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

AMERICAN SAMOA POWER AUTHORITY'S TAFUNA 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 25, SUBPART G

I have reviewed the attached evaluation analyzing the merits of the application of the American Samoa Power Authority (herein, the "applicant") for the Tafuna Sewage Treatment Plant requesting renewal of its variance from secondary treatment requirements of the Clean Water Act (the "Act") 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 Act.

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 permit regulations at 40 CFR Part 124, public notice and comment regarding this tentative decision will be made available to all 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.

[Signed January 14, 2009 by Wayne Nastri]

Dated: _____ _____

Wayne Nastri
Regional Administrator

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Introduction

The American Samoa Power Authority (hereinafter, the “applicant”), has requested a renewal of its variance under section 301(h) of the Clean Water Act, 33 USC section 1311(h) (the "Act"), from the secondary treatment requirements contained in section 301(b)(1)(B) of the Act, 33 USC section 1311(b)(1)(B).

The variance is requested for the Tafuna Sewage Treatment Plant (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 South Pacific Ocean. Secondary treatment is defined in federal 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 133.102, secondary treatment requirements for TSS, BOD and pH include the following:

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%; and

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%; and

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

This document presents U.S. Environmental Protection Agency (EPA) Region 9's 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 Act, as implemented by regulations contained in 40 CFR Part 125, Subpart G.

Decision Criteria

Under section 301(b)(1)(B) of the Act, 33 USC 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 (the "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 Act. POTWs were required to comply with these limitations by July 1, 1977.

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

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

> "…the 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:
>
> (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 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;

[2] Section 502(3) of the Act defines "State" to include territories, specifically including American Samoa. 33 USC 1362(3).

(7) To the extent practicable, the applicant has established a schedule of activities designed to eliminate the entrance of toxic pollutants from non-industrial 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 this subsection the phrase 'the discharge of any pollutant into marine waters' refers to a discharge into deep waters of the territorial sea or the waters of the contiguous zone, or into saline estuarine waters where there is strong tidal movement or 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 biological oxygen demanding material and of the suspended solids in the treatment works influent, and disinfection, where appropriate. A municipality which applies for secondary treatment shall be eligible to receive a permit under 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 saline 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, fish, 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. Notwithstanding any of the other provisions of this subsection, no permit may be issued under this subsection for discharge of a pollutant into the New York Bight Apex consisting of the ocean waters of the Atlantic Ocean westward of 73 degrees 30 minutes west longitude and northward of 40 degrees 10 minutes north latitude."

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 USC 1451 *et seq*.; the Endangered Species Act, as amended, 16 USC 1531 *et seq*.; and Title III of the Marine Protection, Research, and Sanctuaries Act, as amended, 16 USC 1431 *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 though 125.68, as described in this Tentative Decision Document. EPA has reviewed all data 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 makes the following findings regarding the proposed discharge's compliance with the statutory and regulatory criteria:

(1) The applicant's proposed discharge will comply with primary treatment requirements. [section 301(h)(9) of the Act; 40 CFR 125.60]

(2) The applicant has not shown that its proposed modified discharge will comply with American Samoa water quality criteria for dissolved oxygen and suspended solids (i.e., TSS). The specific water quality criteria the applicant cannot consistently achieve are DO and turbidity. The applicant has demonstrated that it can comply with water quality standards for light penetration. [section 301(h)(1) of the Act; 40 CFR 125.61]

(3) The applicant has not shown that it can consistently achieve American Samoa water quality standards at and beyond the zone of initial dilution. The specific water quality criteria the applicant cannot consistently achieve are total phosphorus, total nitrogen, chlorophyll *a*, bacteria, and whole effluent toxicity. [section 301(h)(9) of the Act; 40 CFR 125.62(a)(1)(i) and 122.4(d)]

(4) The applicant's proposed modified 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 Act; 40 CFR 125.62(b), (c), and (d)]

(5) The applicant has submitted a chemical analysis of its current discharge for toxic pollutants and pesticides; however, the applicant has not analyzed the known or suspected source(s) of industrial toxic pollutants or pesticides in its effluent, nor has it developed nonindustrial source control programs to address such sources. [section 301(h)(7) of the Act; 40 CFR 125.66]

(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) Because the Tafuna STP services and will continue to service a population of less than 50,000 in the near future, the applicant is exempt from the provisions of the urban area pretreatment program. [section 301(h)(6) of the Act; 40 CFR 125.65]

(8) The applicant proposed a new monitoring program that is not sufficient. EPA will work with the applicant to develop an improved monitoring program. [section 301(h)(3) of the Act; 40 CFR 125.63]

(9) The modified discharge is not expected to result in any new or substantially increased discharges from the point source of the pollutants to which the section 301(h) variance would apply above those that would be specified in the permit. [section 301(h)(8) of the Act; 40 CFR 125.67]

(10) The applicant has not yet provided determinations or concurrences from the American Samoa Department of Commerce, American Samoa Coastal Management Program, that the applicant's discharge is consistent with the Territory's Coastal Zone Management Program; the National Oceanic and Atmospheric Administration that the applicant's discharge is in accordance with Title III of the Marine Protection, Research and Sanctuaries Act, 16 USC 1431 et seq.; or the U.S. Fish and Wildlife Service and the National Oceanic and Atmospheric Administration'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 NPDES permit not be issued. [40 CFR 125.59(b)(3)]

(11) While the Territory of American Samoa would have to concur in issuance of a final section 301(h)-modified NPDES 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 NPDES permit not be issued. [40 CFR 125.59(b)(3), 125.61(b)(2), and 125.64(b)]

Conclusion

Based on the evaluation of the applicant's proposed modified discharge, EPA has concluded that the discharge will not comply with the requirements of section 301(h) and 40 CFR Part 125, subpart G, and American Samoa water quality standards, Administrative Rule no. 006-2005.

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.

Figure 1a – Map of Tutuila Island, American Samoa. Circle indicates project location or area of the Tafuna STP. Reprinted from the 2004 section 301(h)-modified NPDS permit renewal application.

Description of Facility and Treatment System

A. Background

The original section 301(h) decision for a variance from secondary treatment requirements at the Tafuna Sewage Treatment Plant (STP) was issued in 1985. Tafuna STP's first renewal section 301(h) application was submitted to EPA on March 26, 1992. The renewal application was based on an improved discharge, as defined in 40 CFR 125.58(i). Subsequently, EPA requested additional information and on August 6, 1994, the applicant submitted a revised application under 40 CFR 125.59(d)(3) proposing treatment plant upgrades and a new outfall and diffuser system. On January 30, 1995, EPA issued a Tentative Decision Document recommending that the applicant be granted a variance from the secondary treatment requirements of the Act, provided certain contingencies were met, such as construction of a new outfall. The new outfall began discharging effluent into the open coastal waters in summer of 1995.

On September 29, 1999, EPA issued a Final Decision Document based upon the applicant's ability to meet the contingencies identified in the 1995 Tentative Decision Document. In accordance with the 1999 Final Decision Document, EPA Region IX issued the current section 301(h)-modified NPDES permit (AS0020010) on September 30, 1999. The permit became effective on November 2, 1999, and expired on November 1, 2004. Pursuant to 40 CFR 122.21, the terms of the existing permit have been administratively extended. On May 4, 2004, the applicant submitted a second section 301(h)-modified NPDES permit application, based on an altered discharge as defined in 40 CFR 125.58(b), requesting a renewal of its variance from the secondary treatment requirements described previously.

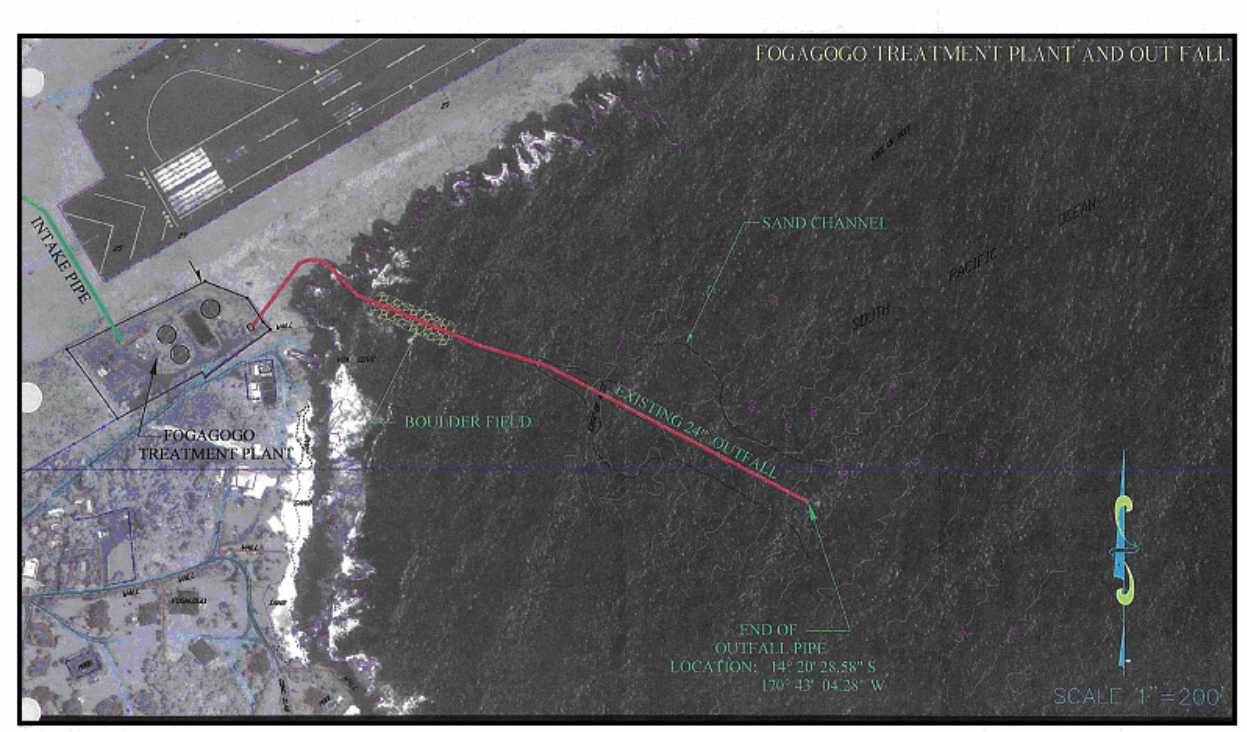

Figure 1b – Map of Tafuna STP (also known as Fogagogo Treatment Plant) and outfall. Reprinted from the 2004 section 301(h)-modified NPDES permit renewal application.

