



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 2  
290 BROADWAY  
NEW YORK, NY 10007-1866

January 11, 2022

Mr. Jesús Bolinaga  
AES Puerto Rico  
P.O. Box 1890  
Guayama, Puerto Rico 00785

Dear Mr. Bolinaga:

This letter provides written confirmation of the discussion between the Environmental Protection Agency (EPA or Agency) and AES Puerto Rico (AES) staff during our conference call on October 1, 2021, regarding the coal combustion residuals (CCR) landfill liner project at the AES Puerto Rico power plant. Prior to that call, EPA had reviewed the report regarding the CCR landfill remedy titled "*Environmental Assessment- AGREMAX Staging Area Liner Project*" (referred herein as the "Report") and the file titled "*AES-PR Guayama Pre-Consultation Figures Appendices*" (referred herein as the "Appendices").<sup>1</sup>

On April 13, 2021, an Administrative Complaint was filed with the Permits Management Office, Puerto Rico Department of Economic Development and Commerce by Ms. Ruth Santiago of Comité Diálogo Ambiental, Inc. and Earthjustice on behalf of nine public interest groups in Puerto Rico. EPA has also reviewed this Administrative Complaint and associated materials.

After reviewing the Report, Appendices and the Administrative Complaint, EPA identified several concerns regarding the selected remedy. On the October 1 call, EPA raised those concerns that pertain to the synthetic liner that AES has determined would be part of its remedy. Because the liner will be the component of the remedy to control the source(s) of releases, it is imperative that the liner and installation are effective in eliminating, to the maximum extent feasible, further releases of constituents from the landfill to the environment.

Specifically, on the October 1 call EPA raised the following issues with the proposed liner design based on information available in the Report and the Appendices:

1. **Compatibility.** Although the Report provides geosynthetic clay liner (GCL) compatibility analysis results for bottom ash, fly ash and synthetic gypsum, it does not appear to provide results for AGREMAX.<sup>2</sup> EPA raised the concern that the leaching characteristics of the individual CCR wastes may not be representative of AGREMAX.
2. **Decontamination plan.** The documents do not include details about the CCR removal procedures, nor any tests/inspections that AES plans to implement to ensure the removal of all

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<sup>1</sup> Prior to reviewing these documents, the EPA reviewed the report titled *Report on Corrective Measures Assessment AES Puerto Rico-AGREMAX Staging Area, Guayama, Puerto Rico*, dated September 2019 and subsequently amended on November 8, 2019. EPA provided comments on that report in a letter dated March 5, 2020.

<sup>2</sup> PDF page 19 of the Appendices document.

the CCR and contaminated media before the subgrade preparation for the liner installation. EPA raised the concern that CCR, if left in place below the proposed liner, could continue to impact groundwater quality after liner installation.

3. **Proposed leachate collection and management plan.** EPA raised the concern that the documents do not provide sufficient information on the operation of the leachate collection system for the CCR landfill or the plan to manage collected leachate.
4. **Historical groundwater elevation data.** EPA raised the concern that the GCL performance may be impacted by contact with groundwater with elevated levels of various constituents (e.g., calcium). EPA stated that an assessment of the seasonal fluctuation and groundwater elevation at the site is important to evaluate whether groundwater would likely contact the proposed liner system.

In response, on October 7, 2021, Ms. Angelique Collier of AES submitted additional information to EPA consisting of groundwater elevation data, leachate collection management specifications, and the verification methodology for AGREMAX removal. The email also indicated some information was still forthcoming on the compatibility analysis.

After reviewing the information submitted by AES, on October 20, 2021, EPA sent an email to AES requesting additional information on the following:

- **Groundwater data.** EPA requested AES provide the modeling method(s), inputs, and results to assess the appropriateness of the established seasonal high groundwater elevations and asked several questions regarding various groundwater elevation data. EPA also requested that AES consider conducting a GCL compatibility evaluation with respect to groundwater quality if any part of the GCL is expected to have an intermittent or recurring connection with the groundwater.
- **Sump detail.** EPA requested AES provide a cross-section of the bottom liner depicting the proposed double liner configuration.
- **Hydraulic conductivity of proposed liner.** EPA requested that AES provide a calculation package demonstrating that the proposed GCL (based on the GCL hydraulic conductivity measured using AGREMAX leachate) is hydraulically equivalent to a 2-foot thick compacted clay liner with a max hydraulic conductivity of  $10^{-7}$  cm/sec.
- **Leachate disposal.** AES plans to pump landfill leachate to the coal pile run-off pond and from there to the onsite wastewater treatment plant. AES indicated that the coal pile run-off pond is lined. The performance of the coal pile run-off pond liner system impacts the efficacy of the proposed corrective measure to address ongoing groundwater exceedances. EPA requested AES to provide coal pile run-off pond liner design details.

