UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region 9
75 Hawthorne Street
San Francisco, CA 94105

GUAM WATERWORKS AUTHORITY'S AGANA SEWAGE TREATMENT PLANT APPLICATION FOR A MODIFIED NPDES PERMIT UNDER SECTION 301(h) OF THE CLEAN WATER ACT

TENTATIVE DECISION OF THE REGIONAL ADMINISTRATOR PURSUANT TO 40 CFR PART 125, SUBPART G

I have reviewed the attached evaluation analyzing the merits of the application of the Guam Waterworks Authority's request for the Agana Sewage Treatment Plant and ocean outfall variance from secondary treatment requirements of the Clean Water Act (CWA) pursuant to section 301(h). It is my tentative decision that the applicant be denied a variance in accordance with the terms, conditions and limitations of the attached evaluation, based on section 301(h) of the CWA.

My decision is based on available evidence specific to this particular discharge. It is not intended to assess the need for secondary treatment in general, nor does it reflect on the necessity for secondary treatment by other publicly owned treatment works discharging to the marine environment.

Under the procedures of the Permit Regulations, 40 CFR Part 124, public notice and comment regarding this tentative decision will be made available to interested persons. Following the public comment period on this tentative decision, a final decision will be issued under the procedures in 40 CFR Part 124.

Dated: 2009 January 05

/s/
Wayne Nastri
Regional Administrator

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INTRODUCTION

The Guam Waterworks Authority (GWA or applicant) has requested a renewal of its variance under section 301(h) of the Clean Water Act (CWA), 33 U.S.C. section 1311(h), from the secondary treatment requirements contained in section 301(b)(1)(B) of the CWA, 33 U.S.C. section 1311(b)(1)(B).

The variance is requested for the Agana Sewage Treatment Plant (Agana STP), a publicly owned treatment works (POTW). The applicant is seeking a section 301(h) variance[1] to discharge wastewater receiving less-than-secondary treatment to the Philippine Sea, Pacific Ocean. Secondary treatment is defined in regulations at 40 CFR Part 133 in terms of effluent quality for total suspended solids (TSS), biochemical oxygen demand (BOD) and pH. Pursuant to 40 CFR Part 133.102, secondary treatment requirements for TSS, BOD and pH are listed below:

TSS: (1) The 30-day average concentration shall not exceed 30 mg/l;
(2) The 7-day average concentration shall not exceed 45 mg/l; and
(3) The 30-day average percent removal shall not be less than 85%.

BOD: (1) The 30-day average concentration shall not exceed 30 mg/l;
(2) The 7-day average concentration shall not exceed 45 mg/l; and
(3) The 30-day average percent removal shall not be less than 85%.

pH: The pH of the effluent shall be maintained within the limits of 6.0 to 9.0 pH standard units.

This document presents the United States Environmental Protection Agency Region 9 (EPA) findings, conclusions, and recommendations as to whether the applicant's proposed 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.

DECISION CRITERIA

Under section 301(b)(1)(B) of the CWA, 33 U.S.C. section 1311(b)(1)(B), POTWs in existence on July 1, 1977, were required to meet effluent limitations based upon secondary treatment as defined by the Administrator of EPA (Administrator). As previously described, secondary treatment has been defined by the Administrator in terms of three parameters: TSS, BOD, and pH. Uniform national effluent limitations for these pollutants were promulgated and included in National Pollutant Discharge Elimination System (NPDES) permits for POTWs issued under section 402 of the CWA. POTWs were required to comply with these limitations by July 1, 1977.

[1] A section 301(h) variance from secondary treatment is sometimes informally referred to as a "waiver."

Congress subsequently amended the CWA, adding section 301(h) which authorizes the Administrator, with State concurrence,[2] to issue NPDES permits that modify the secondary treatment requirements of the CWA with respect to certain discharges. 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:

> [T]he Administrator, with the concurrence of the State [or Territory], may issue a permit under section 402 [of the Act] which modifies the requirements of subsection (b)(1)(B) of this section [the secondary treatment requirements] 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:
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> (1) 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 this Act;
>
> (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 (BIP) 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 the 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

[2] Section 502(3) of the CWA defines "State" to include territories of the Unites States, specifically including Guam. 33 U.S.C. 1362(3).

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; and

(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 the Act after initial mixing in the waters surrounding or adjacent to the point at which such effluent is discharged.

For the purposes of subsection 301(h) 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 allow compliance with paragraph (2) of this subsection, and section 101(a)(2) of this Act. For the purposes of paragraph (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 of the suspended solids in the treatment works influent, and disinfection, where appropriate. A municipality which applies secondary treatment 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 under this subsection shall authorize the discharge of sewage sludge into marine waters. In order for a permit to be issued under this subsection 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 under this subsection shall authorize the discharge of any pollutant into marine estuarine waters which at the time of application do 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.

EPA regulations implementing section 301(h) provide that a section 301(h)-modified NPDES permit may not be issued in violation of 40 CFR 125.59(b), which requires among other things, compliance with all applicable requirements or provisions of state, local or other federal laws or Executive Orders, such as the Coastal Zone Management Act, as amended, 16 U.S.C. 1451 *et seq*., the Endangered Species Act, as amended, 16 U.S.C. 1531 *et seq.*, the Marine Protection Research and Sanctuaries Act, as amended, 16 U.S.C. 1431 *et seq.*, and the Magnuson-Stevens Fishery Conservation and Management Act, as amended, 16 U.S.C. 1801 *et seq.* Furthermore, in accordance with 40 CFR 125.59(i), the decision to grant or deny a section 301(h) variance shall be made by the Administrator and shall be based on the applicant's demonstration that it has met all the requirements of 40 CFR 125.59 through 125.68, as described in this Tentative Decision Document. EPA has reviewed all information submitted by the applicant in the context of applicable statutory and regulatory criteria and has presented its findings and conclusions in this Tentative Decision Document.

SUMMARY OF FINDINGS

Based upon review of information provided in the application and supporting documents, EPA Region 9 makes the following findings regarding the proposed discharge's compliance with the statutory and regulatory criteria:

(1) The applicant's proposed discharge will not comply with primary treatment requirements. [section 301(h)(9) of the CWA; 40 CFR 125.60]

(2) The applicant's proposed discharge will comply with Guam water quality standards for dissolved oxygen and suspended solids (i.e., TSS). [section 301(h)(1) of the CWA; 40 CFR 125.61]

(3) The applicant has not shown that it can consistently achieve Guam water quality standards beyond the zone of initial dilution. The specific water quality standard the applicant cannot consistently achieve is the standard for bacteria. In addition, the applicant has failed to submit the information required to assess whether or not the proposed discharge would achieve water quality standards for nutrients, whole effluent toxicity, toxic pollutants, and pesticides. [section 301(h)(9) of the CWA; 40 CFR 125.62(a)(1)(i) and 122.44(d)]

(4) The applicant's proposed discharge, alone or in combination with pollutants from other sources, will not adversely impact public water supplies. However, the applicant's proposed discharge may interfere with the protection and propagation of a balanced

indigenous population of fish, shellfish, and wildlife, and may adversely affect recreational activities. [section 301(h)(2) of the CWA; 40 CFR 125.62(b), (c), and (d)]

(5) The applicant has not continued the monitoring program specified in its current section 301(h)-modified permit and the current monitoring program is not sufficient. The applicant has not demonstrated that it has the resources necessary to implement an adequate monitoring program upon issuance of the modified permit and to carry it out for the life of the modified permit. [section 301(h)(3) of the CWA; 40 CFR 125.63]

(6) The applicant's proposed discharge would not result in any additional treatment requirements on any other point or non-point source. [section 301(h)(4) of the CWA; 40 CFR 125.64]

(7) The applicant has failed to develop and implement an Urban Area Pretreatment program in accordance with section 301(h)(6) of the CWA and 40 CFR 125.65. The applicant has failed to submit the necessary toxic pollutant analysis in accordance with 40 CFR 125.66(a). Consequently, the applicant has failed to identify and categorize known or suspected sources of toxic pollutants or pesticides (40 CFR 125.66(b)). The applicant also has failed to develop and implement a non-industrial source control program that would have informed the public about nonpoint and wastewater issues and household toxic control measures [40 CFR 125.66(d)]. In addition, the applicant has not indicated that it plans to implement pre-treatment. [section 301(h)(5), (6), and (7) of the CWA; 40 CFR 125.65 and 125.66]

(8) The applicant has failed to demonstrate that there will be no new or substantially increased discharges from the point source of the pollutants to which the section 301(h) variance will apply above those specified in the current section 301(h)-modified permit. [section 301(h)(8) of the CWA; 40 CFR 125.67]

(9) The applicant has not yet provided determinations or concurrences from the Guam Bureau of Planning, Guam Department of Agriculture, and Guam Environmental Protection Agency that the applicant's discharge is consistent with the Territory of Guam's Coastal Zone Management Program, nor has provided determinations from the National Oceanic and Atmospheric Administration (NOAA) that the applicant's discharge is in accordance with Title III of the Marine Protection, Research and Sanctuaries Act, 16 U.S.C. 1431 *et seq*. or from the U.S. Fish and Wildlife Service and the NOAA's National Marine Fisheries Service that the discharge is not likely to adversely affect listed threatened or endangered species or habitat. However, these determinations or concurrences are not necessary at this time because the tentative decision is that a section 301(h)-modified permit not be issued. [40 CFR 125.59(b)(3)]

(10) While the Territory of Guam would have to concur with the issuance of a final section 301(h)-modified permit and make specific determinations regarding compliance with water quality standards and whether the discharge would result in additional requirements on other sources, no Territory concurrence or determination is necessary at this time because the tentative decision is that a section 301(h)-modified permit not be issued. [40 CFR 125.61(b)(2), 125.54, and 125.53]

CONCLUSION

EPA has concluded that the applicant's proposed discharge will not comply with the requirements of section 301(h) of the CWA and 40 CFR 125, Subpart G, and Guam water quality standards (GWQS), Public Law 26-113, Guam Administrative Rule, Guam Environmental Protection Agency (GEPA), Division II-Water Control, Chapter 5, Water Quality Standards, Section 5101 *et seq*. (GEPA 2002).

RECOMMENDATION

It is recommended that the applicant be denied its request for a section 301(h) variance in accordance with the above findings pursuant to the applicable provisions of 40 CFR Parts 122 through 125. The basis for this recommendation is discussed in the following sections.

DESCRIPTION OF TREATMENT SYSTEM

A. Background

EPA issued the Agana STP's first section 301(h)-modified permit (NPDES Permit No. GU0020087) on June 30, 1986. The permit became effective on June 30, 1986, and expired on June 30, 1991. Pursuant to 40 CFR 122.6, the terms of the permit have been administratively extended.

The applicant submitted it first section 301(h) application for renewal of its variance on December 28, 1990. Between 1991 and 1997, EPA required GWA to submit additional information to supplement its renewal application. However, GWA failed to provide complete information during this period, and, as a result, EPA issued a tentative decision on April 4, 1997, that recommended that GWA be denied a variance from secondary treatment requirements specified in 40 CFR Part 133 (Marcus 1997). Also leading to the tentative decision to deny a variance was GWA's failure to demonstrate that the discharge would not adversely impact public health or coral reef communities and that the discharge would meet GWQS for fecal coliform and dissolved oxygen (DO). In the 1997 tentative decision, EPA recommended that GWA provide adequate maintenance to the current diffuser and consider extending the outfall for the Agana STP, which has the potential to allow the discharge to attain section 301(h) criteria. EPA indicated that GWA had 45 days to submit a letter of intent to revise its section 301(h)

application for the Agana STP. On May 6, 1997, EPA received GWA's letter of intent, which stated GWA's willingness to "make certain that the entire [section 301(h)] Applicant Questionnaire is filled with sufficient detail to adequately demonstrate compliance with all [section] 301(h) requirements."

On June 18, 1997, EPA confirmed its receipt of GWA's letter of intent to extend the ocean outfall for the Agana STP's treatment system and to submit a revised section 301(h) application for renewal of its variance (Strauss 1997). EPA provided suggestions on approaches for completing an acceptable revised permit application. EPA informed GWA that the revised application had to be submitted within one year of submittal of the May 6, 1997 letter of intent, and that it had to include a completed section 301(h) Applicant Questionnaire with sufficient detail to adequately demonstrate compliance with all section 301(h) requirements. In the letter, EPA also provided guidelines on collecting baseline data for the proposed new outfall, such as effluent and receiving water monitoring data, including data on benthic fauna, sediment quality, toxic pollutants, chronic toxicity, and other necessary information to assess compliance with section 301(h) criteria. EPA recommended that GWA use the section 301(h) Applicant Questionnaire that is provided in EPA's Amended Section 301(h) Technical Support Document (ATSD; EPA 1994a) and other guidance documents to complete its revised application, and clarified that the Agana STP would be considered a "large applicant" due to growth in the population it serves.

In response to the 1997 letter from EPA, GWA submitted a revised section 301(h) renewal application for the Agana STP to EPA on March 27, 1998 (GWA 1998). In the revised renewal application, GWA provided architectural and engineering design and construction schedules for the Agana STP's proposed outfall extension. In addition, GWA indicated that baseline surveys in the area of the new outfall had begun but had not been completed, and that funding was not secured for the outfall construction but efforts were underway to identify potential funding sources. However, on April 21, 1998, upon review of the revised renewal application, EPA indicated to GWA that its application was "significantly deficient in providing sufficient information" to support the proposed outfall extension and that it had not adequately demonstrated compliance with all section 301(h) requirements.

Since 1998, GWA has submitted additional information to supplement its application for renewal of its section 301(h) variance. In July 2000, GWA submitted a section 301(h) Applicant Questionnaire for the Agana STP (GWA 2000). In August 2001, GWA submitted a Basis of Design report that detailed plans and configurations of a new outfall for the Agana STP (GMP Associates, Inc. 2001). GWA is in the process of constructing an extension of the new outfall and completion of the new outfall is anticipated in early 2009. For the purpose of the section 301(h) evaluation, all information submitted by the applicant in the 1998 revised renewal application and in the 2000 and 2001 supplemental documents is considered, in whole, GWA's application for renewal of its section 301(h) variance.

B. Treatment System

The Agana STP is located on a 152.4 m by 213.4 m (500 ft by 700 ft) man-made island west of Hagatna Bay (see Figure 1). The facility resides within the town of Agana and forms a western boundary of a recreational boat basin. The facility collects and treats wastewater from the central region of Guam which includes the villages of Hagatna, Agana Heights, Asan Piti, Tauning, Mongmong-Toto, Senajana, Chalan Pago-Ordot, Yona, Mangelao, portion of Barrigada, and Tumon. The service area also includes federal government installations (Naval Hospital facilities and personnel). The Agana STP currently provides primary treatment for a population of approximately 82,645 people. In addition, the Department of Defense (DoD) is planning an expansion of military operations in Guam with the construction of a new Marine base that will neighbor the Northern District STP facility.[3] Based on information from DoD, EPA understands that the population of civilian and military personnel will increase on Guam within and throughout the municipalities served by the Agana STP. At this time, EPA is not aware of any anticipated changes to the Agana STP that would result from military expansion activities. Therefore, for the purpose of this section 301(h) evaluation, EPA has reviewed GWA's application for renewal of its section 301(h) variance for the Agana STP without consideration of DoD's proposed military expansion.

Based on information provided by the applicant, the average daily and peak hourly design flow capacities of the facility are estimated at 12.0 and 34.1 MGD, respectively. Based on review of DMR data (March 2007 through March 2008), EPA determined that the average monthly and daily maximum discharge harmonic means are 5.1 MGD and 6.5 MGD, respectively. In the application, GWA stated that a flow of 12 MGD is estimated for the proposed discharge at the end of the next permit cycle (GMP Associates Inc. 2001). The design treatment removal is estimated to be between 40 and 60% for TSS and between 25 and 40% removal for BOD. No updated information was provided by the applicant regarding categorical industrial dischargers into the treatment system.

Design treatment at the Agana STP includes screening of raw sewage, grit removal, and primary sedimentation. Figure 2 provides a schematic of the Agana STP treatment works system. According to GWA's Final Water Resources Master Plan, the Agana STP's inflow flow meter, grit removal, primary clarifiers (3), centrifuges, aerobic digesters (2), and odor control system were declared out-of-service or off-line (GWA 2006). The Agana STP underwent a complete renovation between June 2006 and March 2007 with all out-of-service and off-line equipment repaired and/or replaced. To expedite renovation, GWA was temporarily granted permission by GEPA in coordination with EPA to bypass the facility's treatment system and discharge untreated raw sewage directly into the receiving water during construction activities (Sablan, 2006).