B. Treatment System

The Tafuna STP is located in Fogagogo on Tutuila Island, the largest and principal island of American Samoa. Tafuna STP is a primary sedimentation treatment plant that collects wastewater from the airport, a non-industrial business park, and several nearby residential areas within the Tafuna Plains region of the island. According to the applicant, the wastewater collected from these areas is largely organic and domestic in nature (ASPA 2004). Domestic wastewater includes waste or wastewater from humans or household operations that is discharged to or otherwise enters the treatment plant (40 CFR 122.2). There are currently no industrial sources of wastewater that flow to the treatment plant and none planned in the near future. The plant currently serves a population of 12,000 people. Future system expansions on the collection system are expected to provide service to approximately 20,000 people in the Tafuna Plains area by 2012.

The Tafuna STP discharges treated effluent directly into the South Pacific Ocean through a 24-inch high-density polyethylene pipe and outfall. The terminus of the outfall is located approximately 1,562 feet from the southeastern portion of the island at a depth of 94.5 feet. This places the end of the outfall at 14º 20’ 28.58” South latitude and 170º 43’ 04.28” West longitude. Figures 1a and 1b identify the locations of the facility and outfall and Figure 2 shows a diagram of the facility. Effluent is discharged horizontally in alternately opposite directions through a multiport diffuser. The diffuser consists of six ports and has a total length of approximately 50

feet, with each port spaced approximately 10 feet from each other. The ports have a diameter of 7.75-inches and are at a depth that ranges between 87.6 and 91.5 feet.

The existing outfall and diffuser first began operation in 1995 and were constructed to improve the discharge by enhancing the initial dilution and dispersal of pollutants in the receiving water. The improvements included a 50 foot diffuser with six ports to enhance dilution and mixing within the water column. Sludge from the primary process is treated by anaerobic digestion and placed in drying beds until landfill disposal. The climate in American Samoa is characterized as the humid tropics with wet weather occurring on a year-round basis. Therefore, no peak dry weather periods occur as observed on other Pacific Islands. Table 1 provides a summary of characteristics of the Tafuna STP outfall and diffuser.

From April 2005 to June 2008, the daily maximum flow of the discharge ranged between 1.8 and 4.5 MGD. According to the applicant, the predicted peak daily flow rate of the Tafuna STP during the next permit cycle is 6.0 MGD[3] (ASPA 2004).

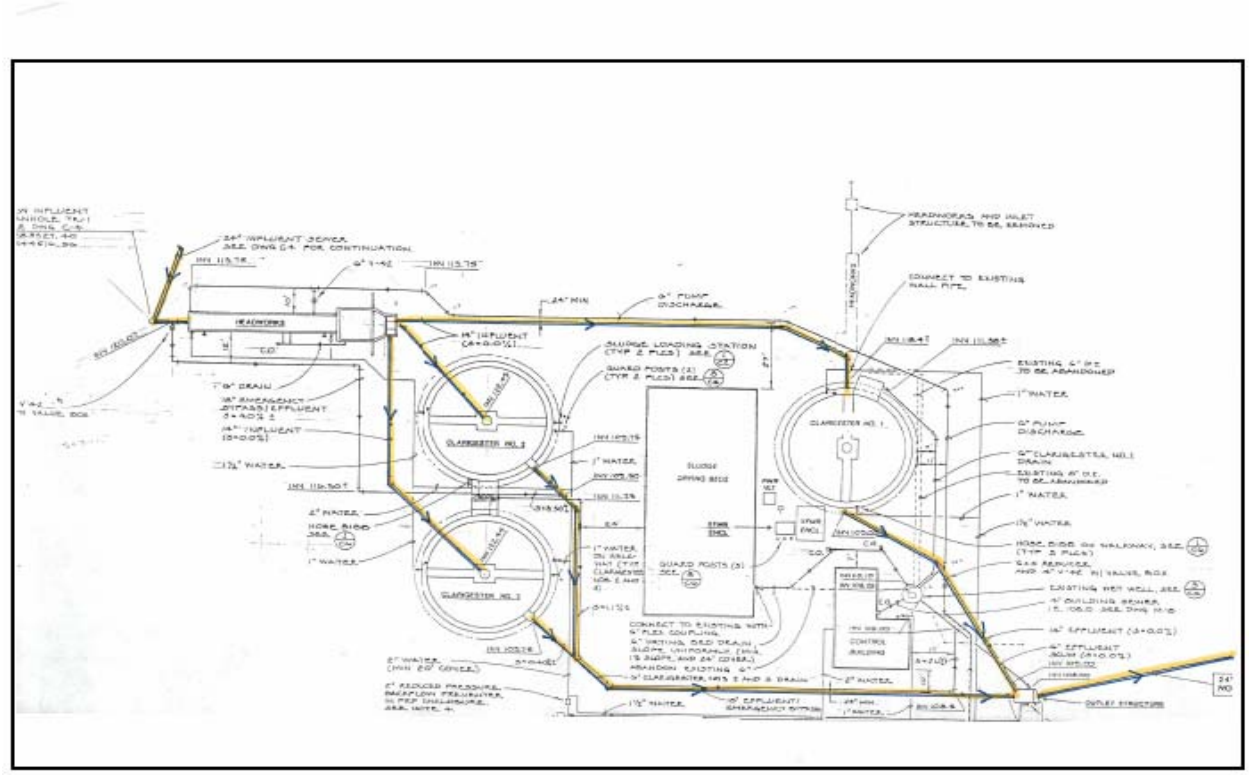

Figure 2 - Diagram of Tafuna STP's wastewater treatment system. Reprinted from the 2004 section 301(h)-modified NPDES permit renewal application.

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[3] The applicant describes 6.0 MGD as the most critical condition or hourly peak end-of-permit flow.

Table 1 - Summary of outfall and diffuser characteristics for the Tafuna STP.

Parameter	Description
Total outfall + diffuser length, feet	1,562
Outfall diameter, inches	21
Diffuser depth, feet	95
Diffuser diameter, inches	21
Diffuser length, feet	50
Port configuration	alternate
Port number	6
Port spacing, feet	10
Port diameter, inches	7.75
Angle of port orientation from horizontal, degrees	90
Port depth below the surface, feet	91.5
Design maximum hydraulic rate for ports 1-6, MGD[1]	1.04, 1.04, 1.01, 0.99, 0.95, 0.98

[1]Design maximum hydraulic rate for each port based on design capacity of 6.0 MGD

C. Altered Discharge

Under 40 CFR 125.58(b), an altered discharge means any discharge other than a current discharge or improved discharge, as defined in 40 CFR 125.58(h) and (i), respectively. The applicant's request for modification of secondary treatment requirements for the Tafuna STP is based on an altered discharge to waters of American Samoa. The applicant identifies the altered discharge as an anticipated average daily flow increase from 2.0 million gallons per day (MGD) to 3.0 MGD in the near future and has requested this increase as a result of the expansion of the sewer collection system.

The applicant is seeking a variance from secondary treatment requirements for BOD and TSS only. The applicant is not seeking a variance for pH. Table 2 provides a comparison of the applicant's existing and proposed effluent limitations for BOD and TSS and recent performance data.

Table 2 - Summary of existing and the applicant's requested effluent limitations and effluent monitoring data based on Discharge Monitoring Reports for the Tafuna STP.

Parameter	Existing Effluent Limits			Requested Effluent Limits			Effluent Monitoring Data (1999-2008)		
	30-Day Average	Average Weekly	Daily Maximum	30-Day Average	Average Weekly	Daily Maximum	Highest 30-Day Average[1]	Highest Average Weekly[2]	Daily Maximum
BOD, mg/l	100	150	200	100	150	200	100	132	-[3]
BOD, lbs/day	1,669	2,504	3,338	2,502	3,753	5,004	1,628	2,335	-
TSS, mg/l	75	113	150	75	113	150	69	90	-
TSS, lbs/day	1,252	1,878	2,504	1,877	2,827	3,753	928	1,413	-
Settable Solids, ml/l	1	-	2	1	-	2	0.2	-	1
pH, standard units	Not less than 6.5 nor greater than 8.6			Not less than 6.5 nor greater than 8.6			6.0 (Minimum) to 7.6 (Maximum)		

[1]For BOD and TSS, highest 30-day average values based on monitoring data from 1999 to 2007 that were provided by the applicant in the application and from Discharge Monitoring Reports from April 2005 to June 2008 submitted to EPA by the applicant as part of existing permit requirements; for settable solids, highest 30-day average values were based on monitoring data from April 2005 to June 2008
[2]Highest average weekly values based on monitoring data from Discharge Monitoring Reports for the period beginning April 2005 to June 2008
[3]Data not required or available for review

Description of Receiving Water

The Tafuna STP discharges into the open coastal waters of the South Pacific Ocean on the southeastern portion of Tutuila Island in American Samoa. According to the applicant, the open coastal waters of American Samoa are not considered stressed waters, as defined in 40 CFR 125.58(z). The applicant describes the open coastal waters in the vicinity of the discharge as energetic with excellent circulation and flushing patterns. The tides are considered semi-diurnal in nature with an average of 2.5 feet.

A. Stratification

According to the applicant, there is little seasonal variation in the water column with respect to temperature and salinity (ASPA 2004). Density profiles at the outfall taken during tradewind and non-tradewind seasons indicate that thermoclines and haloclines do not form, which allows for the constant mixing of the water column throughout the year. In addition, according to the applicant, there are negligible freshwater surface water discharges that enter the area of the outfall that may affect stratification. Ambient temperatures near the outfall range from 26 to 30 degrees Celsius based on receiving water monitoring data collected during the tradewind and non-tradewind seasons. The applicant has indicated that salinity data in the vicinity of the outfall are not entirely reliable but that salinity in the open ocean of American Samoa has generally been found to be 36 parts per thousand. In the application, the applicant presented ambient monitoring data from open coastal waters outside of Pago Pago Harbor. Data were collected from station 5, a reference site for the applicant's Utulei STP receiving water monitoring program. Based on temperature and salinity data collected between March 2001 and August 2003 from station 5, the applicant estimated that the density of the ambient receiving water is 1.029 g/cm^3.

