ANALYSIS OF THE SECTION 301(h) MODIFICATION OF SECONDARY TREATMENT 2007 RENEWAL APPLICATION FOR THE ARECIBO REGIONAL WASTEWATER TREATMENT PLANT NPDES PERMIT NO. PR0023710

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INTRODUCTION

The Puerto Rico Aqueduct and Sewer Authority (hereinafter PRASA) has requested a renewal of its modification under section 301(h) of the Clean Water Act (CWA), 33 U.S.C. 1311(h), from the secondary treatment requirements contained in section 301(b)(1)(B) of the CWA, 33 U.S.C. 1311(b)(1)(B) for the Arecibo Regional Wastewater Treatment Plant (RWWTP), a publicly owned treatment works (POTW) located on the island of Puerto Rico. [National Pollutant Discharge Elimination System (NPDES) Permit No. PR0023710] The facility is owned and operated by PRASA.

PRASA is seeking a section 301(h) modification to discharge wastewater receiving less-than-secondary treatment from the Arecibo RWWTP to the Atlantic Ocean. Secondary treatment is defined in federal regulations at 40 CFR Part 133 in terms of effluent quality for total suspended solids (TSS), five-day measure of biochemical oxygen demand (BOD_5) and pH. The original application for a section 301(h) modification of secondary treatment requirements at the Arecibo RWWTP was submitted to the U.S. Environmental Protection Agency (EPA) in 1979, and was denied by EPA in 1984 for failure to receive an approved mixing zone from the Puerto Rico Environmental Quality Board (EQB) as part of its Water Quality Certification (WQC) for the facility in accordance with Rule 1305 of Puerto Rico Water Quality Standards (PRWQS). In 1985, PRASA re-applied for a section 301(h) modification of secondary treatment requirements and in 1989, EPA tentatively approved PRASA's application for a section 301(h) modified permit (hereinafter a modified permit) for the Arecibo RWWTP based, in part, on the approval and implementation of a pretreatment program and development of a receiving water monitoring program. In 2000, the EPA re-evaluated the 1989 tentative decision and issued a final decision to approve PRASA's application for a modification from the secondary treatment requirements. Subsequently, EPA issued a modified permit to PRASA in 2002 for the Arecibo RWWTP that became effective on November 1, 2002, and expired on October 31, 2007. The terms and conditions of the modified permit have been administratively extended until issuance of a new permit. 40 CFR 122.21.

In 2007, PRASA submitted an application for renewal of its modified permit for the Arecibo RWWTP. PRASA requested a modification of secondary treatment requirements for the Arecibo RWWTP based on an improved discharge within the meaning of 40 CFR 125.58(c) and (i), and has requested effluent limits for flow, BOD_5 and TSS that are established in the existing modified permit. In 2012, PRASA submitted an updated application that modified dilution estimates and the mixing zone size based on more recent receiving water data and modeling. This document presents the EPA's findings, conclusions, and recommendations as to whether the modified discharge will comply with the criteria set forth in section 301(h) of the CWA, as implemented by regulations contained in 40 CFR Part 125, Subpart G, and PRWQS Regulations, as amended (Regulation Number 7837).

DECISION CRITERIA

Under section 301(b)(1)(B) of the CWA, POTWs in existence on July l, l977, were required to meet a minimum level of effluent quality attainable by secondary treatment in terms of TSS, BOD_5, and pH. The minimum level was promulgated as a national uniform effluent standard and is established as technology-based effluent limitations in permits for POTWs issued under section 402 of the CWA. POTWs were required to be in compliance with these limitations, in most circumstances, by July 1, 1977.

Congress subsequently amended the CWA, adding section 301(h), which authorized the EPA Administrator, with State[1] concurrence, to issue permits which modify the secondary treatment requirements of the Act. P.L. 95-217, 91 Stat. 1566, as amended by P.L. 97-117, 95 Stat. 1623; and section 303 of the Water Quality Act (WQA) of 1987. Section 301(h) provides that:

> The Administrator, with the concurrence of the State, may issue a permit under [section 402 of the CWA] which modifies the requirements of subsection (b)(l)(B) of this section with respect to the discharge of any pollutant from a publicly owned treatment works into marine waters, if the applicant demonstrates to the satisfaction of the Administrator that:

[1] Section 502(3) of the CWA defines "State" to include the Commonwealth of Puerto Rico. 33 U.S.C. 1362(3).

(l) there is an applicable water quality standard specific to the pollutant for which the modification is requested, which has been identified under [section 304(a)(6) of the CWA];

(2) the discharge of pollutants in accordance with such modified requirements will not interfere, alone or in combination with pollutants from other sources, with the attainment or maintenance of that water quality which assures protection of public water supplies and the protection and propagation of a balanced, indigenous population of shellfish, fish and wildlife, and allows recreational activities, in and on the water;

(3) the applicant has established a system for monitoring the impact of such discharge on a representative sample of aquatic biota, to the extent practicable, and the scope of such monitoring is limited to include only those scientific investigations which are necessary to study the effects of the proposed discharge;

(4) such modified requirements will not result in any additional requirements on any other point or nonpoint source;

(5) all applicable pretreatment requirements for sources introducing waste into such treatment works will be enforced;

(6) in the case of any treatment works serving a population of 50,000 or more, with respect to any toxic pollutant introduced into such works by an industrial discharger for which pollutant there is no applicable pretreatment requirement in effect, sources introducing waste into such works are in compliance with all applicable pretreatment requirements, the applicant will enforce such requirements, and the applicant has in effect a pretreatment program which, in combination with the treatment of discharges from such works, removes the same amount of such pollutant as would be removed if such works were to apply secondary treatment to discharges and if such works had no pretreatment program with respect to such pollutant;

(7) to the extent practicable, the applicant has established a schedule of activities designed to eliminate the entrance of toxic pollutants from nonindustrial sources into such treatment works;

(8) there will be no new or substantially increased discharges from the point source of the pollutant to which the modification applies above that volume of discharge specified in the permit;

(9) the applicant at the time such modification becomes effective will be discharging effluent which has received at least primary or equivalent treatment and which meets the criteria established under [Section 304(a)(1) of this Act] after initial mixing in the waters surrounding or adjacent to the point at which such effluent is discharged . . .”

For the purpose of this subsection the phrase "the discharge of any pollutant into marine waters" refers to a discharge into deep waters of the territorial sea or the waters of the contiguous zone, or into saline estuarine waters where there is strong tidal movement and other hydrological and geological characteristics which the Administrator determines necessary to comply with the requirements of sections 30l(h)(2) and 101(a)(2) of the [CWA]. For the purposes of section 301(h)(9), “primary or equivalent treatment” means treatment by screening, sedimentation and skimming adequate to remove at least 30 percent of the biochemical oxygen demanding material and 30 percent of the suspended solids in the treatment works influent, and disinfection, where appropriate. A municipality which applies for a modification from secondary treatment requirements shall be eligible to receive a permit pursuant to this subsection which modifies the requirements of subsection (b)(1)(B) of this section with respect to the discharge of any pollutant from any treatment works owned by such municipality into marine waters. No permit issued shall authorize the discharge of sewage sludge into marine waters. In order for a permit to be issued for the discharge of a pollutant into marine waters, such marine waters must exhibit characteristics assuring that water providing dilution does not contain significant amounts of previously discharged effluent from such treatment works. No permit issued shall authorize the discharge of any pollutant into marine or estuarine waters which at the time of application does not support a balanced, indigenous population of shellfish, fish and wildlife, or allow recreation in and on the waters or which exhibit ambient water quality below applicable water quality standards adopted for the protection of public water supplies, shellfish and wildlife, or recreational activities or such other standards necessary to assure support and protection of such uses. The prohibition contained in the preceding sentence shall apply without regard to the presence or absence of a causal relationship between such characteristics and the applicant’s current or proposed discharge.

On August 9, 1994, the EPA promulgated final regulations implementing these statutory criteria in 40 CFR Part 125, Subpart G. These regulations provide that a modified permit may not be issued in violation of 40 CFR 125.59(b), which requires, among other things, compliance with provisions of the Coastal Zone Management Act (16 U.S.C. 1451 *et seq.*), the Endangered Species Act (16 U.S.C. 1531 *et seq.*), Title III of the Marine Protection, Research and Sanctuaries Act (16 U.S.C. 1431 *et seq.*), and other applicable provisions of state or federal laws or Executive Orders such as requirements of Essential Fish Habitat of the Magnuson-Stevens Fishery Conservation and Management Act and the President's Executive Order on Coral Reef Protection dated June 11, 1998. Furthermore, the decision to grant or deny a section 301(h) modification shall be made by the Administrator and shall be based on whether PRASA has demonstrated it has met all the requirements of 40 CFR 125.59 through 125.68. The EPA has reviewed all data submitted by PRASA in the context of applicable statutory and regulatory criteria and presents its findings and conclusions herein. This document includes review of effluent and receiving water monitoring data collected since issuance of the 2002 modified permit in addition to other relevant information to evaluate the potential impact of the modified discharge on water quality and the marine environment and to support re-issuance of the existing permit.