[3] For more information on the military expansion in Guam, visit the DoD Joint Guam Program Office's website at http://www.guambuildupeis.us

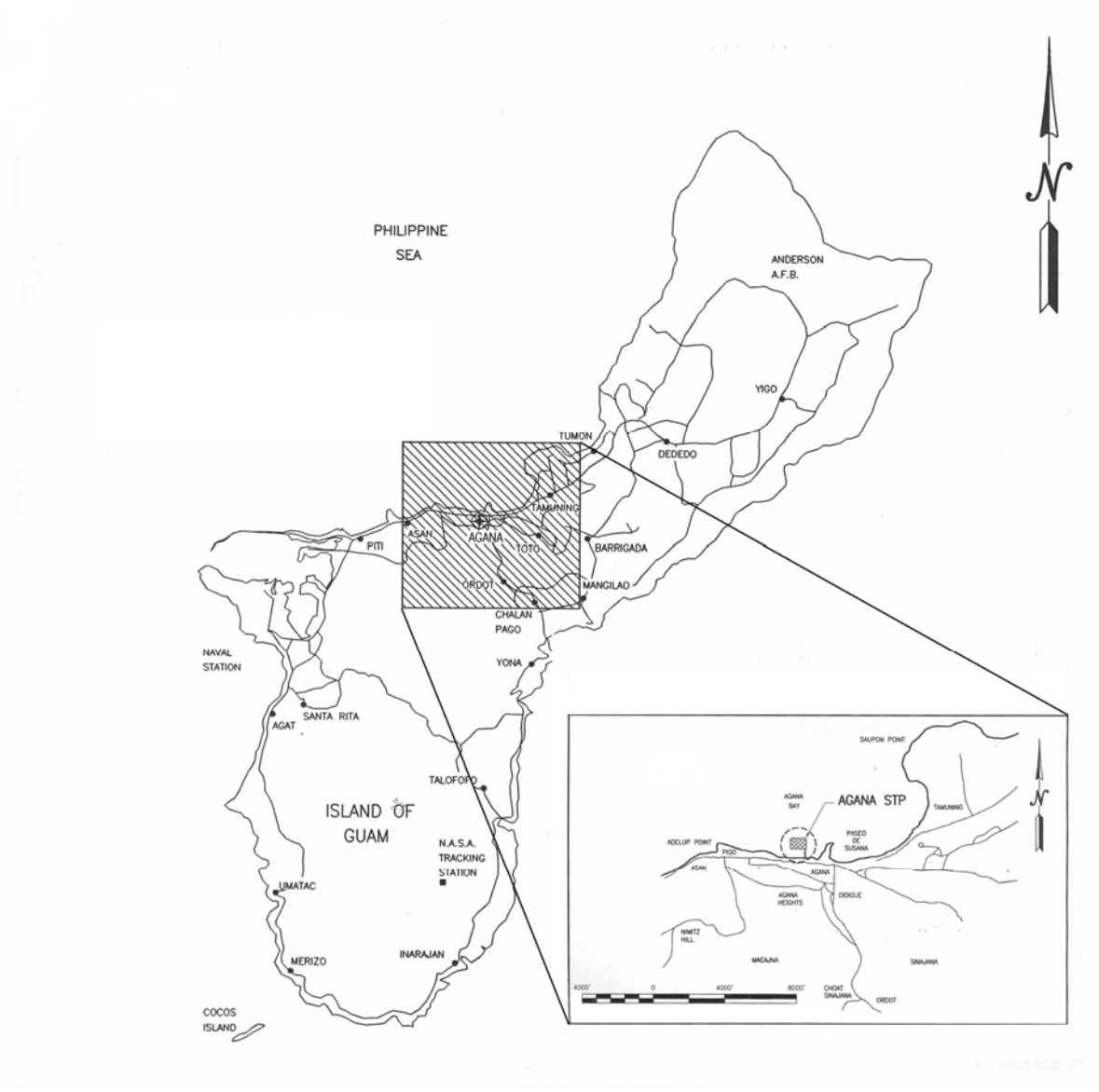

Figure 1. Location of Agana STP on the island of Guam. Reprinted from GWA's Construction Plans for Tumon Infrastructure and Beautification for the Agana STP Outfall Extension (GMP Associates Inc. 2005).

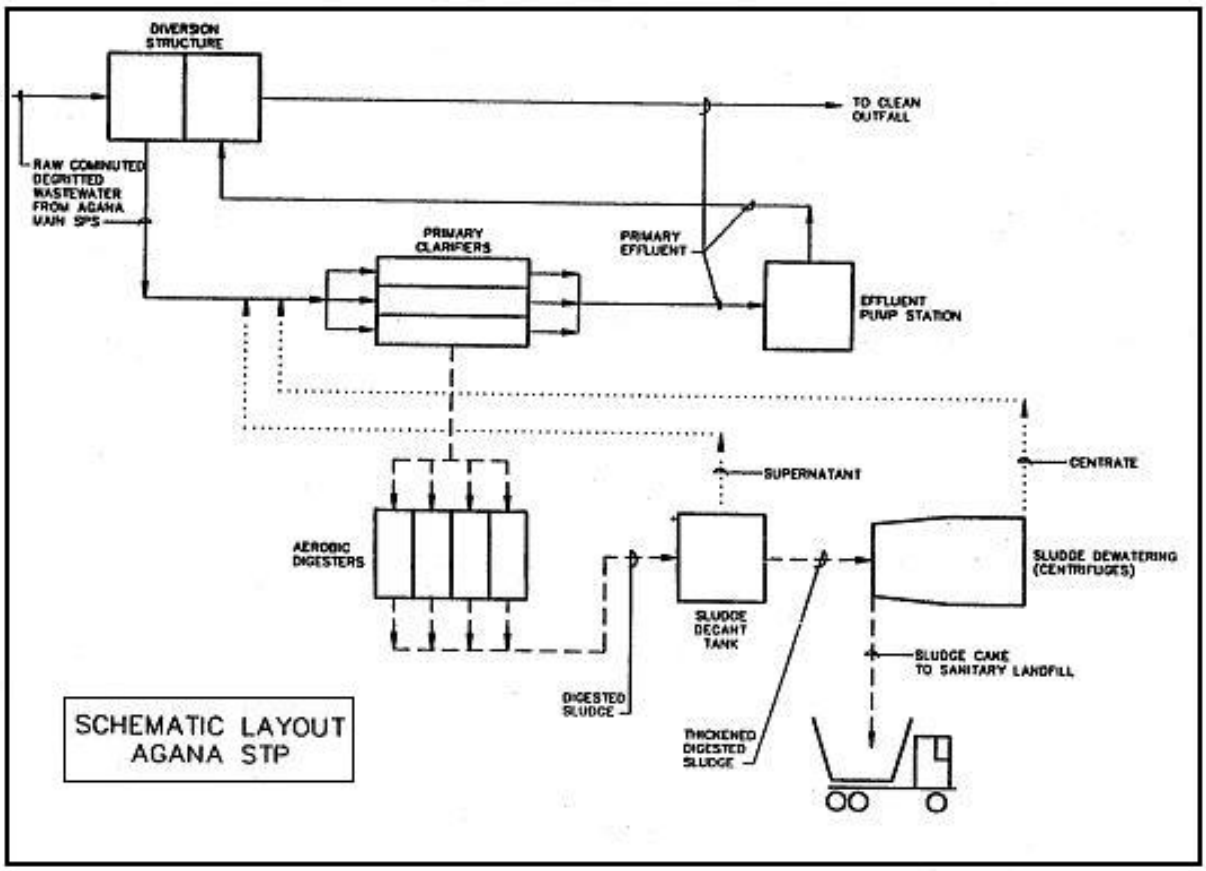

Figure 2. Process diagram of Agana STP. Reprinted from GWA's section 301(h)-modified NPDES permit renewal application (GWA 1998).

Table 1 provides a comparison of characteristics for the current and proposed discharges. For the current discharge, the Agana STP is located on Agana Bay and discharges effluent directly into the Philippine Sea at 876 m (2,875 ft) from the shoreline and at a depth of 25.9 m (85 ft). The current outfall is located at 265 m (870 ft) beyond the reef line at latitude of 13°29'3.3" N and longitude of 144°44'37.1" E. The current outfall consists of a 1,067 m (3,500 ft), 91.4 cm (36 in) diameter reinforced concrete pipe. According to GWA's Basis of Design report, the current diffuser consists of six port risers that are capped with 90 degree elbows and installed on the diffuser pipe, which is 12 m (40 ft) in length (GMP Associates, Inc. 2001). The current

Table 1. Characteristics of Current and Proposed Discharges for the Agana STP.

Parameter	Current Discharge	Proposed Discharge
Total outfall + diffuser length, m (ft)	1,067 (3,500)	1,234 (4,050)
Outfall diameter, cm (in)	91.4 (36)	107 (42)
Outfall depth, m (ft)	25.9 (85)	84 (275)
Diffuser length, m (ft)	12.2 (40)	N/A[1]
Diffuser configuration	Linear	Linear
Port number	6	1
Angle of port orientation from horizontal, degrees	90	90

[1]Diffuser length is not applicable because the new outfall will consist of single-port at the end of the pipe.

diffuser is oriented south to north and located perpendicular to the shoreline. In November 1998, GWA conducted an underwater inspection and found that the first three inshore risers were buried and the pipe end plate removed.

For the proposed discharge, GWA has designed a new extended outfall and diffuser system that will discharge 366 m (1,200 ft) beyond the reef line, which is 100 m (328 ft) further offshore from the current discharge, and at a depth of 84 m (275 ft). According to GWA's Basis of Design report, the new outfall will consist of a 107 cm (42 in) diameter pipe with a new single-port diffuser (GMP Associates, Inc. 2001). Since the proposed discharge will discharge farther away from the shoreline and at a deeper depth, the proposed discharge is predicted to have higher dilution.

C. Improved Discharge

Under 40 CFR 125.58(i), an improved discharge is defined as the volume, composition, or location of the discharge following: (1) construction of planned outfall improvements, including, without limitation, outfall relocation, outfall repair, or diffuser modification; or (2) construction of planned treatment system improvements to treatment levels or discharge characteristics; or (3) implementation of a planned program to improve operation and maintenance of an existing treatment system or to eliminate or control the introduction of pollutants into the applicant's treatment works. The applicant has requested a modification of secondary treatment requirements for the Agana STP based on an improved discharge to the Territorial waters of Guam due to an extension of the current outfall, construction of a new diffuser, and improvements to the treatment system.

The applicant is seeking a variance from the secondary treatment requirements for BOD and TSS only. GWA has proposed an outfall extension and new diffuser system, and has not requested an increase in the permitted wastewater flow to the facility during the next permit cycle. As a result, the applicant has not requested a change in concentration-based effluent limits for BOD and TSS that are established in the current permit. EPA anticipates that concentration-based and mass-based effluent limits will not need to be modified for the new permit. Table 2 provides a comparison of GWA's current and proposed effluent limits for BOD and TSS, and facility performance data from March 2007 through March 2008.

The applicant is not seeking a variance for pH. As specified in 40 CFR 133.102(c), the secondary treatment requirement for pH is that effluent values shall be maintained within limits of 6.0 to 9.0 pH standard units. Based on review of Discharge Monitoring Report (DMR) data (March 2007 through March 2008), EPA determined that effluent values of pH ranged between 7.13 and 8.26 standard units. Therefore, pH values in the effluent met current permit limits and secondary treatment requirements. In the application, GWA has anticipated that the minimum pH value to be 7.0 and the maximum pH value to be 9.0 during the term of the new permit. These values are consistent with secondary treatment requirements for pH.

DESCRIPTION OF RECEIVING WATER

The Agana STP discharges into coastal waters that are located off Agana Bay on the central and western shoreline of Guam. Agana Bay is located between Oca and Adelup Points and is characterized by a wide fringing reef flat that borders most of the area. The shoreline is characterized as rubble with sand with coral-algal rubble covering the ocean floor. As specified in section 5102 of GWQS, the coastal waters off Agana Bay are considered "Category M-2 Good" marine waters. The beneficial uses for this category of waters are the propagation and survival of marine organisms, particularly shellfish and coral reefs. Other important and intended uses include mariculture activities, aesthetic enjoyment, and compatible recreation inclusive of whole body contact and related activities.

A. Current Direction and Speed

The circulation pattern of currents in Guam is a function of the westward flowing North Equatorial Current. Currents are driven by prevalent northeast trade winds, tidal phases, local eddies/winds, and seafloor bathymetry. Current studies suggest that the flow pattern in Guam is predominantly in the westerly direction, particularly in the winter. During the summer, the tides and trade winds abate somewhat and the current patterns can vary. Western prevailing currents will still dominate, but with less persistence and strength. Tidal activity in Guam is characterized as semidiurnal, bearing considerable diurnal inequality, with a mean range of 0.51 m (1.7 ft) and a diurnal range of 0.72 m (2.4 ft) (Huddell et al, 1974). Huddell et al. (1974) reported that winds in Guam have an overwhelming influence against other current causing forces such as tidal activity, density patterns, wave activity, and ocean topography.

Table 2. Summary of current and proposed effluent limitations and monitoring data for BOD and TSS for the Agana STP. Monitoring data based on Discharge Monitoring Reports (DMRs) from March 2007 to March 2008.

Pollutant	Current Effluent Limits[1]				Proposed Effluent Limits[2]				Maximum Effluent Concentrations Based on DMR Data			
	Mass-based Limits (kg/day)		Concentration-based Limits (mg/l)		Mass-based Limits (kg/day)		Concentration-based Limits (mg/l)		Mass-based Limits (kg/day)		Concentration-based Limits (mg/l)	
	30-day Average	Daily Max	30-day Average	Daily Max	30-day Average	Daily Max	30-day Average	Daily Max	30-day Average	Daily Max	30-day Average	Daily Max
BOD	3,694	7,268	80	160	3,694	7,268	80	160	1,977	2,609	105	128
TSS	2,725	5,450	60	120	2,725	5,450	60	120	1,266	1,898	65	98

[1] Based on the permitted daily maximum flow of 12 MGD.
[2] Based on the applicant's requested daily maximum flow of 12 MGD.

Current measurements in Agana Bay show both predominant southwesterly towards Adelip Point and easterly. Based on information provided by the applicant, plume behavior is expected to travel up and down the coast along the island and travel away from the shoreline. In the application, GWA provided mean frequency diagrams for current direction utilizing drift cross cast data that suggest that ocean current may not influence the plume to travel towards shore. The applicant reported that the predominant current velocities during all four seasons in the receiving water ranged from 0.0 knots to 0.75 knots. In the application, GWA provided a 1998 current study for the proposed outfall site that indicated that during the six days of current monitoring, the currents moved easterly and westerly at a mean velocity of 0.12 knots (0.2 ft/s) and ranged from no current movement to a current speed of 0.47 knots (0.8 ft/s).

B. Stratification

In the application, GWA stated that there are no discernable periods of significant (maximum) stratification in the vicinity of the current or proposed discharges. According to the applicant, there is very little seasonal temperature variation (less than 1°C) between the surface and the 74 m (243 ft) depth that would cause stratification in areas of the current and proposed outfall. The current outfall discharges at a depth of 25.9 m (85 ft) and the proposed outfall would discharge at a depth of 84 m (275 ft).

In the application, GWA provided a summary of 17 salinity-temperature-depth (STD) profiles from receiving waters near the proposed outfall that were collected between November 6 and November 14, 1998. STD data were collected and used to calculate density profiles. Based on density profiles, GWA concluded that little stratification exists in the area surrounding the proposed discharge based on uniform density values from the surface to a 70 m (231 ft) depth. Based on review of density profile data, EPA has concurred with GWA's finding that there likely is little variation in density across the water column in the area of the proposed discharge.

C. Coral Reefs

In the application, GWA indicated that the distance from the current outfall to the edge of the coral reef flat is approximately 265 m (870 ft). Based on GWA's Basis of Design report, at completion of the proposed outfall, the distance from the new outfall to the edge of the coral reef flat is estimated to be approximately 366 m (1.200 ft; GMP Associates, Inc. 2005).

PHYSICAL CHARACTERISTICS OF THE DISCHARGE

A. Initial Dilution

40 CFR 125.62(a) requires that the proposed outfall and diffuser be located and designed to provide adequate initial dilution, dispersion, and transport of wastewater to meet all applicable

water quality standards and all applicable EPA water quality criteria at and beyond the boundary of the zone of initial dilution (ZID). EPA's ATSD provides the following description of initial dilution and dispersion:

> As the plume rises and entrains ambient saline water, its density increases and its momentum and buoyancy decreases accordingly. If a sufficient ambient vertical density gradient or zone of stratification (like a pycnocline or a thermocline) is present, the plume will spread horizontally at the level of neutral buoyancy (i.e., where the plume density equals ambient water density). If a sufficient density gradient is not present, the diluted effluent will reach the water surface and flow horizontally. The vertical distance from the discharge points to the centerline of the plume when it reaches the level of neutral buoyancy or the water surface is called the 'height-of-rise' (sometimes referred to as the height to 'trapping' or 'equilibrium' level). The dilution achieved at the completion of this process is called the 'initial dilution.' Dilution is the ratio of the total volume of a sample (ambient water plus effluent) to the volume of effluent in the sample. A dilution of 100 is a mixture composed of 99 parts of ambient water and 1 part of effluent.

Figure 3 provides a description of initial dilution. Initial dilution is an important parameter for determining compliance with territory and federal water quality standards and criteria. Initial dilution varies with oceanographic (e.g., temperature and salinity) and effluent (e.g., flow rate) conditions. Pursuant to EPA's ATSD, the critical (i.e., lowest) initial dilution must be computed for each of the critical environmental periods and is based on the predicted peak two to three-hour effluent flow for the new permit term. Critical environmental periods are defined as a "worst-case density profile (i.e., the profile producing the lowest initial dilution)" or ambient parameters causing the most significant stratification along the water column in respect to the diffuser. In addition, current speed and direction are important in assessing initial dilution and pollutant transport at critical conditions.

In the application, GWA estimated average initial dilutions for the proposed discharge using dilution modeling. Based on various outfall design parameters and a critical flow of 34.1 MGD, GWA estimated dilution values between 111:1 and 120:1 for discharge depths ranging from 225 to 325 ft (GMP Associates, Inc. 2001). For construction of the new outfall, GWA selected an outfall depth of 275 ft and an initial dilution of 100:1, which it determined necessary for compliance with water quality criteria for toxic pollutants. According to GWA's Basis of Design report, additional dilution would be necessary for the proposed discharge to comply with GWQS for bacteria at the ZID (GMP Associates, Inc. 2001). For example, GWA estimated that a dilution of up to 8,000:1 would be required to meet and attain GWQS for enterococci based on enterococci concentrations typically observed in primary treated wastewater.

In accordance with EPA's ATSD, EPA re-calculated initial dilution for the proposed discharge using the EPA-approved PLUMES model to better understand initial dilution (EPA 1994b).