B. Current Speed and Direction

No recent data exist for current speed and direction at the discharge site. The 1995 Tentative Decision Document used current data from a 1979 Baseline Water Quality Report which provided an overall tide current rose. In the application, the applicant provided a tide current rose that showed that current and wind direction is parallel to the shoreline with two primary directions of current flow: southwest to south southwest and north northwest. In the application, the applicant indicated current speeds range between 0 to 20 cm/sec with a current speed of 5 cm/sec occurring at least 90 percent of the time.

C. Protected and Prohibited Uses

American Samoa water quality standards (ASWQS) can be found at Administrative Rule no. 006-2005. As noted above, the Tafuna STP discharges into open coastal waters. Section 24.0205(f) of ASWQS identifies the protected uses for open coastal waters and includes

the following:

(1) commercial, subsistence and recreational fishing;
(2) scientific investigations;
(3) whole and limited body-contact recreation, e.g., swimming, snorkeling, and scuba diving;
(4) harbors and boat-launching ramps;
(5) commercial and recreational boating;
(6) support and propagation of marine life; and
(7) aesthetic enjoyment.

To protect these uses, ASWQS also establish prohibited uses that include but are not limited to the following:

(1) offshore oil recovery;
(2) dumping or discharge of solid or industrial waste material;
(2) discharge of oil sludge, oil refuse, fuel oil, bilge waters, or any other wastewater from any vessel or unpermitted shoreside facility;
(4) animal pens over or within 50 feet of any shoreline;
(5) dredging and filling activities; except as approved by the American Samoa Environmental Quality Commission;
(6) toxic, hazardous and radioactive waste discharges; and
(7) point source discharges in Manu'a off Ofu Park and between Ofu Park and the Ofu-Olosega Bridge within 1,000 feet of the bridge.

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). Page 52 of EPA's 1994 Amended Section 301(h) Technical Support Document (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 decrease 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 of 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".

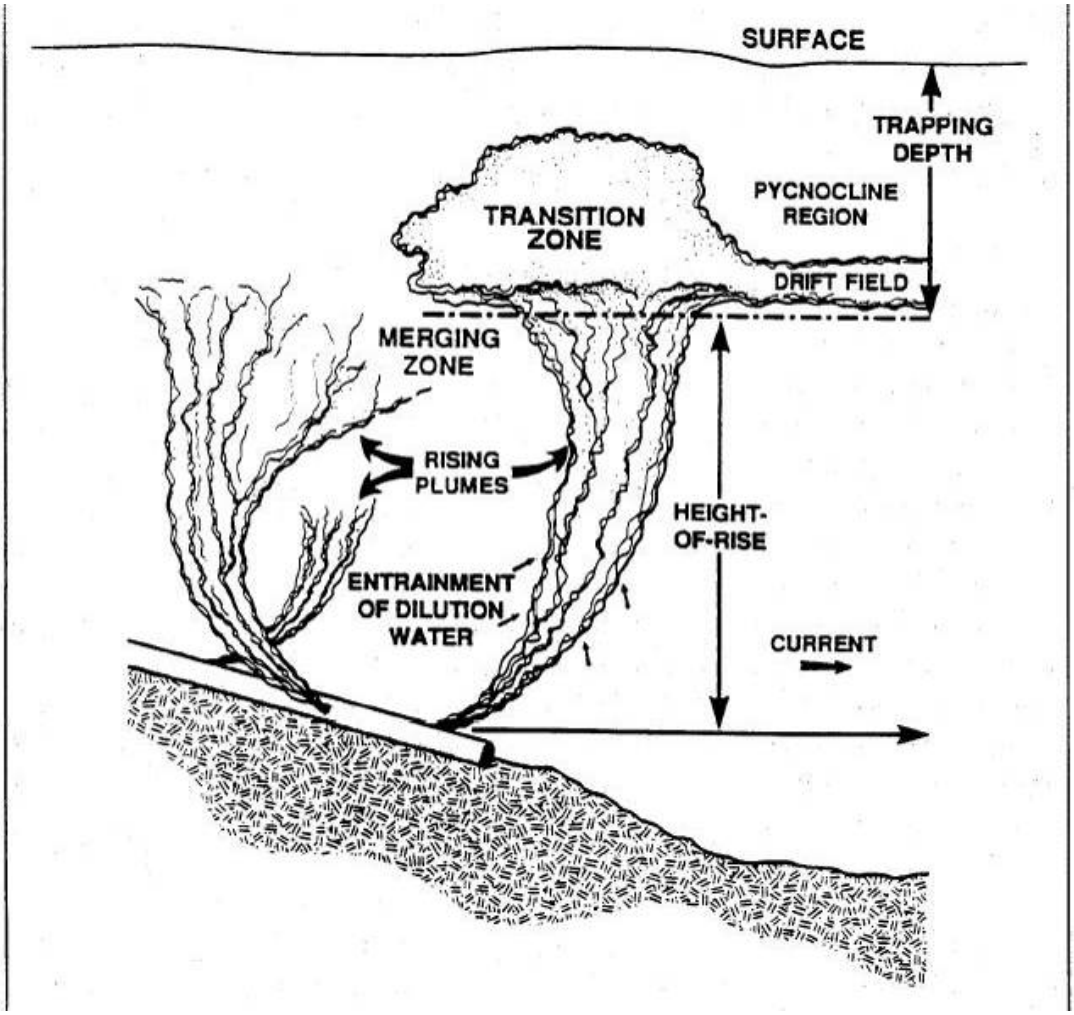

Figure 3. Depiction of initial dilution in the receiving water. Reprinted from EPA's ATSD (EPA 1994a).

Figure 3 provides a depiction of initial dilution. Initial dilution is an important parameter relative to 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 lowest (i.e., critical) 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 end-of-permit year. 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 to assess initial dilution and pollutant transport at critical conditions.

The applicant has demonstrated to the satisfaction of EPA that there is only one critical environmental period in the receiving water near the discharge point based on density profile data collected during both tradewind and non-tradewind seasons. The applicant is only able to provide a peak hourly effluent flow rather than a peak two to three-hour effluent flow for the new end-of-permit year as specified by EPA's ATSD. However, EPA believes that the

applicant's estimated peak hourly effluent flow is an appropriately conservative measure of its most critical flow condition for the proposed modified discharge during the next permit period. Therefore, for the purpose of the section 301(h) evaluation, EPA accepted the following information that was used by the applicant to compute critical initial dilution: the predicted peak hourly effluent flow, the lowest density profile of the receiving water, and a current speed no higher than the lowest 10th percentile.

In the application, the applicant calculated critical initial dilution using the 1985 EPA-approved mixing zone model, UDKHDEN, based on the predicted peak hourly flow of 6.0 MGD. The UDKHDEN model requires specifications of various parameters describing the diffuser configuration, effluent properties, and ambient conditions. When required by the model, the applicant applied the physical outfall characteristics previously described in Table 1. In addition, the applicant applied an ambient current speed of 5 cm/sec based on the 10th percentile current from available data. Density profile data were collected from station 5 located in open coastal waters located offshore of Pago Pago Harbor and approximately six miles east of the Tafuna STP outfall. The applicant believes this area best represents the south central coastal area of Tutuila Island, where the outfall is located, and is a reference station for the applicant's Utulei STP receiving water monitoring program. Due to station 5's location, the applicant also believes the area is not influenced by the effluent discharge, which can affect ambient temperature and salinity data. Density profile data provided by the applicant were collected from March 2001 to August 2003, with March 2002 determined to be the most critical case. This profile resulted in a density gradient of 0.42 sigma-t units between the surface and the 100 foot depth. The applicant also applied the effluent density of 0.99578g/cm^3 based on the density of freshwater at 30 degrees Celsius. Based on the UDKHDEN model, the applicant estimated a critical initial dilution of 187:1 at the trapping depth of 16.1 feet.[4] For comparison purposes, the applicant estimated an initial dilution of 289:1 at the trapping depth of 26.3 feet for the proposed daily average end-of-permit flow of 3.0 MGD (ASPA 2004).

In accordance with EPA's ATSD, EPA reviewed the calculation of initial dilution and trapping depth under both the proposed daily average flow and critical flow scenarios provided by the applicant. Based on its review, EPA believes that an average initial dilution and critical initial dilution of 289:1 and 187:1, respectively, are adequately calculated for the purpose of the section 301(h) evaluation. However, because section 301(h) regulations require that the applicant's diffuser be located and designed to provide initial dilution, dispersion, and transport sufficient to ensure compliance with water quality standards at the ZID boundary under *critical conditions* (see 40 CFR 125.62(a)(1)(iv)), EPA evaluated compliance with section 301(h) regulations based only on the critical initial dilution of 187:1.

B. Application of Initial Dilution to Water Quality Standards

[4] Critical initial dilution is based on the alternate diffuser configuration that contains six equal 7.75-inch ports; this configuration began operation after submittal of the application and, for section 301(h) purposes, is considered the current configuration of the existing outfall. In the 1999 Final Decision Document, a critical initial dilution of 211:1 was used, which was based on a peak two to three-hour effluent flow of 2.0 MGD.

40 CFR 125.62 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 Part 125, and as allowed by section 24.0207 of ASWQS, for the purpose of the section 301(h) evaluation, EPA applied all applicable water quality standards and criteria at the boundary of the ZID to determine compliance with section 301(h) regulations. Therefore, EPA has applied a critical initial dilution of 187:1 to assess attainment of water quality criteria (i.e., for dissolved oxygen, suspended solids, whole effluent toxicity, and toxic pollutants) where attainment of water quality criteria is based on analysis of effluent data.