DESCRIPTION OF THE FACILITY

The Arecibo RWWTP is located on the north coast of the island of Puerto Rico in the town of Arecibo and provides wastewater treatment services to the municipality of Arecibo. The Arecibo RWWTP first began operations in 1986 and is designed to provide advanced primary treatment of wastewater through screening, grit removal, polymer-enhanced sedimentation, disinfection (chlorination), and sludge thickening. The facility is designed for a maximum daily flow of 20 MGD and a monthly average flow of 10 MGD. Based on flow monitoring data from 2002 to 2012, the facility routinely operates below these flows with actual maximum daily flows ranging between 5.33 MGD (January 2004) and 14.6 MGD (November 2008), and actual average monthly flows ranging between 4.19 MGD (November 2012) and 7.38 MGD (March 2010). The facility discharges wastewater to the Atlantic Ocean through a linear high-rate diffuser approximately 1,150 m from the shoreline, at a depth of 27 m.

DESCRIPTION OF THE RECEIVING WATER

The receiving water in the vicinity of the discharge is classified as a Class SC water. Class SC waters are defined in Rule 1302.1 of PRWQS as coastal waters beyond Class SB waters to a maximum distance of 16.6 km. Class SB waters are considered the boundary subject to the ebb and flow of tides (mean sea level) to 500 m seaward. The Commonwealth of Puerto Rico has adopted water quality standards for Class SB and SC waters to protect the designated uses of these waters which include primary and secondary contact recreation, and the propagation and preservation of desirable species, including threatened and endangered species. Since the Arecibo RWWTP outfall is located near the boundary of Class SB and SC waters, the modified discharge may affect both water classifications. For the purpose of the section 301(h) evaluation, the EPA has assessed attainment of water quality standards for both Class SB and SC waters to ensure that the modified discharge from the Arecibo RWWTP does not impact designated uses in either area.

Since 1999, PRASA has conducted ambient monitoring as part of a section 301(h) receiving water monitoring program in accordance with section 301(h) requirements. Based on receiving water monitoring, PRASA has determined that there is little seasonal variation in the water column with respect to temperature and salinity. Density profiles taken near the outfall during wet and dry seasons indicate that thermoclines and haloclines do not form, which allows for constant mixing of the water column throughout the year. Annual ambient water temperatures are shown to range between 25 and 29 degrees Celsius (ºC), with only minor seasonal and spatial differences. Annual temperature and salinity data indicate that surface-to-bottom differences of these parameters are small, and spatial differences are insignificant. Currents in the vicinity of the outfall are generally influenced by the North Equatorial Current. Local winds do not significantly affect the general hydrological flow patterns near the outfall, although they may influence surface currents. In the renewal application, PRASA indicated that currents generally flow east to west, parallel to the coastline, and on average range in speeds between 11.27 and 18.18 cm/sec and vary with depth.

As part of its section 301(h) receiving water monitoring program, PRASA also conducts coral reef monitoring. The

nearest coral assemblage is located approximately 1.1 km southeast of the outfall, and consists of a rock reef with very sparse hard coral growth. Coral surveys have shown the areas monitored are characteristic of other north coast coral assemblages where there are few coral reefs compared to the south coast region of the island, which has a wide shelf that protects the coast and allows for the support of fringing coral reefs. Coral reefs on the north coast are much lower in species diversity than those on the south coast or compared to other Caribbean reefs.

Initial Dilution

At the time a section 301(h) modification becomes effective, 40 CFR 125.62 requires that the Arecibo RWWTP's outfall and diffuser be located and designed to provide adequate initial dilution, dispersion, and transport of wastewater such that the discharge does not exceed, at and beyond the Zone of Initial Dilution (ZID), all applicable water quality standards. Dilution is defined as the ratio of the total volume of the sample (ambient water plus effluent) to the volume of effluent in the sample. The ZID is defined as a region of mixing surrounding, or adjacent to, the end of the outfall or diffuser, provided that the ZID is not larger than allowed by mixing zone restrictions in applicable water quality standards. 40 CFR 125.58(dd). Rule 1305 of PRWQS authorizes the use of mixing zones through a mixing zone approval process. Upon approval by the EQB, an interim authorization for a mixing zone is granted based on the applicant's demonstration that water quality standards are met at the boundary of the proposed mixing zone, after consideration of the lowest (i.e., critical) initial dilution determined for open coastal waters.

In 2007, PRASA originally submitted a request to the EQB for a WQC and mixing zone. In 2012, PRASA submitted a revised request based on new information from dilution modeling. On September 29, 2014, the EQB issued a WQC for the Arecibo RWWTP that included an authorization of a mixing zone. In general, the mixing zone is considered a ZID that is geometrically sized to include the seafloor and the water column above it. For the next permit term, PRASA has proposed new mixing zone boundaries from the existing mixing zone considered in the EPA's 2000 approval of a modified permit due to the use of more recent density profile and current speed information, and new diffuser configuration. Therefore, the new mixing is slightly larger than the mixing zone authorized in the existing permit. PRASA has determined the size of the new mixing zone through dilution modeling to be a rectangular-shaped area approximately 279.6 m long and 79.5 m wide surrounding the diffuser. PRASA also determined that the mixing zone would provide a Critical Initial Dilution (CID) of 224:1 based on a maximum daily design flow of 20 MGD through the outfall and a modified diffuser configuration from 56 to 41 of the total 112 ports open to prevent seawater intrusion.[2]

Since 1999 PRASA has been conducting monitoring of the receiving water in the vicinity of the ZID. The existing permit requires PRASA to conduct section 301(h) Waiver Demonstration Studies at six receiving water monitoring stations, which include locations within the ZID (A6), at the boundary of the ZID (A1 and A2), beyond the ZID (farfield stations A4 and A5), and at a reference site (A3). PRASA has also been required to conduct coral community monitoring surveys at two stations, AA1 and AA2, located both east and west of the outfall near Punta Caracoles and Punta Morillos. PRASA has conducted a total of 30 receiving water monitoring events since the section 301(h) receiving water monitoring program began in 1999.

COMPLIANCE WITH STATUTORY AND REGULATORY CRITERIA

1. Attainment of water quality standards related to BOD_5 and TSS

Under 40 CFR 125.61, which implements section 301(h)(1), there must be water quality standards applicable to the pollutants for which the modification is requested, and PRASA must demonstrate that the modified discharge will comply with these standards. PRASA has requested modified secondary treatment requirements for BOD_5, which affects dissolved oxygen (DO), and TSS, which affects the color and turbidity of the receiving water. PRWQS have established water quality criteria for DO, color and turbidity. As a result, the EPA has evaluated receiving water data from PRASA's *301(h) Waiver Demonstration Studies* documents (2002 – 2013), effluent monitoring data (2002 – 2013) and other information to assess the impact of the modified discharge on the

[2] The EPA's 2000 approval of PRASA's application for renewal of its modified permit for the Arecibo RWWTP was based on a CID of 132:1.

attainment of other water quality standards related to BOD_5 and TSS. A summary of the evaluation is provided below. Detailed information is provided in PRASA's 2012 *Renewal Application for 301(h) Waiver for the Arecibo RWWTP*; 2012 *Revised Application for a Water Quality Certificate and Definition of a Mixing Zone for the Arecibo Regional Wastewater Treatment Plant Outfall System*; and *2013 Dry Season Report Arecibo TWWTP 301(h) Waiver Demonstration Studies, March 2013*.

a. DO

The effect of the effluent discharge on DO can occur in the nearshore and farfield as effluent mixes with the receiving water and the oxygen demand of the effluent BOD load is exerted. As wastewater is discharged through a diffuser, it forms a buoyant plume that rises during initial dilution. As the discharge plume rises, water from deeper parts of the water column is entrained into the plume and advected to the plume trapping level, which can result in an oxygen depression caused by entrainment if the DO level is lower at the bottom of the water column than at the trapping level or surface. Pursuant to 40 CFR 125.61(b)(1) and 125.62(a)(1), PRASA must demonstrate that the modified discharge will comply with water quality criteria for DO and that the outfall and diffuser for the Arecibo RWWTP are located and designed to provide adequate initial dilution, dispersion, and transport of wastewater such that the discharge does not exceed criteria at and beyond the ZID. Rule 1303.2(B) of PRWQS provides that the DO concentration in Class SB waters "shall not contain less than 5 mg/l, except when this value is depressed due to natural causes." For Class SC waters, the DO concentration shall not contain less than 4 mg/l except when natural conditions cause this value to be depressed. Rule 1303.2(C) of PRWQS.