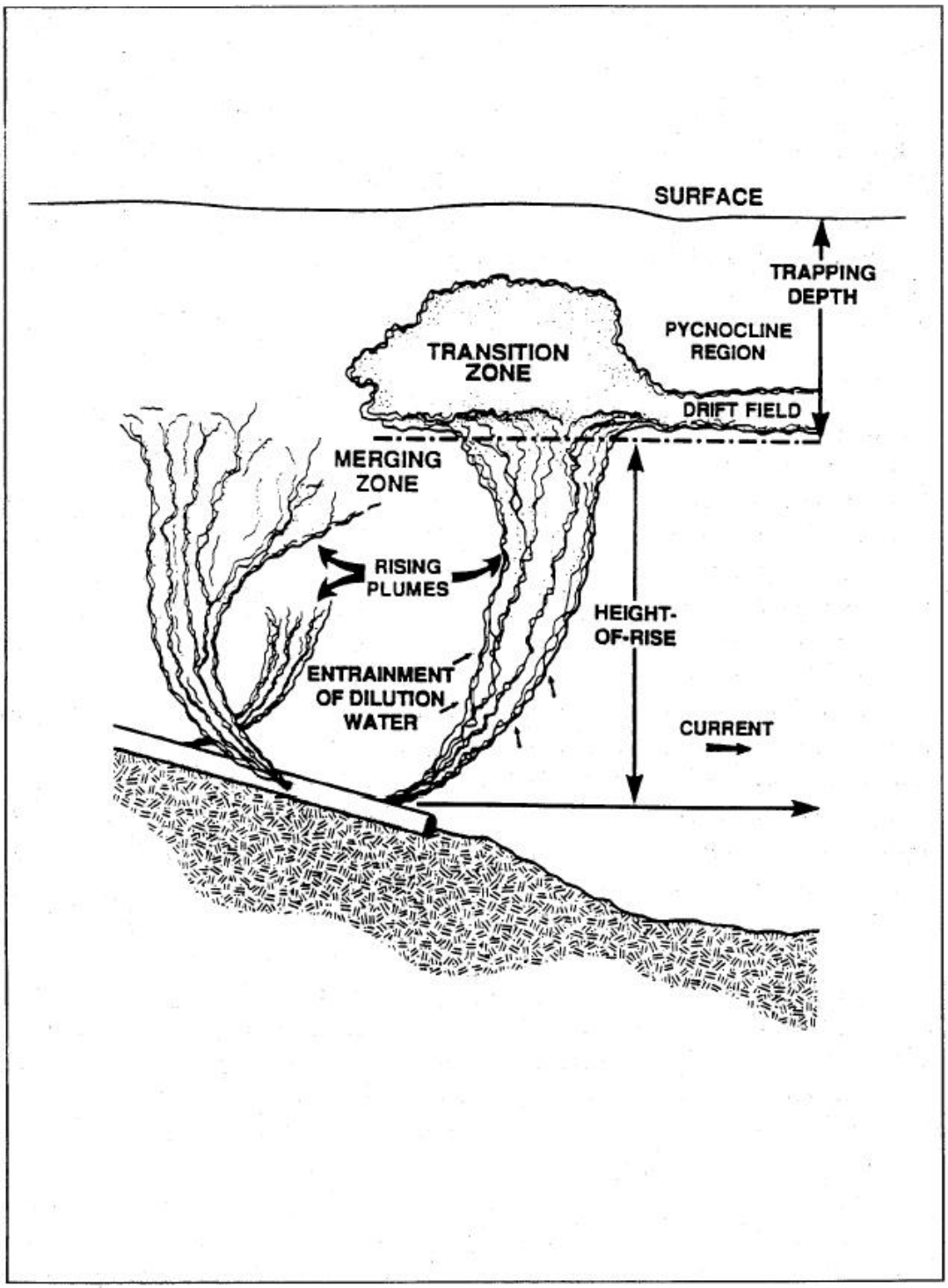

Figure 3. Description of initial dilution in the receiving water. Reprinted from EPA's ATSD (EPA 1994a).

EPA utilized the applicant's proposed outfall design parameters such as the depth of 275 ft, critical hourly peak flow of 12.0 MGD, two ambient density profiles provided by the applicant (Nos. 001 and 002), a current speed of 0.2 fps, and a current direction perpendicular to the diffuser. EPA determined that Nos. 001 and 002 density profiles from a November 1998 receiving water monitoring survey were the most critical profiles, although other density profiles provided by the November 1998 survey demonstrated strong similarities with little to no stratification. Based on dilution modeling, EPA estimated an initial dilution of 219:1 and predicted that the proposed discharge will have a trapping depth of 16.61 ft below the surface. As shown in Figure 3, the trapping depth is the vertical distance from the point where the discharged effluent is no longer rising in the water column to the surface.

In the application, GWA proposed an initial dilution of 100:1 for the proposed discharge. Although EPA predicted a higher initial dilution, EPA has concluded that using the applicant's proposed initial dilution of 100:1 is a conservative estimate of critical dilution and, therefore, is adequate for the purpose of the section 301(h) evaluation for the proposed discharge.

B. Application of Initial Dilution to Water Quality Standards

40 CFR 125.62(a) requires that at the time a section 301(h) modification becomes effective, the applicant'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. In accordance with 40 CFR 125, and as allowed by section 5103 of GWQS, EPA has analyzed all applicable water quality standards to determine compliance with section 301(h) regulations. Because the applicant has submitted a revised application for an improved discharge that consists of construction of an extension of the current outfall during the next permit term, EPA has assessed compliance with section 301(h) requirements for the proposed discharge using information on the current discharge, where appropriate and necessary. Since GWA has not proposed a change in the level of treatment at the Agana STP and the proposed discharge will be to the same receiving water, the review of receiving water monitoring data for the current discharge can provide useful information when predicting whether the proposed discharge will meet water quality standards. Thus, where attainment of water quality standards is based on receiving water monitoring, EPA has used data from the current discharge to evaluate the impact of the proposed discharge on water quality because the proposed outfall is currently not operating and any monitoring data collected in the vicinity of the proposed outfall reflect only baseline conditions. By contrast, where attainment of water quality standards is based on predictive modeling or the analysis of effluent data, EPA has applied a critical initial dilution of 100:1 for the proposed discharge to assess attainment of water quality criteria (i.e., for DO, suspended solids, whole effluent toxicity, and toxic pollutants) at the ZID.

Section 5104 of GWQS allows the use of dilution of effluent to attain and maintain water quality standards so long as "the best pollutant removal or control consistent with technological feasibility, economic reasonableness and sound engineering judgment" are implemented. In section 5104(c) of GWQS, narrative criteria for general mixing zones are described as well as

mixing zone criteria for specific types of discharges. The narrative criteria found in section 5104(d)(2) of GWQS apply to the applicant's discharge and describe: (a) mixing zone size limit; (b) compliance with section 403(c) of the CWA; and (c) when practical, desirable location of discharge and its mixing zone. GWQS also provide a requirement for using a minimum or average dilution to assess outfall performance.

Although a mixing zone for the proposed discharge has not been approved by the Territory of Guam, GWQS provide for the use of mixing zones. Therefore, for the purpose of the section 301(h) evaluation, EPA has considered all applicable water quality standards at the boundary of the ZID and has applied a critical initial dilution of 100:1, where appropriate and necessary, to determine compliance with section 301(h) regulations.

C. Zone of Initial Dilution

As defined in 40 CFR 125.58(dd), the ZID is a region of mixing surrounding, or adjacent to, the end of the outfall or diffuser, provided that the ZID may not be larger than allowed by mixing zone restrictions in applicable water quality standards. EPA's ATSD limits the ZID to the depth of the outfall, i.e., subtending the depth of the outfall on each side of the diffuser and above it. In the application, GWA described the ZID for the current discharge as having a horizontal width of 58.0 m (190.3 ft) and length of 12 m (423 ft) but did not provide any ZID dimensions for the proposed discharge. Based on the procedures described in EPA's ATSD, EPA calculated the ZID dimensions for the proposed discharge as having a horizontal width and a length of 168 m (550 ft).

APPLICATION OF STATUTORY AND REGULATORY CRITERIA

A. Attainment of Primary or Equivalent Treatment Requirements

Section 301(h)(9) of the CWA was amended by section 303(d)(1) and (2) of the WQA. Under section 303(d)(1), the applicant's wastewater effluent must be receiving at least primary treatment at the time its section 301(h)-modified permit becomes effective. Section 303(d)(2) states that "primary or equivalent treatment means treatment by screening, sedimentation, and skimming adequate to remove at least 30% of the biological oxygen demanding material and of the suspended solids in the treatment work's influent, and disinfection, where appropriate." 40 CFR 125.60 requires the applicant to perform influent and effluent monitoring to ensure, based on the monthly average results of monitoring, that the effluent it discharges has received primary or equivalent treatment.

In the application, GWA provided influent and effluent monitoring data for BOD and TSS from January to December 1997, and April 1999 to March 2000. Since March 2000, GWA has submitted DMR reports to EPA pursuant to permit requirements. However, due to renovations conducted between June 2006 and February 2007 to improve TSS and BOD removal from the

Table 3. Monthly Removal Efficiencies for BOD and TSS. Shaded cell indicates percent removal that is below the 30% removal rate requirement for primary treatment.

Date	BOD			TSS		
	Influent (mg/l)	Effluent (mg/l)	Percent Removal	Influent (mg/l)	Effluent (mg/l)	Percent Removal
March 2007	136	86	36.76	129	85	34.11
April 2007	125	86	31.20	110	57	48.18
May 2007	92	80	13.04	82	44	46.34
June 2007	82	61	25.61	80	48	40.00
July 2007	57	56	1.75	117	50	57.26
August 2007	67	60	10.45	66	44	33.33
September 2007	79	70	11.39	75	46	38.67
October 2007	79	73	7.59	85	49	42.35
November 2007	77	88	-14.29	100	60	40.00
December 2007	81	78	3.70	81	51	37.04
January 2008	112	105	6.25	104	53	49.04
February 2008	119	94	21.01	117	65	44.44
March 2008	109	101	7.34	103	54	47.57

wastestream, EPA evaluated DMR data beginning in March 2007 to evaluate compliance with the primary treatment requirements. Table 3 provides a summary of monthly average TSS and BOD influent and effluent concentrations and average percent removals. Of the 13 months that were assessed for BOD removal, the Agana STP achieved the 30% removal requirement 15.4% of the time. Removal efficiency rates for monthly averaged percent removal for BOD ranged between -14.29 to 36.76%. GWA did not specify a possible reason for negative or low percent removal values for BOD. Of the 13 months that were assessed for TSS removal, the applicant met the percent removal requirement for TSS 100% of the time. Removal efficiency rates for monthly averaged TSS data ranged from 33.33 to 57.26%. Prior to facility renovations, percent removal ranged between 9.42% and 76.36% for BOD and between -15.00% and 61.11% for TSS. Based on information provided by GWA, EPA believes that there are several possible reasons for the poor removal rates for BOD such as: weak influent from infiltration/inflow (I/I) and/or supernatant disposal at headworks, inadequate sedimentation in clarifier such as decreased retention time and/or insufficient surface overflow rates (especially during wet weather seasons), irregular plant performance malfunction such as backflow, resuspension of particulate and bacterial growth from the sludge zone of the primary clarifier, algae growth, and general facility under-performance.

Table 4. Summary of BOD and TSS percent removal rates based on a rolling one year averaging period. Shaded cell indicates percent removal that is below the 30% removal rate requirement for primary treatment.

One Year Period	BOD Percent Removal	TSS Percent Removal
March 2007 – February 2008	12.87	42.56
April 2007 – March 2008	10.42	43.69

Although GWA did not request using a longer averaging period for meeting the percent removal requirements for BOD and TSS, EPA also assessed whether the 30% removal requirement would have been achieved based on the annual average of removal rates if GWA had been granted a longer averaging period pursuant to 40 CFR 125.60(c)(1). As shown in Table 4, the applicant would meet the 30% removal requirement for TSS but would not be able to consistently meet the requirement for BOD based a longer averaging period.

In accordance with 40 CFR 125.60, the applicant is required to meet primary treatment requirements for BOD and TSS. Review of monitoring data indicates percent removal of TSS greater than the 30% requirement. However, EPA has determined that GWA does not meet primary treatment requirements based on BOD. Therefore, based on the facility's performance data, EPA has concluded that the applicant has not demonstrated that the Agana STP is consistently able to meet the primary treatment requirements as specified in section 301(h)(9) of the CWA and 40 CFR 125.60 for the proposed discharge.

B. Attainment of Water Quality Standards related to BOD and TSS

In accordance with section 301(h)(1) of the CWA, EPA may not issue a section 301(h)-modified permit unless the applicant demonstrates that it meets the applicable water quality standard specific to the pollutant for which the modification is requested. GWA has requested a variance from federal secondary treatment requirements for BOD and TSS. Water quality standards applicable for Agana STP are those for Category M-2 marine waters in section 5103 of GWQS. Although GWQS contain specific water quality criteria for TSS, GWQS do not contain specific water quality criteria for BOD; however, criteria are established for DO, which can be affected by BOD (section 5103(C) of GWQS). In addition to the criteria for TSS, GWQS also contain criteria for turbidity, which can be affected by suspended solids. Under 40 CFR 125.61(a)(1) and (2), and (b)(1), which implement section 301(h)(1) of the CWA, the applicant must demonstrate that the modified discharge will comply with water quality criteria for BOD or DO, and for suspended solids (i.e., TSS) and turbidity.

1. Dissolved Oxygen

The effect of the effluent discharge on DO can occur in the nearfield and farfield as the effluent mixes with ambient water and the oxygen demand of the effluent BOD load is exerted. Pursuant to 40 CFR 125.61(b)(1), the applicant must demonstrate that the modified discharge will comply with water quality criteria for DO and 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 criteria at and beyond the ZID (40 CFR 125.62(a)(1)). Section 5103(C)(4) of GWQS provides that the DO concentration in Category M-2 marine waters "shall not decrease to less than 75% of saturation at any time as influenced by salinity or naturally occurring temperature variations."

Since the application is based on a proposed discharge through a new outfall that has not yet been completed, the effects of the proposed discharge on water quality cannot be directly assessed through water quality monitoring. The proposed outfall is currently not operating and any monitoring data collected in the vicinity of the proposed outfall reflect only baseline conditions. Therefore, where attainment of water quality criterion for DO is based on receiving water monitoring, EPA has used monitoring data from the current discharge to assess the potential impact of the proposed discharge on receiving waters. By contrast, where attainment of the water quality criterion for DO is based on predictive modeling, EPA has applied a critical initial dilution of 100:1 for the proposed discharge to assess attainment of water quality criteria at the ZID.

a. Analysis of DO Based on Monitoring Data

To determine whether the proposed discharge would attain the water quality criterion for DO, EPA reviewed monitoring data to assess levels of DO in the receiving water. EPA compared concentrations of DO at receiving water monitoring stations for the current discharge to the DO criterion, which is expressed as 75% of the saturation concentration. The saturation concentration of DO is dependent on temperature and salinity of the water matrix. Because the water quality criterion is related to the saturation concentration, which varies with temperature and salinity, the criterion can change throughout the water column. For instance, warmer water has less capacity for oxygen than colder water and more saline water has less DO capacity than less saline water. Therefore, the DO concentration based on a 75% saturation criterion may be lower in warmer, more saline water than it would be in colder, less saline water. To determine the appropriate DO concentration based on the DO criterion, EPA calculated 75% DO saturation values for each sample at each station based on temperature and salinity data provided by GWA for the current discharge. Based on a comparison of these values and actual measurements of DO in the water column, EPA determined whether the proposed discharge will provide for the attainment of the DO criterion in the receiving water.

In the application, GWA provided receiving water concentrations of DO from June 1989 to July 1997 taken from stations within and beyond the ZID for the current discharge. There is no receiving water monitoring station located at the boundary of the ZID or monitoring data for DO

after July 1997. In GWA's quarterly Wastewater Operations and Maintenance Progress Reports for the Agana STP, GWA consistently indicated that the absence of water monitoring data was due to the lack of personnel. Since receiving water monitoring at the ZID has not been conducted, EPA could not determine if the water quality criterion for DO was attained at the ZID boundary in accordance with 40 CFR 125.62. As a result, EPA evaluated receiving water monitoring data from stations within the ZID (station D) and in the farfield (station E) to infer whether the criterion would be met at the boundary of the ZID for the current discharge and potentially for the proposed discharge.

Based on review of receiving water monitoring data, EPA determined that between 33.3% and 44.4% of the DO concentrations taken within and beyond the ZID do not meet the 75% saturation criterion for DO. Since the observed DO concentrations frequently did not meet the water quality criterion, it is likely that the DO criterion is also not met at the boundary of the ZID for the current discharge. However, because the proposed discharge is predicted to achieve greater dilution through a new outfall that will be located farther offshore and in deeper water and, because the applicant has not proposed an increase in the concentration of BOD for the proposed discharge, which can affect DO concentrations in the receiving water, it is likely that the criterion for DO will be met at the boundary of the ZID for the proposed discharge. Furthermore, by using the method of prediction for DO in the receiving water following initial dilution, attainment of the DO criteria can be evaluated based on parameters specific to the proposed discharge. As a result, EPA used predictive modeling to further assess the impact of the proposed discharge on DO concentrations in the receiving water.

b. Analysis of DO Based on Predictive Modeling

In addition to reviewing receiving water data, using predictive modeling can help assess whether a discharge will meet water quality criteria for DO. Since the proposed discharge consists of a new outfall, the modeling of potential impacts to water quality is especially important because the impact of the proposed discharge cannot be directly analyzed using monitoring data. In the application, GWA did not provide such an analysis. Using predictive modeling procedures pursuant to EPA's ATSD, EPA analyzed the following four scenarios to assess whether the proposed discharge would meet the
water quality criteria for DO:

- in the wastewater plume at the boundary of the ZID;
- in the wastewater plume in the farfield (beyond the ZID);
- near the bottom due to steady-state sediment oxygen demand; and
- near the bottom due to abrupt sediment resuspension.

For all four scenarios, EPA calculated resultant DO values for the proposed discharge.

DO depression upon initial dilution. When wastewater is discharged through a diffuser, the effluent forms a buoyant plume that entrains ambient water as it rises. The affected ambient DO concentration can change substantially as a function of depth, depending on environmental

characteristics and seasonal influences. As the discharge plume rises during initial dilution, 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. To assess whether the proposed discharge would meet the DO criterion at completion of critical initial dilution, EPA calculated final DO concentrations based on the procedures described in EPA's ATSD. In the application, GWA did not provide an assessment of DO depression upon initial dilution for the proposed discharge.

The DO concentration upon critical initial dilution, at the boundary of the ZID, can be estimated using Equation B-5 of EPA's ATSD:

$$DO_f = DO_a + \frac{DO_e - IDOD - DO_a}{S_a}$$

where:

DO_f = final DO concentration of the receiving water at the plume trapping depth, in mg/l;

DO_a = ambient DO concentration immediately up current of the diffuser, averaged from the diffuser port depth to the plume trapping depth, in mg/l;

DO_e = DO concentration of the effluent, in mg/l;

IDOD = immediate DO demand, in mg/l; and

S_a = critical initial dilution.