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 operationally delimits this volume of water in relation 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, the applicant calculated the ZID as having a horizontal distance of 64.3 feet from each side of the diffuser. The applicant did not provide information regarding the ZID length. However, in accordance with EPA's ATSD, and based on the maximum water depth with respect to the mean lower low water surface (91.5 feet) and length of the linear diffuser (50 feet), as described in the application, EPA has calculated the dimension of the ZID as 183 feet wide and 239 feet along the centerline of the diffuser. The existing NPDES permit describes the ZID as having a 90 foot depth. This is consistent with EPA's ATSD.

40 CFR 125.62(a) requires that the applicant's outfall and diffuser be located and designed to provide adequate initial dilution, dispersion, and transport of wastewater such that the discharge does not exceed, at and beyond the ZID, all applicable Territory water quality standards, and section 304(a) criteria for pollutants for which there are no EPA-approved water quality standards. Section 24.0207(b)(8) of ASWQS allows the use of mixing zones beyond the boundary of the ZID. The existing section 301(h)-modified NPDES permit established a ZOM for bacteria that was larger than the ZID, having a horizontal distance of 627 feet shoreward from the mid-point of the diffuser and an 18 foot depth.

However, section 301(h) regulations require facilities with variances from secondary treatment to meet all water quality standards and criteria at the ZID, unless the ZOM is smaller. 40 CFR 125.58(dd). Therefore, in this Tentative Decision Document, EPA has applied applicable water quality standards and criteria at the boundary of the ZID to determine compliance with section 301(h) regulations. Two monitoring stations (stations A1 and A2) were established at the ZID and results from the applicant's monitoring were reviewed for section 301(h) purposes. EPA also reviewed receiving water monitoring collected at two stations beyond the ZID: ZOM station B and reference station C.

Application of Statutory and Regulatory Criteria

A. Attainment of Primary or Equivalent Treatment Requirements

Section 301(h)(9) of the Act was amended by section 303(d)(1) and (2) of the WQA of 1987. 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 NPDES 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 percent 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. The existing section 301(h)-modified NPDES permit for the Tafuna STP contains monitoring requirements for TSS and BOD. EPA reviewed average monthly percent removal data to evaluate the applicant's compliance with federal primary treatment requirements.

Between January 1999 and June 2008, the applicant monitored influent and effluent concentrations of TSS and BOD and determined monthly percent removal rates in accordance with existing permit requirements. Table 3 provides a comparison of TSS and BOD monthly average percent removal rates. Of the 110 months that were monitored for TSS removal, the Tafuna STP met the 30 percent removal requirement 98 percent of the time. The monthly average percent removal of TSS ranged between 24 and 88 percent, with two months reported below the 30 percent removal requirement (September 2001 and July 2004). Of the 95 months that were monitored for BOD removal, the Tafuna STP met the 30 percent removal requirement also 98 percent of the time. The monthly average percent removal efficiency rate of BOD ranged between 25 and 75 percent, with April 1999 and June 2008 reported to be below the 30 percent removal requirement. Figure 4 shows a comparison of TSS and BOD removal rates over the monitoring period.

Table 3 - Comparison of monthly average BOD and TSS removal rates from the Tafuna STP. Shaded cell indicates percent removal below the 30 percent primary treatment requirement.

Month	TSS and BOD Percent Removal by Calendar Year																			
	1999		2000		2001		2002		2003		2004		2005		2006		2007		2008	
	TSS	BOD	TSS	BOD	TSS	BOD	TSS	BOD	TSS	BOD	TSS	BOD	TSS	BOD	TSS	BOD	TSS	BOD	TSS	BOD
January	71	44	57	58	76	-[1]	79	-	74	56	53	59	-	-	46	50	49	54	53	38
February	55	38	70	63	48	-	66	58	68	50	65	50	-	-	42	46	46	55	48	57
March	88	39	65	-	81	-	46	73	71	50	61	54	-	-	49	55	47	51	47	40
April	77	25	81	-	47	-	65	75	76	47	35	59	38	51	48	51	48	50	41	46
May	86	51	84	-	50	63	75	56	79	37	46	54	43	50	45	44	40	36	44	42
June	82	46	70	-	48	56	73	52	67	35	69	58	40	50	33	49	53	54	31	29
July	78	55	80	-	48	52	58	45	63	45	24	61	48	56	49	49	45	57	-	-
August	76	69	54	-	60	60	65	50	76	49	30	51	42	50	43	55	45	49	-	-
September	84	61	70	-	29	50	73	48	58	53	42	51	44	56	48	54	44	40	-	-
October	81	58	73	-	55	59	74	61	79	55	44	38	44	57	41	57	46	47	-	-
November	-	-	64	-	62	52	80	55	65	36	45	47	46	58	50	50	44	55	-	-
December	81	66	64	-	75	36	84	56	56	83	43	55	44	57	38	47	39	53	-	-

[1]Data not available for review

Figure 4 - Comparison of TSS and BOD percent effluent removal for the Tafuna STP.

Based on available data, EPA has determined that the Tafuna STP is able to remove 30 percent of the TSS and BOD in its influent waste stream on a monthly average basis prior to discharging effluent into the South Pacific Ocean. Furthermore, the applicant has also demonstrated that the Tafuna STP is able to meet primary treatment requirements for its proposed increase in maximum daily effluent flow from 2.0 to 3.0 MGD for renewal of its NPDES permit. Recent effluent monitoring data (2006-2008) have shown that the facility has operated at a maximum daily flow of 4.5 MGD and has met the 30 percent removal requirement for both TSS and BOD. Therefore, based on the facility's past performance, EPA has concluded that the applicant has demonstrated that the Tafuna STP is able to meet the primary treatment requirements with the proposed effluent flow increase.

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

In accordance with section 301(h)(1) of the Act, EPA may not issue a section 301(h)-modified NPDES permit unless the applicant demonstrates that there is an applicable water quality standard specific to the pollutant for which the modification is requested. The applicant has requested a variance from federal secondary treatment requirements for BOD and TSS. ASWQS do not contain specific water quality criteria for BOD or TSS; however, criteria are established for DO, and turbidity and light attenuation, which can be affected by BOD and TSS (section 24.0206(o) of ASWQS). Under 40 CFR 125.61(a)(1) and (2), and (b)(1), which implement section 301(h), 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), turbidity, light transmission, light scattering, or maintenance of the euphotic zone.

Water quality standards applicable to the Tafuna STP discharge are those for open coastal waters at section 24.0206(o) of ASWQS. Other provisions relevant to interpreting ASWQS are those for zones of mixing at section 24.0207, and those regarding enforcement, compliance, and water quality monitoring, found at section 24.0210. Under section 24.0210(b)(1), compliance with numeric water quality criteria for toxic pollutants shall be determined by any single sample, while compliance for other criteria shall be determined utilizing the median of at least four consecutive measurements over a time period of not less than three months or greater than 12 months, or at a frequency specified by the American Samoa Environmental Quality Commission (EQC). ASEPA, as a representative of the EQC, has indicated to EPA that where the frequency of sampling events is low, each sample is evaluated against the numeric water quality criterion listed in section 24.0206, and any exceedance is considered to be a violation of water quality criteria (Buchan 2006). ASEPA also has indicated that when it is possible to calculate median values, comparable samples at the same station and same depth are used, i.e., ASEPA does not average samples across different depths. Therefore, for monitoring data, where applicable, EPA has calculated median values. However, because of the limited monitoring data available, for the purpose of the section 301(h) evaluation, EPA has evaluated both individual samples and median values to determine compliance with water quality criteria for DO, turbidity and light penetration. In addition, EPA has evaluated the impact of the proposed discharge on predicted ambient concentrations of DO and turbidity in the receiving water so as to evaluate compliance with water quality criteria at and beyond the ZID in accordance with 40 CFR 125.62(a)(1).

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 BOD effluent 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)). ASWQS provide that the DO concentration for open coastal waters shall not be less than 80 percent of saturation or less than 5.5 mg/l. If the natural level of DO is less than 5.5 mg/L, ASWQS specify that the natural level becomes the standard (section 24.0206(o) of ASWQS). To determine whether 80 percent of saturation, or 5.5 mg/l, or the natural level of DO shall be applied, EPA reviewed information provided by the applicant in the application and surface water monitoring data.

To evaluate whether 80 percent of saturation is the appropriate criterion for DO, EPA reviewed March 2002 temperature and salinity vertical profile data and calculated average ambient 100 percent DO saturation for all three depths based on Table B-4 of EPA's ATSD. EPA selected the March 2002 data from Utulei STP's reference station 5 since the applicant determined that these data best represented critical conditions in the receiving water and used them to model critical initial dilution for the Tafuna STP and since temperature and salinity vertical profile data are not available for reference station C for evaluation. For all surface, middle, and bottom depths at reference station 5, the average temperature and salinity were 30 degrees Celsius and

35 ppt, respectively, which correspond to a 100 percent DO saturation value of 6.75 mg/l. From a DO saturation value of 6.75 mg/l, EPA is able to calculate an 80 percent saturation value of 5.4 mg/l.

To determine the natural level of DO, EPA reviewed monitoring data at reference station C and March 2002 vertical profile data from reference station 5 to better evaluate the natural level of DO from the surface to the depth of the Tafuna STP outfall. Based on receiving water monitoring data collected from 1999 to 2006 from reference station C pursuant to the existing NPDES permit for the Tafuna STP, EPA calculated an average surface (at 3 feet) DO concentration of 6.33 mg/l, an average mid-depth (at 45 feet) DO concentration of 6.42 mg/l, and an average bottom depth (at 90 feet) DO concentration of 6.28 mg/l. Based on March 2002 data collected at 3.3 feet intervals from station 5, EPA calculated an average DO concentration of 6.15 mg/l for the surface (3.3 feet), 6.20 mg/l for the middle depth (3.3-43 feet), and 6.14 mg/l for the bottom depth (43-95 feet). Based on monitoring data, EPA has concluded that the natural level of DO is greater than 5.5 mg/l.