With consideration of DO depression from all sources, PRASA predicted negligible effects on DO levels in the receiving water. DO depression levels were calculated at initial dilution and in the farfield, and due sediment oxygen demand and sediment re-suspension. Table 1 provides a summary of the levels of DO depression. Upon initial dilution, PRASA predicted a DO depression of 0.061 mg/l in the water column with a final DO concentration of 5.51 mg/l based on the following: an effluent DO concentration of 0.07 mg/l, ambient DO concentration of 5.57 mg/l, immediate DO demand value of 8.0 mg/l, and CID of 224:1. Following initial dilution, PRASA predicted additional DO depression due to BOD exertion based on the current BOD_5 limitation of 120 mg/l, ambient DO concentration of 5.57 mg/l, and a final DO concentration of 5.51 mg/l calculated at the end of initial dilution. Calculations were done for 10 days at 6-hour intervals and for one day at 0.5-hour intervals and resulted in a DO depression of 0.003 mg/l. Since the deposition of suspended particles from the wastewater discharge and also their re-suspension can impact concentrations of DO near the seafloor, PRASA calculated additional DO depression values of 0.013 mg/l and 0.079 mg/l due to sediment oxygen demand and sediment re-suspension, respectively. Considering the DO demand from initial dilution to sediment re-suspension, the cumulative potential DO depression is predicted to be 0.156 mg/l, with a final predicted DO concentration of 5.413 mg/l. This is above the water quality criteria for DO and generally consistent with findings from receiving water data. While DO levels in the effluent were generally reported low, below the 4 mg/l DO criterion, DO levels in the receiving water were consistently above the water quality criteria for Class SC waters, at all stations, including the two ZID stations. Average DO concentrations ranged between 4.87 and 6.81 mg/l for all six stations combined. DO levels also generally met the DO criterion for Class SB waters. Therefore, the modified discharge is not anticipated to adversely impact DO concentrations in the receiving water during the next permit term.

Table 1. Potential DO Demand from All Sources – Arecibo RWWTP

DO depression following initial dilution	-0.061 mg/l
Maximum DO depression in the farfield	-0.003 mg/l
Maximum DO depression due to sediment oxygen demand (critical 90-day conditions)	-0.013 mg/l
Maximum DO depression due to sediment re-suspension (critical 90-day conditions)	-0.079 mg/l
Cumulative potential DO depression	-0.156 mg/l

b. Color

Rule 1303.1 of PRWQS provides that "the waters of Puerto Rico shall be free from color . . . attributable to discharges in such a degree as to create a nuisance to the enjoyment of the existing or designated uses of the waterbody." Specifically, for Class SB and SC waters, Rule 1303.2 provides that color shall not be altered except by natural causes. Significant changes in color can adversely affect aquatic life by reducing light penetration thereby limiting photosynthesis by phytoplankton and aquatic plants. In the WQC for the existing permit, EQB determined an effluent limitation of 65 Pt-Co was necessary to ensure that narrative water quality criterion for color was met. Review of effluent levels of color were consistently below 65 Pt-Co. Receiving water monitoring

data also showed levels below the 65-Pt-Co with results reported consistently below the detection limit of 5 Pt-Co for all monitoring stations. Color did not appear to vary between the reference station and other stations.

Therefore, the modified discharge is not anticipated to adversely affect color levels in the receiving water during the next permit term.

c. Turbidity

Suspended solids in the effluent can result in a significant loading of particles to the water column and their subsequent deposition onto the seafloor in the vicinity of the modified discharge. Suspended solids can cause turbidity, decrease light penetration, and harm sensitive marine ecosystems by interfering with the light available for photosynthesis. Pursuant to 40 CFR 125.61 and 125.62, PRASA must demonstrate that the modified discharge from the Arecibo RWWTP will comply with water quality standards for suspended solids, which may include criteria for turbidity, light transmission, light scattering, or maintenance of the euphotic zone. In addition, PRASA must demonstrate that the outfall and diffuser are located and designed to provide adequate initial dilution, dispersion, and transport of wastewater such that the discharge does not exceed, at and beyond the ZID, these water quality standards. Rule 1303.1 of PRWQS provides that "the waters of Puerto Rico shall be free . . . from turbidity attributable to discharges in such a degree as to create a nuisance to the enjoyment of the existing or designated uses of the waterbody." Specifically, Rule 1303.2 provides that turbidity in Class SB and Class SC waters shall not exceed 10 nephelometric turbidity units (NTUs), except by natural causes.

Review of receiving water monitoring data indicates that the level of turbidity at all stations consistently met the water quality criterion of 10 NTUs, with levels generally below 1.0 NTU. In contrast, effluent data show turbidity values were reported greater than the criterion with levels ranging between 3.1 NTUs (November 2001) and 400 NTUs (April 2009). With consideration of dilution, turbidity from the effluent is not anticipated to adversely affect turbidity in the receiving water during the next permit term and it predicted to meet the water quality criterion at the edge of the mixing zone.

2. Attainment of other water quality standards and impact of discharge on public water supplies; shellfish, fish and wildlife; and recreation

Section 301(h)(2) of the CWA provides that the EPA may issue a permit which modifies the requirements of secondary treatment if PRASA demonstrates that the discharge of pollutants will not interfere, alone or in combination with pollutants from other sources, with the attainment or maintenance of water quality which assures protection of public water supplies and the protection and propagation of a balanced, indigenous population (BIP) of shellfish, fish and wildlife, and allows recreational activities. Pursuant to 40 CFR 125.62(a), which implements section 301(h)(2), the Arecibo RWWTP's outfall and diffuser must be located and designed to provide adequate initial dilution, dispersion, and transport of wastewater such that the discharge does not exceed, at and beyond the ZID, all applicable water quality standards, nor exceed section 304(a) criteria for toxic pollutants for which there are no applicable EPA-approved standards.

Since 1999, PRASA has implemented a section 301(h) monitoring program for the Arecibo RWWTP that consists of effluent and water quality monitoring; the assessment of benthic invertebrates and coral reefs; and analysis of toxic pollutants in sediment and fish tissue. Information from PRASA's 2012 *Renewal Application for 301(h) Waiver for the Arecibo RRWTP*, *Arecibo RWWTP 301(h) Waiver Demonstration Studies* documents (2002 – 2013), effluent monitoring (2002 – 2013) and other information associated with the Arecibo RWWTP's modified permit has been evaluated to assess the impact of the modified discharge on the attainment of other water quality standards, including those for toxic pollutants and toxicity; and the impact on the protection and propagation of a BIP of shellfish, fish and wildlife; public water supplies and recreation. A complete description of the section 301(h) monitoring program is provided in PRASA's 2012 *Quality Assurance Project Plan and Sampling and Analysis Protocols for the Arecibo RWWTP 301(h) Waiver Demonstration Studies*.

a. Parameter-specific Analysis

The existing modified permit requires PRASA to monitor the concentration of approximately 150 pollutants in effluent from the Arecibo RWWTP and in the receiving water. The EPA has assessed the potential for each pollutant to cause or contribute to an exceedance of PRWQS at the edge of the mixing zone. Based on the definition of dilution in Rule 1301.1 of PRWQS, attainment of applicable water quality criteria is based on the assessment of the effluent concentration and background concentration in the receiving water.

Metals

To protect the beneficial uses of coastal waters, Rule 1303.1 of PRWQS provides the maximum allowable concentrations of metals in Class SB and SC waters. Effluent data show that concentrations of arsenic, copper, mercury, nickel, silver, and lead to be above the water quality criteria. With consideration of dilution and background concentrations, the concentrations of these pollutants are predicted to be below the water quality criteria at the edge of the ZID during the next permit term. Review of metal concentrations in the receiving water at and beyond the ZID showed levels of these metals below water quality criteria at all monitoring stations.

Conventional, Non-Conventional and Organic Pollutants.

To protect the designated uses of coastal waters, Rules 1303.1 and 1303.2 of PRWQS provides the maximum allowable concentrations of conventional, non-conventional and organic pollutants in Class SB and SC waters. Effluent data show total cyanide (as CN), total nitrogen (NO_2, NO_3, NH_3), sulfide (undissociated H_2S), surfactants (as methylene blue active substances), and thallium detected at concentrations above the water quality criteria. However, review of receiving water data showed that all pollutants to be below water quality criteria at all monitoring stations. With consideration of dilution and background concentrations, concentrations of these pollutants are predicted to be below the water quality criteria at the edge of the ZID during the next permit term.

