Excerpt 19

Screening Level Ecological Risk Assessment for the Renewable Energy Power Plant to be located in Arecibo, dated October, 22, 2010 ("SLERA"), AR I.B.10.a

APENDICE L

Estudio de Riesgo Ecológico

Noviembre 2010

Declaración de Impacto Ambiental – Preliminar

Planta de Generación de Energía Renovable y Recuperación de Recursos

BARRIO CAMBALACHE DE ARECIBO

EnergyAnswers Arecibo

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Arecibo, Puerto Rico Renewable Energy Project

Screening Level Ecological Risk Assessment for the Renewable Energy Power Plant to be located in Arecibo

October 2010

ARCADIS

Screening Level Ecological Risk Assessment

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Our Ref.:
NCENRGY1.0003.00008

Date:
October 21, 2010

3.4.1.3 Woodlands (SLERA 4):

COPEC concentrations in soil were calculated for this large area of woodlands within a karst region to the southwest of the Site and south of the populated area of the town of Arecibo (Figure 5).

Table 1 presents the COPEC concentrations for this habitat area. The maximum modeled COPEC concentrations for soil in this habitat area include: 6.63E-08 mg/kg for Aroclor-1254 (PCB); 1.82E-08 mg/kg benzo(a)pyrene; 4.08E-11 mg/kg naphthalene; 6.64E-10 mg/kg 2,3,7,8-Tetrachlorodibenzodioxin (TCDD); and metals concentrations ranging from 1.51E-05 (methyl mercury) to 3.04E-02 mg/kg (zinc).

3.4.1.4 Woodlands at Rio Abajo State Forest (SLERA 5):

COPEC concentrations in soil were calculated for this area of woodlands encompassed by the Rio Abajo State Forest, a conserved area approximately 5 miles southwest of the Site (Figure 5).

Table 1 presents the COPEC concentrations for this habitat area. The maximum modeled COPEC concentrations for soil in this habitat area include: 1.04E-08 mg/kg for Aroclor-1254 (PCB); 1.72E-09 mg/kg benzo(a)pyrene; 1.02E-11 mg/kg naphthalene; 6.78E-11 mg/kg 2,3,7,8-Tetrachlorodibenzodioxin (TCDD); and metals concentrations ranging from 5.74E-07 (selenium) to 2.58E-03 mg/kg (zinc).

3.4.1.5 Forested and Emergent Wetlands (SLERA 6):

COPEC concentrations in soil were calculated for this floodplain location approximately 5 km south of the Site (Figure 5).

Table 1 presents the COPEC concentrations for this habitat area. The maximum modeled COPEC concentrations for soil in this habitat area include: 5.77E-09 mg/kg for Aroclor-1254 (PCB); 1.08E-09 mg/kg benzo(a)pyrene; 4.09E-11 mg/kg 2,3,7,8-Tetrachlorodibenzodioxin (TCDD); and metals concentrations ranging from 3.76E-07 (selenium) to 1.68E-03 mg/kg (zinc).

3.4.1.6 Woodlands at Cambalache State Forest (SLERA 7):

COPEC concentrations in soil were calculated for this area of woodlands encompassed by the Cambalache State Forest, a conserved area approximately 7 km southeast of the Site (Figure 5).

Table 1 presents the COPEC concentrations for this habitat area. The maximum modeled COPEC concentrations for soil in this habitat area include: 2.51E-10 mg/kg for Aroclor-1254 (PCB); 1.04E-10 mg/kg benzo(a)pyrene; 4.19E-12 mg/kg 2,3,7,8-Tetrachlorodibenzodioxin (TCDD); and metals concentrations ranging from 3.10E-08 (selenium) to 1.39E-04 mg/kg (zinc).

3.4.1.7 Reserva Natural Cano Tiburones (SLERA 8):

COPEC soil concentrations were calculated for this Priority Conservation Area located approximately 2 km northeast of the Site (Figure 5) .

Table 1 presents the COPEC concentrations for this habitat area. The maximum modeled COPEC concentrations for soil in this habitat area include: 6.31E-09 mg/kg for Aroclor-1254 (PCB); 1.29E-09 mg/kg benzo(a)pyrene; 4.72E-11 mg/kg 2,3,7,8-Tetrachlorodibenzodioxin (TCDD); and metals concentrations ranging from 1.03E-06 (methyl mercury) to 2.10E-03 mg/kg (zinc).