ASWQS provide that the DO concentration for open coastal waters shall not be less than 80 percent of saturation or less than 5.5 mg/l, unless the natural level of DO is less than 5.5 mg/l, in which case the natural level becomes the criterion. Based on information provided by the applicant and the review of monitoring data at two reference sites, EPA has concluded that the natural level of DO is not less than 5.5 mg/l. Therefore, the natural level is not the standard under ASWQS. Also, EPA has calculated the 80 percent DO saturation value based on temperature and salinity values from reference station 5 to be 5.4 mg/l, which is less than 5.5 mg/l. Since under ASWQS the DO concentration shall not be less than 80 percent of saturation or less than 5.5 mg/l, the 5.5 mg/l becomes the criterion. Therefore, EPA has applied the DO criterion of 5.5 mg/l as established in ASWQS to assess DO concentrations in the receiving waters surrounding the Tafuna STP discharge.

a. Analysis of DO Based on Monitoring Data

Pursuant to the existing section 301(h)-modified permit, the applicant is required to conduct quarterly monitoring of DO in the receiving water. Figure 5 shows the location of receiving water monitoring stations pursuant to the existing permit requirements. In accordance with these requirements, the applicant must conduct receiving water monitoring at four monitoring stations: A1, A2, B, and C. Monitoring data collected from stations A1 and A2 are considered to represent conditions at the boundary of the ZID whereas monitoring data from station B represent conditions beyond the ZID. Receiving water conditions at station C are considered not to be influenced by the discharge, and therefore are considered reference conditions for this analysis. Station A1 is located 90 feet northeast of the diffuser midpoint and has a 90 foot depth. Station A2 is located 90 feet southwest of the diffuser midpoint and has a 90 foot depth. Station B is located 627 feet shoreward of the diffuser midpoint and has an 18 foot depth. Station C is located 700 feet northeast of the diffuser midpoint and has a 90 foot depth.

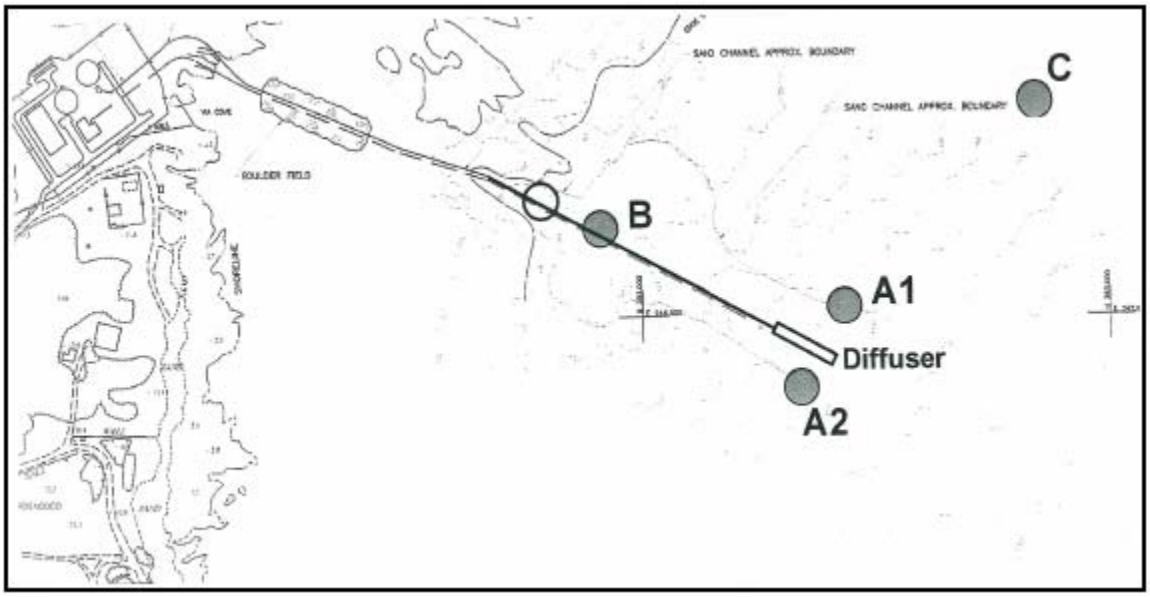

Figure 5 - Location of receiving water monitoring stations for the Tafuna STP.

In the application, the applicant provided a summary of DO concentrations for the period of 1999 to 2003. EPA reviewed these data and subsequent data from monitoring reports submitted pursuant to the existing section 301(h)-modified permit to evaluate receiving water concentrations of DO upon and following initial dilution. Pursuant to section 24.0210(b) of ASWQS, EPA assessed attainment of the water quality criterion for DO based on the median concentration of at least four measurements over a calendar year. Based on receiving water monitoring data from 1999 to 2008, the only year in which four receiving water sampling events occurred was in 2005. Table 4 provides a summary of median concentrations of DO for 2005. At all monitoring stations, including ZID stations A1 and A2, annual median concentrations for 2005 were above the criterion of 5.5 mg/l for DO at surface, middle and bottom depths.

However, due to the limited monitoring data, EPA also assessed attainment of the water quality criterion for DO based on the individual measurements across depths. Table 5 provides a summary of receiving water monitoring data for DO at the surface, middle and bottom depths. Between 1999 and 2008, the applicant conducted 20 DO monitoring events. At each monitoring station, DO measurements were collected at the surface (0-5 feet), middle (25-45 feet) and bottom (45-84 feet) depths within the water column. Based on receiving water monitoring data, DO concentrations were observed below the water quality criterion of 5.5 mg/l at the ZID. At ZID stations A1 and A2, the minimum DO concentrations observed at the surface were 5.3 and 4.7, respectively. At mid-depths, the minimum DO concentrations at stations A1and A2 were 4.8 mg/l and 5.2 mg/l, respectively. The minimum DO concentrations at the bottom depth were 4.83 and 5.26 mg/l for stations A1 and A2, respectively. At ZOM station B, the minimum DO concentrations at the surface and mid and bottom depths were 4.7, 4.4, and 4.9 mg/l, respectively. At reference station C, the minimum DO concentrations at the surface, middle, and bottom depths were 4.7, 5.1, and 4.9 mg/l, respectively. Although DO concentrations below the water quality criterion were observed at the reference station, approximately two to three times

as many depressions of DO were observed at the ZID and ZOM stations compared to the reference station. Of the 57 DO measurements taken at ZID station A1, twelve percent were below the water quality criterion. Of the 59 DO measurements taken at ZID station A2, fifteen percent were below the water quality criterion. Nineteen percent of DO concentrations at the ZOM showed levels below the water quality criterion. In contrast, only seven percent of the DO measurements taken at the reference station showed levels of DO below the criterion. Since early 2001, concentrations of DO were observed to be above the water quality criterion at reference station C during all sampling events, except for one in 2008, whereas DO depressions have been observed at the ZID since then (in 2004, 2006, and 2008).

Based on receiving water monitoring data, DO concentrations below the water quality criterion for DO have been frequently observed. Therefore, EPA has concluded that the applicant has not demonstrated that the discharge can attain the water quality criterion for DO based on receiving water monitoring data.

Table 4. Summary of 2005 median DO concentrations at the surface (S), and middle (M) and bottom (B) depths at Tafuna STP receiving water monitoring stations.

Site	Station	DO (mg/l)
ZID	A1-S	6.19
	A1-M	6.07
	A1-B	6.02
	A2-S	6.11
	A2-M	6.20
	A2-B	6.24
ZOM	B-S	6.36
	B-M	6.18
	B-B	6.22
REF	C-S	6.07
	C-M	6.10
	C-B	6.15

Table 5 - Summary of receiving water monitoring data for DO concentrations at the surface (S), mid-depth (M) and bottom depth (B) at Tafuna STP monitoring stations. Shaded cell indicates DO concentration below the ASWQS criterion of 5.5 mg/l.

DO Concentrations (mg/l)																					
Site	**Station-Depth**	**Monitoring Events by Calendar Year**																			
		1999		**2000**		**2001**			**2002**	**2003**		**2004**	**2005**				**2006**		**2007**		**2008**
ZID	A1-S	6	7.2	6.8	5.3	5.6	8.7	7.3	6.4	6.54	6.58	6.2	6.17	5.97	6.41	6.2	-[1]	6.1	6.56	6.21	5.94
	A1-M	5.2	7.2	7	5.2	4.8	8.6	7.6	6.4	6.38	6.55	5.1	6.19	5.9	6.42	5.94	-	6.09	6.56	6.26	5.92
	A1-B	6.2	7.2	6.7	5.8	5.4	8.8	6.9	-	6.34	6.55	6.1	6.15	5.69	6.25	5.89	4.83	6.01	6.75	6.25	5.83
	A2-S	4.7	7.2	6.8	5.6	5.8	7.6	7.4	6.3	6.21	6.38	5.3	6.14	6.06	6.47	6.08	6.31	6.13	6.46	6.23	5.71
	A2-M	5.4	7.3	6.8	5.2	5.3	8.1	7.2	6	6.36	6.26	5.4	6.18	6.22	6.35	6.12	6.27	6.02	6.65	6.29	5.34
	A2-B	6.2	7.3	6.9	5.8	5.7	8	7.9	-	6.36	6.28	5.3	6.3	6.21	6.26	6.02	5.89	6.12	6.7	6.3	5.26
ZOM	B-S	4.7	7.2	6.7	5.2	6.1	8.2	8.1	6.8	6.52	6.14	6.1	6.37	6.35	6.54	6.31	6.4	6.58	6.52	6.54	5.4
	B-M	4.4	7.2	6.8	5.4	5	7.9	7.3	6.5	6.45	6.2	5.3	6.08	5.96	6.28	7.26	6.09	6.46	6.29	6.62	5.34
	B-B	4.9	7.3	6.8	5.4	6.2	8.2	7.7	-	6.48	6.15	5.8	6.12	6.19	6.24	6.98	5.84	6.36	6.54	6.5	5.27
REF	C-S	4.7	7.2	6.9	5.8	5.8	6.9	7.6	6.4	6.21	6.3	5.6	6.25	6.07	6.06	5.86	6.3	5.89	6.2	6.25	5.86
	C-M	6	7.2	7	5.1	6	8	7.6	6.4	6.21	6.5	6.1	6.07	6.13	6.15	5.73	6.08	6.11	6.45	6.31	5.51
	C-B	6.4	7.3	7	5.9	4.9	8	7.5	6.4	6.46	6.48	6.2	6.14	6.16	6.24	5.66	5.78	6.21	6.8	6.27	5.06

[1]Data not available for review

b. Analysis of DO Based on Predictive Modeling

Pursuant to EPA's ATSD, EPA also evaluated potential DO depressions upon initial dilution and in the farfield using predictive modeling.