Whole Effluent Toxicity

The existing permit requires that PRASA conduct acute and chronic whole effluent toxicity (WET) testing on the modified discharge from the Arecibo RWWTP. The EPA evaluated bioassay results based on the authorized dilution of 133:1 for the existing permit and the proposed dilution of 224:1 for the next permit term. With consideration of a dilution, acute instream waste concentrations (IWCs) of 1.47 and 2.5 percent effluent and chronic IWCs of 0.44 and 0.75 percent effluent were used to interpret the narrative criteria for WET identified in the PRWQS. The mixing zone provisions of PRWQS provide that acute and chronic mixing zones are equal for coastal dischargers equipped with high rate diffusers, such as that of the Arecibo RWWTP. Review of most recent WET data (2005 - 2012) showed no acute toxicity. However, chronic toxicity was shown in WET data from February 2006 to July 2012. During this period, PRASA conducted nine chronic tests on both *Mysidopsis bahia* (mysid shrimp) and *Cyprinodon variegatus* (sheepshead minnow) and 13 chronic tests on *Arbacia punctulata* (sea urchin). Chronic toxicity was observed in four of the 13 tests conducted on *Arbacia punctulata* (sea urchin) where results were determined to be below the chronic IWCs. To ensure that the narrative criterion for chronic toxicity is met at the edge of the mixing zone, the EPA has established an effluent limitation for chronic toxicity during the next permit term in accordance with 40 CFR 122.44(d)(v).

Although chronic WET has been observed, the EPA does not anticipate a biological impact of the discharge on fish, shellfish and wildlife at the edge of the ZID during the next permit term. Receiving water monitoring has demonstrated that the modified discharge from the Arecibo RWWTP has not adversely affected biological conditions of phytoplankton, benthic invertebrate, fish, and coral reef communities in the vicinity of the outfall and it is not likely to based on the location of the outfall and since the outfall is equipped with a high rate diffuser to ensure that the discharge receives significant amount of dilution to minimize any potential adverse impacts. In addition, in the event that chronic WET toxicity is shown to be persistent during the next permit, PRASA is required to conduct a Toxics Reduction Evaluation to address the observed toxicity to further ensure that there are no adverse biological impacts in the receiving water.

b. Impact of discharge on public water supplies

Pursuant to 40 CFR 125.62(b), which implements section 301(h)(2) of the CWA, the modified discharge from the Arecibo RWWTP must allow for the attainment or maintenance of water quality that assures the protection of public water supplies. The modified discharge also must not interfere with the use of planned or existing public water supplies. Drinking water supplies in Puerto Rico are derived from inland surface and groundwater sources and thus drinking water (for human consumption) has not been established as a designated use for Class SB or SC waters. Rule 1303.2 of PRWQS. Consequently, the modified discharge from the Arecibo RWWTP is not likely to affect public water supplies since ocean waters within the vicinity of the outfall have not been designated as a source of public water supply at the present time nor are expected to become one in the near future.

c. Biological impact of discharge

Pursuant to 40 CFR 125.62(c), PRASA must demonstrate that the modified discharge from the Arecibo RWWTP will allow for the attainment or maintenance of water quality which assures protection and propagation of a BIP of shellfish, fish and wildlife, and that a BIP of shellfish, fish and wildlife will exist in all areas beyond the ZID that might be affected by the modified discharge. The EPA reviewed monitoring data collected to assess the biological conditions of phytoplankton, benthic invertebrate, fish, and coral reef communities in the vicinity of the modified discharge.

Eutrophication

Eutrophication of coastal waters and the occurrence of phytoplankton blooms can result in significant economic and ecological consequences. Increased levels of nutrients such as nitrogen are generally associated with conditions of eutrophication and phytoplankton blooms in marine waters, with nutrient inputs largely resulting from anthropogenic sources such as agricultural runoff, and sewage and industrial discharges. PRASA has conducted water quality monitoring for total nitrogen (NO_3, NO_2, NH_3) and chlorophyll *a* (Chl-*a*), an indicator of phytoplankton abundance, to assess the potential nutrient impacts from the modified discharge. PRWQS provide a water quality criterion for total nitrogen for Class SB and Class SC waters; however, there are no PRWQS or EPA-recommended water quality criteria for Chl-*a*. Instead, EPA's Strategic Target for Chl-*a* for nearshore and coastal waters within the Florida Keys National Marine Sanctuary was used in assessing phytoplankton productivity since the Florida Keys provide similar tropic and sub-tropic marine systems to Puerto Rico (Boyer and Briceno 2009).

Receiving water monitoring data show that nitrogen levels were consistently below the criterion of 5 mg/l at all monitoring stations. with all data reported below 0.1 mg/l. Receiving water concentrations of Chl-*a* were also generally below the Strategic Target Chl-*a* value of 0.35 mg/m^3 at all monitoring stations. Monitoring data from September 2003, however, showed concentrations of Chl-*a* above the Strategic Target at within-ZID station (A6), ZID station (A1) and reference station (A3). The EPA is not aware of any phytoplankton blooms occurring in the vicinity of the outfall during this period or in any other periods since issuance of the existing permit. In addition, concentrations of nitrogen and Ch-*a* at stations nearest to the outfall are comparable to those levels observed at the farfield and background stations. Therefore, the discharge of nutrients is not likely to result in excessive phytoplankton growth at or beyond the edge of the mixing zone during the next permit term.

Benthic Invertebrate Communities

In aquatic systems, monitoring of benthic invertebrates adjacent to wastewater outfalls can provide useful information on the spatial extent and magnitude of impacts of the discharge to the surrounding area. Benthic communities are an important component in the analysis of a BIP since they are sedentary or relatively immobile and therefore may be chronically exposed to discharged pollutants or adversely affected by the organic enrichment of sediments from the discharge. Rule 1303.1(E) of PRWQS provides that "solids from wastewater sources shall not cause deposition in or be deleterious to the existing or designated uses of the waters." Many of the potential impacts of wastewater discharges are associated with the discharge of suspended solids and toxic pollutants that accumulate in the sediment. Benthic community indices, sediment characteristics (quality and composition) and sediment accumulation were evaluated to determine whether the benthic community in the

vicinity of the outfall may be adversely affected by the modified discharge.

- **Benthic Indices**. Analysis of benthic invertebrates was based on the number of taxa and five other biological indices (including the number of individuals, density, Shannon-Wiener diversity index, species evenness and species richness) to describe the overall condition of the benthic community. Statistical analyses were performed by PRASA on monitoring events conducted between 1999 and 2013 that compared data collected from the within-ZID station to the other monitoring stations. Communities did not change significantly from the within-ZID station and farfield and reference stations, except for one farfield station (A5) where four biological indices (taxa, diversity, richness, and evenness) were significantly different than those at the within-ZID station. All monitoring stations showed either no significant difference in the benthic indices over the monitoring period or a general increase. Only species evenness decreased at the edge of ZID station, farfield station, and reference station.

- **Sediment Quality**. Analysis of sediment quality was based on a comparison of the level of pollutants detected in sediment and sediment quality benchmarks developed by Long et al. (1995). Sediment quality benchmarks were used as a screening tool to determine whether further assessment is needed to better define the potential adverse impacts of pollutant concentrations. For pollutants with benchmarks available, concentrations of pesticides and other organic pollutants were generally not detected at any of the monitoring stations. Sediment monitoring did result in observed detections of toluene, BHC (alpha, delta and gamma), dieldrin, and 4,4'DDT but were detected below benchmark values and detections varied among stations and monitoring events. There did not appear to be a spatial or temporal trend in the pesticides and organic pollutants detected between those observed at stations nearest to the outfall and those at the reference station or farfield stations. Concentrations of several metals and other inorganic pollutants were detected in sediments at various monitoring stations but were also generally detected below benchmark values and did not appear to correlate with the location of the outfall. The exceptions are for arsenic, barium, and manganese which were found above the benchmark values at all monitoring stations, including the within-ZID station (A6) and reference station (A3). Levels determined at the reference station and farfield stations were comparable to those found within or at edge of the ZID.

- **Sediment Composition**. Results showed a variation in particle size distribution at all stations except the farfield and no significant change in overall nutrient and organic content, except for decreasing total phosphorus concentrations at the edge of the ZID and increasing total organic carbon at the reference station. All monitoring stations shown a decreasing trend in clay, except for farfield station A5. All monitoring stations exhibited similar sediment chemistry for nitrogen (total Kjeldahl nitrogen), phosphorus and total organic carbon and there was no trend or significant change in these parameters at any of the stations over the monitoring period. The exception is for the ZID stations, which showed a decreasing trend in phosphorus levels yet levels were not shown to be significantly difference from farfield or reference stations.