Based on these results, the SLERA 7 area showed the lowest concentrations of COPEC in soil and the SLERA 3 area showed the highest concentrations. As indicated above, the SLERA 7 area (Woodlands at Cambalache State Forest) showed trace COPEC concentrations ranging from 4.06E-12 mg/kg for benzo(b)fluoranthene to 1.39E-04 mg/kg for zinc. The SLERA 3 area (Forested Wetlands west of Facility) showed trace COPEC concentrations ranging from 6.48E-11 mg/kg for Acenaphthene to 6.99E-02 mg/kg for zinc. The remaining areas had similar low-level concentrations of COPEC ranging between the concentrations observed in these two areas. It should be noted that many of the Facility-related metals concentrations modeled for soil in the SLERA areas are substantially less than background concentrations of these metals in soil based on information provided by USEPA in their Eco-SSL documents (USEPA 2005 a-e).

3.4.2 Surface Water/Sediment

A screening of modeled COPEC concentrations in surface water and sediment was conducted to evaluate potential ecological risk to organisms at representative aquatic habitats within a 10-km radius of the Facility. Aquatic habitat areas with the combination of potential COPEC concentrations and ecological receptors of concern were screened for potential impacts using EBSLs. In addition, certain sensitive habitat areas such as nature reserves within the 10-km radius were evaluated even if COPEC concentrations in these areas were not the maximum concentrations identified by the

4.2.1.2 Forested Wetlands (SLERA 3):

COPEC concentrations in soil were calculated for this location to the west of the Site and just south of the populated area of the town of Arecibo. As indicated in Section 3, of all the SLERA areas evaluated, this area showed the highest concentrations of COPEC in soil.

Table 1presents the COPEC concentrations for this habitat area. The modeled COPEC concentrations for this habitat area are typically more than 3 orders of magnitude (i.e., 1,000 times) less than the screening levels. The only exceptions were the toxicity equivalent concentration for dioxins/furans (mammalian), methyl mercury and zinc, which were approximately 2 orders of magnitude (or 100 times) less than the most-conservative screening levels for these constituents. As a result, the modeled soil concentrations in this area are substantially less than the ecological screening levels and potential ecological effects are unlikely.

4.2.1.3 Woodlands (SLERA 4):

COPEC concentrations in soil were calculated for this large area of woodlands within a karst region to the southwest of the Site and south of the populated area of the town of Arecibo.

Table 1 presents the COPEC concentrations for this habitat area. The modeled COPEC concentrations for this habitat area are typically more than 3 orders of magnitude (i.e., 1,000 times) less than the screening levels. The concentration of methyl mercury modeled for this location was 2 orders of magnitude less than the screening level. As a result, the modeled soil concentrations for COPEC in this area are substantially less than the ecological screening levels and potential ecological effects are unlikely.

4.2.1.4 Woodlands at Rio Abajo State Forest (SLERA 5):

COPEC concentrations in soil were calculated for this area of woodlands encompassed by the Rio Abajo State Forest, a conserved area approximately 5 miles southwest of the Site.

Table 1 presents the COPEC concentrations for this habitat area. The modeled COPEC concentrations for this habitat area are typically more than 3 orders of magnitude (i.e., 1,000 times) less than the screening levels. As a result, the modeled

soil concentrations for COPEC in this area are substantially less than the ecological screening levels and potential ecological effects are unlikely.

4.2.1.5 Forested and Emergent Wetlands (SLERA 6):

COPEC concentrations in soil were calculated for this floodplain location approximately 5 km south of the Site.

Table 1 presents the COPEC concentrations for this habitat area. The modeled COPEC concentrations for this habitat area are typically more than 4 orders of magnitude (i.e., 10,000 times) less than the screening levels. As a result, the modeled soil concentrations for COPEC in this area are substantially less than the ecological screening levels and potential ecological effects are unlikely.

4.2.1.6 Woodlands at Cambalache State Forest (SLERA 7):

COPEC concentrations in soil were calculated for this area of woodlands encompassed by the Cambalache State Forest, a conserved area approximately 7 km southeast of the Site. As indicated in Section 3, of all the SLERA areas evaluated, this area showed the lowest concentrations of COPEC in soil.