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 modified discharge would meet the DO criterion at completion of critical initial dilution, EPA evaluated final DO concentrations predicted by the applicant. EPA also calculated final DO concentrations based on the procedures described in EPA's ATSD.

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

$$DO_f = DO_a + [(DO_e - IDOD - DO_a) \div S_a]$$

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 6 provides a summary of values for each parameter the applicant and EPA used to calculate final DO concentrations and the predicted net change in ambient DO concentrations as a result of the proposed discharge.

In the application, the applicant calculated a DO_f in the receiving water upon critical initial dilution of the effluent based on the peak hourly flow of 6.0 MGD and two scenarios with differing ambient concentrations of DO to investigate the range of possible effects. For both scenarios, S_a was based on the estimated critical initial dilution factor of 187:1; and IDOD was based on Table B-3 of EPA's ATSD for primary treatment using an effluent BOD concentration of 200 mg/l, which is requested as a maximum daily effluent permit limitation by the applicant, and a travel time from the treatment plant through the diffuser of 33 minutes to determine a

typical IDOD value of 5.0 mg/l. In accordance with EPA's ATSD, the applicant also applied a conservative estimate of DO_e of 0.0 mg/l for both scenarios. In Scenario 1, the applicant used a DO_a value of 5.55 mg/l to represent critical ambient conditions at reference station C, which is up current of the diffuser. The applicant calculated this value by averaging mid- and bottom depth DO concentrations for each monitoring event between 1999 and 2003 and then selected the minimum average DO concentration observed, which the applicant determined was the first quarter monitoring event of 2001. In contrast, for Scenario 2, the applicant applied a DO_a value of 6.5 mg/l that was calculated by averaging all DO concentrations from the mid and bottom depths from all monitoring events. Based on Scenario 1 and Scenario 2, the applicant estimated final DO concentrations of 5.494 and 6.439 mg/l in the receiving water. By comparing ambient and final DO concentrations, the applicant determined that the overall DO demand upon initial dilution under critical conditions (i.e., peak hourly flow of 6.0 MGD) would result in only a minor depression of less than one percent in DO concentrations in the receiving water. Thus, the applicant concluded that final DO concentrations in the receiving water, following critical initial dilution, would comply with the water quality criterion for DO.

In accordance with EPA's ATSD, EPA also calculated DO_f using Equation B-5 with values similar to those used by the applicant. However, EPA applied a DO_a value of 6.16 mg/l based on water quality monitoring data from March 2002 collected at reference station 5. As specified in EPA's ATSD, DO_a should represent critical conditions and be calculated as the average of DO concentrations from the diffuser to the trapping level. EPA calculated DO_a from the March 2002 data since the applicant determined that these data best represented critical conditions in the receiving water. As previously discussed, the applicant modeled a critical initial dilution of 187:1 with a trapping depth of 16 feet from the March 2002 data. Therefore, based on an average of DO measurements taken at 3.3 feet intervals beginning at 16 feet to depth of the outfall, 95 feet, EPA calculated DO_a of 6.16 mg/l. As a result, EPA then calculated a DO_f of 6.10 mg/l, which is a DO depression of 0.06 mg/l from ambient conditions.

Although the applicant's and EPA's predicted final DO concentrations resulted in a reduction of DO from ambient conditions, only the applicant's Scenario 1 showed a final DO concentration

Table 6. Summary of values used to estimate final DO concentrations (DO_f) and predicted DO_f upon critical initial dilution.

Parameter	Applicant Values Scenario 1	Applicant Values Scenario 2	EPA Values
Critical flow, MGD	6.0	6.0	6.0
S_a	187:1	187:1	187:1
IDOD, mg/l	5.0	5.0	5.0
DO_e, mg/l	0.0	0.0	0.0
DO_a, mg/l	5.55	6.5	6.16
DO_f, mg/l	5.494	6.439	6.10
ΔDO_{a-f}, mg/l	-0.056	-0.061	-0.06

below the ASWQS of 5.5 mg/l for DO. The applicant's scenario 2 and EPA's calculations predicted DO_f concentrations above this criterion. The differences in the final DO concentrations calculated by the applicant and EPA are based on the use of different ambient DO values in Equation B-5. However, EPA believes that applying the March 2002 data to calculate an ambient DO value is consistent with EPA's ATSD. Therefore, EPA has concluded that, based on predictive modeling, the applicant has demonstrated that the proposed modified discharge upon initial dilution would attain the water quality criterion for DO upon initial dilution.

DO depression due to BOD exertion in the farfield. Pursuant to the 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 an oxygen depression beyond the zone of initial dilution 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. To assess DO concentrations after initial dilution, the applicant evaluated receiving water monitoring data for the existing modified discharge, and modeled the exertion of BOD in the farfield on DO concentrations under critical conditions.

In accordance with EPA's ATSD, DO depression in the farfield due to the consumption of BOD in the receiving water was estimated using a simplified farfield depletion model for open coastal waters. The DO concentration in the receiving waters following critical initial dilution can be expressed as a function of travel time using Equation B-16 identified in EPA's ATSD:

$$DO(t) = DO_a + [(DO_f - DO_a) \div D_s] - [(L_{fc} \div D_s)(1-\exp^{-k_c t})] - [(L_{fn} \div D_s)(1-\exp^{k_n t})]$$

where,

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

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

DO_f = DO concentration, in mg/l, at the completion of initial dilution calculated using Equation B-5 described in EPA's ATSD;

k_c = CBOD decay rate coefficient;

k_n = NBOD nitrification rate;

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

L_{fn} = Ultimate NBOD concentration in mg/l above ambient at completion of initial dilution; and

D_s = Dilution attained subsequent to initial dilution as function of travel time, t.

Table 7 provides a summary of values the applicant and EPA used to calculate DO(t) concentrations immediately following critical initial dilution as a function of time.

For DO_a and DO_f, the applicant used the previously calculated DO_a value of 6.5 mg/l and DO_f of 6.439, rounded to 6.44 mg/l. Similarly, EPA used the previously calculated DO_a and DO_f values of 6.16 and 6.10 mg/l, respectively.

For the CBOD decay rate coefficient, k_c, the applicant calculated a CBOD decay rate of 0.347/day (base e) based on a value of 0.23/day and adjusted for ambient water temperature. In accordance with Equation B-13 specified in EPA's ATSD, the CBOD decay rate coefficient was based on the following:

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

where:

k_c = CBOD decay rate coefficient; and

T = Ambient receiving water temperature, in degrees Celsius.

In the application, the applicant calculated a k_c based on an average ambient water temperature of 29 degrees Celsius since maximum water temperatures have shown to be between 28 and 30 degrees Celsius. In contrast, EPA calculated a k_c of 0.36/day based on an average water temperature of 30 degrees Celsius, which EPA calculated from March 2002 receiving water data from reference station 5.

Table 7. Summary of values used by the applicant and EPA to predict DO concentrations, DO(t), as a function of time.

Parameter	**Applicant Values**	**EPA Values**
DO_a, mg/l	6.5	6.16
DO_f, mg/l	6.44	6.10
k_c, day^{-1}	0.347	0.36
k_n, day^{-1}	0.151	0.158
L_{fc}, mg/l	1.54	1.56
L_{fn}, mg/l	0.0	0.0
D_s	See Table 8	See Table 8

Similarly, for the nitrogenous BOD (NBOD) decay rate coefficient, k_n, the applicant calculated a NBOD decay rate of 0.151/day (base e) based on a value of 0.1/day using the same ambient water temperature used to calculate the CBOD decay rate coefficient, 29 degrees Celsius. In accordance with Equation B-15 specified in EPA's ATSD, the NBOD decay rate coefficient was based on the following:

$$k_n = 0.1 \times 1.08^{(T-20°C)}$$

where:

k_n = NBOD decay rate coefficient; and

T = Ambient receiving water temperature, in degrees Celsius.

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. Consequently, EPA has assumed that, in the vicinity of modified discharge, oxygen depletion in the first phase of the BOD reaction occurs solely due to carbonaceous BOD (CBOD) and that the effect of NBOD on farfield dissolved oxygen is negligible. For ultimate CBOD concentration, $L_{fc,}$ the final BOD_5 concentration can be estimated using Equation B-10 from EPA's ATSD as follows:

$$BOD_f = BOD_a + (BOD_e - BOD_a) \div S_a$$

where,

BOD_f = final BOD_5 concentration, in mg/l;

BOD_a = affected ambient BOD5 concentration, in mg/l, immediately updrift of the diffuser from the differ port depth to the trapping depth;

BOD_e = effluent BOD_5 concentration, in mg/l;

S_a = initial dilution;

and,

$$L_{fc} = BOD_{fu} = BOD_f \times 1.46$$

where,

BOD_{fu} = Ultimate BOD at completion of initial dilution, in mg/l.

In the application, the applicant calculated an L_{fc} value of 1.54 mg/l based on a BOD_f of 1.053 mg/l, BOD_a of 0.0 mg/l, a requested permit BOD_e effluent limitation of 200 mg/l, and S_a of 190:1. Similarly, EPA calculated an L_{fc} value based on a BOD_a of 0.0 mg/l and a requested permit BOD_e effluent limitation of 200 mg/l. However, EPA applied a S_a of 187:1. EPA’s

calculations resulted in a BOD_f of 1.07 mg/l. As a result, EPA calculated an L_{fc} value of 1.56 mg/l. For the L_{fn} calculation, since it is assumed that oxygen depletion in open coastal waters occurs in the first phase of the BOD reaction due to carbonaceous BOD, both the applicant and EPA assumed an L_{fn} value of 0.0 mg/l.

For $D_{s,}$ the centerline dilution in the farfield was calculated by the applicant using Equation B-20 of EPA's ATSD:

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

and

$$\varepsilon_o \quad = \quad 0.001 \times b^{4/3}\ \text{feet}^2/\text{second}$$

where:

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

erf = the error function;

ε_o = diffusion coefficient when L, width of the sewage field at any distance from the ZID in feet, is equal to b; calculated using Equation B-18 of EPA's ATSD;

b = initial width of sewage field (approximately as the longest dimension of the ZID), in feet; and

t = travel times, in seconds.