- **Sediment Accumulation**. The accumulation of suspended solids in the vicinity of the outfall is influenced by several factors such as the amount of solids discharged (i.e., mass emission rate), the settling velocity distribution of the particles in the discharge, the plume height-of-rise, and current velocities. Suspended solids can vary in size, shape, and density and that can cause them to settle at different rates. The EPA estimates that approximately 50 percent of suspended solids in wastewater discharges are likely to settle and accumulate in the vicinity of the outfall (EPA 1994). Biological effects are estimated to be minimal when the accumulation of suspended solids is estimated to be below 50 g/m^2, and organic deposition rates are below 548 g/m^2/year (EPA 1994; Maughan and Oviatt 1993). PRASA calculated a steady-state accumulation of suspended solids of 6.47 g/m^2 and 90-day critical condition accumulation of 19.96 g/m^2. The deposition rate was estimated to be 23.62 g/m^2/year over the primary depositional area of 2.70 km^2 under steady-state conditions. This estimate is based on the existing permitted TSS mass loading of 4,168 kg/day. No change to this limit has been proposed by PRASA for the next permit term. PRASA also predicted that settleable solids transported beyond the primary depositional area would deposit over a 20,309 km^2 area, with a steady-state accumulation of the organic fraction estimated to be less than 0.3 g/m^2.

The results of the benthic and sediment analyses indicate that the modified discharge is not likely to cause adverse impacts to benthic invertebrate communities in the vicinity of the Arecibo RWWTP outfall during the next permit term. Benthic indices show that the diversity and richness of the species, for example, are generally increasing or showing no signs of significant change at all the stations, including the ZID stations, and are not generally significantly different between the stations. Pollutant concentrations in sediments were generally measured below levels of concern at the ZID and other monitoring stations or not shown to be different from other stations with similar detected pollutants. There was generally no trend in sediment composition at any of the stations and that there are no differences noted in the levels of gravel, sand, silt or clay from the ZID stations and reference station. This is consistent with the prediction that the modified discharge will not significantly discharge suspended solids that will accumulate at levels that would impact benthic invertebrates.

Fish Communities

Rule 1303.1(I) of PRWQS provides that the waters of Puerto Rico shall not contain any substances at such

concentrations, either alone or as a result of synergistic effects with other substances that are toxic or produce undesirable physiological responses in humans, fish, or other flora or fauna. For the purpose of this section 301(h) evaluation, Similar to the benthic invertebrate assessment, biological indices were used to evaluate whether the fish community in the vicinity of the outfall may be adversely affected by the modified discharge during the next permit term. In addition, contaminants in fish tissue were assessed.

- **Fish Community Indices**. Analysis of fish was based on the number of taxa and five other biological indices (including the number of individuals, density, Shannon-Wiener diversity index, species evenness and species richness) to describe the overall condition of the fish community. Statistical analyses were performed by PRASA on 28 monitoring events conducted between 1999 and 2013 that compared data collected from the within-ZID station to the other monitoring stations.[3] Generally fish community studies showed only slight variations among stations and monitoring events and indicate that the fish community structure within the ZID similar to farfield stations and the reference station. Fish indices such as diversity, richness and evenness, were either less than those measured at within-ZID station, or not significantly different at all. A decreasing trend was observed in the number of taxa across all monitoring stations, including the within-ZID station, over the monitoring period; however, the within-ZID did not show a trend in the other indices. The farfield stations and reference station either showed a decreasing trend in the other indices or no significant difference at all.

- **Fish Tissue Bioaccumulation**. Analysis of pollutant concentrations in fish tissue was based on studies conducted between 2002 and 2013 using fish tissue screening concentrations (TSCs) developed by Shephard 1998 and updated by Dyer et al (2000). Concentrations of pollutants were generally at or below TSCs found in fish at all monitoring stations except for arsenic, chromium, lead, mercury, nickel, selenium, and alpha-BHC. Arsenic and mercury were found in concentrations above TSCs at the farfield and reference stations only and chromium, lead and nickel were found in concentrations above the TSC at within-ZID station and the farfield stations. Selenium was only found at the within-ZID station above the screening level and alpha-BHC was only found at the reference station above the screening level. Where concentrations were found above the TSCs, pollutants were also detected at the other monitoring stations.

Results of the fish community analysis indicate that fish do not appear to be adversely impacted. There were moderate abundances of fish found in the hard-bottom environments located in the vicinity of the outfall and no physical defects or abnormalities were documented in fish samples collected at any of the monitoring stations located at and beyond the ZID. PRASA has indicated that fish collected at all the monitoring stations showed no signs of any physical stress, lesions, fin rot, parasitism, or other indicators of potential effluent-dominated stress. Bioaccumulation of some toxics in fish has been observed but not routinely above levels of concern; and the parameters and concentrations are found to be comparable to those found among the stations. The EPA is not aware of any fishing restrictions or fish consumption advisories as a result of contaminants in fish tissue.

Coral Reef Communities as Distinctive Habitats of Limited Distribution

Distinctive habitats of limited distribution are defined as habitats whose protection is of special concern because of their ecological significance, such as coral reefs, or value to humans, such as for subsistence fishing (EPA 1994a). Because of their nature, distinctive habitats of limited distribution may be highly susceptible to the potential effects of discharged suspended solids, nutrients, and other pollutants on the unique faunal components of marine communities. Coral reefs on the island's north coast are poorly developed due to the strong wind and wave action compared to coral reefs in the southern part of the island. The nearest coral community is located approximately 1.1 km southeast of the outfall.

Coral reef monitoring at two nearshore stations has demonstrated that the coral reef communities in these areas have generally remained unchanged in their total coral density, stony/hydrocoral species, and species evenness over the 10 year monitoring period. Monitoring data indicate that the reefs are predominately composed of bare reef-rock covered with filamentous algae and/or coralline algae colonies. Percent coral cover for all coral types (stony and soft corals) is generally low, with less than four percent of the total area frequency observed. The low percent coral coverage and low coral species diversity and evenness frequently suggests sparse and poorly

[3] There was no fish community assessment in 2012.

developed corals that are likely related to the high energy environment characteristic of the north shore and not the modified discharge from the Arecibo RWWTP.

In consultation with the National Oceanic and Atmospheric Administration under section 7 of the Endangered Species Act, the EPA determined that coral reef communities are not likely to be adversely impacted by the modified discharge from the Arecibo RWWTP during the next permit term and that coral reef monitoring is no longer necessary during the next permit term. The following provides the basis for this determination.

- The nearest coral reef community is approximately 700 m from the outfall and is located at monitoring station AA2.

- Monitoring surveys since 1999 consistently demonstrate that the nearest coral reef community is sparse and poorly developed are characteristic of other coral in the north coast of Puerto Rico.

- The predominant current is perpendicular to the diffuser and parallel to the shoreline, transporting the wastewater plume offshore, away from any coral reef community.

- Dilution modeling (e.g., PRASA's 2012 *Revised Application for a Water Quality Certificate and Definition of a Mixing Zone for the Arecibo Regional Wastewater Treatment Plant Outfall System*, Appendix J) based on worst-case conditions predict initial dilution at 30 m from the outfall, which is below the 700 m to the nearest coral reef community.

- Dye studies (e.g., PRASA's 2012 *Mixing Zone Validation Study for the Arecibo RWWTP*) show that the wastewater plume is rapidly diluted within 75 m of the outfall.

- Ocean current speed data indicate a high energy environment in the vicinity of the outfall that contributes to constant flushing of the discharge and therefore no buildup of effluent (average current speed of 10.81 cm/s and 95th percentile current of 25.90 cm/s).

- Receiving water monitoring studies indicate that there are no observed periods of significant onshore transport of the wastewater plume.