Table 5 provides the values for each parameter that EPA used to calculate final DO concentrations and the predicted net change in ambient DO concentrations for the proposed discharge. As specified in EPA's ATSD, DO_a values should represent critical conditions and be calculated based on data that are immediately upcurrent of the diffuser averaged over the tidal period (12 hours) and from the diffuser port depth to the trapping level (18.3 m; see section on Initial Dilution). Based on baseline monitoring data for the new outfall, EPA determined that the critical (lowest) DO value was observed at the surface and was reported as a DO concentration of 5.18 mg/l (GMP Associates, Inc. 2001). EPA averaged DO concentrations from the diffuser depth to the trapping level and determined a DO_a of 5.94 mg/l.

In accordance with EPA's ATSD, EPA applied a DO_e of zero for the proposed discharge. For IDOD, EPA estimated an IDOD of 4 mg/l using Table B-3 of EPA's ATSD based on the maximum monthly average BOD concentration of 105 mg/l (January 2008) and a travel time

Table 5. Values used to estimate final DO concentrations (DO_f) and predicted DO_f upon critical initial dilution.

Parameter	Proposed Discharge
S_a	100:1
IDOD, mg/l	4
DO_e, mg/l	0
DO_a, mg/l	5.94
DO_f, mg/l	5.84
Average ambient salinity, ppt	31.7
Average ambient temperature, °C	29.8
DO_{sat}, mg/l	6.8
DO_{target}, mg/l	5.1

from the treatment plant to the point of discharge of less than one hour. For S_a, EPA applied a critical initial dilution of 100:1. Using Equation B-5 and the values presented in Table 5, EPA calculated DO_f for the proposed discharge.

To assess whether predicted final concentrations of DO in the receiving water will meet the DO criterion, EPA compared DO_f to DO_{target} for the proposed discharge. DO_{target} is 75 percent of DO_{sat} and represents the value for assessing compliance with the water quality criterion, as specified in section 5103 of GWQS. First, EPA calculated DO_{sat}, based on the average salinity and temperature values listed in Table 5. Based on DO_{sat} concentrations of 6.8 mg/l, EPA calculated a DO_{target} concentration of 5.1 mg/l for the proposed discharge. Using Equation B-5, EPA calculated a DO_f of 5.84 mg/l. Because DO_f is estimated to be above the DO_{target} concentration, the proposed discharge is predicted to meet the water quality criteria for DO at the ZID upon critical initial dilution.

DO depression due to BOD exertion in the farfield. Pursuant to EPA's ATSD, EPA also evaluated potential DO depression in the farfield. Subsequent to initial dilution, DO in the water column is consumed by BOD in the wastefield. As the discharge plume travels through the water column, the combined oxidation of organic material in the diluted effluent and receiving water can result in oxygen depression beyond the ZID in the farfield. BOD consists of a carbonaceous component (CBOD) and a nitrogenous component (NBOD), both of which can contribute to oxygen depressions in the farfield. As described in EPA's ASTD, NBOD may not always contribute to oxygen depletion if the discharge is to open coastal waters where there are no other major discharges in the vicinity and the background population of nitrifying bacteria is negligible. To assess DO concentrations after initial dilution, the applicant evaluated receiving water monitoring data for the current discharge, and modeled the exertion of BOD on DO concentrations in the farfield under critical conditions for the proposed discharge.

Before conducting an analysis to determine whether the farfield BOD exertion causes a violation of the DO criterion, EPA first determined whether the following inequality is true:

$$DO_f - 1.46 \times \frac{BOD_a + (BOD_e - BOD_a)}{S_a} \geq DO_{target}$$

where,

DO_f = DO concentration at the completion of initial dilution, in mg/l;

BOD_a = affected ambient BOD concentration immediately updrift of the diffuser, from the diffuser port depth to the trapping depth, in mg/l;

BOD_e = effluent BOD concentration, in mg/l;

S_a = critical initial dilution; and

DO_{target} = DO concentration at 75% saturation, in mg/l..

According to EPA's ATSD, if the inequality is true, then the proposed discharge alone is not likely to exceed the DO criterion due to BOD exertion and no further analysis of farfield BOD is required. Table 6 provides a summary of values EPA used in the screening analysis. The values for DO_f, S_a, and DO_{sat} are the same as those provided in Table 5. BOD_a was estimated to be zero as a conservative assumption. As a conservative approach for BOD_e, EPA's ATSD recommends utilizing the maximum monthly average effluent BOD concentration from the previous 12 months of data. As a result, based on BOD data, EPA determined the maximum monthly average effluent BOD was 105 mg/l (January 2008). For the proposed discharge, EPA determined that the result of the calculation was not greater than the DO_{target}, and therefore, further analysis is required to determine if the proposed discharge will attain the water quality criterion for DO in the farfield.

Table 6. Summary of values used by EPA in determining whether the predicted DO concentration in the farfield will attain the water quality criterion for DO as a result of the proposed discharge.

Parameter	Proposed Discharge
DO_f, mg/l	5.84
BOD_a, mg/l	0
BOD_e, mg/l	105
S_a	100:1
DO_{sat}, mg/l	6.8

In accordance with EPA's ATSD, EPA estimated DO depression in the farfield due to the consumption of BOD in the receiving water using a simplified farfield depletion model for open coastal waters. In this case, the closest major discharger is Unitek Environmental, which is an industrial treatment plant and is located approximately 7.7 km (4.8 mi) southwest of the new outfall. EPA has assumed that oxygen depletion in the vicinity of the proposed discharge occurs in the first phase of the BOD reaction due to CBOD and that the effect of NBOD on farfield DO is negligible. Therefore, the terms related to NBOD in Equation B-16 of EPA's ATSD are not included in determining final DO concentrations:

$$DO(t) = DO_a + \frac{DO_f - DO_a}{D_s} - \frac{L_{fc}}{D_s}\left[1 - \exp(-k_c t)\right]$$

where,

$DO(t)$ = DO concentration in submerged wastefield as a function of travel time, t, in mg/l;

DO_a = affected ambient DO concentration immediately up current of the diffuser, in mg/l;

DO_f = DO concentration at the completion of initial dilution, in mg/l;

k_c = carbonaceous BOD (CBOD) decay rate coefficient, in day^{-1};

L_{fc} = ultimate CBOD concentration above ambient at completion of initial dilution, in mg/l; and

D_s = dilution attained subsequent to initial dilution as a function of travel time.

Table 7 provides the values used by EPA to predict DO(t) concentrations in the receiving water immediately following critical initial dilution as a function of time. For DO_a and DO_f, EPA used the values calculated previously when estimating DO depression upon initial dilution (using ATSD Equation B-5; see section "*DO depression upon initial dilution*"). EPA calculated k_c according to Equation B-13 in EPA's ATSD:

$$k_c = 0.23 \times 1.047^{(T-20°C)}$$

where:

k_c = CBOD decay rate coefficient, in day^{-1}; and

T = ambient receiving water temperature, in °C.

Table 7. Values EPA used to predict DO concentrations, DO(t), in the farfield as a function of time.

Parameter	Proposed Discharge
DO_a, mg/l	5.94
DO_f, mg/l	5.75
k_c, day^{-1}	0.361
L_{fc}, mg/l	1.53

Using a temperature of 29.8°C for the proposed discharge, EPA calculated a k_c of 0.361 day^{-1}. For ultimate CBOD concentration, $L_{fc,}$ EPA estimated the final BOD concentration using Equation B-10 from EPA's ATSD:

$$L_{fc} = 1.46 \times \frac{BOD_a + (BOD_e - BOD_a)}{S_a}$$

where,

L_{fc} = ultimate CBOD concentration above ambient at completion of initial dilution in mg/l;

BOD_a = affected ambient BOD concentration immediately updrift of the diffuser, averaged from the differ port depth to the trapping depth in mg/l;

BOD_e = effluent BOD_5 concentration in mg/l; and

S_a = critical initial dilution.

Using the values for BOD_a, BOD_e, and S_a listed in Table 6, EPA calculated a L_{fc} value of 1.53 mg/l for the proposed discharge.

Since the proposed discharge is to open coastal waters, EPA calculated D_s as a function of time using the following equation in accordance with EPA's ATSD:

$$D_s = \frac{1}{erf\left(\frac{1.5}{\left[1 + \frac{12\varepsilon_o t}{b^2}\right]^2 - 1}\right)^{1/2}}$$

where:

D_s = dilution attained subsequent to initial dilution as a function of travel time;

b = initial width of the sewage wastefield, in ft;

ε_o = diffusion coefficient when the width of the sewage wastefield at any distance from the ZID is equal to the initial width of the wastefield, in ft;

t = travel time in seconds; and

erf = the error function.

As specified in EPA's ATSD, EPA applied a value for b based on the longest dimension of the ZID. For the proposed discharge, b is 680 ft. For the diffusion coefficient (ε_o), EPA estimated a value of 5.98 ft^2/sec for the proposed discharge. Using these values, EPA calculated D_s at intervals up to 96 hours immediately following critical initial dilution as shown in Table 8. EPA applied the values listed in Tables 7 and 8 to Equation B-16 of EPA's ATSD and calculated a minimum farfield DO concentration of 5.91 mg/l for the proposed discharge. For the proposed discharge, the minimum farfield DO concentration of 5.91 mg/l is greater than DO_{target} of 5.1 mg/l.

Table 8. Predicted farfield dilution, D_s, for the proposed discharge as a function of travel time.

Time, hrs	Farfield Dilution, D_s
0	1.02
1	1.33
2	1.78
4	2.75
8	4.73
12	6.70
16	8.68
24	12.64
32	16.60
48	24.51
60	30.45
72	36.38
84	42.32
96	48.26

DO depression due to sediment oxygen demand. In addition to causing DO depression in the water column, the deposition of suspended particles from the wastewater discharge can also impact ambient concentrations of DO near the seafloor. In the application, GWA did not provide an analysis of the impact of the proposed discharge on DO concentrations in the receiving water due to sediment oxygen demand. Therefore, in accordance with EPA's ATSD, EPA used Equation B-24 from EPA's ATSD to calculate oxygen depletion due to sediment oxygen demand:

$$\Delta DO = \frac{a\bar{S}k_d X_m}{UHD}$$

where:

ΔDO = oxygen depletion, in mg/l;

a = oxygen stoichiometric ratio, 1.07 mg O_2/mg sediment;

$\bar{S}$ = average concentration of deposited organic sediments over the deposition area, in g/m^2;

k_d = sediment decay rate, 0.01/day;

X_m = length of deposition area in longshore direction, in m;

H = average depth of water column influenced by sediment oxygen demand, measured above bottom, in m;

U = minimum sustained current over deposition area, in m/sec; and

D = dilution caused by horizontal entrainment of ambient water as it passes over the deposition area (always $\geq$ 1).

To calculate ΔDO, EPA used values for average deposited organic sediments, $\bar{S}$, and the length of the deposition area, X_m, determined from the analysis done for suspended solids deposition in the next section of the document. $\bar{S}$ is estimated by averaging the maximum (closest to the ZID) and minimum (farthest from the ZID) steady-state sediment accumulation values. For the proposed discharge, EPA calculated a $\bar{S}$ averaged steady-state sediment accumulation value of 1.53 g/m^2. The X_m value for the deposition zones for the proposed discharge is 825 km. Using the procedures in the EPA's ATSD, H is dependent on the X_m value and was calculated as 42.0 m for the proposed discharge. U describes the minimal natural current velocity over the deposition area. The applicant applied EPA's ATSD prescribed default velocities for on-/off-shore (3 cm/s) and up-/down-coast (5 cm/s) vectors. Since the proposed discharge is in open coastal waters that are off-shore, EPA selected 3 cm/s as its minimum velocity. In addition,

given the initial field width and plume travel time, *D* is estimated as 1.0 for the proposed discharge.

In accordance with EPA's ATSD, EPA calculated a ΔDO of 0.12 mg/l for the proposed discharge. For the proposed discharge, EPA subtracted the steady sediment oxygen demand from the outfall's projected DO_f concentration of 5.84 mg/l and determined a DO concentration of 5.72 mg/l, which is above the DO_{target} of 5.1 mg/l.

DO depression due to sediment resuspension. As suspended solids from the discharge are initially deposited on the seafloor, sediments can be resuspended due to disturbances in the water column or on the seafloor that can cause additional DO depression in the receiving water. Given the complexity of accurately predicting oxygen demand due to resuspension, EPA applied a worst-case situation to simplify the analysis. Equation B-29 in EPA's ATSD specifies the following:

$$\Delta DO = \frac{\overline{S_r}}{DH}\left[1 - \exp\left(\frac{-k_r t}{24}\right)\right]$$

where:

ΔDO = oxygen depletion, in mg/l;

$\overline{S_r}$ = average concentration of resuspended organic sediment (based on 90-day accumulation), in g/m^2;

D = dilution caused by horizontal entrainment of ambient water as it passes over the deposition area (as previously defined), set to equal 1;

H = depth of water column containing resuspended materials, in m;

k_r = decay rate of suspended solids, 0.1/day; and

t = elapsed time following resuspension, in hrs.

For the purpose of the section 301(h) evaluation, EPA has applied a conservative assessment for determining DO depression due to sediment resuspension that is outside the ZID and assumes continued resuspension beyond the ZID. EPA derived $\overline{Sr}$ for the proposed discharge by averaging the respective maximum and minimum 90-day organic accumulations. A description of the methods and values used for accumulation is found in the following section discussing sediment deposition. Since depth of the water column containing resuspended sediment is a function of time, values were determined at intervals ranging from 3 to 24 hours to determine maximum depletion as described in EPA's ATSD. As a result, EPA calculated a ΔDO of 0.54 mg/l for the proposed discharge based on oxygen depletion due to abrupt resuspension of

suspended solids. EPA then calculated the DO concentration that would result from depletion due to the wastefield combined with abrupt sediment resuspension. For the proposed discharge, subtracting DO depression due to abrupt resuspension of bottom sediments from projected DO_f concentration of 5.84 mg/l results in a DO concentration of 5.30 mg/l, which is above the DO_{target} concentration of 5.1 mg/l.

c. Conclusion on Attainment of Water Quality Standards for DO

In accordance with 40 CFR 125.61 and 125.62, the applicant must demonstrate that the proposed discharge will comply with water quality criteria for DO, and that the outfall and diffuser are located and designed to provide adequate dilution such that the discharge does not exceed these criteria at and beyond the ZID. Based on review of available information, EPA has determined the proposed discharge is likely to meet the DO criteria based on the following: the proposed discharge will consist of a new outfall that is predicted to achieve greater dilution; GWA has not proposed an increase in the effluent concentration of BOD or a change in the level of treatment that would increase the discharge of oxygen-demand substances; and predictive modeling has demonstrated that the DO criteria would be met during critical conditions. Therefore, EPA has concluded that the proposed discharge will likely attain the applicable water quality criteria for DO at and beyond the boundary of the ZID.

2. Suspended Solids and Turbidity

a. Suspended Solids following Initial Dilution

Section 5103(C)(6) of GWQS has established water quality criteria for total suspended solids (TSS) for Category M-2 marine waters that provide that concentrations of suspended solids at any point shall not be increased more than 10% from ambient conditions at any time, and the total concentration should not exceed 20 mg/l, except when due to natural conditions. Since there are no receiving water monitoring data for TSS, EPA is unable to determine ambient conditions of suspended solids and, therefore, directly assess the impact of the proposed discharge on concentrations of suspended solids at the ZID. However, because GWA has not proposed a change in the level of treatment for suspended solids for the proposed discharge, EPA is able to use suspended solids concentrations in the effluent based on DMR data for TSS to predict concentrations of suspended solids upon initial dilution for the proposed discharge. Although there are no ambient data available to assess the water quality criterion for suspended solids based on a 10% increase, EPA evaluated whether the concentration of TSS predicted at the ZID would exceed the water quality criterion of 20 mg/l for suspended solids.

The maximum change in suspended solids concentration, ΔS, at the boundary of the ZID, can be calculated using the following Equation B-32 from EPA's ATSD:

$$\Delta S = \frac{SS_e}{S_a}$$

where:

SS_e = TSS concentration in the effluent, in mg/l; and

S_a = critical initial dilution.

As discussed in EPA's ATSD, suspended solids concentrations in the effluent are generally much greater than solids concentrations in the receiving water. Since there are no receiving water monitoring data for suspended solids and the discharge is to open coastal waters, suspended solids are considered to be negligible. Based on DMR data from March 2007 to March 2008, EPA determined the minimum and maximum effluent flow rates and their corresponding TSS values for the Agana STP. DMR data from this period were selected for having the lowest suspended solids concentrations in terms of both critical flow rates and critical water quality loading. EPA determined TSS concentrations of 54 and 85 mg/l based on the minimum and maximum flow rates of 5.20 and 7.85 MGD, respectively. In addition, EPA also determined the minimum and maximum TSS concentrations of 44 and 85 mg/l, respectively, which are independent of flow. The critical initial dilution (S_a) of 100:1 for the proposed discharge was used to determine the potential solids contribution to the receiving water.

Table 9 provides a summary of changes in suspended solids concentrations in the receiving water after initial dilution. Based on effluent concentrations of TSS, EPA calculated increases of suspended solids concentrations at the ZID that ranged between 0.44 and 0.85 mg/l, with the maximum predicted increase based on both the maximum effluent concentration of TSS and maximum concentration of TSS independent of flow (85 mg/l). Because ambient concentrations of suspended solids are considered to be low, the predicted increases are not likely to result in total concentrations of suspended solids in the receiving water that would exceed the water quality criterion of 20 mg/l for TSS. In addition, because the proposed discharge is predicted to achieve greater dilution and because GWA has not proposed an increase in the discharge of TSS concentrations for the proposed discharge, it is likely that the criteria for suspended solids will be met at the boundary of the ZID for the proposed discharge.

Table 9. Predicted increase in suspended solids concentrations in the receiving water based on TSS concentrations in the effluent.