In the application, the applicant calculated D_s using an initial width of the sewage field, b, of 128 feet, which corresponds to the length of the diffuser plus half widths of the plume on either end of the diffuser for the critical conditions and maximum effluent flow. Based on the above equation, the applicant and EPA predicted dilution, D_s, in the receiving waters as a function of travel time. Table 8 provides a comparison of time intervals and corresponding dilutions calculated by the applicant and EPA. In the application, the applicant predicted dilutions based on one day, at 0.6-hour intervals; as well as for 10 days, at 6-hr intervals, to better predict the potential impact of oxygen demand on ambient DO concentrations in the farfield.

In the application, the applicant estimated that a maximum farfield DO depression of 0.0016 mg/l resulted 360 seconds after the completion of initial dilution resulting in a DO concentration of 6.4984 mg/l in the wastefield. The applicant concluded that this represents a DO depression of less than one percent from the affected ambient condition at plume trapping depth.

In accordance with EPA's ATSD, EPA reviewed the calculation of the DO concentration in submerged wastefield as a function of travel time for the proposed modified discharge provided by the applicant. Based on EPA’s input values listed in Table 7, the maximum farfield DO

Table 8. Comparison of predicted dilution, Ds, and dissolved oxygen concentrations, DO(t), in the farfield calculated by the applicant and EPA as a function of travel time. Shaded cells represent the maximum DO depression, i.e., lowest DO concentration, predicted by the applicant and EPA, occurring at a specific time. The line at 450 seconds is shown because EPA calculated on a 30-second timestep (vs. the applicant's 60-second basis) and the minimum DO happened to occur on such a step.

Time, t, in seconds	Applicant Calculations		EPA Calculations	
	D_s	D(t)	D_s	D(t)
0	-	6.5	-	6.16
60	1	6.4392	1.0000	6.0999
120	1	6.4388	1.0000	6.0995
180	1.00005	6.4385	1.0000	6.0991
240	1.00051	6.4382	1.0004	6.0988
300	1.00208	6.4380	1.0017	6.0985
360	1.00539	6.4379	1.0044	6.0982
420	1.01076	6.4379	1.0088	6.0981
450	N/A	N/A	1.0117	6.0981
480	1.01823	6.4381	1.0150	6.0981
540	1.02772	6.43833	1.0229	6.0982

depression was found to be 0.0022 mg/l at a time of 450 seconds after completion of initial dilution resulting in a DO concentration of 6.098 mg/l in the wastefield. This would represent a maximum DO depression of 1.01 percent from the affected ambient condition at the plume trapping depth. Although both EPA and the applicant predicted a depression of DO after initial dilution, final concentrations were predicted to be above the ASWQS of 5.5 mg/l for DO for open coastal waters. Therefore, EPA has concluded that the applicant has demonstrated that the proposed modified discharge after initial dilution would attain the water quality criterion for DO based on predictive modeling.

DO depression due to steady-state oxygen demand. As specified in EPA's ATSD, DO depletion due to steady sediment demand and sediment resuspension depends on many environmental conditions such as sediment composition (e.g., grain size distribution and organic content), sediment accumulation rates, current speeds, and circulation patterns. Applicants for a section 301(h) waiver from secondary treatment requirements are required to provide information in their application on steady sediment DO demand and DO demand due to resuspension of sediments in the vicinity of the current and modified discharge. However, since the applicant is considered a small applicant, as described previously, the applicant is not required to provide information to EPA on DO depression due to sediment interactions in the receiving water.

c. Conclusion on Attainment of Water Quality Standards for DO

The results of EPA's analysis are mixed. Although predictive modeling suggests that the applicant can meet the DO criterion, the actual receiving water data show that the water quality criterion for DO is not met consistently at the ZID. Based on this analysis, EPA has concluded that the applicant has not demonstrated that the discharge will comply with water quality criteria for DO.

2. Turbidity, Light Penetration, and Suspended Solids

Suspended solids in the effluent can result in a significant loading of solids to the water column and their subsequent deposition onto the seafloor in the vicinity of the discharge. Significant amounts of suspended solids in the water column associated with the discharge can cause turbidity, decrease light penetration, and harm sensitive marine ecosystems by interfering with the light available for photosynthesis.

Pursuant to 40 CFR 125.61 and 125.62, section 301(h) applicants must demonstrate that the modified discharge will comply with water quality criteria for suspended solids, which may include criteria for turbidity, light transmission, light scattering, or maintenance of the euphotic zone. Applicants must demonstrate that the outfall and diffuser are located and designed to provide adequate initial dilution, dispersion, and transport of wastewater such that the discharge does not exceed, at and beyond the ZID, these water quality criteria.

Section 24.0206(o) of ASWQS provides that turbidity in open coastal waters shall not exceed 0.25 Nephelometric Turbidity Units (NTU) and that light penetration depth shall exceed 130.0 feet 50 percent of the time. ASWQS define "light penetration depth" as the depth reached by one percent of the sunlight incident on the surface of a body of water (section 24.0201). In accordance with EPA's ATSD, EPA evaluated the potential for attainment of the criteria for turbidity and light penetration in the receiving water.

a. Analysis of Turbidity and Light Penetration Based on Monitoring Data

i. Turbidity

Pursuant to the existing section 301(h)-modified permit, the applicant is required to conduct quarterly monitoring of turbidity in the receiving water. In the application, the applicant provided a summary of turbidity measurements only for three quarters (i.e., three sampling events) from 2001 through 2003 (i.e., one in 2001, one in 2002 and one in 2003). To evaluate turbidity in the receiving water, EPA reviewed these data, along with data from a second monitoring event conducted in 2001 that the applicant submitted as part of its DMRs, which were not included in the application, and subsequent receiving water monitoring data from 2005 through 2007 submitted pursuant to the existing permit. EPA was unable to evaluate turbidity data for 2003 for this Tentative Decision Document since the applicant reported negative values in the application and indicated that these values were likely due to the sensor operating below its threshold limits. Consequently, EPA evaluated turbidity measurements from 2001, 2002, and

2005 through 2008. The applicant did not provide information to EPA on why there is limited receiving water data for turbidity.

Pursuant to section 24.0210(b) of ASWQS, EPA attempted to assess attainment of the water quality criterion for turbidity based on the median values of at least four measurements over a calendar year. However, the only year in which four receiving water sampling events occurred was in 2005. Table 9 provides a summary of median values of turbidity for 2005. For 2005, calculated annual median values show that at all monitoring stations, including ZID stations A1 and A2, turbidity values were at or below the criterion of 0.25 NTU at the surface, middle and bottom depths.

However, due to the limited monitoring data, EPA also assessed attainment of the water quality criterion for turbidity based on the individual samples across depths. Table 10 provides a summary of receiving water monitoring data for turbidity at the surface, middle and bottom depths. Based on receiving water monitoring data, turbidity values were observed greater than the turbidity criterion of 0.25 NTU in individual samples collected at the ZID. At ZID stations A1 and A2, the maximum turbidity observed was at the surface and mid-depth, respectively. At ZID station A1, turbidity ranged from below the detectable level to 0.5 NTU for all individual

Table 9. Summary of 2005 median turbidity values at the surface (S), mid-depth (M) and bottom depth (B) at Tafuna STP receiving water monitoring stations.

Site	Station	Turbidity (NTU)
ZID	A1-S	0.25
	A1-M	0.25
	A1-B	0.15
	A2-S	0.2
	A2-M	0.17
	A2-B	0.23
ZOM	B-S	0.18
	B-M	0.18
	B-B	0.18
REF	C-S	0.18
	C-M	0.17
	C-B	0.19

samples. Of the 36 individual samples taken at station A1, 25 percent (or 9 samples) showed elevated turbidity values. Similarly, at ZID station A2, turbidity ranged from below detectable levels to as high as 1.0 NTU with 17 percent (or six) of the individual samples showing elevated turbidity values. At ZOM station B, turbidity values ranged between below the detectable level and 1.5 NTU, which was reported at the surface. Of the 36 individual samples taken at the ZOM, 19 percent (or seven samples) showed elevated turbidity values. At reference station C, the maximum turbidity value was reported at the middle depth, with values for all monitoring events and depths ranging between below the detectable limit and 1.0 NTU. Of the 36 individual samples taken at the reference station, 14 percent (or five samples) showed elevated turbidity values.

Table 10. Summary of turbidity values at the surface (S), mid-depth (M) and bottom depth (B) at Tafuna STP receiving water monitoring stations. Shaded cells indicate turbidity above the ASWQS criterion of 0.25 NTU for open coastal waters.

