

12 July 2019

Mr. Randy Melton
Administrator
Planning and Environmental Health & Safety
702 North Franklin Street
Tampa, FL 33602

Subject: Summary of Results – Fourth Detection Monitoring Event (March 2019)
Economizer Ash and Pyrite Pond System
Big Bend Station – Tampa Electric Company

Dear Mr. Melton,

Geosyntec Consultants, Inc. (Geosyntec) has prepared the enclosed technical memorandum to summarize the findings from the Fourth Detection Monitoring Event performed on 14 March 2019 at the Economizer Ash and Pyrite Pond System (EAPPS) located at Big Bend Station. The detection monitoring event for Appendix III parameters was conducted in accordance with 40 CFR 257.94 of the federal Coal Combustion Residual Rule.

The Appendix III results were compared against background concentrations derived previously using statistical methods that comply with the allowable methods specified in 40 CFR 257.93. As with the previous three detection monitoring events, groundwater pH was the only Appendix III parameter detected above background levels. However, the Alternate Source Demonstration (April 2018) prepared in accordance with 40 CFR 257.94(3)(e) documented that groundwater pH is not a statistically significant increase (SSI) attributable to a release from the EAPPS. As a result, detection monitoring will continue at the EAPPS in the absence of an Appendix III SSI.

Please contact us at 813-558-0990 if you have further questions.

Sincerely,
GEOSYNTEC CONSULTANTS, INC.



Todd K. Kafka (FL PG 2338)
Principal



Michael N. Lodato (FL PG 1351)
Senior Principal

Memorandum

Date: 20 June 2019
To: Randy Melton
Copies to: Terry Eastley
Zel Jones
From: Cathy Crea, Ph.D.
Reviewed by: Michael Lodato, PG
Todd Kafka, PG
Subject: Summary of Results for the Third Detection Monitoring Event
Economizer Ash and Pyrite Pond System
Tampa Electric Company - Big Bend Station
13031 Wyandotte Road
Gibson, FL 33572

On April 17, 2015, the United States Environmental Protection Agency (USEPA) published 40 Code of Federal Regulations (CFR) Parts 257 and 261: Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule (USEPA, 2015). This regulation addresses the safe disposal of coal combustion residuals (CCR) as solid waste under Subtitle D of the Resource Conservation and Recovery Act (RCRA) and is referred to herein as the CCR Rule. The CCR Rule became effective on 14 October 2015 and provides national minimum criteria for “the safe disposal of CCR in new and existing CCR landfills, surface impoundments, and lateral expansions, design and operating criteria, groundwater monitoring and corrective action, closure requirements and post closure care, and recordkeeping, notification, and internet posting requirements.” The groundwater monitoring requirements of the CCR Rule apply to the economizer ash and pyrite pond system (EAPPS) at Tampa Electric Company’s (TEC) Big Bend Power Station (BBS) in southeast Hillsborough County in Gibson, Florida. TEC installed a groundwater monitoring system (GMS) at the EAPPS that complies with 40 CFR 257.91 and performed baseline groundwater sampling events in accordance with 40 CFR 257.93.

Geosyntec Consultants, Inc. (Geosyntec) has prepared this technical memorandum to summarize the results of the fourth detection monitoring event as required by 40 CFR 257.94. The fourth detection

monitoring event was performed by TEC staff on 14 March 2019. Geosyntec's statistical analyses were performed in accordance with the *Statistical Analysis Plan* dated 15 October 2017.

BACKGROUND

The GMS was installed at the EAPPS in May 2016 and consists of two background monitoring wells, BBS-CCR-BW1 and BBS-CCR-BW2, and three downgradient monitoring wells, BBS-CCR-1, BBS-CCR-2, and BBS-CCR-3. TEC conducted eleven baseline groundwater sampling events from the GMS between June 2016 and October 2017 and analyzed the samples for Appendix III and Appendix IV constituents as required in 40 CFR 257.93. The inorganic data were reviewed based on the following: *CCR Groundwater Monitoring Program Plan*, Big Bend Power Station, Apollo Beach, Florida, September 2016, USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, August 2014 (OSWER 9355.0-131, EPA 540-R-013-001), as well as by the pertinent methods referenced by the data package and professional and technical judgment.