Description	**SS_e, mg/l**	**ΔS, mg/l**
TSS at Max Flow	85	0.85
TSS at Min Flow	54	0.54
Max TSS	85	0.85
Min TSS	44	0.44

b. Suspended Solids Deposition

Many of the potential impacts of wastewater discharges are associated with the discharge of suspended solids. Suspended solids in the effluent can result in a significant loading of solids to the water column that subsequently deposit onto the seafloor. Suspended solids vary in size and other factors which cause them to settle at different rates. Some solids settle so slowly that they may stay suspended in the water column for long periods of time. According to EPA's ATSD, EPA assumes that 50 percent of suspended solids in wastewater discharges settle quickly enough to potentially accumulate in the vicinity of the outfall. The accumulation of suspended solids from wastewater discharges can lower DO concentrations in near-bottom waters which can adversely impact benthic communities. Section 5103(A)(1)(b) of GWQS provides that "all waters shall … be free from substances, conditions, or combinations thereof attributable to domestic, commercial, and industrial discharges or agricultural, construction, and land use practices or other human activities … that produce visible turbidity, settle to form deposits, or otherwise adversely affect aquatic life."

As specified in EPA's ATSD, the applicant is required to predict the sedimentation of suspended solids that results from the discharge of suspended solids into the receiving water. In the application, GWA provided information regarding suspended solids deposition for the current discharge and did not provide information on the sedimentation of suspended solids for the proposed discharge. However, because the application is based on a proposed discharge through a new outfall, GWA is required to assess the sedimentation of suspended solids for the proposed discharge. EPA's ATSD provides procedures for predicting whether substantial sedimentation of suspended solids will occur as a result of a discharge. Using these procedures, EPA assessed the accumulation of suspended solids in the vicinity of the proposed discharge based on predictive modeling to determine whether the proposed discharge would attain the water quality standard for suspended solids deposition.

The accumulation of suspended solids in the vicinity of a discharge is influenced by 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. In accordance with EPA's ATSD, EPA calculated a mass emission rate of 2,513 kg/d on an annual basis. This estimate is based on an average suspended solids concentration of 55.3 mg/l from DMR data (April 2007 through March 2008) and the applicant's current and requested permitted flow of 12 MGD. For settling velocity distribution, EPA applied settling velocities based on particle sizes typically observed in primary treated effluent (EPA 1994a). For the plume height-of-rise, EPA applied the plume height-of-rise of 83.8 m (275 ft) based on the initial dilution modeling previously described. For current velocities, EPA used information provided by the applicant that currents in Agana Bay typically range between 10 cm/s and 20.6 cm/s (0.2 kts to 0.4 kts). Settleable solids contain both inert and organic components. The reactive components, which EPA estimates are 80% of total settleable solids for wastewater receiving primary treatment, have the potential to affect biota.

Based on this information, EPA calculated the accumulation of solids for the critical 90-day period when seabed deposition is likely to be highest and for steady-state conditions where

average annual values are used. In accordance with EPA's ATSD, EPA determined an annual total organic deposition rate of 10.66 $g/m^2/yr$. Using this deposition rate, EPA calculated a critical 90-day organic accumulation value of 2.92 g/m^2 and a steady-state organic accumulation value of 1.73 g/m^2, the proposed discharge is not likely to cause significant sedimentation of suspended solids in the vicinity of the discharge.

c. Turbidity

Pursuant to 40 CFR 125.62(a), the applicants must demonstrate that the proposed discharge will comply with water quality standards for suspended solids, including turbidity. Applicants must demonstrate that the outfall and diffuser are located and designed to provide adequate initial dilution, dispersion, and transport of wastewater such that discharge does not exceed, at and beyond the ZID, these water quality standards. Section 5103 of GWQS provides that turbidity values at any time, as measured by nephlometric turbidity units (NTU), shall not exceed 1.0 NTU over ambient conditions except when due to natural conditions. GWQS for turbidity also provide that when debris, rapidly settling particles and true color give low readings when using nephlometric methods in making turbidity determination, Secchi disc determinations shall be used and be based on the standard that Secchi disc visibility shall not decrease by more than five meters from ambient conditions except when due to natural conditions.

In the application, GWA provided water quality data for turbidity based on receiving water monitoring for the current discharge and did not provide information for the proposed discharge. GWA also did not provide water quality data based on Secchi disc depth. Because the application is for a proposed discharge that will consist of a new outfall that has not yet been constructed, EPA evaluated attainment of the turbidity criterion based on receiving water monitoring data collected between December 1989 and July 1997 for the current discharge to infer whether the turbidity criterion would be met at the ZID for the proposed discharge. Data dated after July 1997 were not made available for EPA to review. Based on review of available data, EPA determined that almost all monitoring data met the turbidity criterion of 1 NTU for within-ZID station D, farfield station E, and reference station F for the current discharge. Since the turbidity criterion was met within and beyond the ZID, it is likely that the turbidity criterion would be met at the boundary of the ZID for the current discharge. The proposed discharge is predicted to achieve higher dilution and since GWA has not proposed an increase in the discharge of TSS concentrations, EPA determined that it is likely that the criterion for turbidity would also be met at the boundary of the ZID for the proposed discharge.

d. Conclusion for Suspended Solids and Turbidity

In accordance with 40 CFR 125.61 and 125.62, the applicant must demonstrate that the proposed discharge will comply with water quality criteria for suspended solids and turbidity, and that the outfall and diffuser are located and designed to provide adequate dilution such that the discharge does not exceed these criteria at and beyond the ZID. Based on the available information, EPA determined the proposed discharge is likely to meet the suspended solids and turbidity criterion based on the following: the total concentration of TSS in the receiving water would be below the

20 mg/l criterion for suspended solids; sediment is not predicted to significantly accumulate in the vicinity of the proposed discharge and would not result in adverse impacts to the biological community; and turbidity is predicted to meet the criterion at the ZID based on receiving water monitoring data. Therefore, EPA has concluded that the proposed discharge will attain the applicable water quality standards related to suspended solids and turbidity at and beyond the ZID.

C. 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 contemplates that to qualify for a variance, a discharge must protect human health and the environment. Specifically, section 301(h)(2) requires that the applicant's discharge must not interfere with the attainment and maintenance of water quality which assures protection of public water supplies; assures protection and propagation of a balanced, indigenous population (BIP) of shellfish, fish and wildlife; and allows recreational activities. In addition, section 301(h)(9) requires that the applicant must be discharging effluent which meets the criteria established under section 304(a)(1) of the CWA after initial dilution. This portion of the Tentative Decision Document addresses these requirements as specified in relevant EPA regulations at 40 CFR 125.62.

1. Attainment of Other Water Quality Standards

Pursuant to 40 CFR 125.62(a), the applicant'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 CWA section 304(a) criteria for toxic pollutants for which there are no applicable EPA-approved standards. In addition, 40 CFR 125.59(b)(1) prohibits issuance of a modified permit that would not assure compliance with all applicable NPDES requirements of 40 CFR Part 122; under these requirements a permit must ensure compliance with all water quality standards. 40 CFR 122.4(d) and 122.44(d). Attainment of water quality criteria for DO, total (unfilterable) suspended solids, and turbidity was previously discussed. However, in accordance with 40 CFR 125.62(a), the applicant must also demonstrate that the proposed discharge will attain other water quality standards, including those for bacteria, toxic pollutants, nutrients, toxicity, temperature, salinity, and pH. GWQS also have water quality criteria for ammonia. However, EPA was unable to assess attainment of these criteria because ammonia data were unavailable for review since the applicant was not required to collect such data pursuant to permit requirements. Because GWA has submitted an application for an improved discharge that consists of construction of a new and extended outfall during the next permit term, EPA has assessed compliance with section 301(h) requirements for the proposed discharge using information on the current discharge, where appropriate and necessary. As previously described, the proposed outfall is currently not operating and any monitoring data collected in the vicinity of the proposed outfall reflect only baseline conditions. Therefore, where attainment of water quality standards is based on receiving water monitoring (i.e., nutrients, temperature, salinity, and pH), EPA has used receiving water monitoring data from the current discharge to evaluate the impact

of the proposed discharge on water quality because any ambient water quality data collected in the vicinity of the proposed extended outfall do not currently reflect the impact of discharge and because both discharges discharge into the same receiving water, i.e., Agana Bay. By contrast, where attainment of water quality standards is based on the analysis of effluent data, EPA has applied a critical initial dilution of 100:1 for the proposed discharge to assess attainment of these water quality criteria (i.e., bacteria, toxic pollutants, and whole effluent toxicity) at the ZID.

a. Bacteria

In general, undisinfected wastewater from sewage treatment plants consists of high levels of pathogenic organisms that can adversely affect water quality and the uses it supports. Enterococcus concentrations are important bacterial indicators in assessing the impact of pathogens on recreational uses. Section 5102(B)(2) of GWQS establishes water quality criteria for enterococcus to protect whole body contact recreation for Category M-2 marine waters. Section 5103(C)(1) of GWQS provides that the number of enterococcus bacteria shall not exceed 35 enterococci per 100 ml based on a geometric mean of five (5) sequential samples over a period of thirty (30) days nor have an single sample exceeding 104 enterococci per 100 ml.

In the application, GWA did not provide information on concentrations of enterococci in the effluent or receiving water. As a result, EPA cannot determine directly whether attainment of the enterococcus criteria is met at and beyond the ZID in accordance with 40 CFR 125.62(a). However, in GWA's Basis of Design report, GWA indicated that a dilution of up to 8,000:1 would be necessary to meet water quality criteria for enterococcus at the boundary of the ZID for the proposed discharge (GMP Associates, Inc. 2001). But since the applicant has designed the new outfall for the Agana STP to attain an initial dilution of 100:1, it is unlikely that the proposed discharge through the new outfall would meet GWQS for enterococcus. GWA's Basis of Design report estimates that effluent from the Agana STP would contain approximately 830,000 enterococci per 100 ml after primary treatment, which is consistent with reports of levels of enterococci from other wastewater treatments. For instance, Miescier and Cabelli (1982) found that primary treatment decreased enterococci densities only by about 25%, and therefore, primary treatment alone does not reduce bacteria levels to the extent that would be required to meet GWQS for enterococci (Miescier and Cabelli 1982). As previously mentioned, GWA does not disinfect effluent from the Agana STP, nor has it proposed to disinfect the effluent as part of its section 301(h) application.

Due to the lack of effluent or receiving water data to evaluate the attainment of the water quality criteria for enterococcus, EPA cannot be reasonably assured that the proposed discharge would meet the water quality criteria for bacteria in the receiving water. Therefore, EPA has concluded that the applicant has not demonstrated that the proposed discharge would meet water quality criteria for enterococcus at and beyond the ZID.

b. Toxic Pollutants

Pursuant to 40 CFR 125.62(a), the applicant must demonstrate that, at and beyond the ZID, the discharge does not exceed applicable water quality standards or CWA section 304(a) water quality criteria for toxic pollutants for which there are no EPA-approved water quality standards. In addition, in accordance with 40 CFR 125.66, which implements section 301(h)(7) of the CWA, the applicant is required to conduct a toxic pollutant analysis of its effluent under both wet and dry weather conditions for toxic pollutants defined in 40 CFR 125.58(p) and (aa). Section 5103(C)(11)(B) of GWQS provides numeric criteria for toxic pollutants for Category M-2 marine waters based on the saltwater criterion maximum concentration (CMC), saltwater criterion continual concentration (CCC), and human health criterion for consumption of organisms only.

In the application, GWA provided results of a March 1998 toxic pollutant analysis of effluent from the Agana STP but did not specify if the analysis was based on a wet or dry weather sample. No toxic pollutant data dated after March 1998 were made available to EPA for review, even though, in EPA's 1997 letter, EPA instructed GWA to conduct annual toxic pollutant analyses to support its section 301(h) application to better understand potential toxic pollutants in the discharge (Strauss 1997). Based on review of data from the March 1998 toxic pollutant analysis, EPA determined that eight toxic pollutants were detected in the effluent: *p*-dichlorobenzene, chloroform, copper, di(2-ethylhexyl)phthalate, silver, tetrachloroethylene, toluene, and zinc Table 10 provides a comparison of the water quality criterion, effluent concentration, and predicted concentrations of the toxic pollutant at the edge of the ZID based on critical initial dilution. With consideration of critical initial dilution, concentrations of all eight of the detected toxic pollutants were estimated to be below water quality criteria at the ZID.

While GWA conducted a toxic pollutant analysis, EPA required GWA, as a large applicant, to submit annual toxic pollutant analyses to better understand toxic pollutant concentrations in the effluent and to identify potential sources, if applicable. Because GWA has not provided additional toxic pollutant analyses, as specified by EPA, EPA cannot be reasonably assured that the proposed discharge will attain water quality criteria for toxic pollutants at and beyond the ZID for the proposed discharge. Therefore, EPA has concluded that the applicant has failed to demonstrate that the proposed discharge would comply with water quality standards for toxic pollutants at and beyond the ZID.

Table 10. Comparison of water quality criteria, effluent concentrations of detected toxic pollutants, and the predicted concentrations of toxic pollutants at the ZID for the proposed discharge.

Toxic Pollutant	Water Quality Criterion			Effluent Conc. (µg/l)	Predicted Conc. at ZID (µg/l)
	CMC (µg/l)	CCC (µg/l)	Human Health Criterion For Consumption of Organism Only (µg/l)		
p -dichlorobenzene	-	-	2,600	1.2	0.012
Chloroform	-	-	470	0.5	0.005
Copper, total	4.8	3.1	-	0.053	0.00053
Di(2-ethylhexyl)phthalate	-	-	5.9	23	0.23
Silver, total	2.3	-	-	0.01	0.0001
Tetrachloroethylene	-	-	8.85	2	0.02
Toluene	-	-	200,000	1.2	0.012
Zinc, total	95	86	69,000	0.087	0.0009

c. pH

Pursuant to 40 CFR 125.62(a), the applicant must demonstrate that the proposed discharge, at and beyond the ZID, will comply with water quality criteria for pH. Section 5103 of GWQS provides water quality criteria for pH for Category M-2 marine waters which states that the pH shall remain within the range of 6.5 and 8.5 standard units and, for open ocean waters where the depth is substantially greater than the euphotic zone, the pH should not be changed more than 0.2 units from the naturally occurring variation, or in any case outside the range of 6.5 to 8.5. GWA has not requested a variance for pH. Because the proposed discharge will discharge at a depth of less than 200 m, which lies within the euphotic zone, EPA has evaluated the attainment of the water quality criterion for pH based on the pH range of 6.5 and 8.5.

In the application, GWA submitted receiving water monitoring data for pH from March 1989 to July 1997. No monitoring data dated after July 1997 were received by EPA for review. Based on review of monitoring data, EPA observed pH levels above the maximum pH criterion of 8.5 standard units at monitoring stations within and beyond the ZID. Exceedances of the pH criterion were observed at within-ZID station D in October 1991, August 1992, March 1993, September and October 1993, and June and July 1994. Exceedances were also observed at the farfield station E in July and October 1991, August 1992, March and September 1993, and June and July 1994. Reference station F did not meet the pH criterion in July 1991, October 1991, August 1992, September 1993, and July 1994. In addition, because GWA has not proposed a change in treatment level at the Agana STP that would affect effluent pH levels, EPA reviewed

DMR data to determine whether the proposed discharge would attain the water quality criterion for pH in the receiving water. Review of DMR data from March 2007 to March 2008 show that levels of pH in the effluent were within the pH range of 6.5 and 8.5. The minimum pH value reported was 7.13 and the maximum pH value was 8.26. This range falls within Guam's pH criterion.

Despite observed receiving water pH exceedances, EPA predicts that the proposed outfall will meet the water quality criteria of pH for the following reasons: the new outfall is predicted to achieve greater dilution, and effluent concentrations of pH are shown to meet the water quality criterion for pH. Therefore, EPA has concluded that the proposed discharge would likely attain the pH criteria at and beyond the ZID.

d. Nutrients

Nutrients such as phosphorus and nitrogen play a critical role in the health and productivity of the marine environment. However, domestic wastewater can contain high levels of phosphorus and nitrogen, and significant loadings of these nutrients into the environment can result in excessive algal growth and eutrophication that can adversely impact marine biota and habitats. To protect the beneficial uses of Category M-2 marine waters, section 5103(C)(3) of GWQS provides numeric criteria for nutrients which state that concentrations of nitrate-nitrogen (NO_3-N) and orthophosphate (PO_4-P) shall not exceed 0.20 mg/l and 0.05 mg/l, respectively.

In the application, GWA provided receiving water monitoring data from March 1989 to December 1989 for "NO_x" and FRP (free-reactive phosphate). No data dating after December 1989 were made available to EPA for review. GWA did not specify the value of 'x' in "NO_x," which identifies the form of nitrogen analyzed. Therefore, EPA assumed that 'NO_x' represents concentrations of nitrate, or NO_3, for its initial evaluation under section 301(h). Since GWQS are in the nitrogen form of NO_3-N, EPA converted assumed NO_3 concentrations to NO_3-N to assess attainment of the water quality criteria for NO_3-N. As a result, EPA calculated maximum concentrations of NO_3-N of 0.003 mg/l, 0.022 mg/l, and 0.271 mg/l for within-ZID station D, farfield station E, and reference station F, respectively, based on receiving water data for NO_x. To assess attainment of the water quality criterion for PO_4-P, EPA converted FRP concentrations to PO_4-P that resulted in the maximum PO_4-P concentrations of 0.035 mg/l, 0.007 mg/l, and 0.009 mg/l for within-ZID station D, farfield station E, and reference station F, respectively. The maximum calculated receiving water concentrations of NO_3-N and PO_4-P were below the applicable water quality criteria at stations D (NO_3-N only), D and E (PO_4-P only).