- Although ESA-listed and proposed coral species have been identified at the monitoring stations, data indicate that these species or coral reef communities, in general, do not occur in the receiving water impacted by the modified discharge.

d. Absence of extreme adverse impacts within the ZID

Pursuant to 40 CFR 125.62(c)(3), conditions within the ZID must not contribute to extreme adverse biological impacts, including but not limited to, the destruction of distinctive habitats of limited distribution, the presence of disease epicenters, or the stimulation of phytoplankton blooms which have severe adverse effects beyond the ZID. Effluent and receiving water monitoring continue to indicate that the modified discharge from the Arecibo RWWTP will provide for the attainment of water quality criteria for DO, turbidity, toxic pollutants, and toxicity, and maintenance of a BIP. The EPA is not aware of any phytoplankton blooms, fish kills, or other adverse impacts in the vicinity of the outfall, and does not anticipate any adverse impacts during the next permit term that would rise to the level of being extremely adverse as a result of the modified discharge. The modified discharge is to open coastal waters that provide a dynamic mixing zone unstratified in nature and influenced by large-scale, wind-driven ocean currents, and thus is not likely to cause conditions within the ZID that would contribute to extreme adverse biological impacts.

e. Impact of discharge on recreational activities

Under 40 CFR 125.62(a) and (d), the Arecibo RWWTP's outfall and diffuser must be located and designed to provide adequate initial dilution, dispersion, and transport of wastewater such that the discharge does not exceed,

at and beyond the ZID, all applicable water quality standards, and that the discharge must allow for the attainment or maintenance of water quality which allows for recreational activities beyond the ZID, including, without limitation, swimming, diving, boating, fishing, picnicking, and sports activities along shorelines and beaches. There must also be no federal, territorial, or local restrictions on recreational activities within the vicinity of the outfall unless such restrictions are routinely imposed around sewage outfalls or would be lifted or modified if the facility was upgraded to secondary treatment (EPA 1994).

PRASA has indicated that the outfall is located 1.1 km from any existing or potential recreational beaches and that the prevailing long-shore ocean currents create rapid flushing and dispersion that result in little, if any, impacts to nearby recreational activities. Review of receiving water data show that fecal coliform and enterococcus samples taken in the vicinity of the outfall and at the edge of the ZID consistently met water quality criteria for bacteria for Class SB and Class SC waters. Bacterial concentrations at all monitoring stations generally reported levels at or below detection limits. The EPA is not aware of any regulatory restrictions imposed on recreational activities in the area of the discharge and does not anticipate any during the next permit term. Effluent concentrations of fecal coliform from the Arecibo RWWTP indicate that the modified discharge, alone and in combination with current receiving water background levels, will consistently meet water quality criteria for fecal coliform at the ZID and allow for recreational activities at and beyond the ZID. Although enterococcus is currently not regulated in the existing modified permit due to an 2010 PRWQS update to the bacteria criteria, the EPA anticipates that effluent concentrations of enterococcus will also consistently meet water quality criteria at the ZID and not impact recreational activities during the next permit term since the Arecibo RWWTP provides wastewater disinfection through chlorination and that the wastewater is discharged through a high-rate diffuser that results in significant dilution.

f. Stressed waters

Under 40 CFR 125.62(f) PRASA must demonstrate that the modified discharge from the Arecibo RWWTP will not contribute to, increase, or perpetuate stressed conditions, contribute to further degradation if pollution from other sources increases, and will not retard recovery if pollution from other sources decreases. Stressed waters are defined in 40 CFR 125.58(z) as those ocean waters for which an applicant can demonstrate that the absence of a BIP is caused solely by human perturbations other than the applicant's modified discharge. PRASA has indicated that the Arecibo RWWTP does not discharge into stressed waters, and has demonstrated that a BIP exists in the vicinity of the outfall and that the modified discharge will provide for the attainment of water quality standards and criteria at and beyond the ZID. Therefore, the modified discharge from the Arecibo RWWTP is not likely to contribute to or perpetuate stressed conditions in the receiving water.

3. Establishment of a monitoring program

Under 40 CFR 125.63, which implements section 301(h)(3) of the CWA, PRASA must have a monitoring program designed to evaluate the impact of the modified discharge from the Arecibo RWWTP on the marine biota, demonstrate compliance with applicable water quality standards, and measure toxic substances in the discharge. In addition, PRASA must also demonstrate that it has the resources necessary to implement the monitoring program upon issuance of a modified permit and to carry it out for the life of the permit. 40 CFR 125.63(a)(1)(iii). The frequency and extent of the monitoring program are determined by taking into consideration the facility's rate of discharge, quantities of toxic pollutants discharged, and the potential for significant impacts in the receiving water. 40 CFR 125.63(a)(1)(iv).

Since 1999, PRASA has implemented a section 301(h) monitoring program for the Arecibo RWWTP that consists of effluent and water quality monitoring; the assessment of benthic invertebrates and coral reefs; and analysis of toxic pollutants in sediment and fish tissue. A complete description of the section 301(h) monitoring program is provided in PRASA's 2012 *Quality Assurance Project Plan and Sampling and Analysis Protocols for the Arecibo RWWTP 301(h) Waiver Demonstration Studies* (QAPP/SAP). The monitoring program is well-established and has been developed jointly between the EPA, EQB and PRASA to meet the requirements of 40 CFR 125.63. PRASA has conducted a total of 29 monitoring events at receiving water stations established at and beyond the ZID. Through these monitoring events and based on the 2012 QAPP/SAP, PRASA has demonstrated that it has the resources to implement and maintain a monitoring program during the next permit term.

4. Effect of discharge on other point and nonpoint sources

In accordance with section 301(h)(4) of the CWA, the EPA may not issue a modified permit unless PRASA can demonstrate that such modified requirements will not result in any additional requirements on any other point or nonpoint source. Effluent and receiving water monitoring show that the modified discharge has not caused additional treatment or control requirements for any pollutant or parameter, including BOD_5 and TSS, for any other point or nonpoint sources in the vicinity of the outfall. As part of its WQC, EQB has determined that the discharge will not cause violations to applicable water quality standards in the receiving water or result in additional treatment controls or other requirements on any other point or nonpoint sources. Therefore, the EPA does not anticipate any additional treatment or control requirements on any other point or nonpoint source to result during the next permit term.

5. Establishment of an urban area pretreatment program

In accordance with section 301(h)(5) and (6) of the CWA, the EPA may not issue a modified permit unless the applicant demonstrates that all applicable pretreatment requirements for sources introducing waste into such treatment works will be enforced. 40 CFR 125.65, which implements section 301(h)(5) and (6) of the Act, requires that the applicant establish control of toxic pollutants that may be introduced by an industrial discharger by demonstrating that it has an applicable pretreatment requirement, that industrial sources are in compliance with the pretreatment requirement (including a local limit), and that it will enforce the requirement. PRASA has an Industrial Pretreatment Program that was approved by the EPA on September 28, 1985, and an Enforcement Response Plan approved by the EPA on May 30, 1995, as part of this program. Revisions to PRASA's sewer use ordinance were approved by the EPA on September 8, 2003.

a. Establishment of local limits

As part of an Industrial Pretreatment Program, POTWs that apply for a modified permit must assess the need for local limits and set local limits in accordance with 40 CFR Part 403 based on an analysis of toxic pollutants known or suspected of being introduced by industrial sources. Local limits are developed for pollutants that may cause interference, pass through, sludge contamination, and/or worker health and safety problems, if discharged in excess of the receiving POTW's capabilities and/or receiving water quality standards. The EPA's original approval of PRASA's Industrial Pretreatment Program in 1985 contained general island-wide local limits for all of its wastewater treatment facilities. PRASA assessed the need for facility-specific local limits for the Arecibo RWWTP on an annual basis. According to PRASA's most recent Industrial Pretreatment Program Annual Report, which covers activities from September 1, 2011 through August 31, 2012, PRASA has established local limits for the following pollutants for the Arecibo RWWTP service area:

- Arsenic
- Beryllium
- BOD_5
- Cadmium
- Chromium
- Copper
- Cyanide
- Fluoride
- Lead
- Manganese
- Mercury
- Molybdenum
- Nickel
- Oil & Grease
- Phenolics
- Selenium
- Silver
- Surfactants
- Thallium
- TSS
- Total Toxic Organics
- Zinc

PRASA has incorporated limits for these pollutants into all applicable industrial pretreatment permits for industries that discharge to the Arecibo RWWTP. For chloroform, di(2-ethyl-hexyl)phthalate (more commonly known as bis(2-ethylhexyl)phthalate), and toluene, PRASA determined that local limits were not necessary for the Arecibo RWWTP service area since these pollutants were not detected in both the influent and effluent and any detectable level was below the water quality criteria. During the next permit term, PRASA will be required again to re-evaluate the current local limits to determine whether or not they need to be updated to reflect any changes in the Arecibo RWWTP service area.

b. Compliance and Enforcement of Local Limits

For urban area pretreatment programs with significant numbers of industrial users, at any given time, it is reasonable to expect that at least one or more of those users might be out of compliance (59 Federal Register 152, August 9, 1994, page 40656). The EPA determines a facility's continuing eligibility for a modified permit under section 301(h)(6) by measuring industrial user compliance and the POTW's enforcement activities against existing criteria in EPA's National Pretreatment Program. A POTW's enforcement program is considered adequate if not more than 15 percent of its significant industrial users (SIUs) meet the significant noncompliance (SNC) criteria in a single year. Under the Industrial Pretreatment Program for the Arecibo RWWTP, there are five SIUs that have pretreatment permits authorizing discharges to the facility. According to PRASA's 2012 *Industrial Pretreatment Program Annual Report September 2011-August 2012*, none of the facilities met the SNC criteria. Therefore, PRASA's enforcement program has met the criteria for adequate enforcement of its pretreatment program for the Arecibo RWWTP.