Geosyntec prepared a *Statistical Analysis Plan* to provide details on the selection of statistical methods in accordance with the provisions set forth in 40 CFR 257.93 "Groundwater sampling and analysis requirements." Background concentrations were established for each of the constituents listed in 40 CFR 257 Appendix III by analyzing the data from the two background wells. A 95% upper prediction limit (UPL) was established for each constituent from the baseline sampling events conducted between June 2016 and August 2017 and the first detection monitoring event in October 2017. In accordance with the *Statistical Analysis Plan*, the same methodology used for the first three detection monitoring events (October 2017, April 2018, and September 20109) was used for the fourth detection monitoring event (March 2019) and is not repeated herein. Details of the derivation of the background concentrations and the results of the first detection monitoring event are summarized in the summary memorandum *Summary of Statistical Analyses of Baseline Groundwater Samples Economizer Ash and Pyrite Pond System* dated January 2018.

DETECTION MONITORING RESULTS

The fourth detection monitoring event included the collection of five groundwater samples from the GMS in March 2019. Geosyntec reviewed and performed a Stage 2A data validation, consistent with the data collected previously. The data were qualified and deemed usable for meeting project objectives. The data validation summary memorandum is provided in **Attachment A**.

A comparison of the fourth detection monitoring results to the background values for the Appendix III constituents is shown in **Table 1** and indicates pH concentrations above background in BBS-CCR-1, which is one of the three downgradient monitoring wells. The established Upper Prediction Limit (UPL)

for pH is 6.70 standard units (SU), and the pH at BBS-CCR-1 was 6.81. Similar pH values were reported in this well during the first three detection monitoring events (October 2017, April 2018, and September 2018). The pH concentrations at BBS-CCR-2 and BBS-CCR-3 remain within background concentrations.

CONCLUSIONS

As specified in 40 CFR 257.94(3)(e), Geosyntec prepared an alternate source demonstration (ASD) documenting that the elevated pH value is not an SSI and is not attributable to a release from the EAPPS. The elevated pH values are attributable to natural variability (e.g., local background and changes in groundwater flow directions) and within the margin of error for the field pH instrument (*Alternate Source Demonstration – Economizer Ash and Pyrite Pond System* dated April 2018). In the absence of SSIs for other Appendix III constituents, TEC will continue with detection monitoring as applicable for the EAPPS.

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TABLE 1

Detection Monitoring Results – March 2019

TABLE 1 - DETECTION MONITORING RESULTS - March 2019
Tampa Electric Company, Big Bend Station, Economizer Ash and Pyrite Pond System, Apollo Beach, FL

Analytical Parameter		Boron, total	Calcium, total	Chloride, total	Fluoride, total	pH (field)	Sulfate, total	Total Dissolved Solids
Units		mg/L	mg/L	mg/L	mg/L	STD	mg/L	mg/L
Background Concentration Value		59.1	781	1140	0.559	(6.38, 6.70)	1550	5050
Well ID	Sample Collection Date	March 2019 Detection Monitoring Results						
BBS-CCR-1	3/14/2019	18.4	518	664	0.415 U	6.81	1,160	3,000
BBS-CCR-2	3/14/2019	0.279	208	77.2	0.394 U	6.74	445	1,060
BBS-CCR-3	3/14/2019	0.259	207	161	0.513 J+	6.43	534	1,350

Notes:

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- Bold, highlighted text indicates statistically significant increase above background concentration values.

J+ : Data validation qualifier - The analyte was positively identified; however, the associated numerical value is likely to be higher than the concentration of the analyte in the sample due to positive bias of associated QC or calibration data or attributable to matrix interference.

mg/L - milligrams per litre

STD - standard units

U: Laboratory qualifier - Indicates that the compound was not detected above the reporting limit.

ATTACHMENT A
Data Validation Memorandum

Memorandum

Date: 16 May 2019
To: Todd Kafka
From: Kristoffer Henderson
CC: J. Caprio
Subject: **Stage 2A Data Validation – Level II Data Deliverable – Tampa Electric Laboratory Service Work Order L19C024, TestAmerica Job ID 660-93234-1 and KNL Environmental Testing Order L19C024**

SITE: Big Bend Power Station, Apollo Beach, Florida

INTRODUCTION

This report summarizes the findings of the Stage 2A data validation of five water samples, collected on March 14, 2019 as part of the Big Bend Power Station coal combustion residuals (CCR) groundwater monitoring program plan. The lithium analyses were performed by TestAmerica Tampa, Tampa, Florida (TA). The radium analyses were performed by KNL Environmental Testing, Tampa, Florida (KNL). The rest of the analyses were performed by Tampa Electric Laboratory Services, Tampa, Florida (TELS). The samples were analyzed for the following:

- Metals by EPA Methods 200.7 Rev. 4.4, 200.8 and 6010B
- Mercury by EPA Method 7470A
- Radium-226 by EPA Method 903.0
- Radium-228 by EPA Method Ra-05
- Anions (Chloride, Fluoride and Sulfate) by EPA Method 300.0
- Total Dissolved Solids (TDS) by Standard Method 2540C

EXECUTIVE SUMMARY

Overall, based on this Stage 2A data validation covering the quality control (QC) parameters listed below and the information provided, the data as qualified are usable for meeting project objectives. The qualified data should be used within the limitations of the qualifications.

The inorganic data were reviewed based on the following: CCR Groundwater Monitoring Program Plan, Big Bend Power Station, Apollo Beach, Florida, September 2016 (GWMP), USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, January

2017 (OLEM 9355.0-135, EPA 540-R-2017-001), as well as by the pertinent methods referenced by the data package and professional and technical judgment.

The following samples were analyzed and validated at a Stage 2A level in the data set:

Laboratory ID	Client ID
L19C024-01	BBS-CCR-1
L19C024-02	BBS-CCR-2
L19C024-03	BBS-CCR-3

Laboratory ID	Client ID
L19C024-04	BBS-CCR-BW1
L19C024-05	BBS-CCR-BW2

The samples were received at the laboratories within the criteria of 0-6°C. No sample preservation or sample receipt issues were noted by the laboratories.

Times were not listed for the relinquished by and received by signatures for the first transfer and the relinquished by signature for the second transfer on the chain of custody (COC) for the sample transfer from TELS to KNL.

The laboratory report was revised on May 15, 2019 to add calcium LCS/MS/MSD results and to include the radiochemistry QC. The revised report was identified as L19C024 Revised.

1.0 TOTAL METALS

The samples were analyzed for total metals per EPA Methods 200.7 Rev. 4.4, 200.8 and 6010B.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine the impact on data quality and usability.

- ✓ Overall Assessment
- ✓ Holding Times
- ✓ Method Blank
- ✓ Matrix Spike/Matrix Spike Duplicate
- ✓ Laboratory Control Sample
- ✓ Serial Dilution
- ✓ Field Duplicate
- ✓ Sensitivity
- ✓ Electronic Data Deliverable Review

1.1 Overall Assessment

The metals data reported in this package are considered usable for meeting project objectives. The results are considered valid; analytical completeness, defined as the ratio of the number of valid

analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for analysis for the data set is 100%.

1.2 Holding Times

The holding time for the metals analysis of waters is 180 days from sample collection to analysis. The holding time was met for the sample analyses.

1.3 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Three method blanks were reported (method 200.7 batch 433799, method 200.8 batch 19C0102 and method 6010B batch 19C0106). Metals were not detected in the method blanks above the method detection limits (MDLs).

1.4 Matrix Spike/Matrix Spike Duplicate (MS/MSD)

MS/MSDs were analyzed at the proper frequency for the number and types of samples analyzed (one pair per batch of 20 samples). Two sample set specific MS/MSD pairs were reported, one for the method 200.8 data using sample BBS-CCR-BW1; and one for the method 6010B data using sample BBS-CCR-1. The recovery and relative percent difference (RPD) results were within the laboratory specified acceptance criteria, with the following exceptions.

The MS recoveries of boron and calcium were low and outside the laboratory specified acceptance criteria in the MS/MSD pair using sample BBS-CCR-1. Since the sample concentrations of boron and calcium were greater than four times the spiked concentration, no qualifications were applied to the data.

Batch MS/MSD pairs were also reported for the method 200.8 and method 200.7 Rev 4.4 data. Since these are batch QC, the results do not affect the samples in this data set and qualifications were not applied to the data.

1.5 Laboratory Control Sample (LCS)

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Three LCSs were reported. The recovery results were within the laboratory specified acceptance criteria.

1.6 Serial Dilution

Serial dilutions were not reported.

1.7 Field Duplicate

Field duplicates were not reported with the sample sets.

1.8 Sensitivity

The samples were reported to the MDLs. No elevated non-detect results were reported. The MDLs met the limits listed in Table 4 of the CCR Groundwater Monitoring Plan.

1.9 Electronic Data Deliverable (EDD) Review

The results and sample identifications (IDs) in the EDD were reviewed against the information provided by the associated level II reports at a minimum of 20% as part of the data validation process. The laboratory flags used in the laboratory report did not match the flags used in the EDD. No other discrepancies were identified between the level II reports and the EDD.