Although GWA has provided some receiving water monitoring data for nutrients, EPA is unable to adequately evaluate whether the proposed discharge will attain water quality criteria for nutrients at and beyond the ZID. Generally, receiving water monitoring data for the current discharge can be useful in predicting the potential receiving water impacts for the proposed discharge; however, the available receiving water data provided by the applicant were limited and do not provide for a direct comparison with the attainment of applicable water quality criteria as required by 40 CFR 125.62(a)(1). Furthermore, since 1997, EPA has expressed to

GWA on several occasions that it should collect and provide EPA with more recent monitoring information, such as water quality data for nutrients, for evaluation of compliance with section 301(h) requirements. However, GWA has consistently failed to provide this information, which is necessary for adequately assessing whether the proposed discharge will meet water quality criteria for nutrients. Therefore, EPA has concluded that the applicant has failed to demonstrate that the proposed discharge would attain water quality criteria for nutrients at and beyond the ZID.

e. Temperature

Section 5103(C)(9) of GWQS provides that the receiving water temperature shall not be changed more than 1.0 °C (1.8 °F) from ambient conditions. Because the temperature criterion is expressed as a difference from ambient conditions, and since the proposed discharge is for a new outfall that has not yet been completed, EPA predicted the attainment of the water quality criterion for temperature for the proposed discharge based on a comparison of receiving water monitoring from the reference station of the current discharge to the stations in the vicinity of the current discharge.

In the application, GWA provided receiving water monitoring data for temperature from March 1989 to July 1997. Temperature data were collected at within-ZID station D, farfield station E, and reference station F. No data dating after July 1997 were made available to EPA for review. EPA compared receiving water monitoring data for the current discharge from reference station E to data from within-ZID station D and farfield station E for each monitoring event and sampling depth. For example, temperature data for October 1993 showed that the temperature at the middle depth for reference station F was 28°C, whereas the temperature for within-ZID station D and farfield station E were 27.0°C and 29.0°C, respectively. Based on review of available temperature data, EPA determined that temperature differences between within-ZID station D and reference station F exceeded 1°C on three sampling dates: August 1992 at surface depth (1.6°C); July 1994 at surface, middle and bottom depths (-2.0°C , -1.8°C and -1.7°C, respectively); and May 1997 at surface depth (-3.7°C). Temperature differences between farfield station D and reference station E showed an exceedance of 1°C, which were observed on May 1997 at surface (-3.5°C). Because there are no receiving water monitoring data directly from the boundary of the ZID, and the temperature criteria was met at within-ZID station D but not at farfield station E, it is unclear whether the criteria for temperature would be met at the ZID for the current discharge.

Nevertheless, EPA has concluded that the proposed discharge would likely attain the criterion for temperature at and beyond the ZID based on the following: the receiving water monitoring data show a low frequency of temperature exceedances; the temperature criterion is met at within-ZID station C; and the proposed discharge is predicted to achieve greater dilution through a new outfall.

f. Salinity

Section 5103(5) of GWQS provides that "no alterations of marine environments shall occur that would alter the salinity of marine and estuarine waters and wetlands of Guam more than an increase of 10% of the ambient conditions, except when due to natural conditions." This standard is applicable to all marine water categories. Because the salinity criterion is expressed as a change in ambient conditions, and since the proposed discharge is for a new outfall that has not yet been completed, EPA predicted the attainment of the water quality criterion for salinity for the proposed discharge based on a comparison of receiving water monitoring from the reference station of the current discharge to the stations in the vicinity of the current discharge.

In the application, GWA provided receiving water monitoring data for salinity from March 1989 to July 1997. Salinity data were collected at within-ZID station D, farfield station E, and reference station F. No data dating after July 1997 were made available to EPA for review. EPA compared receiving water monitoring data from reference station F to data from within-ZID station D and farfield station E for the same monitoring event and depth. For example, salinity data for October 1993 showed that the salinity at the middle depth for reference station F was 29.0 parts per thousands (ppt), whereas the salinity values for within-ZID station D and farfield station E at middle depth were 27.0 and 28.0 ppt, respectively.

Of the 48 calculated salinity differences between reference station E and within-ZID station D, EPA determined that only two differences exceeded the salinity criterion of 10%. These occurred at middle and bottom depths on August 1991 and were calculated as a salinity difference of 11.4%. Of the 57 calculated salinity differences between reference station E and farfield station D, there were three instances where exceedances of the 10% criterion were observed. On July 1990 the difference at middle and bottom depths was 11.4% and on January 1997 the difference at shallow depth at 17.9%. Due to salinity differences that were greater than 10% at the within-ZID station D and farfield station E from reference station F, it is possible that salinity at the boundary of the ZID also did not meet the 10% criterion.

Based on review of the receiving water monitoring data for salinity for the current discharge, changes in salinity have been observed within and beyond the ZID for the current discharge. Since these changes did not meet the salinity criterion within and beyond the ZID, it is possible that the salinity criterion is also not met at the boundary of the ZID for the current discharge. However, because the proposed discharge is predicted to achieve greater dilution through a new outfall, and because the proposed discharge, which is primarily freshwater, will have low salinity, EPA has concluded that the proposed discharge would likely attain the water quality criterion for salinity at and beyond the ZID.

g. Toxicity (Whole Effluent Toxicity)

In 1989, EPA defined whole effluent toxicity (WET) as "the aggregate toxic effect of an effluent measured directly by a toxicity test" (54 FR 23895, June 2, 1989). Aquatic toxicity tests are laboratory tests that measure the biological effect (e.g., an acute effect such as mortality and chronic effects such as impairment of growth and reproduction) of effluents or receiving waters

on aquatic organisms. In aquatic toxicity tests, organisms of a particular species are held in test chambers and exposed to different concentrations of an aqueous sample (e.g., effluent, dilution water containing different concentrations of effluent or a particular pollutant, or receiving water). Observations are then made and recorded at predetermined exposure periods and at the end of the test. The measured responses of the test organisms are used to evaluate the effects of the aqueous test sample.

In the NPDES program, WET test results are used to evaluate both the toxicity of wastewater discharges and compliance with water quality standards that prohibit the discharge of toxic pollutants in toxic amounts, or otherwise provide for the maintenance and propagation of a balanced population of aquatic life. NPDES regulations at 40 CFR 122.44(d)(1) have established procedures for determining when water quality-based effluent limits for WET are required in permits and specify that the level of water quality achieved by such limits must be derived from and comply with water quality standards. Section 5103(C)(11)(A) of GWQS provides narrative water quality criteria for toxicity that all waters shall be maintained free of toxic substances in concentrations that produce detrimental responses in human, plant, animal, aquatic life, or consumable harvestable aquatic life. This is often referred to as "no toxics in toxic amounts" (Denton et al. 2007). GWQS do not provide a numeric standard for toxicity.

In the application, GWA did not provide any WET results to assess effluent toxicity. In 1997, EPA instructed GWA to conduct annual WET tests using a marine indicator species and specified that these results be submitted as part of its section 301(h) application for renewal of its variance (Strauss 1997). EPA also recommended that GWA refer to the EPA WET guidance document, *Short-Term Method for Estimating the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms*, EPA/600/R-95/136 or its most recent edition, for information on conducting these tests. Between 1997 and 2007, however, GWA did not provide EPA with any WET data to assess whether the proposed discharge would attain water quality standards for toxicity. In response to EPA's expressed concern for the lack of WET data, GWA finally submitted results of a single WET test from December 2007 to EPA in July 2008. The test was conducted using *Ceriodaphnia dubia*, a freshwater indicator organism. Results of the test showed no observable toxic effects at 100% effluent. However, the Agana STP discharges into a marine environment and EPA previously had provided guidance to GWA on the appropriate WET test methods it should be using. EPA had previously indicated to GWA that it should conduct WET testing on a marine organism since marine test organisms would be more representative of the type of species found in the vicinity of the proposed discharge.

Therefore, because GWA has submitted data for only one WET test, which is based on a freshwater organism, EPA cannot be reasonably assured that toxic impact will not occur as a result of the proposed discharge and issuance of a modified permit. EPA has repeatedly requested additional WET testing to assess the proposed discharge, but due to the lack of sufficient data EPA is unable to adequately assess whether the proposed modified discharge will meet the water quality standards for toxicity. Consequently, EPA has concluded that the applicant has not demonstrated that the proposed discharge would attain water quality standards for toxicity at and beyond the ZID.

2. Impact of Discharge on Public Water Supplies

Pursuant to 40 CFR 125.62(b), which implements section 301(h)(2) of the CWA, the applicant's proposed discharge must allow for the attainment or maintenance of water quality that assures the protection of public water supplies. The applicant's proposed discharge must also not interfere with the use of planned or existing public water supplies. Ocean waters within the vicinity of the proposed discharge are not considered as a source of public water supply at the present time. According to section 5102(B)(1) of GWQS, drinking water (human consumption) has not been established as a designated use for Category M-2 marine waters of Guam. Currently, drinking water supplies are derived from surface and groundwater sources. Therefore, EPA has concluded that the proposed discharge would not affect public water supplies.

3. Impact of Discharge on Shellfish, Fish and Wildlife

Pursuant to 40 CFR 125.62(c), the applicant's proposed discharge must allow for the attainment or maintenance of water quality which assures protection and propagation of a balanced indigenous population (BIP) of shellfish, fish, and wildlife. A BIP must exist immediately beyond the ZID of the applicant's discharge and in all other areas beyond the ZID where marine life is actually or potentially affected by the applicant's proposed discharge.[4] In addition, 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 adverse effects beyond the ZID. 40 CFR 126.62(c)(3).

Discharges from wastewater treatment plants can contain a variety of pollutants that can cause adverse impacts to the marine environment. In Part C.1 of this section, EPA evaluated individual pollutants and assessed whether the proposed discharge would affect the attainment of water quality standards for those pollutants. In this part, to assess the impact of the proposed discharge on shellfish, fish, and wildlife, EPA has used a weight-of-evidence approach based on evaluation of chemical-specific data, WET data, and biological data. This is consistent with the approach described in EPA's Technical Support Document for Water Quality-based Toxics Control (EPA 1994c):

> It is EPA's position that the concept of "independent application" be applied to water quality-based situations. Since each method (chemical specific, whole effluent, and bioassessment) has unique as well as overlapping attributes, sensitivities, and program applications, no single approach for detecting impact should be considered uniformly superior to any other approach. For example, the inability to detect

[4] As defined in 40 CFR 125.58(f), a balanced indigenous population is an ecological community which "exhibits characteristics similar to those of nearby, healthy communities existing under comparable but unpolluted environmental conditions, or may reasonably be expected to become re-established in the polluted water body segment from adjacent waters if sources of pollution were removed."

receiving water impacts using a biosurvey alone is insufficient evidence to waive or relax a permit limit established using either of the other methods.

While GWA has submitted an application for an improved discharge that consists of construction of a new and extended outfall during the next permit term, EPA has assessed compliance with 40 CFR 125.62(c) for the proposed discharge using information on the current discharge, where appropriate and necessary. As described in EPA's ATSD, however, for improved discharges, applicants are required to predict the physical, chemical, and biological conditions that would occur in the receiving water following implementation of the proposed improvements or alterations. Therefore, EPA has assessed the available information to determine whether a BIP would exist in the vicinity of the proposed discharge.

a. Review of Chemical-specific Data

Domestic wastewater discharges can contain significant amounts of organic material and other pollutants that can cause potential adverse biological impacts in the receiving water. Monitoring of water quality can provide valuable information when assessing the impact of discharges on marine life. As previously discussed, EPA has concluded that the proposed discharge will comply with water quality criteria for DO, suspended solids, and turbidity. However, EPA has concluded that the applicant has failed to provide adequate water quality monitoring data to determine whether toxic pollutants, and other chemical-specific pollutants, such as orthophosphate and nitrate-nitrogen, can consistently comply with GWQS. Therefore, because sufficient water quality data do not exist to evaluate potential biological impacts, even though EPA has repeatedly requested this information from GWA for the section 301(h) evaluation, EPA cannot be reasonably be assured that the proposed discharge will not cause adverse biological impacts due to the discharge of chemical-specific pollutants into the marine environment.

b. Review of WET Data

Section 101(a)(3) of the CWA states that it is the national policy that the discharge of toxic pollutants in toxic amounts be prohibited. 33 U.S.C. section 1251(a)(3). To evaluate toxicity, EPA established WET as a pollutant parameter defined as "the aggregate toxic effect of an effluent measured directly by a toxicity test" (54 FR 23895, June 2, 1989). The primary advantage to using WET over individual, chemical-specific measurements is that WET integrates the effects of all chemical(s) in an aqueous sample (EPA 2007). Generally, WET tests are designed to detect toxicity in whole effluents as well as predict receiving water impacts. The objective of a toxicity test is to estimate the highest "safe" or "no-effect concentration" (NOEC) of wastewaters (Denton et al. 2007). Although relating effluent toxicity to receiving water impacts can be difficult, there is evidence that suggests a strong correlation between the discharge of toxic effluents and adverse impacts to receiving waters (Grothe et al. 1996; Denton et al. 2007).

As previously discussed, EPA has concluded that the applicant has failed to demonstrate that the proposed discharge would comply with water quality standards for toxicity due to the lack of representative WET data. As a result, EPA is unable to determine if the proposed discharge would not likely interfere with the attainment or maintenance of water quality to protect aquatic life. Based on the March 1998 toxic pollutant analysis, toxic pollutants such as copper, zinc, silver, chloroform, p-dichlorobenzene, di(2-ethylhexyl)phthalate, and toluene have been detected in the effluent. While these pollutants were predicted to be below water quality criteria at the ZID, there is a potential for these pollutants, alone or in combination, to adversely impact marine life once in the environment. Therefore, because GWA has not demonstrated that the proposed discharge will meet water quality standards for toxicity in the receiving water, there is potential that the discharge may contain pollutants that, alone or in combination, may impact marine life.

c. Review of Biological Data

Wastewater discharges can affect biological communities in many ways such as modifying the structure of benthic communities caused by accumulation of discharged solids on the seafloor, increasing algae growth due to nutrient inputs, reducing DO levels due to phytoplankton blooms and subsequent die-offs that result in mass mortalities of fish or invertebrates, and causing bioaccumulation of toxic substances in marine organisms. According to EPA's ATSD, the assessment of adverse biological effects in section 301(h) analyses involves the assessment of whether a BIP exists in the vicinity of the discharge and in other areas potentially affected by the discharge. Biological impact assessments that examine species composition, abundance, and diversity, for example, are necessary components of a BIP demonstration. Under 40 CFR 125.59(c), all applications for section 301(h)-modified permits shall contain a complete section 301(h) Applicant Questionnaire, which requires demonstration of a BIP. For a BIP demonstration, EPA's ATSD requires large applicants, such as GWA, to perform biological impact assessments that involve comparisons of biological conditions and habitat characteristics among different stations at the ZID boundary, nearfield, farfield, and reference areas.

Because the application is for an improved discharge that consists of construction of a new outfall and any biological data collected in the vicinity of the outfall would not reflect the impacts of the proposed discharge, a demonstration of a BIP cannot directly be determined. However, as specified in EPA's ATSD, comparisons of the attributes of the proposed discharge (e.g., volume and composition) and receiving water with conditions near other outfalls that discharge effluent of similar volume and composition and in similar receiving water (i.e., current discharge) can be used to predict whether a BIP would exist as a result of the proposed discharge. In addition, 40 CFR 125.63 requires that biological monitoring also be conducted at the new discharge site to provide the basis for demonstrating a BIP in compliance with the requirements of 40 CFR 125.62(c).

In the application, GWA provided results of several biological surveys that were conducted in the vicinity of the current discharge. Surveys were conducted once in 1971 and quarterly from August 1989 to September 1994 (Boyd 1998). In addition, GWA provided baseline benthic community monitoring studies conducted for the proposed discharge. These studies were

conducted in August 2005, March 2006, and January 2007 (Bailey-Brock and Krause 2007). Even though both discharges are expected to be similar in composition and will discharge into the same receiving water, GWA did not predict whether unacceptable biological conditions would occur as a result of the proposed discharge based on a comparison of biological monitoring data at each site and the attributes of the proposed discharge. According to EPA's ATSD, biological impact assessments for improved discharges involve not only describing the current biological communities but also determining whether a BIP will exist beyond the ZID after improvements to the discharge, which requires predictive demonstrations of future biological conditions near the new outfall and elsewhere in the receiving water. In the application, GWA has not provided the necessary biological information to adequately assess whether biological impacts would occur as a result of the proposed discharge.

Since the necessary biological data are not available for review, EPA cannot assess the extent to which the proposed discharge may impact the structure of the biological community in the vicinity of the new outfall. Consequently, EPA cannot be assured that there are acceptable biological conditions that would occur or that a BIP would exist in the vicinity of the proposed discharge and in other areas potentially affected by the discharge.

d. Conclusion on Impacts on Shellfish, Fish and Wildlife at and beyond the ZID

Pursuant to 40 CFR 125.62(c)(2), the applicant's discharge must allow for a BIP of shellfish, fish, and wildlife at and immediately beyond the ZID of the proposed discharge and in all other areas beyond the ZID where marine life is actually or potentially affected by the proposed discharge. Based on review of available data, EPA has determined the applicant has not provided the necessary information for evaluating whether a BIP would exist as a result of the proposed discharge. Therefore, EPA has concluded that the applicant has failed to demonstrate that the proposed discharge would not interfere with the attainment or maintenance of water quality which assures protection of a BIP of shellfish, fish, and wildlife.

e. Conclusion on Impacts on Shellfish, Fish and Wildlife 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.

Although EPA has concluded that the applicant has not demonstrated that the proposed discharge would provide for the attainment of water quality criteria for toxic pollutants, nutrients, and WET, EPA has no information that exceedances of these would be so severe that they would result in extreme events such as major fish kills. EPA does not anticipate any adverse impacts to rise to the level of being extremely adverse as a result of the proposed discharge based on the applicant's requested daily average flow of 12 MGD, the predicted critical initial dilution of the proposed discharge, and that the discharge is to open coastal waters. Therefore, EPA has

concluded that the proposed discharge would not cause conditions within the ZID that would contribute to extreme adverse biological impacts.

4. Impact of Discharge on Recreational Activities

Pursuant to 40 CFR 125.62(d), the applicant's 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, and picnicking, and sports activities along shorelines and beaches. In addition, there must be no federal, territory, or local restrictions on recreational activities within the vicinity of the applicant's modified outfall unless such restrictions are routinely imposed around sewage outfalls. It is also necessary that the proposed discharge meet water quality standards relevant to recreational activities beyond the ZID, and not cause legal restrictions on activities that would be lifted or modified if the applicant's Agana STP were upgraded to secondary treatment (EPA 1994a). Section 5101(b) of GWQS provides protected uses for Category M-2 marine waters that include, but are not limited to, recreational activities such as mariculture and whole body contact recreation.