Table 1 presents the COPEC concentrations for this habitat area. The modeled COPEC concentrations for this habitat area are typically more than 4 orders of magnitude (i.e., 10,000 times) less than the screening levels. As a result, the modeled soil concentrations for COPEC in this area are substantially less than the ecological screening levels and potential ecological effects are unlikely.

4.2.1.7 Reserva Natural Cano Tiburones (SLERA 8):

COPEC soil concentrations were calculated for this Priority Conservation Area located approximately 2 km northeast of the Site.

Table 1 presents the COPEC concentrations for this habitat area. The modeled COPEC concentrations for this habitat area are typically more than 4 orders of magnitude (i.e., 10,000 times) less than the screening levels. The concentration of methyl mercury modeled for this location was approximately 3 orders of magnitude, or 1,000 times, less than its soil screening level. As a result, the modeled soil concentrations for COPEC in this area are substantially less than the ecological screening levels and potential ecological effects are unlikely.

The modeled sediment COPEC concentrations for this habitat area are more than 3 orders of magnitude less than the screening levels. The modeled concentration of 2,3,7,8-TCDD at this location is approximately 5 orders of magnitude (or 100,000 times) less than the chronic screening level for sediment. As a result, the modeled sediment concentrations for COPEC in this area are substantially less than the ecological screening levels and potential ecological effects are unlikely.

4.2.2.2 Rio Grande de Arecibo Estuary/Priority Conservation Area (SLERA 2):

Surface water and sediment COPEC concentrations were calculated for this location within the Priority Conservation Area north of the Site. Table 2 presents the surface water and Table 3 presents the sediment COPEC concentrations for this habitat area.

The modeled surface water COPEC concentrations for this estuarine habitat area are more than 3 orders of magnitude less than the screening levels. As a result, the modeled surface water concentrations for COPEC in this area are substantially less than the ecological screening levels and potential ecological effects are unlikely.

The modeled sediment COPEC concentrations for this habitat area are also more than 3 orders of magnitude less than the screening levels. The modeled concentration of 2,3,7,8-TCDD at this location is approximately 5 orders of magnitude (or 100,000 times) less than the chronic screening level for sediment. As a result, the modeled sediment concentrations for COPEC in this area are substantially less than the ecological screening levels and potential ecological effects are unlikely.

4.2.2.3 Reserva Natural Cano Tiburones (SLERA 8):

Surface water, and sediment COPEC concentrations were calculated for this Priority Conservation Area located approximately 2 km northeast of the Site. Table 2 presents the surface water and Table 3 presents the sediment COPEC concentrations for this habitat area.

The modeled surface water concentrations for COPEC associated with this estuarine habitat area are typically at least one order of magnitude less than the screening levels. The zinc concentration is 2 to 3 factors less than the most-conservative EBSL. As a result, the modeled surface water concentrations for COPEC in this area are less than the ecological screening levels and potential ecological effects are unlikely.

The modeled sediment COPEC concentrations for this habitat area are more than 3 orders of magnitude less than the screening levels. The modeled concentration of

5.1.2 Rio Grande de Arecibo Estuary/Priority Conservation Area (SLERA 2)

Soil, surface water and sediment COPEC concentrations were calculated for this location within the Priority Conservation Area located approximately 1.5 km north of the Site. A comparison of soil, surface water, and sediment COPEC concentrations to EBSLs indicated that COPEC concentrations are 3 orders-of magnitude less than the soil EBSLs, more than 3 orders-of magnitude less than the surface water EBSLs, and more than 3 orders-of magnitude less than the sediment EBSLs. As a result, the potential for risks to terrestrial and aquatic receptors at this location is negligible.

5.1.3 Forested Wetlands (SLERA 3)

COPEC concentrations in soil were calculated for this location approximately 3 km west of the Site and just south of the populated area of the town of Arecibo. A comparison of soil COPEC concentrations to EBSLs indicated that COPEC concentrations are at least 2 orders-of magnitude less than the soil EBSLs. As a result, the potential for risks to terrestrial receptors at this location is negligible.

5.1.4 Woodlands (SLERA 4)

COPEC concentrations in soil were calculated for this large area of woodlands within a karst region approximately 5 km southwest of the Site and south of the populated area of the town of Arecibo. A comparison of soil COPEC concentrations to EBSLs indicated that COPEC concentrations are at least 2 orders-of magnitude less than the soil EBSLs. As a result, the potential for risk to terrestrial receptors at this location is negligible.

