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Project No. DNA-180161

Mr. David M. Heger
Senior Counsel
AES US Services, LLC
One Monument Circle, Suite 701A
Indianapolis, Indiana 46204-2901

2018 CCR Annual Groundwater Monitoring Report
AES Puerto Rico LP, Guayama, Puerto Rico

Dear Mr. Heger:

DNA-Environment, LLC (DNA) has prepared this 2018 CCR Annual Groundwater Monitoring Report for the temporary storage area of manufactured aggregate[1] (Agremax) at AES Puerto Rico LP (AES-PR) in Guayama, Puerto Rico. This report has been prepared to comply with the reporting requirements described in the United States Environmental Protection Agency (USEPA) Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals (CCR) from Electric Utilities, 40 CFR Part 257, Subpart D (CCR Rule), as required by §257.90(e)(1) through §257.90(e)(5).

Section 257.90(e) of the CCR Rule specifies the following:

> *For existing CCR landfills and existing CCR surface impoundments, no later than January 31, 2018, and annually thereafter, the owner or operator must prepare an annual groundwater monitoring and corrective action report. For new CCR landfills, new CCR surface impoundments, and all lateral expansions of CCR units, the owner or operator must prepare the initial annual groundwater monitoring and corrective action report no later than January 31 of the year following the calendar year a groundwater monitoring system has been established for such CCR unit as required by this subpart, and annually thereafter. For the preceding calendar year, the annual report must document the status of the groundwater monitoring and corrective action program for the CCR unit, summarize key actions completed, describe any problems encountered, discuss actions to resolve the problems, and project key activities for the upcoming year. For purposes of this section,*

[1] The AES-PR temporary storage of its inventory of manufactured aggregate (or Agremax) is not a CCR unit subject to the CCR Rule. Nonetheless, as a conservative measure, AES-PR has taken steps to satisfy the CCR Rule and has voluntarily published certain documents. The undertaking of these steps shall not be interpreted or construed in any way as an admission that AES-PR operations or facility are subject or covered by the CCR Rule and expressly reserves any rights and defenses available to it and related with this matters.

the owner or operator has prepared the annual report when the report is placed in the facility's operating record as required by §257.105(h)(1).

The following key actions were completed in 2018 to comply with the CCR Rule:

- Groundwater monitoring data for the constituents listed in Appendix III to 40 CFR Part 257 were evaluated for statistically significant increases (SSIs) over corresponding background levels pursuant to §257.93(h) and §257.94(e).
- A Notice of Establishment of an Assessment Monitoring Program was completed as required by §257.94(e)(3), effective July 16, 2018.
- Assessment monitoring sampling events were conducted in June and October 2018 as required by §257.95. Appendix III constituents were included as part of the June 2018 sampling event during the transition period from detection monitoring to assessment monitoring.
- Groundwater Protection Standards were established in accordance with §257.95(d)(2) and §257.95(h) of the CCR Rule.

To report on the activities conducted during the prior calendar year and document compliance with the CCR Rule, the specific requirements listed in §257.90(e)(1) through §257.90(e)(5) are provided below in bold/italic type followed by a short narrative addressing how that specific requirement has been met.

At a minimum, the annual groundwater monitoring and corrective action report must contain the following information, to the extent available:

§257.90(e)(1): A map, aerial image, or diagram showing the CCR unit and all background (or upgradient) and downgradient monitoring wells, to include the well identification numbers, that are part of the groundwater monitoring program for the CCR unit;

AES-PR is located in the municipality of Guayama in the south coast of Puerto Rico ("Site"). The Site is bordered to the north and west by an inactive pharmaceutical facility (formerly TAPI Puerto Rico) and by an undeveloped parcel of land, to the south by land owned by the Puerto Rico Ports Authority and Las Mareas Harbor, to the east by an inactive petroleum refinery (formerly Chevron Phillips Chemical Puerto Rico Core), and to the west by AES Ilumina (solar panel farm). A Site Location Map is provided as Figure 1. A map showing the location of the temporary storage area of the manufactured aggregate pile (Agremax) and associated upgradient and downgradient monitoring wells is provided as Figure 2.

§257.90(e)(2): Identification of any monitoring wells that were installed or decommissioned during the preceding year, along with a narrative description of why those actions were taken;

No monitoring wells were installed or decommissioned during this reporting period.

The CCR groundwater monitoring system at AES-PR consists of five monitoring wells as follows: upgradient wells MW-1 and MW-2; and downgradient wells MW-3, MW-4 and MW-5 (*See* Figure 2). The wells were installed in accordance with §257.91 of the CCR Rule. Documentation pertaining to the design and construction of the monitoring well system was provided in the "Groundwater Monitoring System & Sampling and Analysis Program, AES Puerto Rico LP, Guayama, Puerto Rico", (the "Groundwater Monitoring Plan"), dated August 2017 and included in the facility's 2017 CCR Annual Groundwater Monitoring Report.