On October 26, 2021, AES submitted a letter written by Oasis Consulting Services, PR, LLC that included attachments from Colloid Environmental Technologies Company, LLC (CETCO), among others, providing information related to the compatibility of the groundwater and AGREMAX with the various geosynthetics that AES is proposing for the liner. Specifically, a discussion about the compatibility of geomembrane, geocomposite and GCL were provided. The submittal did not include the GCL compatibility test results with respect to AGREMAX. CETCO committed to provide these data to AES when they become available. Furthermore, the submittal does not provide the thickness of the proposed GCL at the design overburden pressure which is needed to verify the GCL equivalency.

On November 5, 2021, AES submitted additional information responding to some of the questions raised by EPA on October 20. Specifically, AES provided the following information:

- **Groundwater data.** AES provided information describing how the seasonal high groundwater elevations were determined. In addition, AES responded to EPA's question about the compatibility of the liner with groundwater. AES explained that intermittent or recurring contact between the new liner system and groundwater will not occur based on the conservative approach of the design.
- **Sump detail.** AES provided a cross-section of the bottom liner depicting the proposed double liner configuration.
- **Leachate disposal.** AES provided design details for the coal pile run-off pond liner.
- **Hydraulic conductivity of proposed liner.** AES's submission did not include a calculation package demonstrating that the proposed GCL (based on the GCL hydraulic conductivity measured using AGREMAX leachate) is hydraulically equivalent to a 2-foot thick compacted clay liner with a max hydraulic conductivity of  $10^{-7}$  cm/sec as requested by EPA on October 20. On October 26, AES-PR provided calculations demonstrating the proposed GCL is hydraulically equivalent to a 2-foot thick compacted clay liner; however, these calculations are based on GCL hydraulic conductivity values that are not measured or derived using AGREMAX leachate.

At this time, since we have not been given the requested information on the compatibility and hydraulic conductivity mentioned above, we cannot determine that the liner will be effective in preventing AGREMAX from contaminating the groundwater.

EPA also has concerns regarding the assessment and selection of monitored natural attenuation (MNA) as the other component of AES' chosen remedy. Page iii of the Assessment of Corrective Measures (ACM) claims that all remedies in the ACM meet the requirements of 40 C.F.R. § 257.97(b)(1) to be protective of human health and the environment, and they all assess equally for all assessment criteria in 40 C.F.R. §§ 257.96(c) and 257.97(c) "...because no adverse risk currently exists, any of the remedies considered herein are all protective of human health and the environment, and implementation of any of the remedial alternatives will not result in a meaningful reduction in risk to groundwater-related exposures or risk." This is inconsistent with the requirements in the CCR regulations that contamination above the regulatory standard in groundwater must be cleaned up in corrective action. "EPA's longstanding and consistent policy across numerous regulatory programs has been that groundwater contamination is a significant concern that merits regulatory action in its own right, whether or not the aquifer is not currently used as a source of drinking water." (80 FR 21455, April 17, 2015).

The ACM does not contain site-specific evidence to support the assessment of MNA with respect to the released constituents (lithium, molybdenum, selenium) at AES. In order to conduct the assessment according to criteria in 40 C.F.R. § 257.96(c), evaluation of MNA as a corrective measure requires analysis of site-specific data and characteristics that control and sustain any naturally occurring attenuation. It is necessary to know what specific mechanism (e.g., sorption or reduction and oxidation reaction) is responsible for the attenuation so that the mechanism can be evaluated, considering factors such as attenuation capacity of the aquifer and stability of the mechanism. Changes in a contaminant's concentration or chemical speciation or in geochemical parameters (e.g., pH, oxidation and reduction potential) may reduce the occurrence of or the stability of a naturally occurring attenuation mechanism at AES and result in additional releases to the environment. Determining the occurrence and demonstrating the success and irreversibility of MNA mechanisms is necessary to assess the performance, reliability, ease of implementation, and the time required to complete the remedy. See 40

C.F.R. § 257.96 (c)(1) and (c)(2). This information would ultimately be necessary to show that MNA meets the requirements of 40 C.F.R. § 257.97(b). For more information about MNA and inorganic metals in groundwater, see the EPA guidance document “Use of Monitored Natural Attenuation for Inorganic Contaminants in Groundwater at Superfund Sites,” August 2015 (“2015 MNA Guidance”).