5.1.5 Woodlands at Rio Abajo State Forest (SLERA 5)

COPEC concentrations in soil were calculated for this area of woodlands encompassed by the Rio Abajo State Forest, a conserved area approximately 6 km southwest of the Site. A comparison of soil COPEC concentrations to EBSLs indicated that COPEC concentrations are at least 3 orders-of magnitude less than the soil EBSLs. As a result, the potential for risk to terrestrial receptors at this location is negligible.

5.1.6 Forested and Emergent Wetlands (SLERA 6)

COPEC concentrations in soil were calculated for this floodplain location approximately 5 km south of the Site. A comparison of soil COPEC concentrations to EBSLs indicated that COPEC concentrations are typically more than 4 orders-of magnitude less than the soil EBSLs. As a result, the potential for risk to terrestrial receptors at this location is negligible.

5.1.7 Woodlands at Cambalache State Forest (SLERA 7)

COPEC concentrations in soil were calculated for this area of woodlands encompassed by the Cambalache State Forest, a conserved area approximately 7 km southeast of the Site. A comparison of soil COPEC concentrations to EBSLs indicated that COPEC concentrations are typically more than 4 orders-of magnitude less than the soil EBSLs. As a result, the potential for risk to terrestrial receptors at this location is negligible.

5.1.8 Reserva Natural Cano Tiburones (SLERA 8):

Soil, surface water, and sediment COPEC concentrations were calculated for this Priority Conservation Area located approximately 2 km northeast of the Site. A comparison of soil, surface water, and sediment COPEC concentrations to EBSLs indicated that COPEC concentrations are at least 3 orders-of magnitude less than the soil EBSLs, at least one or more orders of magnitude less than the surface water EBSLs, with the exception of zinc, which was 2 to 3 factors less than the most-conservative EBSL. Sediment COPEC concentrations were at least 3 orders of magnitude less than the sediment EBSLs. As a result, the potential for risk to terrestrial and aquatic receptors at this location is negligible.

5.1.9 Puerto Arecibo

Surface water and sediment concentrations were calculated for this location north of the Site. A comparison of surface water COPEC concentrations to EBSLs indicated that COPEC concentrations are several orders-of-magnitude less than the EBSLs. COPEC concentrations for sediment at this location were shown to be more than 3 orders of magnitude less than the sediment EBSLs. As a result, the potential for risk to aquatic receptors at this location is negligible.

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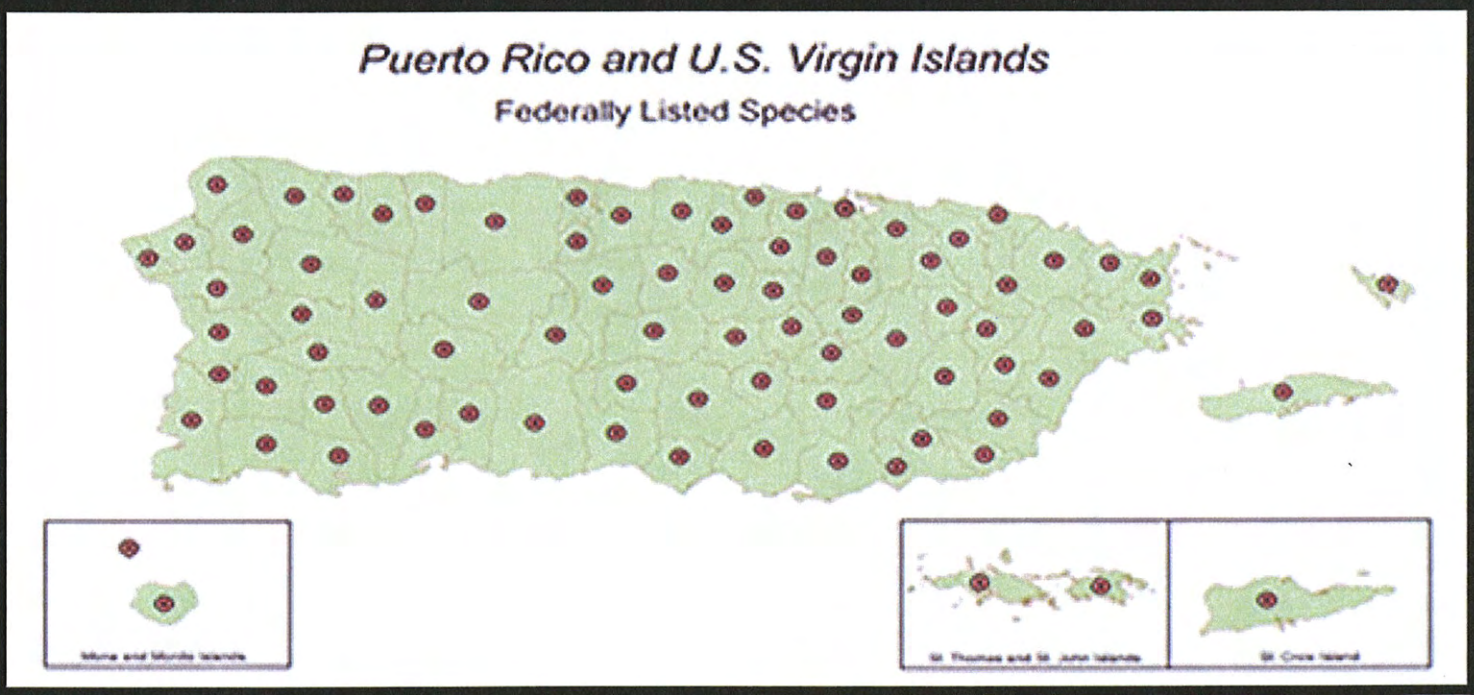
Appendix C