***§257.90(e)(3): In addition to all the monitoring data obtained under §257.90 through §257.98, a summary including the number of groundwater samples that were collected for analysis for each background and downgradient well, the dates the samples were collected, and whether the sample was required by the detection monitoring or assessment monitoring programs*;**

Table 1 provides a summary of the number of samples collected at each monitoring well, sampling dates, and designation of whether the samples were required by detection or assessment monitoring program.

Groundwater analytical results for samples collected during the 2018 sampling events are summarized in Table 2 and Table 3.

§257.90(e)(4): A narrative discussion of any transition between monitoring programs (e.g., the date and circumstances for transitioning from detection monitoring to assessment monitoring in addition to identifying the constituent(s) detected at a statistically significant increase over background levels);

Consistent with §257.90(e), this annual report documents activities conducted during the 2018 calendar year.

In accordance with §257.93(h), the statistical analysis of the initial eight rounds of Appendix III groundwater sampling data was completed in January 2018. Based on the analysis, SSIs over background levels were detected for the following constituents: Boron, Calcium, Chloride Fluoride, pH, Sulfate and Total Dissolved Solids (TDS).

Pursuant to §257.94(e)(2), an Alternate Source Demonstration (ASD) investigation was completed to evaluate potential sources of offsite impacts to groundwater that would explain the observed SSIs.

Pursuant to §257.94(e)(2), §257.94(e)(3) and §257.95(b), the facility established an Assessment Monitoring Program on July 16, 2018, in accordance with the requirements of §257.95 as a successful ASD was not completed.

§257.90(e)(5): Other information required to be included in the annual report as specified in §257.90 through §257.98.

In accordance with §257.95(b), Appendix IV assessment monitoring was completed in June 2018. Consistent with §257.95(d), an assessment monitoring resampling event was completed in October 2018. Tables 2 and 3 summarize the groundwater analytical results. Table 4 summarizes the groundwater protection standards established in accordance with §257.95(d)(2) and §257.95(h). Background analytical data were previously provided in the 2017 CCR Groundwater Annual Monitoring Report.

Projected key activities to be completed during the 2019 calendar year include the following:

- Statistical evaluation to determine whether there is a statistical significant exceedance of groundwater protection standards for Appendix IV constituents in accordance with §257.95(g) and §257.93(h).
- Annual and semi-annual assessment monitoring sampling events in accordance with §257.95.

This annual report documents activities to comply with Sections §257.90 through §257.95 of the CCR Rule. There are no applicable requirements from Sections §257.96 through §257.98 for this reporting period.

We appreciate the opportunity to assist with the CCR Rule groundwater monitoring program at AES-PR.

Sincerely,

Alberto Meléndez
Principal Environmental Consultant

Enclosure

c.: Ms. Angelique Collier, AES US Services, LLC – w/enclosure
Ms. Nysa Hogue, AES US Services, LLC – w/enclosure
Mr. Héctor Ávila, AES Puerto Rico, LP - w/enclosure

TABLES

Table 1. Summary of 2018 CCR Groundwater Sampling Program, AES Puerto Rico LP, Guayama, Puerto Rico

Monitoring Well ID	Upgradient/Background or Downgradient Well	Number of Samples Collected in 2018 *	Sample Collection Date	Monitoring Phase
MW-1	Upgradient/Background	2	25-Jun-18 01-Oct-18	Assessment
MW-2	Upgradient/Background	2	25-Jun-18 01-Oct-18	Assessment
MW-3	Downgradient	2	25-Jun-18 01-Oct-18	Assessment
MW-4	Downgradient	4	26-Jun-18 02-Oct-18	Assessment
MW-5	Downgradient	2	26-Jun-18 02-Oct-18	Assessment

Notes:

* One groundwater sample was collected per sampling event at Monitoring Wells MW-1, MW-2, MW-3 and MW-5, whereas two groundwater samples were collected per sampling event at MW-4 (these consisted of one sample and one field duplicate sample per event).