Since PRASA has established local limits to control toxic pollutants that may be introduced by an industrial discharger, and has demonstrated that it is able to enforce these limits, the EPA has concluded that PRASA has demonstrated that it has met requirements of 40 CFR 125.65 for an urban area pretreatment program and that it enforces its applicable pretreatment requirements.

6. Implementation of an Toxics Control Program

a. Chemical analysis

Pursuant to 40 CFR 125.66(a), PRASA must submit a chemical analysis of its current discharge for all toxic pollutants and pesticides defined in 40 CFR 125.58(p) and (aa). PRASA has conducted priority pollutant screening for toxics pollutants and pesticides on an annual basis as part of its industrial pretreatment and the section 301(h) monitoring programs. These data are sufficient to assess pollutants that may be present in the Arecibo RWWTP effluent and to meet the requirements of 40 CFR 125.66(a).

b. Toxic pollutant source identification

Under 40 CFR 125.66(b), PRASA must submit an analysis of the known or suspected sources of toxic pollutants or pesticides identified in response to 40 CFR 125.66(a). To the extent practicable, PRASA must also categorize the sources according to industrial and nonindustrial types. In its 2012 *Industrial Pretreatment Program Annual Report*, PRASA identified the industrial sources of toxic pollutants and determined that control of nonindustrial sources is not warranted.

c. Industrial pretreatment program

Under 40 CFR 125.66(c), PRASA must have an approved pretreatment program as described in 40 CFR Part 403 for the entry of known or suspected industrial sources of toxic pollutants into the Arecibo RWWTP. Since 1985, PRASA has implemented an EPA-approved industrial pretreatment program and, since 1995, an EPA-approved enforcement response plan as part of this program. The program is implemented on an island-wide basis and includes the service areas of the Arecibo RWWTP. The Puerto Rico Rules and Regulations for the Supply of Water and Sewer Service were approved as part of the original program and met the existing pretreatment requirements for legal authority at 40 CFR 403.8. In 2003, PRASA revised the Rules and Regulations in accordance with the changes made to the federal pretreatment regulations (e.g., additional prohibitions, revised definitions, and notification requirements).

7. Establishment of an nonindustrial source control program

Pursuant to 40 CFR 125.66(d), which implements section 301(h)(7) of the CWA, PRASA must propose a public education program designed to minimize the entrance of nonindustrial toxic pollutants into the treatment system, which shall be implemented no later than 18 months after issuance of a modified permit. As part of its nonindustrial source control program, PRASA proposes to continue implementation of its "Aquamóvil" Education Program and the Fat, Oil and Grease (FOG) Program during the next permit term. Originally implemented in 1993, the "Aquamóvil" Education Program is an island-wide program designed to control toxic substances from

nonindustrial sources through a mobile learning center that travels throughout the island providing literature, illustrations, and models of the wastewater treatment processes. In 2011, PRASA conducted 11 educational and public awareness activities at a variety of public and private schools, science and trade fairs, summer camps, and professional conventions in the Arecibo RWWTP service area in which a total of 542 people attended. Information was provided on wastewater treatment processes and preventative measures for introducing toxics into the waste stream. In the FOG Program, PRASA focuses on educating commercial facilities across the island, such as food establishments that discharge specifically to the Arecibo RWWTP, about the impact of FOG on wastewater infrastructure and treatment facilities. In 2006, PRASA developed a Best Manufacturing Program Manual for food service establishments to better control fats, oil and grease and continues to implement a FOG program through its nonindustrial source control program. PRASA also provides information on its website (http://acueductospr.com) to educate the public on pollution prevention. Therefore, the development and implementation of the Aquamóvil" Education Program and the FOG Program demonstrates that PRASA has a nonindustrial source control program that is designed to minimize the entrance of nonindustrial toxic pollutants into the Arecibo RWWTP.

8. Increase in effluent volume or amount of pollutants discharged

Under 40 CFR 125.67, which implements section 301(h)(8) of the CWA, the EPA may not issue a modified permit unless PRASA demonstrates there will be no new or substantially increased discharges from the point source of the pollutant to which the modification applies above the volume of discharge specified in the permit. PRASA has not requested an increase in the permitted effluent flow limitations for the Arecibo RWWTP or a change in concentration-based BOD_5 and TSS effluent limitations that would affect permitted loadings. The existing permit establishes average monthly effluent limitations for BOD_5 of 120 mg/l and 4,547 kg/day. For TSS, the existing permit establishes average monthly effluent limitations of 110 mg/l and 4,168 kg/day. The existing concentration-based effluent limitations are proposed for the next permit term. Mass-based effluent limitations for the next permit term are based on the monthly average design flow of 10 MGD and the facility routinely operates below this flow. Effluent flow data (2002 and 2013) indicated average monthly flows ranged between 4.19 MGD (November 2012) and 7.38 MGD (March 2010). Furthermore, actual concentrations of BOD_5 and TSS are routinely below the permitted values resulting in much lower loadings than permitted. Maximum average monthly concentrations of BOD_5 and TSS were reported as 87 mg/l (January 2004) and 57 mg/l (April 2005), respectively. PRASA does not anticipate any changes in the service area or population over the term of the next permit that would result in substantially increased effluent volume or discharges of BOD_5 and TSS from the Arecibo RWWTP above those specified in the modified permit.

9. Minimum level of treatment

Section 301(h)(9) of the CWA was amended by section 303(d)(1) and (2) of the WQA. Under section 303(d)(1) and 40 CFR 125.60, wastewater from the Arecibo RWWTP must be receiving at least primary or equivalent treatment at the time its modified permit becomes effective. Section 303(d)(2) defines primary or equivalent treatment as a means of treatment by screening, sedimentation, and skimming adequate to remove at least 30 percent of the BOD_5 and TSS in the POTW's influent, and disinfection, where appropriate. Since 2002, the Arecibo RWWTP has consistently shown it can achieve at least primary or equivalent treatment with 30 percent removal of BOD_5 and TSS in the influent. Between 2002 and 2012, monthly average removal rates for BOD_5 ranged between 35 percent (August 2003) and 86 percent (December 2004) and removal rates for TSS ranged between 58 percent (February 2005) and 97 percent (December 2004).

COMPLIANCE WITH APPLICABLE PROVISIONS OF COMMONWEALTH, LOCAL, OR OTHER FEDERAL LAW OR EXECUTIVE ORDERS

Under 40 CFR 125.59(b)(3), a modified permit may not be issued if such issuance would conflict with applicable provisions of Commonwealth, local, or other federal laws or executive orders. PRASA must demonstrate compliance with all applicable Commonwealth and federal laws and regulations, and executive orders which include the Coastal Zone Management Act, Marine Protection Research and Sanctuaries Act, and the Endangered Species Act.

1. Coastal Zone Management Act

Under 40 CFR 125.59(b)(3), a modified permit must comply with the Coastal Zone Management Act of 1972, as amended, 16 U.S.C. 1451 *et seq*. In accordance with 16 U.S.C. 1456(c)(3)(A), and its implementing regulations, a modified permit may not be issued unless the proposed discharge is certified by the Commonwealth of Puerto Rico to be consistent with the Commonwealth's Coastal Zone Management Program. PRASA has indicated that the outfall is located in a coastal area managed by the Commonwealth's Coastal Zone Management Program. On **[INSERT DATE]**, the Puerto Rico Planning Board issued a consistency certification for the modified discharge from the Arecibo RWWTP.

2. Marine Protection, Research and Sanctuaries Act

40 CFR 125.59(b)(3) provides that issuance of a modified permit must comply with Title III of the Marine Protection, Research and Sanctuaries Act (MPRSA), 16 U.S.C. 1431 *et seq*. In accordance with 16 U.S.C. 1434(d), a modified permit may not be issued for a discharge located in a marine sanctuary designated pursuant to Title III of the MPRSA if the regulations applicable to the sanctuary prohibit issuance of such a permit. PRASA has indicated that the outfall is not located in a marine or estuarine sanctuary designated under Title III of the MPRSA. In 1989, the National Oceanic and Atmospheric Administration (NOAA) determined that the outfall is not located in a marine or estuarine sanctuary designated under Title III of the MPRSA. Since then, the location of the outfall has not changed nor has there been a marine or estuarine sanctuary designated under Title III of the MPRSA in the area of the outfall for the Arecibo RWWTP. As a result, EPA has determined that NOAA's 1989 determination is sufficient to meet the requirements of 40 CFR 125.59(b)(3).