In the application, GWA identified recreational activities such as fishing, swimming, snorkeling, scuba, boating, and diving that occur within an 8 km (5 mile) radius of the current discharge. GWA did not indicate whether these recreational activities are anticipated in the vicinity of the proposed discharge. However, since the proposed discharge is near the current discharge, i.e., 100 m farther from the shoreline, in the same receiving water, EPA believes that these activities are likely to occur in the vicinity of the proposed discharge during the next permit period. For the purpose of the section 301(h) evaluation, EPA assessed the available information to determine the impact of the proposed discharge on fish consumption and water contact recreation.

a. Fish Consumption

Assessment of impact on fisheries is important because of their economic significance, their recreational potential, and the potential for human consumption of contaminated organisms. Guam's coral reefs and offshore waters provide habitat for a variety of fish, invertebrates and shellfish that are often harvested by local people. The discharge of effluent containing toxic pollutants such as heavy metals and some pesticides could result in bioaccumulation of these pollutants in aquatic organisms consumed by humans. EPA's ATSD provides procedures for adequately evaluating whether adverse impacts will occur as a result of a discharge.

In the application, GWA provided results of a March 1998 toxic pollutant analysis of the Agana STP effluent. However, GWA did not provide an analysis of toxic pollutants in fish tissue or sediments nor has evaluated whether fishing resources will be impacted as a result of the proposed discharge as described in EPA's ATSD. In a 1997 letter, EPA instructed GWA to conduct annual toxic pollutant analyses in the effluent and sediments to support the section 301(h) application and provide the groundwork for the NPDES monitoring program for the proposed discharge (Strauss 1997). However, since the March 1998 toxics pollutant analysis,

GWA has not conducted any analyses of toxic pollutants in the effluent or sediments. Based on the results of the March 1998 toxic pollutant analysis, toxic pollutants were detected in the effluent.
As a result, and because GWA has not assessed the potential for the bioaccumulation of toxic pollutants, EPA has determined that GWA has not provided the necessary information to adequately assess the impact of the proposed discharge on fish consumption.

Therefore, EPA has concluded that the applicant has not demonstrated that the proposed discharge will allow for the attainment or maintenance of water quality which allows for fishing and other mariculture activities.

b. Water Contact Recreation

Because of the potential for pathogenic microorganisms to be transmitted by contaminated water, monitoring of indicator bacteria such as enterococci can be used to identify the presence of sewage and fecal contamination and ensure the protection of the beneficial uses of the waterbody, such as water contact recreation. To protect the beneficial uses of Category M-2 marine waters for water contact recreation, section 5103(C) of GWQS provides that concentrations of enterococci shall not exceed 104 enterococci per 100 ml for a single sample and 35 enterococci per 100 ml based on a geometric mean of five sequential samples.

In the application, GWA did not provide effluent or receiving water monitoring data for bacteria to assess whether the discharge of bacteria from the proposed discharge would allow for the attainment of water contact recreation at and beyond the ZID. Based on beach monitoring data collected in Agana Bay (namely at Hagatna Boat Basin, Hagatna Channel, Hagatna Channel/Outrigger Ramp sites), beach closures and advisories due to bacterial contamination have been frequently reported (NRDC 2004 and 2005). While it is possible that there may be other sources of bacteria, EPA notes that under 40 CFR 125.62(f), an applicant must demonstrate compliance with 40 CFR 125.62(d) not only on the basis of the applicant's own proposed discharge, but also taking into account the applicant's discharge in combination with pollutants from other sources. Since effluent from the Agana STP is currently not disinfected, effluent discharged from the facility is a source of bacterial contamination in the receiving water.

Undisinfected primary treated effluent is known to contain high levels of bacteria and the applicant has not proposed disinfection as a treatment for bacteria in the Agana STP effluent. As a result, EPA has determined that the proposed discharge would not attain GWQS for enterococci beyond the ZID. Therefore, EPA has concluded that the proposed discharge may adversely affect water contact recreation.

c. Conclusion on Impact of Discharge on Recreational Activities

In accordance with 40 CFR 125.62(d), the applicant's discharge must allow for the attainment or maintenance of water quality which allows for recreational activities beyond the ZID. Based on

available information, EPA has determined that GWA has not provided the necessary information on toxic pollutants in effluent, fish tissue, or sediments, nor information on bacteria to adequately evaluate the impact of the proposed discharge on recreational activities such as mariculture activities and water contact recreation. Therefore, EPA has concluded that the applicant has not demonstrated that the discharge of pollutants will not interfere, alone or in combination with other sources, with the attainment and maintenance of water quality which allows for recreational activities beyond the ZID, as required by 40 CFR 125.62(d).

5. Additional Requirements for Applications based on Improved or Altered Discharges

Pursuant to 40 CFR 125.62(e), where the proposed discharge is based on an improved discharge, the applicant must demonstrate that the proposed improvements or alterations to the current discharge have been thoroughly planned and studied, and that the improved discharge will comply with the requirements of 40 CFR 125.62(a) through (d). As previously described, GWA has requested a modification of secondary treatment requirements for TSS and BOD for the Agana STP based on an improved discharge to the Territorial waters of Guam due to the construction of an extended outfall and a new diffuser. GWA has not proposed additional treatment to the current discharge. GWA has not requested an increase in its maximum daily flow of 12.0 MGD during the next permit period or a change in concentration limitations for BOD or TSS. In the application, GWA indicated that the improved discharge has been thoroughly planned and studied, as required by 40 CFR 125.62(e)(1), but did not provide the detailed analyses required by 40 CFR 125.62(e)(4).

Based on available information, EPA has determined that the proposed discharge would not comply with water quality standards; would not provide for the attainment or maintenance of water quality which assures the protection and propagation of a BIP of shellfish, fish, and wildlife; and would not allow for recreational activities. Furthermore, since the Agana STP does not provide for disinfection of its effluent, and none is proposed, EPA has determined that the proposed discharge would not meet water quality criteria for bacteria at the ZID. Thus, the proposed discharge would not provide for the attainment of recreational activities. Accordingly, EPA has concluded that the proposed discharge would not ensure compliance with the requirements of 40 CFR 125.62(a) through (d).

While it is possible that there may be other sources of pollutants discharging to Agana Bay, EPA notes that under 40 CFR 125.62(f), an applicant must demonstrate compliance with water quality standards not only on the basis of the applicant's own discharge, but also taking into account the applicant's discharge in combination with pollutants from other sources. Although EPA recognizes that GWA has proposed to construct an extended outfall to achieve higher dilution to assist in meeting water quality standards, EPA believes that the initial dilution for the proposed discharge based on the new outfall is not sufficient to attain water quality criteria for bacteria. Therefore, EPA has concluded that the applicant has not demonstrated that the proposed discharge would meet the requirements of 40 CFR 125.62(e).

D. Establishment of a Monitoring Program

Under 40 CFR 125.63, which implements section 301(h)(3) of the CWA, the applicant must have a monitoring program designed to evaluate the impact of the proposed discharge on the marine biota, demonstrate compliance with applicable water quality standards and measure toxic substances in the discharge. In addition, the applicant must also demonstrate that it has the resources necessary to implement the monitoring program upon issuance of a section 301(h)-modified NPDES 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 program are to be determined by taking into consideration the applicant'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)).

The current permit requires GWA to conduct biological, receiving water, and effluent monitoring. However, as previously discussed, since approval of the previous section 301(h) variance and subsequent issuance of the current permit, GWA's application status has changed and GWA is now considered a large applicant for the purpose of the section 301(h) evaluation. As a result, as specified in 40 CFR 125.63(b), GWA is required to have a monitoring program that includes additional biological requirements. EPA has reviewed GWA's monitoring program for the proposed discharge to assess compliance with the requirements of 40 CFR 125.63(a) through (d).

1. Biological Monitoring Program

Pursuant to 40 CFR 125.63(b), the applicant must have a biological monitoring program that provides adequate data to evaluate the impact of the discharge on the marine biota. In addition, in accordance with 40 CFR 125.63(b)(3)(ii), because the application is based on an improved discharge, the applicant must have a biological program that includes the current discharge site until such discharge ceases. The applicant must also provide baseline data at the relocation site to demonstrate impact of the discharge and demonstrate that the requirements of 40 CFR 125.62(c) will be met. Under 40 CFR 125.63(b)(1), the applicant's biological monitoring program must include periodic surveys of control sites and biological communities most likely to be affected by the discharge; periodic bioaccumulation studies and examination of possible adverse effects of effluent-related toxic substances; periodic sampling of sediments for toxic pollutants and pesticides; and periodic assessment of fisheries.

In the application, GWA has proposed a biological monitoring program for the current discharge and a baseline biological monitoring program for the proposed discharge that consists of quarterly surveys of benthic and fish community structure, coral reef assemblages, and sediment. However, GWA has not proposed bioaccumulation studies or the monitoring of toxic pollutants in sediments for the current discharge, or a biological monitoring program for the proposed discharge that would be implemented upon completion of the new outfall as required by 40 CFR 125.63(b)(1)(i) through (iv). In 1997, EPA instructed GWA to conduct baseline biological monitoring at the new outfall starting in 1997 to support its section 301(h) application, and to continue the monitoring until the outfall is completed (Strauss 1997). EPA also indicated that

such monitoring should include annual surveys of sediment characterization, toxic pollutants, and infauna and that collecting such information would set the foundation for GWA's NPDES monitoring program for the proposed discharge. However, in the application, GWA did not include these surveys in a proposed biological monitoring program for the proposed discharge.

Although GWA has proposed a biological monitoring program for the current and proposed discharges, EPA has determined that the proposed program is not consistent with the requirements of 40 CFR 125.63(b)(1)(i) through (iv) and is not sufficient to provide data to evaluate the impact of the proposed discharge on the marine biota. Furthermore, while GWA conducted baseline benthic monitoring surveys for the proposed discharge, GWA has not conducted baseline monitoring pursuant to EPA's 1997 letter and 40 CFR 125.63(b)(1)(iii) that to provide the basis for demonstrating that the proposed discharge will result in the attainment or maintenance of water quality that assures protection and propagation of a BIP of shellfish, fish, and wildlife (40 CFR 125.62(c)). Furthermore, GWA has not demonstrated that it would have the resources necessary to implement a biological monitoring program upon issuance of a new permit and to carry it out for the life of the new permit.

Because the applicant has proposed a biological monitoring program that has not met the requirements of 40 CFR 125.63(b)(1)(i) through (iv), and the applicant has not demonstrated that it has the resources to implement a biological monitoring program pursuant to 40 CFR 125.63(a)(1)(iii), EPA has concluded that the applicant has failed to establish an adequate biological monitoring program to evaluate the impact of the proposed discharge and to demonstrate compliance with section 301(h) biological monitoring requirements. In this Tentative Decision Document, however, EPA is not recommending specific changes to the biological monitoring program; rather, EPA intends to work with GWA in the development of an appropriate biological monitoring program for the renewed permit (a renewed section 301(h)-modified permit if EPA's final decision is to grant a variance, or a secondary-treatment permit if the final decision is to deny the variance).

2. Receiving Water Monitoring Program

Pursuant to 40 CFR 125.63(c), the applicant must have a receiving water monitoring program that provides adequate data for evaluating compliance with water quality standards or criteria, and measures the presence of toxic pollutants which have been identified or are expected to be in the effluent discharged to the receiving water.

In accordance with the current permit, GWA is required to conduct receiving water monitoring for the current discharge. Table 11 provides a summary of the current receiving water monitoring program. In the application, GWA proposed a baseline receiving water monitoring program for the proposed discharge but did not clearly indicate whether this would be the receiving water monitoring program upon completion of the new outfall, as required by

Table 11. Summary of receiving water monitoring parameters and requirements pursuant to the current section 301(h)-modified permit for the Agana STP.

Parameter	Stations	Sample Frequency	Sample Type
Floating Materials, Odor and Color	D, E, F	Quarterly	Visual
Total Coliform	D, E, F	Quarterly	Discrete
Temperature	D, E, F	Quarterly	Discrete
Salinitiy	D, E, F	Quarterly	Discrete
pH	D, E, F	Quarterly	Discrete
Dissolved Oxygen	D, E, F	Quarterly	Discrete
Turbidity	D, E, F	Quarterly	Secchi disc/discrete

40 CFR 125.63(c). GWA proposed a baseline receiving water monitoring program that includes the parameters for the current discharge as well as additional ones: bacteria, pH, orthophosphate, nitrate-nitrogen, DO, salinity, total filterable suspended solids, turbidity, temperature, and oil and grease. The parameters proposed are consistent with those specified by EPA in 1997 for a baseline receiving water monitoring program for the proposed discharge. GWA did not propose to monitor any toxic pollutants or pesticides that have been measured or expected to be in the effluent.

In 1997, EPA also indicated that GWA must monitor the listed parameters in Table 11 on a quarterly basis at the new outfall's discharge site starting in 1997 and continue until the outfall is completed in order to support its section 301(h) application. EPA also indicated that collecting such baseline information would set the foundation for GWA's NPDES monitoring program for the proposed discharge (Strauss 1997). Since 1997, GWA has conducted only one baseline receiving water monitoring survey (September 2000) for the proposed discharge. Furthermore, in the application, GWA submitted receiving water monitoring data from March 1989 to July 1997 for the current discharge pursuant to the current permit but no other data since July 1997 has been submitted to EPA for review. In GWA's quarterly Wastewater Operations and Maintenance Progress Reports for the Agana STP, GWA has consistently indicated that the absence of water monitoring data has been due to the lack of personnel.

Although GWA has proposed a baseline receiving water monitoring program for the proposed discharge, EPA has determined that it is not adequate to meet the requirements of 40 CFR 125.63(c). In addition, EPA has determined that GWA has not demonstrated that it would have the resources necessary to implement a receiving water monitoring program upon issuance of a new permit and to carry it out for the life of the new permit, as required by 40 CFR 125.63(a)(1)(iii). Based on review of the receiving water monitoring program for the current discharge and proposed discharge, EPA has concluded that GWA has not consistently conducted receiving water monitoring to provide the basis for demonstrating that the proposed discharge will meet all applicable water quality standards at and beyond the ZID (40 CFR 125.62(a)(1)).

As a result, EPA has determined that the applicant has not demonstrated that it can consistently conduct receiving water monitoring pursuant to 40 CFR 125.63(a) and (c), and collect the necessary information for determining compliance under 40 CFR 122. Because the applicant has consistently failed to conduct the required receiving water monitoring under its current permit, and specified in EPA's 1997 letter, EPA cannot be reasonably assured that the applicant will adequately implement a receiving water monitoring program for the proposed discharge upon issuance of a new permit and to carry it out for the life of the new permit. Therefore, EPA has concluded that the applicant has not established a receiving water monitoring program for the proposed discharge that meets the requirements of 40 CFR 125.63(c).

3. Effluent Monitoring Program

Pursuant to 40 CFR 125.63(d), the applicant must have an effluent monitoring program that provides quantitative and qualitative data that measures toxic substances and pesticides in the effluent, and data for evaluating compliance with the percent removal efficiency requirements under 40 CFR 125.60. As described in EPA's ATSD, the major objectives of effluent monitoring are to provide data for determining compliance with permit effluent limitations and CWA section 304(a) water quality criteria, measure the effectiveness of the toxic substances control programs, and relate effluent characteristics to the receiving water biological and water quality conditions. In addition, influent and effluent monitoring provides data for assessment of treatment plant performance with primary treatment requirements for BOD and TSS.

In the application, GWA proposed an effluent monitoring program for the proposed discharge that includes monitoring of effluent parameters included in the current permit, and any required for the new permit, in addition to monitoring of toxic substances and pesticides as required by 40 CFR 125.63(d). GWA did not propose WET testing. Table 12 provides a summary of effluent monitoring parameters and requirements in the current permit. The current permit does not require effluent monitoring for toxic pollutants or WET testing. However, in a 1997 letter, EPA

Table 12. Summary of effluent monitoring parameters and requirements pursuant to the current section 301(h)-modified permit for the Agana STP.

Parameter	Sample Frequency	Sample Type
Flow	Continuous	-
BOD_5	1/week	Composite
Suspended Solids	1/week	Composite
Settleable Solids	1/week	Discrete
Oil and Grease	1/month	Discrete
pH	1/week	Discrete

instructed GWA to conduct annual toxic pollutant analyses and WET testing to better understand potential sources of toxic pollutants in the Agana STP effluent (Strauss 1997). Although GWA has provided EPA with some effluent monitoring data (e.g., March 1998 toxic pollutant analysis and December 2007 WET test), GWA has failed to conduct annual toxic pollutant analyses and WET testing as required by EPA.

Although GWA has proposed an effluent monitoring program for the proposed discharge in accordance with 40 CFR 125.63(d), EPA has determined that GWA has not demonstrated that it would have the resources necessary to implement an effluent monitoring program upon issuance of a new permit and to carry it out for the life of the new permit, as required by 40 CFR 125.63(a)(1)(iii). GWA has not consistently conducted effluent monitoring to provide the basis for demonstrating that the proposed discharge will meet all applicable water quality standards at and beyond the ZID (40 CFR 125.62(a)(1)). As a result, EPA has determined that the applicant has not demonstrated that it can consistently conduct effluent monitoring pursuant to 40 CFR 125.63(a) and (d), and collect the necessary information for determining compliance under 40 CFR Part 122. Therefore, EPA has concluded that the applicant has not established an effluent monitoring program for the proposed discharge that meets the requirements of 40 CFR 125.63(d).

4. Conclusion on the Establishment of a Monitoring Program

Under 40 CFR 125.63, the applicant must have a monitoring program designed to evaluate the impact of the proposed discharge on the marine biota, demonstrate compliance with applicable water quality standards and measure toxic substances in the discharge. In addition, the applicant must also demonstrate that it has the resources necessary to implement the monitoring program upon issuance of a section 301(h)-modified NPDES permit and to carry it out for the life of the permit (40 CFR 125.63(a)(1)(iii)).