USFWS Caribbean Endangered Species Map for Puerto Rico

U.S. Fish & Wildlife Service

Caribbean Endangered Species Map

Mapa de Especies Caribeñas en Peligro de Extinción



Carey

Coquí guajón

Higuero de Sierra

Palometas

U.S.Fish & Wildlife Service

Ecological Services in the Caribbean

DISCLAMER: The Endangered Species Map is provided as a tool for developers, consultants, land management agencies, resource agency staff and the general public as a quick reference for the evaluation of possible effects that may result from development projects. The information provided in this map identifies general areas where the species may be located. The information does not represent the absolute distribution of a particular species. The map and table were developed with the best information available to the Service, but additional sightings of the species may occur. If the project is located within the currently known distribution of a species, additional information may be required to determine the presence of suitable habitat within the project area, and in some cases, specialized surveys may be required to determine presence/absence of the species.

Continue to Map

Last Revised: 2007

ARECIBO (1-2)

SCIENTIFIC NAME	COMMON NAME	COMMON NAME SPANISH	GROUP	STATUS	DISTRIBUTION
Accipiter striatus venator	Puerto Rican Sharp-Shinned Hawk	Falcon de Sierra	Bird	E	Rio Abajo State Forest
Amazona vittata vittata	Puerto Rican Parrot	Cotorra Puertorriqueña	Bird	E	Rio Abajo State Forest
Auerodendron pauciflorum	No Common Name	No Tiene Nombre Comun	Plant	E	Rio Abajo State Forest
Buteo platypterus brunnescens	Puerto Rican Broad-winged Hawk	Guaraguao de Bosque	Bird	E	Rio Abajo State Forest
Calyptronoma rivalis	No Common Name	Palma de Manaca	Plant	T	Rio Abajo State Forest
Chelonia mydas	Green Sea Turtle	Peje Blanco	Reptile	T, CH	Coastal Zones
Cordia bellonis	No Common Name	No Tiene Nombre Comun	Plant	E	Rio Abajo State Forest
Cornutia obovata	No Common Name	Palo de Nigua	Plant	E	Rio Abajo State Forest, Near Arecibo Observatory
Dermochelys coriacea	Leatherback Sea Turtle	Tinglar	Reptile	E, CH	Coastal Zones
Epicrates inornatus	Puerto Rican Boa	Boa Puertorriqueña	Reptile	E	Forested Volcanic and Limestone (Karst) Hills
Eretmochelys imbricata	Hawksbill Sea Turtle	Carey	Reptile	E, CH	Coastal Zones
Goetzea elegans	Beautiful Goetzea	Matabuey	Plant	E	Cambalache State Forest
Continues on Next Page					

Status
E=Endangered
T=Threatened
CH=Critical Habitat

BACK CONTINUE