Inorganic contaminants persist in the subsurface because, except for radioactive decay, they are not degraded by the other natural attenuation processes. In other words, the released constituents at AES are atoms, and atoms do not break down or degrade through any naturally occurring process unless they are radioactive.<sup>3</sup> Often, however, inorganic contaminants may exist in forms that have low mobility, toxicity, or bioavailability such that they pose a relatively low level of risk. Therefore, natural attenuation of inorganic contaminants is most applicable to sites where immobilization is demonstrated to be in effect and the process/mechanism is irreversible.<sup>4</sup>

The ACM discusses MNA mechanisms that are not applicable to the released constituents at AES (e.g., volatilization, transformation, destruction) because they are inorganic metals and do not behave in this way. No specific mechanisms occurring at AES are identified in the ACM or Remedy Selection Report, and no data are presented to confirm that any are occurring, other than dilution and dispersion. Dilution and dispersion reduce concentrations through dispersal of contaminant mass rather than destruction or immobilization of contaminant mass.<sup>5</sup> Consequently, these mechanisms do not meet the requirement at 40 C.F.R. § 257.97(b)(4) to remove from the environment as much of the contaminated material as is feasible, and they may not meet the requirement at 40 C.F.R. § 257.97(b)(1) to be protective of human health and the environment. Note that this is also consistent with EPA’s long-standing policy that dilution and dispersion are generally not appropriate as primary MNA mechanisms<sup>6</sup>.

While MNA can reduce the aqueous concentration or mobility of inorganic contaminants in groundwater if immobilization occurs through adsorption or absorption to subsurface soils, it does not remove the contaminants from the environment. MNA, therefore, would not be assessed favorably in either the ACM or any remedy selection report with respect to 40 CFR § 257.97(b)(4), which requires that remedies “remove from the environment as much of the contaminated material that was released from the CCR unit as is feasible.” Immobilization that is not permanent would be assessed differently than permanent immobilization and would also require ongoing monitoring in accordance with 40 C.F.R. § 257.98(a)(1) as long as immobilized constituents remain in the aquifer matrix.

None of this analysis is provided in the discussion of MNA in the ACM. The ACM identifies no specific immobilization mechanisms and contains no data to support the occurrence of either permanent or reversible immobilization of molybdenum, lithium and selenium at AES Puerto Rico. The ACM assesses MNA favorably under various criteria without providing any site-specific data, gathered in the characterization required by 40 C.F.R. § 257.95(g)(1), to support the assessment. EPA believes the discussion of MNA in the ACM is insufficient to support its selection or to meet the requirements of 40 CFR § 257.96.

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<sup>3</sup> This is in contrast to organic compounds, comprised of multiple elements, which may react or degrade to their constituent elements and could form other, less harmful compounds.

<sup>4</sup> “Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action and Underground Storage Tank Sites,” April 1999, p. 9

<sup>5</sup> “Use of Monitored Natural Attenuation for Inorganic Contaminants in Groundwater at Superfund Sites,” August 2015, p. 14

<sup>6</sup> “Use of Monitored Natural Attenuation for Inorganic Contaminants in Groundwater at Superfund Sites,” August 2015, p. 14

Also, EPA notes that AES has not provided groundwater flow rate or direction of flow, laboratory analytical reports, statistical analyses, or any detailed discussion of the statistical analyses (e.g., statistical method applied, confidence levels, normality test results) in the Annual Groundwater Monitoring and Corrective Action (GWMCA) Reports. As a result, these reports fail to include all the monitoring data obtained under 40 C.F.R. §§ 257.90 through 257.98 as required by 40 C.F.R. § 257.90(e)(3).

The purpose of the Annual GWMCA Report is to provide the most recently obtained groundwater information as well as to allow review for compliance with the requirements. The groundwater monitoring provisions in 40 C.F.R. §§ 257.90 through 257.95 include numerous requirements (e.g., standards for lowest achievable quantitation limits, requirement to analyze samples for total recoverable metals, performance standards for various statistical methods). It is the owner or operator's responsibility to demonstrate that they are in compliance with the regulations, and the failure to provide this information in the Annual GWMCA Reports prevents the EPA, states, or other stakeholders from evaluating compliance.

Based on these deficiencies and lack of required details, we look forward to AES' response addressing them in the near future. Likewise, we look forward to a discussion on your selection of MNA as a part of your remedy. If you have any questions please contact Mr. Dale Carpenter, Chief of EPA Region 2's Sustainable Materials Management Section, at (212) 637-4110 to discuss any questions you may have about the comments provided herein.

Sincerely,

Ariel Iglesias, Director  
Land, Chemicals and Redevelopment Division