-100	Full		1						
	B-1-1	3		hard clay	1	1			1		
	B-1-2	6		hard clay	1						
	B-1-3	10		hard clay	1						
	B-1-4	15		very stiff clay	1						
	B-1-5	22		med. Stiff	1						
	B-1-6	25		med. Stiff	1	1			1		
	B-1-7	34		soft	1						
	B-1-8	40		soft	1						
	B-1-9	48		soft	1	1			1		
	B-1-10	52		soft	1						
	B-1-11	59		med. Stiff	1	1			1		
	B-1-12	63		med. Stiff	1						
	B-1-13	74		stiff	1						
	B-1-14	80		stiff	1						
	B-1-15	82		stiff	1						
	B-1-16	85		stiff	1	1			1		
	B-1-17	87		stiff	1						
	B-1-18	94		stiff	1						
2	B-2-ST-1	1-3	Full		1	1	1	1	1	1	1
	B-2-ST-2	7-9	Full		1	1			1	1	
	B-2-ST-3	27-29	Full		1						
	B-2-ST-4	47-49	Full		1	1	1	1	1	1	1
	B-2-ST-5	67-69	Full		1						
	B-2-ST-6	77-79	Full		1						
	B-2-ST-7	97-99	Full		1						
	B-2-1	1		hard clay	1						
	B-2-2	5		hard clay	1	1			1		
	B-2-3	10		hard clay	1						
	B-2-4	12		very stiff clay	1						
	B-2-5	18		very stiff clay	1	1			1		
	B-2-6	24		med. Stiff	1						
	B-2-7	32		soft	1						
	B-2-8	40		soft	1	1			1		
	B-2-9	46		soft	1						

Note: The initial testing program was provided to EGT on December 22, 2020 and completed on March 3, 2021.

ALTERNATE LINER INVESTIGATION LABORATORY STUDY - BELLE RIVER

BORING NO	SAMPLE NO	Sample Interval (ft bgs)	Shelby Tube Recovery (ft)	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)
2	B-2-10	50		soft/stiff	1						
	B-2-11	54		stiff	1						
	B-2-12	60		stiff	1	1			1		
	B-2-13	64		stiff	1						
	B-2-14	70		stiff	1						
	B-2-15	75		stiff	1						
	B-2-16	80		stiff	1	1			1		
	B-2-17	86		stiff	1						
	B-2-18	91		very stiff clay	1						
	B-2-19	96		very stiff clay	1						
3	B-3-ST-1	1-3	Full		1	1			1	1	
	B-3-ST-2	7-9	Full		1						
	B-3-ST-3	27-29	Full		1						
	B-3-ST-4	47-49	Full		1						
	B-3-ST-5	77-79	Full		1	1	1	1	1	1	1
	B-3-ST-6	97-99	Full		1	1			1	1	
	B-3-1	1		gravelly sand	1						
	B-3-2	5		hard clay	1	1			1		
	B-3-3	10		very stiff clay	1						
	B-3-4	15		med. Stiff	1						
	B-3-5	20		med. Stiff	1						
	B-3-6	25		med. Stiff	1	1			1		
	B-3-7	30		med. Stiff	1						
	B-3-8	35		med. Stiff	1						
	B-3-9	40		med. Stiff	1						
	B-3-10	45		med. Stiff	1	1			1		
	B-3-11	50		med. Stiff	1						
	B-3-12	55		med. Stiff	1						
	B-3-13	60		med. Stiff	1						
	B-3-14	67		silty sand	1	1					
	B-3-15	70		silty sand	1						
	B-3-16	75		stiff clay	1						
	B-3-17	80		stiff clay	1						
	B-3-18	85		very stiff clay	1	1			1		
	B-3-19	90		very stiff clay	1						
	B-3-20	95		very stiff clay	1						
4	B-4-ST-1	7-9	Full		1						
	B-4-ST-2	27-29	Full		1						
	B-4-ST-3	47-49	Full		1	1	1	1	1	1	1
	B-4-ST-4	67-69	Full		1	1			1	1	
	B-4-ST-5	87-89	Full		1						

Note: The initial testing program was provided to EGT on December 22, 2020 and completed on March 3, 2021.