Table 2. Analytical Results and Monitoring Data for Groundwater Samples Collected in June 2018
AES Puerto Rico, LP in Guayama, Puerto Rico

	Well ID	MW-1	MW-2	MW-3	MW-4	MW-4	MW-5
	Well Location	Upgradient	Upgradient	Downgradient	Downgradient	NA	Downgradient
	Sample ID	AES-MW1-062518	AES-MW2-062518	AES-MW3-062518	AES-MW4-062618	AES-MW4-DUP-062618	AES-MW5-062618
	Sampling Date	6/25/2018	6/25/2018	6/25/2018	6/26/2018	6/26/2018	6/26/2018
Static Water Elevation (ft MSL)		13.60	13.88	3.21	4.70	NA	3.24
Field Parameters	**Units**						
pH	SU	7.13	6.84	7.23	7.27	NA	6.72
Specific Conductivity	mS/cm	3.712	2.072	31.96	63.37	NA	21.72
Redox Potential	mV	25.0	-48.7	-46.8	-65.1	NA	-1.6
Dissolved Oxygen	mg/L	0.54	0.84	0.52	0.48	NA	1.00
Turbidity	NTU	2.50	1.79	2.86	13.61	NA	6.81
Temperature	°C	29.47	29.44	30.92	32.45	NA	29.70
Analytical Results							
Antimony	mg/L	0.0010 U	0.0010 U	0.0010 U	0.0023 J	0.0019 J	0.0010 U
Arsenic	mg/L	0.00046 U	0.00046 U	0.0018	0.0024	0.0021	0.0071
Barium	mg/L	0.039	0.15	0.24	0.044	0.046	0.036
Beryllium	mg/L	0.00034 U	0.00034 U	0.00034 U	0.00034 U	0.00034 U	0.00034 U
Cadmium	mg/L	0.00034 U	0.00034 U	0.00042 J	0.00034 J	0.00034 U	0.00034 U
Chromium	mg/L	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U
Cobalt	mg/L	0.00040 U	0.00067 J	0.0031	0.0016 J	0.0016 J	0.0030
Fluoride	mg/L	0.61	0.52	1.6	0.76	0.76	0.49
Lead	mg/L	0.00077 J	0.00035 U	0.00035 U	0.00035 U	0.00035 U	0.00035 U
Lithium	mg/L	0.0011 U	0.0011 U	0.0073	0.54	0.57	0.0038 J
Mercury	mg/L	0.000070 U	0.000070 U	0.000070 U	0.000070 U	0.000070 U	0.000070 U
Molybdenum	mg/L	0.00085 U	0.00085 U	0.22	0.55	0.58	0.0042 J
Selenium	mg/L	0.025	0.00040 J	0.21	0.0064	0.0055	0.00024 U
Thallium	mg/L	0.000085 U	0.000085 U	0.000085 U	0.000085 U	0.000085 U	0.000085 U
Radium 226 and 228 combined	pCi/L	0.0551 U	-0.0965 U	0.311 U	0.341 U	0.165 U	0.326
Boron	mg/L	0.25	0.16	1.2	3.2	3.2	0.47
Calcium	mg/L	130	110	330	460	440	690
Chloride	mg/L	260	140	4400	9100	8900	3700
pH (field)	SU	7.13	6.84	7.23	7.27	NA	6.72
Sulfate	mg/L	510	43	2800	12000	12000	2100
Total Dissolved Solids	mg/L	1500	740	11000	16000	17000	8700

Notes:
mg/L - milligrams per Liter
SU - Standard Units
pCi/L - picocuries per Liter
ft MSL - Feet above Mean Sea Level
mS/cm - millisiemens per centimeter
mV - millivolt
NTU - Nephelometric Turbidity Units
°C - degrees Celsius
Analytical results for metal elements are "Total Recoverable".
Sampling Date format is mmddyy.
Sample ID format is: "Site Name-MW_ID-Sampling_Date".
Sample AES-MW4-DUP-062618 is the field duplicate sample of AES-MW4-062618.
U - Not detected at the indicated Method Detection Limit (MDL) or in the case of radiochemistry, the indicated result is less than the sample detection limit.
J - Result is less than the Reporting Limit, but greater than or equal to the MDL; concentration is an approximate value.
NA - Not Applicable to the field duplicate sample.
Static water elevations listed are based on measurements collected in all wells at the end of the sampling event.