Although GWA has proposed a monitoring program for the proposed discharge that consists of biological, receiving water, and effluent monitoring, EPA has determined that proposed monitoring is not adequate to evaluate the impact of the proposed discharge on the receiving water. Furthermore, because GWA has failed to implement an adequate monitoring program of biological, receiving water, and effluent monitoring for the current discharge, EPA has determined that GWA has not demonstrated that it has the resources to implement an adequate monitoring program for the proposed discharge in accordance with 40 CFR 125.63(a)(1)(iii). Therefore, EPA has concluded that the applicant has not met the requirements of 40 CFR 125.63.

E. Impact of Modified Discharge on Other Point and Non-point Sources

In accordance with section 301(h)(4) of the CWA, EPA may not issue a section 301(h)-modified permit unless the applicant demonstrates that such modified requirements will not result in any additional requirements on any other point or non-point source. Under 40 CFR 125.64, which implements section 301(h)(4) of the CWA, the applicant's proposed modified discharge may not result in any additional pollution control requirements on any other point or non-point source.

In the application, GWA indicated that there are no other pollution discharges within the area of its current or proposed discharges. Based on review of other point source dischargers in Agana Bay, EPA determined that the nearest point source is Unitek Environmental (NPDES No. GU0020362), which is located on Cabras Island in Piti and discharges through an outfall located approximately five miles southwest of the proposed discharge. As the NPDES permitting authority in Guam, EPA has not imposed any additional requirements on this discharge (or any other discharge) based on its proximity to the current outfall, nor would EPA expect to impose additional requirements on the facility's discharge once the new outfall for the Agana STP is completed. Furthermore, EPA is not aware of any additional requirements that have been imposed on non-point sources as a result of the applicant's current discharge. Non-point source discharges are known to occur in Agana Bay; however, EPA has no information that the proposed discharge would result in additional pollution control requirements on these sources. In addition, based on information provided by GWA, the proposed discharge will travel away from the shoreline and away from potential interactions with other sources. Since EPA is not aware of any additional requirements that would be imposed on point and non-point sources as a result of the proposed discharge, and since the proposed discharge will be located farther offshore and have additional dilution, EPA has concluded that the applicant's proposed discharge would not result in any additional pollution control requirements on any other point or non-point source.

F. Toxics Control Program

In accordance with section 301(h)(7) of the CWA, EPA may not issue a section 301(h)-modified permit unless the applicant demonstrates, to the extent practicable, that it has established a schedule of activities designed to eliminate the entrance of toxic pollutants from industrial and nonindustrial sources into such treatment works. Under 40 CFR 125.66, which implements section 301(h)(7), the applicant must design a toxics control program to identify and ensure control of toxic pollutants and pesticides discharged in the effluent. In addition, for industrial sources of toxic pollutants, the applicant must also comply with the urban pretreatment program requirements under 40 CFR 125.65, which is discussed in the next section.

1. Chemical Analysis

Under 40 CFR 125.66(a), at the time of application, the applicant must submit a chemical analysis of its current discharge for all toxic pollutants and pesticides defined in 40 CFR 125.58(p) and (aa). As specified in EPA's ATSD, the applicant must submit results of wet and dry weather analyses of the effluent if known or suspected industrial sources of toxic pollutants or pesticides exist. The analysis shall be performed on a minimum of two 24-hour composite samples (one dry weather and one wet weather). Applicants may supplement or substitute chemical analyses if the composition of the supplemental or substitute samples typifies that which occurs during wet and dry weather conditions.

In the application, GWA provided results of a March 9, 1998 toxic pollutant analysis. The applicant did not specify if the analysis was based on effluent sampled during wet or dry weather conditions or if the sample was a supplement or substitute for wet or dry weather conditions. Based on the toxic pollutant analysis, the applicant reported detectable concentrations of *p*-dichlorobenzene, chloroform, copper, di(2-ethylhexyl)phthalate silver, tetrachloroethylene, toluene, and zinc. Since the applicant did not provide toxic pollutant analyses based on wet and dry weather conditions, nor specified whether the sample was a supplement or substitute, EPA has concluded that the applicant has not met the requirements of 40 CFR 125.66(a).

2. Toxic Pollutant Source Identification

Under 40 CFR 125.66(b), the applicant must submit at the time of application an analysis of the known or suspected sources of toxic pollutants or pesticides identified in response to 40 CFR 125.66(a). As described in 40 CFR 403.8(f)(2), applicants must conduct an industrial waste survey as the basis for determining whether there are any known or suspected industrial sources of toxic pollutants. To the extent practicable, the applicant is required to categorize the sources according to industrial and nonindustrial types.

In 2001, as part of supplementing its application, GWA provided results of an April 1999 survey conducted via mail and telephone of all GWA commercial wastewater customers. GWA indicated that, of the 1,500 surveys, a total of 366 responses were received by GWA. GWA reported that the results of the survey showed that 346 of the 366 responses reported no discharge of any non-domestic wastewater into the collection system. The remaining 20 responses reported the discharge of non-domestic wastewater into the collection system. Respondents reported indirect non-domestic dischargers such as a hotel, water park, hemodialysis center, laundromat, beverage and ice manufacturer, dental clinic, seafood retailer, restaurants/food court, daycare center, newspaper publisher, commercial building, diagnostic laboratory, optical laboratory, medical clinic, and pharmacy. In the application, GWA did not include military facilities such as the Naval Hospital as a source of non-domestic wastewater to the Agana STP.

Although GWA has conducted a survey of potential sources of pollutants pursuant to 40 CFR 403.8(f)(2), based on review of available information, EPA has determined that the applicant has failed to identify the sources of the detected toxic pollutants identified in the March 9, 1998 toxic pollutant analysis and categorize them according to industrial and non-industrial origins. Identifying and categorizing the sources of toxic pollutants is important in developing and implementing toxics monitoring and source control programs. Because GWA has not provided the necessary information to assess potential sources of toxic pollutants to Agana STP's wastewater collection system, EPA cannot be reasonably assured that GWA has properly identified and categorized potential industrial and nonindustrial sources of toxic pollutants. Therefore, EPA has concluded that the applicant has not met the requirements of 40 CFR 125.66(b) for toxic pollutant source identification.

3. Industrial Pretreatment Requirements

Under 40 CFR 125.66(c)(1), an applicant for a section 301(h) variance that has known or suspected industrial sources of toxic pollutants must have an approved pretreatment program as described in 40 CFR 403. The applicant does not need to have an approved pretreatment program if it provides a certification at the time of application that there are no known or suspected sources of toxics pollutants, and the certification is supported by an industrial user survey, as described in 40 CFR 125.66(c)(2).

Currently, GWA does not have an EPA-approved industrial pretreatment program. In the application, GWA indicated that the Territory of Guam has very little or no heavy industry and that there were no suspected industrial sources of toxic pollutants. However, GWA did not provide a certification that there were no sources of pollutants as specified in 40 CFR 125.66(c)(2). Based on the March 9, 1998 toxic pollutant analysis, toxic pollutants have been detected in the Agana STP effluent. In the application, GWA provided results of an October 15, 1999 survey that indicated potential industrial sources but GWA did not indicate whether it identified any known or suspected industrial source as a result of the March 9, 1998 toxic pollutant analysis. GWA does not have an EPA-approved pretreatment program and has failed to provide a certification that there are no known or suspected sources of toxic pollutants. Therefore, EPA has concluded that the applicant has not met the requirements of 40 CFR 125.66(c)(1) and (2).

4. Nonindustrial Source Control Program

Pursuant to 40 CFR 125.66(d)(1), all applicants must submit a proposed public education program designed to minimize the entrance of nonindustrial toxic pollutants into the wastewater treatment system, which shall be implemented no later than 18 months after issuance of a section 301(h)-modified permit. According to the applicant's current permit, the public education program's implementation date was November 30, 1987. However, in the application, GWA indicated that it had not yet implemented a formal program. Instead, GWA provided a schedule for implementing a public education program. GWA specified a completion date of September 1998 for the collection of industrial user surveys and the investigation and identification of significant toxic pollutant contributors. However, the implementation of a public education program with the issuance of industrial user surveys did not occur until April 1999. In the application, GWA proposed the use of posters, newspaper articles, and radio/TV announcements as parts of its public education program to educate the public on proper disposal of waste. However, GWA has not provided information to EPA on the progress towards meeting the requirements of 40 CFR 125.66(d)(1). Therefore, EPA has concluded that the applicant has not meet the requirement of 40 CFR 125.66(d)(1).

Under 40 CFR 125.66(d)(2) and (3), the applicant also must develop and implement a nonindustrial source control program, including a schedule of activities for identifying nonindustrial sources of toxics and pesticides and a schedule for developing and implementing control programs. Upon issuance of the current permit, the applicant was exempt from these

requirements since it applies to large applicants only and GWA was a small applicant at the time. However, as previously discussed, GWA's applicant status changed in 1997 when EPA determined that GWA was a large applicant based on the Agana STP serving a population greater than 50,000. Therefore, for the purposes of this section 301(h) evaluation, GWA was required to complete all sections of the section 301(h) questionnaire that pertained to large applicants. In the application, GWA did not provide information on the development and implementation of a nonindustrial source control program as required by 40 CFR 125.66(d)(2) and (3). Therefore, EPA has concluded that the applicant has not demonstrated that it has met the requirements of 40 CFR 125.66(d)(2) and (3).

G. Urban Area Pretreatment Program

In accordance with section 301(h)(5) and (6) of the CWA, EPA may not issue a section 301(h)-modified NPDES permit unless the applicant demonstrates that all applicable pretreatment requirements for sources introducing waste into such treatment works will be enforced. Under 40 CFR 125.65, POTWs that service a population of 50,000 or greater or that receive one or more toxic pollutants from an industrial source are required to comply with the urban area pretreatment requirements. On June 18, 1997, EPA notified GWA that it is considered a large applicant and instructed that it respond to the "Urban Area Pretreatment Requirements" questionnaire and that it should submit the questionnaire as part of its section 301(h) application (Strauss 1997).

Because urban area pretreatment requirements apply to the applicant's proposed discharge, 40 CFR 125.65(b)(1) requires that the applicant establish control of toxic pollutants that may be introduced by an industrial discharger by demonstrating that it either has in effect an applicable pretreatment requirement in accordance with 40 CFR 125.65(c) or has in effect a program that achieves secondary removal equivalence in accordance with 40 CFR 125.65(d). However, GWA did not provide any information in the application that it has adopted, or intends to adopt, any numerical local limits to control toxics from any potential industrial sources that may be introduced into the applicant's treatment works.

Since the applicant provided an incomplete industrial sources survey at the time of application submission, and it did not provide any additional information, neither EPA nor the applicant can determine categorical standards to use for a potential urban area pretreatment program. Consequently, EPA has concluded that the applicant has failed to meet the requirements of 40 CFR 125.65(c) by not identifying appropriate categorical pretreatment standards for toxic pollutant control that would have been used towards setting appropriate local limits to satisfy the requirements of 40 CFR 403. In addition, the applicant has failed to determine whether or not local limits are necessary for toxic pollutant control in accordance with 40 CFR 125.65(c)(1)(iii), largely because the applicant has failed to submit annual toxic pollutant analyses as instructed in EPA's 1997 letter (Strauss 1997). This would have provided necessary monitoring information in support of meeting the requirements of the Urban Area Pretreatment program.

Furthermore, GWA has not demonstrated the secondary removal equivalency as required in 40 CFR 125.65(d). In the application, GWA did not indicate that it has demonstrated or plans on demonstrating that it can achieve secondary removal equivalency through the use of a secondary treatment pilot at the applicant's facility that would provide an empirical determination of the amount of a toxic pollutants removed by the application of secondary treatment to the applicant's influent where the applicant's influent has not been pretreated.

Because GWA has not provided the necessary information regarding toxic pollutants introduced into the wastewater treatment system, nor has demonstrated the secondary removal equivalency, EPA has concluded that the applicant has not demonstrated that it meets all the Urban Area Pretreatment Program requirements specified in 40 CFR 125.65(b) through (d).

H. Increase in Effluent Volume or Amount of Pollutants Discharged

In accordance with section 301(h)(8) of the CWA and 40 CFR 125.67, EPA may not issue a section 301(h)-modified NPDES permits unless the applicant 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. Pursuant to 40 CFR 125.67(b), where pollutant discharges are attributable to combined sewer overflows, the applicant shall minimize existing overflows and prevent increases in the amount of pollutants discharged. 40 CFR 125.67(b) pertains to applicants for facilities that have combined sewer systems. The Agana STP is not a combined sewer system; therefore, the applicant is exempt from this requirement.

In addition, pursuant to 40 CFR 125.67(c), the applicant must provide projections of annual average effluent volume in m^3/sec and mass loadings in metric tons/year for any pollutants to which the modification applies in five-year increments for the design life of its facility. The applicant has requested a variance from federal secondary treatment requirements for BOD and TSS, and has not requested an increase in flow rate for the new permit period. However, in the application, GWA did not provide five-year incremental projections of effluent volume and mass loadings for BOD and TSS as required by 40 CFR 125.67(c). Therefore, the applicant did not project or describe whether pollutant discharge loadings will be affected by an increase in discharge or if modified permit limits will be met. Furthermore, EPA understands that there are plans for a military expansion in Guam. EPA also understands that military and civilian population increases are anticipated. Because the applicant has not provided relevant information that would enable EPA to assess whether the proposed discharge may result in any new or substantially increased discharges of the pollutant, EPA has concluded that the applicant has not met the requirements of 40 CFR 125.67(c).

I. Compliance with Other Applicable Laws

40 CFR 125.59(b)(3) provides that no section 301(h)-modified permit shall be issued where such issuance would conflict with applicable provisions of state, local, or other federal laws or Executive Orders. This includes compliance with the Coastal Zone Management Act of 1972, as

amended, 16 U.S.C. 1451 *et seq*.; Title III of the Marine Protection, Research and Sanctuaries Act, as amended, 16 U.S.C. *et seq*; the Endangered Species Act of 1973, as amended, 16 U.S.C. 1531 *et seq*.; and the Magnuson-Stevens Conservation and Management Act of 1976, as amended, 16 U.S.C. 1801 *et seq*.

1. Coastal Zone Management Act

Under 40 CFR 125.59(b)(3), a section 301(h)-modified permit must comply with the Coastal Zone Management Act (CZMA) 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 section 301(h)-modified NPDES permit may not be issued unless the proposed discharge is certified by the Territory of Guam to be consistent with the Territory of Guam's Coastal Zone Management Program. On March 6, 1998, GWA requested a consistency certification for the proposed discharge from Territory of Guam's Bureau of Planning. In the application, GWA indicated that a response letter from the Bureau of Planning is pending. However, because EPA is tentatively denying the application for a section 301(h) variance, no CZMA certification is necessary at this time.

2. Marine Protection, Research and Sanctuaries Act

Under 40 CFR 125.59(b)(3), a section 301(h)-modified permit must comply with Title III of the Marine Protection, Research and Sanctuaries Act (MPRSA), as amended, 16 U.S.C. 1431 *et seq*. In accordance with 40 CFR 125.59(b)(3), 16 U.S.C. 1434(d), and MPRSA regulations, a section 301(h)-modified permit may not be issued for a discharge into a marine sanctuary designated pursuant to Title III if the regulations applicable to the sanctuary prohibit such a discharge, unless the National Ocean and Atmospheric Administration does not object to the permit. In the application, GWA did not indicate whether the proposed discharge is located in a marine sanctuary designated under Title III of the MPRSA. If EPA's tentative decision were to approve a section 301(h) variance, a demonstration of compliance with the MPRSA would be necessary prior to issuance of a section 301(h)-modified NPDES permit. However, because EPA's tentative decision is that a modified permit would not be appropriate and, therefore, no modified permit has been prepared, no demonstration of compliance with the MPRSA and/or National Marine Fisheries Service concurrence is necessary at this time.

3. Endangered Species Act

Under 40 CFR 125.59(b)(3), a section 301(h)-modified permit must comply with the Endangered Species Act (ESA) of 1973, as amended, 16 U.S.C. 1531 *et seq*. In accordance with 16 U.S.C. 1536(a)(2), a section 301(h)-modified permit may not be issued if the proposed discharge will adversely impact threatened or endangered species or critical habitat listed pursuant to the ESA. In the application, GWA did not indicate whether there are threatened or endangered species or federally designated critical habitat located near the discharge that may be affected by the proposed discharge. If EPA's tentative decision were to approve a section 301(h) variance, a demonstration of compliance with the ESA would be necessary prior to issuance of a section 301(h)-modified NPDES permit. However, because EPA's tentative decision is that a modified

permit would not be appropriate and, therefore, no modified permit has been prepared, no demonstration of compliance with the ESA and/or National Marine Fisheries Service or U.S. Fish and Wildlife Service concurrence or determination is necessary at this time.

4. Magnuson-Stevens Fishery Conservation and Management Act

Under 40 CFR 125.59(b)(3), a section 301(h)-modified permit must comply with applicable provisions of federal laws including the Magnuson-Stevens Fishery Conservation and Management Act (MSA) of 1976, 16 U.S.C. 1801 *et seq*., which protects against adverse impacts to essential fish habitat (EFH). In the application, GWA did not provide any information on whether the proposed discharge will adversely impact EFH, or on compliance with the requirements of the MSA. GWA also did not provide information on consultation with the National Marine Fisheries Service and regional fishery management councils. To comply with 40 CFR 125.59(b)(3), the applicant will need to demonstrate either that the MSA does not apply, or that the discharge would comply with it. However, since EPA's tentative decision is that a modified permit would not be appropriate, and, therefore, no modified permit has been prepared, no demonstration of compliance with the MSA is necessary at this time.

J. State Determination on Compliance with Water Quality Standards

Under 40 CFR 125.61(b)(2) the applicant 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 proposed modified discharge will comply with applicable provisions of State law including water quality standards. This determination shall include a discussion of the basis for the conclusion reached. In the application, GWA indicated that it submitted a request to GEPA for a determination. On March 28, 2008, EPA sent a letter to GEPA requesting a decision on certification of GWA's section 301(h) application. At this time, EPA has not received a certification. However, since EPA is issuing a tentative decision to deny the applicant's request for a waiver from secondary treatment requirements, a water quality certification or determination from the Territory of Guam is unnecessary at this time.

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