ALTERNATE LINER INVESTIGATION LABORATORY STUDY - BELLE RIVER

BORING NO	SAMPLE NO	Sample Interval (ft bgs)	Shelby Tube Recovery (ft)	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-ST-6	97-99	Full		1						
	B-4-1	10		hard clay	1	1			1		
	B-4-2	12		stiff clay	1						
	B-4-3	15		med. Stiff	1						
	B-4-4	20		med. Stiff	1						
	B-4-5	25		med. Stiff	1						
	B-4-6	30		med. Stiff	1						
	B-4-7	34		silty sand	1	1					
	B-4-8	36		med. Stiff	1						
	B-4-9	40		med. Stiff	1						
	B-4-10	45		med. Stiff	1						
	B-4-11	50		med. Stiff	1						
	B-4-12	55		med. Stiff	1	1			1		
	B-4-13	60		med. Stiff	1						
	B-4-14	65		med. Stiff	1						
	B-4-15	70		med. Stiff	1						
	B-4-16	75		stiff clay	1	1			1		
	B-4-17	80		very stiff clay	1						
	B-4-18	85		very stiff clay	1						
	B-4-19	90		stiff clay	1						
	B-4-20	95		stiff clay	1	1			1		
5	B-5-ST-1	1-3	13"		1						
	B-5-ST-2	27-29	Full		1	1			1	1	
	B-5-ST-3	47-49	Full		1						
	B-5-ST-4	67-69	Full		1						
	B-5-ST-5	87-89	Full		1	1	1	1	1	1	1
	B-5-ST-6	97-99	Full		1						
	B-5-1	7		hard clay	1	1			1		
	B-5-2	14		med. Stiff	1						
	B-5-3	21		med. Stiff	1						
	B-5-4	29		med. Stiff	1	1			1		
	B-5-5	32		stiff	1						
	B-5-6	37		stiff	1						
	B-5-7	42		stiff	1						
	B-5-8	46		stiff	1						
	B-5-9	52		stiff	1	1			1		
	B-5-10	57		stiff	1						
	B-5-11	62		med. Stiff	1						
	B-5-12	66		med. Stiff	1						
	B-5-13	72		stiff	1	1			1		
	B-5-14	77		stiff	1						
	B-5-15	82		stiff	1						

BORING NO	SAMPLE NO	Sample Interval (ft bgs)	Shelby Tube Recovery (ft)	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)
5	B-5-16	86		stiff	1						
	B-5-17	92		very stiff clay	1	1			1		
	B-5-18	96		very stiff clay	1						
	B-5-19	99		very stiff clay	1						
6	B-6-ST-1	1-3	12"		1						
	B-6-ST-2	7-9	Full		1						
	B-6-ST-3	27-29	Full		1						
	B-6-ST-4	47-49	Full		1	1			1	1	
	B-6-ST-5	67-69	Full		1						
	B-6-ST-6	87-89	Full 30"/30"		1						
	B-6-ST-7	97-99	Full 30"/30"		1	1			1	1	
	B-6-1	5		hard clay	1						
	B-6-2	10		hard clay	1						
	B-6-3	15		stiff clay	1	1			1		
	B-6-4	20		med. Stiff	1						
	B-6-5	25		med. Stiff	1						
	B-6-6	30		stiff	1						
	B-6-7	35		med. Stiff	1	1			1		
	B-6-8	40		med. Stiff	1						
	B-6-9	45		med. Stiff	1						
	B-6-10	50		med. Stiff	1						
	B-6-11	55		stiff	1	1			1		
	B-6-12	60		stiff	1						
	B-6-13	65		stiff	1						
	B-6-14	70		stiff	1						
	B-6-15	75		stiff	1	1			1		
	B-6-16	80		stiff	1						
	B-6-17	85		stiff	1						
	B-6-18	90		stiff	1						
	B-6-19	95		stiff	1	1			1		
	B-6-20	99		stiff	1						