3. Endangered Species Act

Under 40 CFR 125.59(b)(3), a modified permit may not be issued if the proposed discharge will adversely impact threatened or endangered species or critical habitat listed pursuant to the Endangered Species Act (ESA), 16 U.S.C. 1531 *et seq*. In 2012, PRASA prepared a Biological Evaluation (BE) that assessed the potential effects of the modified discharge of advanced primary treated effluent from the Arecibo RWWTP on federally- listed threatened, endangered, proposed, candidate, or species of concern and any designated or proposed critical habitats potentially occurring in the area of the discharge. In the BE, PRASA indicated that the following species or critical habitat may occur in the vicinity of the modified discharge.

<u>Threatened and Endangered Species</u>
- Leatherback sea turtle (Dermochelys coriacea)
- Hawksbill sea turtle (Eretmochelys imbricate)
- Green sea turtle (Chelonia myda)
- Elkhorn coral (Acroporo palmata)
- Staghorn coral (Acropora cervicornis)
- Humpback whale (Magaptera novaeangliae)

<u>Species of Concern</u>
- Ivory tree coral (Oculina varicose)
- Dusky shark (Carcharhinus obsurus)
- Sand tiger shark (Carcharias Taurus)
- Speckled hind (Epinephelus drummondhayi)
- Striped croaker (Bairdiella sanctaeluciae)

<u>Critical Habitat</u>
- Leatherback sea turtle (Dermochelys coriacea)
- Hawksbill sea turtle (Eretmochelys imbricate)
- Green sea turtle (Chelonia myda)
- Elkhorn coral (Acroporo palmata)
- Staghorn coral (Acropora cervicornis)

Critical habitat has not been designated in Puerto Rico for the humpback whale.

In 2012, NOAA proposed the following additional coral species as threatened or endangered for the Caribbean (77 Federal Register 236, December 7, 2012, pages 73220-73262).

Proposed Threatened or Endangered Species
- Boulder star coral (*Montastraea annularis*)
- Elkhorn coral (*Acropora palmata*) *
- Mountainous star coral (*Montastraea faveolata*)
- Pillar coral (*Dendrogyra cylindrus*)
- Rough cactus coral (*Mycetophyllia ferox*)
- Staghorn coral (*Acropora cervicornis*) *
- Star coral (*Montastraea franksi*)
- Lamarck's sheet coral (*Agaricia lamarcki*)
- Elliptical star coral (*Dichocoenia stokesii*)

* proposed to be reclassified from threatened to endangered

Review of coral reef studies conducted by PRASA since issuance of the existing permit indicates that three of the proposed species have been identified at the monitoring stations.

The EPA has reviewed the BE and previous coral reef studies and has determined that the modified discharge from the Arecibo RWWTP may affect, but is not likely to affect, federally-listed or proposed threatened or endangered species, critical habitat for the elkhorn or staghorn corals or any species of concern. Also, EPA has determined that the modified discharge will not affect critical habitat for the green, leatherback, and hawksbill sea turtles. On August 13, 2013, NOAA provided concurrence that the modified discharge from the Arecibo RWWTP will comply with the ESA.

4. Other Federal, Commonwealth, and Local Laws and Executive Orders

Under 40 CFR 125.59(b)(3), a modified permit must comply with applicable provisions of Federal laws including the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) of 1976, 16 U.S.C. 1801 *et seq.*, which protects against adverse impacts to Essential Fish Habitat (EFH). As required by MSFCMA, the EPA must demonstrate that an approval of a section 301(h) modification from secondary treatment requirements for the Arecibo RWWTP will not result in adverse impact to any EFH or species included in Caribbean or Federal Fisheries Management Plans. In 2010, NMFS issued a letter to the EPA indicating that EFH consultation under the General Concurrence procedures of 50 CFR 600.920(g) is not required for issuance of a modified permit.

On June 11, 1998, the President issued an Executive Order on Coral Reef Protection, directing federal agencies to expand research, preservation and restoration activities for the protection of coral reef ecosystems. As described previously, there is no coral growth in the vicinity of the outfall. The EPA has determined that modified discharge from the Arecibo RWWTP is consistent with the Executive Order on Coral Reef Protection. At this time, the EPA is not of aware any additional Commonwealth laws that need to be addressed prior to issuance of a modified permit for the Arecibo RWWTP.

COMMONWEALTH CONCURRENCE OF SECTION 301(h) MODIFICATION

Under 40 CFR 125.61(b)(2) and 125.64(b), PRASA must provide a determination signed by the state or interstate agency authorized to provide certification under 40 CFR 124.53 and 124.54 that the modified discharge will comply with applicable provisions of Commonwealth law including water quality standards. The state determination shall include a discussion of the basis for its conclusion. Furthermore, pursuant to 40 CFR 124.53 and 124.54, the Commonwealth of Puerto Rico must either grant a certification pursuant to section 401 of the CWA or waive this certification before the EPA may issue a modified permit.

In September 2012, PRASA requested a determination from the EQB that the modified discharge from the

Arecibo RWWTP will comply with all applicable provisions of Commonwealth law. On **<Insert Date>,** the EQB issued a WQC that certified that the modified discharge will comply with all applicable provisions of Commonwealth law including applicable water quality standards and will not result in any additional treatment requirements on any point or nonpoint sources.

SUMMARY OF FINDINGS

Based upon review of information provided by PRASA and other supporting documents, the EPA makes the following findings on the Arecibo RWWTP modified discharge's compliance with all applicable statutory and regulatory criteria:

1. The modified discharge will not cause violations of PRWQS standards for DO, color, or turbidity.

2. The modified discharge will consistently achieve PRWQS at and beyond the ZID. The modified discharge, alone or in combination with pollutants from other sources, will not impact public water supplies; interfere with the protection and propagation of a balanced indigenous population of fish, shellfish, and wildlife; or affect recreational activities.

3. PRASA has demonstrated it has an adequate effluent and receiving monitoring program to assess the impact of the modified discharge on the marine environment.

4. The modified discharge will not result in additional treatment requirements on any other point or nonpoint sources.

5. PRASA has a pretreatment program to limit the entrance of toxic pollutants from industrial sources into the the Arecibo RWWTP.

6. PRASA has an urban area pretreatment program that establishes local limits to control toxic pollutants from industrial sources and has demonstrated that it is able to enforce these limits.

7. PRASA has a toxics control program to limit the entrance of toxic pollutants from nonindustrial sources into the Arecibo RWWTP.

8. There will be no new or substantially increased discharges from point sources of pollutants to which the modification applies above those specified in the modified permit.

9. The modified discharge will receive at least primary or equivalent treatment and meets the requirements established under section 304(a)(1) of the CWA after initial mixing.

In conclusion, the EPA believes that the modified discharge from the Arecibo RWWTP will not adversely impact the marine environment and the designated uses of the receiving water, and will comply with the requirements of section 301(h) of the CWA and 40 CFR Part 125, Subpart G.

RECOMMENDATION

The EPA recommends that PRASA be issued a modified permit for the Arecibo RWWTP and that a public notice of intent to issue a modified permit be prepared in accordance with all applicable provisions of 40 CFR Parts 122 and 124. As required by 40 CFR 125.68, the modified permit shall contain, in addition to all applicable terms and conditions required by 40 CFR Part 122 and 124.53, the following special conditions:

1. All requirements determined necessary by the EQB as part of its WQC for the Arecibo RWWTP to ensure that the modified discharge will comply with all applicable provisions of Commonwealth law, including water quality standards.

2. Effluent limitations and mass loadings for BOD_5 and TSS in accordance with 40 CFR Part 125, Subpart G.

3. Requirements for the use of chemical addition (e.g., polymer) to increase solids removal to achieve a 60 percent removal rate, on a monthly average basis, for TSS.

4. Requirements to implement a section 301(h) monitoring program that include, but are not limited to, effluent, water quality, and biological monitoring that are consistent with 40 CFR 125.60, 125.62, 125.63, and 125.68(c).

5. Reporting requirements for the section 301(h) monitoring program in accordance with 40 CFR 125.68(d).

6. Requirements to modify, as necessary, and implement a toxics control program upon the effective date of the modified permit to limit the entrance of toxic pollutants from nonindustrial sources into the Arecibo RWWTP.

7. Requirements to implement a pretreatment program and nonindustrial control program in accordance with 40 CFR 125.65, 125.66, and 125.68(b).

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