Revised 2-27-2019

Table 3. Analytical Results and Monitoring Data for Groundwater Samples Collected in October 2018
AES Puerto Rico, LP in Guayama, Puerto Rico

	Well ID	MW-1	MW-2	MW-3	MW-4	MW-4	MW-5
	Well Location	Upgradient	Upgradient	Downgradient	Downgradient	NA	Downgradient
	Sample ID	AES-MW1-100118	AES-MW2-100118	AES-MW3-100118	AES-MW4-100218	AES-MW4-DUP-100218	AES-MW5-100218
	Sampling Date	10/1/2018	10/1/2018	10/1/2018	10/2/2018	10/2/2018	10/2/2018
Static Water Elevation (ft MSL)		12.24	12.35	2.86	4.45	NA	2.75
Field Parameters	**Units**						
pH	SU	7.33	7.04	7.43	7.41	NA	6.73
Specific Conductivity	mS/cm	3.302	1.911	32.57	45.85	NA	24.11
Redox Potential	mV	27.3	20.7	-2.1	-123.9	NA	-32.1
Dissolved Oxygen	mg/L	0.83	1.31	0.84	0.85	NA	1.42
Turbidity	NTU	5.64	1.35	2.30	17.28	NA	8.25
Temperature	°C	29.58	29.65	31.54	33.45	NA	29.85
Analytical Results							
Antimony	mg/L	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U
Arsenic	mg/L	0.00046 U	0.00046 U	0.0024	0.0031	0.0027	0.0088
Barium	mg/L	0.032	0.13	0.19	0.035	0.036	0.032
Cadmium	mg/L	0.00034 U	0.00034 U	0.00034 U	0.00057 J	0.00051 J	0.00034 U
Cobalt	mg/L	0.00050 J	0.00058 J	0.0031	0.0016 J	0.0016 J	0.0030
Fluoride	mg/L	0.69	0.67	1.6	1.0	1.0	0.50
Lithium	mg/L	0.0011 U	0.0014 J	0.021	0.38	0.34	0.0038 J
Molybdenum	mg/L	0.00085 U	0.00085 U	0.22	0.74	0.76	0.0053 J
Selenium	mg/L	0.015	0.00024 U	0.23	0.0043	0.0048	0.00046 J
Radium 226 and 228 combined	pCi/L	0.495	0.321 U	0.511	0.0708 U	0.168 U	-0.0397 U
Boron	mg/L	0.24	0.16	1.0	2.6	2.6	0.39
Calcium	mg/L	120	110	330	280	250	710
Chloride	mg/L	200	85	4700	5600	5300	3700
pH (field)	SU	7.33	7.04	7.43	7.41	NA	6.73
Sulfate	mg/L	400	15	3300	6000	6200	2200
Total Dissolved Solids	mg/L	1300	690	13000	21000	22000	10000

Notes:
mg/L - milligrams per Liter
SU - Standard Units
pCi/L - picocuries per Liter
ft MSL - Feet above Mean Sea Level
mS/cm - millisiemens per centimeter
mV - millivolt
NTU - Nephelometric Turbidity Units
°C - degrees Celsius
Analytical results for metal elements are "Total Recoverable".
Sampling Date format is mmddyy.
Sample ID format is: "Site Name-MW_ID-Sampling_Date".
Sample AES-MW4-DUP-100218 is the field duplicate sample of AES-MW4-100218.
U - Not detected at the indicated Method Detection Limit (MDL) or in the case of radiochemistry, the indicated result is less than the sample detection limit.
J - Result is less than the Reporting Limit, but greater than or equal to the MDL; concentration is an approximate value.
NA - Not Applicable to the field duplicate sample.
Static water elevations listed are based on measurements collected in all wells at the end of the sampling event.

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Table 4. Groundwater Protection Standards, AES Puerto Rico LP, Guayama, Puerto Rico

Constituent	GWPS (mg/L)
Antimony	0.006
Arsenic	0.010
Barium	2
Beryllium	0.004
Cadmium	0.005
Chromium	0.1 (a)
Cobalt	0.006 (b)
Fluoride	4.0
Lead	0.015 (b)
Lithium	0.040 (b)
Mercury	0.002 (c)
Molybdenum	0.100 (b)
Selenium	0.05
Thallium	0.002
Radium 226 and 228 combined	5 pCi/L

Notes:

GWPS – Groundwater Protection Standard (based on MCL unless otherwise stated).

MCL - Maximum Contaminant Level, USEPA National Primary Drinking Water Regulations

mg/L - milligram per Liter

pCi/L - picocuries per Liter

(a) Value for Total Chromium

(b) Alternative Risk-Based Groundwater Protection Standard per USEPA Amendments 40 CFR §257.95(h) of the CCR Rule, dated July 30, 2018.

(c) Value for Inorganic Mercury

FIGURES

Figure 1

Site Location Map

AES Puerto Rico, LP
Guayama, Puerto Rico

Legend

AES Puerto Rico
Approximate Property Boundary

N

0 250 500 750 1000 1250 ft

DNA-ENVIRONMENT, LLC

Figure 2

Groundwater Monitoring System

AES Puerto Rico, LP
Guayama, Puerto Rico

N

0 200 400 600 ft

DNA-ENVIRONMENT, LLC