2.0 MERCURY

The samples were analyzed for mercury per EPA Method 7470A.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine the impact on data quality and usability.

- ✓ Overall Assessment
- ✓ Holding Times
- ✓ Method Blank
- ✓ Matrix Spike/Matrix Spike Duplicate
- ✓ Laboratory Control Sample
- ✓ Field Duplicate
- ✓ Sensitivity
- ✓ Electronic Data Deliverable Review

2.1 Overall Assessment

The mercury data reported in this package are considered usable for meeting project objectives. The results are considered valid; analytical completeness, defined as the ratio of the number of

valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for analysis for the data set is 100%.

2.2 Holding Times

The holding time for the mercury analysis of a water sample is 28 days from sample collection to analysis. The holding times were met for the sample analyses.

2.3 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One method blank was reported (batch 19C0109). Mercury was not detected in the method blank above the MDL.

2.4 Matrix Spike/Matrix Spike Duplicate

MS/MSD pairs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One sample set specific MS/MSD pair, using sample BBS-CCR-BW2, was reported. The recovery and RPD results were within the laboratory specified acceptance criteria.

One batch MS/MSD pair was also reported, since this was batch QC the results do not affect the samples in this data set and qualifications were not applied to the data.

2.5 Laboratory Control Sample

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One LCS was reported. The recovery result was within the laboratory specified acceptance criteria.

2.6 Field Duplicate

Field duplicates were not reported with the sample sets.

2.7 Sensitivity

The samples were reported to the MDL. No elevated non-detect results were reported. The MDL for mercury met the limit listed in Table 4 of the CCR Groundwater Monitoring Plan.

2.8 Electronic Data Deliverable Review

The results and sample IDs in the EDD were reviewed against the information provided by the associated level II reports at a minimum of 20% as part of the data validation process. No discrepancies were identified between the level II reports and the EDD.

3.0 RADIUM-226 AND RADIUM-228

The samples were analyzed for radium 226 and radium 228 per EPA Methods 903.0 and RA-05, respectively.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine the impact on data quality and usability.

- ✓ Overall Assessment
- ✓ Holding Times
- ✓ Method Blank
- ✓ Matrix Spike
- ✓ Laboratory Control Sample
- ✓ Laboratory Duplicate
- ✓ Sensitivity
- ✓ Electronic Data Deliverable Review

3.1 Overall Assessment

The radium-226 and radium-228 data reported in this package are considered usable for meeting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for analysis for the data set is 100%.

3.2 Holding Times

The holding times for radium-226 and radium-228 analysis of waters are 180 days from sample collection to analysis. The holding times were met for the sample analyses.

3.3 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Three method blanks were reported (two for the radium-226 data and one for the radium-228 data). The method blanks were within the validation criteria.

3.4 Matrix Spike

MSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Three batch MSs were reported. Since these are batch QC, the results do not affect the samples in this data set and qualifications were not applied to the data.

3.5 Laboratory Control Sample

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two LCSs were reported for radium-226 and one LCS was reported for radium-228. The recovery results were within the laboratory specified acceptance criteria.

3.6 Laboratory Duplicate

Three batch laboratory duplicates were reported for the radium-226 and radium-228 data. Since these are batch QC, the results do not affect the samples in this data set and qualifications were not applied to the data.

3.7 Sensitivity

The samples were reported to the minimum detectable concentrations (MDCs). The reported MDCs met the limits listed in Table 4 of the CCR Groundwater Monitoring Plan.

3.8 Electronic Data Deliverable Review

The results and sample IDs in the EDD were reviewed against the information provided by the associated level II reports at a minimum of 20% as part of the data validation process. No discrepancies were identified between the level II reports and the EDD.

4.0 WET CHEMISTRY PARAMETERS

The samples were analyzed for anions (chloride, fluoride and sulfate) by EPA Method 300.0 and TDS by SM 2540C.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues

were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

- ✓ Overall Assessment
- ✓ Holding Times
- ⊗ Method Blank
- ✓ Matrix Spike/Matrix Spike Duplicate
- ✓ Laboratory Control Sample
- ✓ Laboratory Duplicate
- ✓ Field Duplicate
- ✓ Sensitivity
- ✓ Electronic Data Deliverable Review

4.1 Overall Assessment

The wet chemistry data reported in this package are considered usable for meeting project objectives. The results are considered to be valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for analysis, for the data set is 100%.

4.2 Holding Times

The holding times for the anions (chloride, fluoride and sulfate) by EPA method 300.0 are 28 days from sample collection to analysis and the holding time for TDS by SM 2540C is 7 days from sample collection to analysis. The holding times were met for the sample analyses.

4.3 Method Blanks

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Method blanks were reported for each analysis as appropriate (TDS batch 19C0118 and the anions batch 19C0184). The wet chemistry parameters were not detected in the method blanks above the MDLs, with the following exception.

Fluoride was detected at an estimated concentration greater than the MDL and less than the RL in the method blank for batch 19C0184. Therefore, the estimated concentrations of fluoride in the associated samples were U qualified as not detected at the RL and the fluoride concentrations in samples BBS-CCR-3 and BBS-CCR-BW1 were J+ qualified as estimated with high biases, based on professional and technical judgment.

Sample	Analyte	Laboratory Result (mg/L)	Laboratory Flag	Validation Result (mg/L)	Validation Qualifier*	Reason Code**
BBS-CCR-1	Fluoride	0.415	I	0.500	U	3
BBS-CCR-2	Fluoride	0.394	I	0.500	U	3
BBS-CCR-3	Fluoride	0.513	NA	0.513	J+	3
BBS-CCR-BW1	Fluoride	0.537	NA	0.537	J+	3
BBS-CCR-BW2	Fluoride	0.495	I	0.500	U	3

mg/L-milligrams per liter

I-the reported value is between the laboratory method detection limit and the laboratory practical quantitation limit

NA-not applicable

* Validation qualifiers are defined in Attachment 1 at the end of this report

**Reason codes are defined in Attachment 2 at the end of this report

4.4 Matrix Spike/Matrix Spike Duplicate

MS/MSDs were analyzed at the proper frequency for the number and types of samples analyzed (one pair per batch of 20 samples). One sample set specific MS/MSD pair, using sample BBS-CCR-1, was reported for the anions. The recovery and RPD results were within the laboratory specified acceptance criteria.

One batch MS/MSD pair was also reported for the anions, since this was batch QC the results do not affect the samples in this data set and qualifications were not applied to the data.

4.5 Laboratory Control Sample

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). LCSs were reported for each analysis as appropriate. The recovery results were within the laboratory specified acceptance criteria.

4.6 Laboratory Duplicate

Two sample set specific laboratory duplicates were reported for TDS using samples BBS-CCR-1 and BBS-CCR-2. The RPD results were within the laboratory specified acceptance criteria.

4.7 Field Duplicate

Field duplicates were not reported with the sample sets.

4.8 Sensitivity

The samples were reported to the MDLs. The MDLs reported met the limits listed in Table 4 of the CCR Groundwater Monitoring Plan.

4.9 Electronic Data Deliverable Review

The results and IDs in the EDD were reviewed against the information provided by the associated level II reports at a minimum of 20% as part of the data validation process. The laboratory flags used in the laboratory report did not match the flags used in the EDD. No other discrepancies were identified between the level II reports and the EDD.

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**ATTACHMENT 1
DATA VALIDATION QUALIFIER DEFINITIONS
AND INTERPRETATION KEY
Assigned by Geosyntec's Data Validation Team**

DATA QUALIFIER DEFINITIONS

- U The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
- J The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- J+ The analyte was positively identified; however, the associated numerical value is likely to be higher than the concentration of the analyte in the sample due to positive bias of associated QC or calibration data or attributable to matrix interference.
- J- The analyte was positively identified; however, the associated numerical value is likely to be lower than the concentration of the analyte in the sample due to negative bias of associated QC or calibration data or attributable to matrix interference.
- UJ The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
- R The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

ATTACHMENT 2
DATA VALIDATION REASON CODES
Assigned by Geosyntec's Data Validation Team

Valid Value	Description
1	Preservation requirement not met
2	Analysis holding time exceeded
3	Blank contamination (i.e., method, trip, equipment, etc.)
4	Matrix spike/matrix spike duplicate recovery or RPD outside limits
5	LCS or RPD recovery outside limits (LCS/LCSD)
6	Surrogate recovery outside limits
7	Field Duplicate RPD exceeded
8	Serial dilution percent difference exceeded
9	Calibration criteria not met
10	Linear range exceeded
11	Internal standard criteria not met
12	Lab duplicates RPD exceeded
13	Other