Site	Station-Depth	Turbidity (NTU)											
		Monitoring Events by Calendar Year											
		2001		2002	2005				2006		2007		2008
ZID	A1 - S	0.30	0.00	0.00	0.20	0.30	0.15	0.30	ND[1]	ND	0.10	0.08	0.14
	A1 - M	0.40	0.10	0.00	0.40	0.20	0.17	0.30	ND	ND	ND	0.02	0.16
	A1 - B	0.40	0.00	0.00	0.15	0.18	0.14	0.20	0.50	0.40	ND	ND	0.12
	A2 - S	0.10	0.00	1.00	0.20	0.30	0.15	0.20	ND	ND	<0.05[1]	0.00	0.18
	A2 - M	0.70	0.00	0.00	0.16	0.17	0.15	0.17	ND	ND	<0.05	0.03	0.04
	A2 - B	0.30	0.00	0.00	0.30	0.11	0.15	0.30	ND	0.10	ND	0.01	0.13
ZOM	B - S	0.10	0.10	1.50	0.20	0.30	0.20	0.16	ND	0.10	ND	0.62	0.20
	B - M	0.40	0.00	0.00	0.20	0.18	0.14	0.18	ND	<0.05	ND	0.03	0.09
	B - B	0.60	0.00	1.00	0.16	0.30	0.14	0.18	ND	ND	ND	ND	0.05
REF	C - S	0.10	0.20	0.00	0.19	0.13	0.17	0.20	ND	ND	<0.05	0.45	0.13
	C - M	0.70	0.00	1.00	0.17	0.13	0.17	0.18	ND	0.10	<0.05	ND	0.11
	C - B	0.30	0.10	0.00	0.18	0.27	0.11	0.19	ND	0.10	<0.05	ND	0.12

[1]Turbidity was not detected at the detection limit

Although turbidity values above 0.25 NTU were observed at each depth at the ZOM and reference stations, the frequency of observed exceedances was higher at the ZID stations than the other stations based on the number of monitoring events. Of the 12 monitoring events conducted between 2001 and 2008, there were four monitoring events that showed elevated turbidity values at the ZID stations when none were observed at the ZOM or reference station during the same monitoring event. Also, since 2001, there have been exceedances of the turbidity criterion observed at the ZID when not observed at the reference stations whereas only one monitoring event that showed an exceedance of the 0.25 NTU criterion at the reference station when it was not observed at the either of the ZID stations. Therefore, since turbidity values have been observed above the water quality criterion for turbidity at the ZID, EPA has concluded that the applicant has not demonstrated that the discharge can attain the water quality criterion for turbidity based on receiving water monitoring data.

ii. Light Penetration

To determine attainment of the water quality criterion for light penetration, EPA evaluated the visual clarity measurement of Secchi disc depth. Measurements of Secchi depth are widely used to estimate light penetration. Section 24.0206(o) of ASWQS provides that the light penetration depth shall exceed 130.0 feet 50 percent of the time. By deriving a relationship between visible light and Secchi disc depth, the impact of suspended solids on light penetration in the receiving water can be evaluated using Equation B-54 of EPA's ATSD:

$$\alpha = k_2 \div SD$$

where,

α = Extinction coefficient of visible light, in meters^{-1};

k_2 = A constant; and

SD = Secchi disc depth in meters for a 30 cm disc.

However, since the water quality criterion for light penetration is expressed as a proportion of light transmitted along a pathway to a specific depth and not as an extinction coefficient, α, the extinction coefficient needs to be estimated. Based on Equation B-51 of EPA's ASTD, the extinction coefficient of visible light can be calculated using the Beer-Lambert law:

$$T_d = e^{-\alpha d}$$

where,

T_d = Proportion of light transmitted along a path of length d, in meters;

d = Length of the path, in meters; and

α = Extinction coefficient of visible light, in meters^{-1}.

Table 11. Summary of Secchi disc depth recorded at each monitoring station for the Tafuna STP. Shaded cells indicate Secchi disc depth less than the corresponding Secchi disc depth of 48 feet based on the ASWQS light penetration criterion of 130 feet.

Site	Station	Secchi Disc Depth (ft) by Year								
		2005				2006		2007		2008
ZID	A1	55	55	>60	54	65	45	45	50	35
	A2	50	63	>60	40	85	40	59	47	38.5
ZOM	B	54	53	>54	53	54	52	42	52	35
REF	C	60	53	>60	48	90	90	53	42	38.5

Based on Equations B-51 and B-54, the applicant determined that light penetration of one percent at 130 feet (40 meters) in open coastal waters, as specified in ASWQS, corresponded to a Secchi disc depth of 48 feet (14.5 meters). Pursuant to EPA's ATSD, EPA also calculated the corresponding Secchi disc depth based on Equations B-51 and B-54 of EPA's ATSD. Using Equation B-51, EPA calculated an extinction coefficient of 0.117 per meter based on a length of path, d, of 40 meters and proportion of light of 1/100, which is based on the water quality criterion of one percent of the light transmitted along the 130 feet (40 meters). Based on extinction coefficient of 0.117 per meter calculated using a k_2 of 1.7, EPA then used Equation B-54 to estimate a Secchi disc depth of 14.5 meters (48 feet). Therefore, for the purpose of the section 301(h) evaluation, EPA believes that a Secchi disc depth of 48 feet is appropriate to evaluate compliance with the water quality criterion for light penetration.

In the application, the applicant did not provide information on the transmittance of light through the water column. Instead, EPA evaluated receiving water monitoring data provided by the applicant in its regular NPDES monitoring reports. Between 2005 and 2008, the applicant recorded Secchi disc depth during nine monitoring events at stations A1, A2, B, and C. Table 11 provides a summary of Secchi disc depth in the receiving water. Based on receiving water monitoring data, Secchi disc depth was recorded greater than 48 feet at all stations for 50 percent of the monitoring events. At ZID stations A1 and A2, Secchi disc depth was observed greater than 48 feet 67 and 56 percent of the time, respectively; whereas at the ZOM and reference stations Secchi depth was greater than 48 feet 77 percent of the time. Although individual monitoring events did show Secchi disc depth below 48 feet, ASWQS for light penetration specifically state that the criterion must be met 50 percent of the time. Therefore, since Secchi disc depth at the ZID has been observed greater than 48 feet more than 50 percent of the time, which corresponds to the water quality criterion for light penetration, EPA has concluded that the applicant has demonstrated that the discharge can attain the water quality criterion for light penetration based on receiving water monitoring data.

b. Analysis of Suspended Solids Based on Predictive Modeling

Pursuant to EPA's ATSD, EPA also evaluated potential turbidity impacts upon initial dilution using predictive modeling. As previously described, suspended solids in the effluent can result in a loading of solids in the water column that can cause significant turbidity that can adversely impact the marine environment. Although ASWQS do not have criteria specifically for suspended solids, EPA assessed the likelihood that the modified discharge will have a substantial effect in the receiving water based on predicted suspended solids concentrations. In accordance with EPA's ATSD, the applicant and EPA estimated the concentration of suspended solids at the completion of initial dilution for the modified discharge. The concentration of suspended solids following critical initial dilution, i.e., at the boundary of the ZID, can be calculated using Equation B-31 of EPA's ATSD:

$$SS_f = SS_a + (SS_e - SS_a) \div S_a$$

where,

SS_f = Suspended solids concentration at completion of initial dilution, in mg/l;

SS_a = Affected ambient suspended solids concentration immediately upcurrent of the diffuser averaged from the diffuser port depth to the trapping level, in mg/l;

SS_e = Effluent suspended solids concentration, in mg/l; and

S_a = Initial dilution.

Table 12 provides a summary of predicted suspended solids concentrations at completion of initial dilution predicted by the applicant and EPA and the values used to estimate these concentrations.

Table 12. Summary of factors used to predict ambient suspended solids concentrations, SS_f, upon critical initial dilution and predicted SS_f values.

Parameter	Applicant Value	EPA Value
S_a	187:1	187:1
SS_a, mg/l	1.0	1.83
SS_e, mg/l	150	150
SS_f, mg/l	1.80	2.62
ΔSS_{a-f}, mg/l	+0.80	+0.79
ΔSS_{a-f}, %	+80	+43

Table 13 - Summary of 2005 quarterly receiving water monitoring data for suspended solids concentrations at the surface, middle and bottom depths at reference station C.

Reference Station C - Depth	**Suspended Solids Concentration (mg/l)**				**Avg. Suspended Solids Concentration (mg/l) at Each Depth**
Surface	1	3	2	1	1.75
Middle	1	3	2	1	1.75
Bottom	1	4	2	1	2.00
Total Average Suspended Solids Concentration					1.83

In the application, the applicant provided calculations for predicted suspended solids concentration upon initial dilution based on affected ambient conditions (SS_a) and the daily maximum TSS effluent limitation (SS_e) requested for the renewed NPDES permit. Based on the equation above, the applicant applied an affected ambient concentration of 1.0 mg/l for suspended solids and predicted a final suspended solids concentration of 1.80 mg/l. As detailed in Table 12, based on a S_a of 187:1, the applicant predicted a discharge-related increase of 0.80 mg/l of suspended solids, which is an 80 percent increase from the affected ambient concentration of 1.0 mg/l.

In accordance with EPA's ATSD, EPA also calculated final ambient suspended solids concentrations under critical conditions for the proposed discharge. To determine the affected ambient suspended solids concentration (SS_a) EPA reviewed receiving water data and calculated the average suspended solids concentration at reference station C for all depths combined. Table 13 provides a summary of suspended solids concentrations at reference station C and the calculated average from these values. In accordance with EPA's ATSD, EPA selected the reference station data to determine SS_a since it is located upcurrent of the diffuser and calculated SS_a based on the average of data across depths since the distance between the diffuser and trapping depth of 16.1 feet overlapped with all three individual measurements (e.g., measurements from the bottom to the surface ranged between 80 to 3 feet and the diffuser ports are located at a depth of 91.5 feet). As a result, EPA calculated a SS_a of 1.83 mg/l. Based on this value, a S_a of 187:1, and a SS_e of 150 mg/l, EPA calculated a SS_f of 2.62 mg/l upon initial dilution. This is a discharge-related increase in ambient suspended solids concentration of 0.79 mg/l, which is a 43 percent increase from the affected ambient concentration of 1.83 mg/l.

According to EPA's ATSD, an increase in suspended solids at the completion of initial dilution of less than 10 percent is generally not likely to present a substantial effect in the water column, although in some cases accumulation of suspended solids in the seabed is possible. Based on the applicant's and EPA's results, an increase of greater than 10 percent in affected ambient suspended solids concentration was predicted in the receiving water at the ZID. The applicant and EPA predicted an 80 and 43 percent increase in suspended solids concentrations in the ambient water, respectively, based on the proposed modified discharge under critical conditions. Generally when suspended solids increases are predicted above 10 percent, there could be a substantial effect on the water column. For the Tafuna STP, there are no seabed deposition data available to evaluate discharge-related effects of suspended solids in the marine environment.

Therefore, EPA has concluded that there is a potential for impacts to the water column, such as increased turbidity, due to suspended solids from the proposed modified discharge.

3. Conclusion on Compliance with Water Quality Criteria for DO, Turbidity, and Light Penetration

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 suspended solids, and that the outfall and diffuser is located and designed to provide adequate dilution such that the discharge does not exceed these criteria at and beyond the ZID. While ASWQS do not have a water quality criterion specific for suspended solids, water quality criteria are provided for turbidity and light penetration to protect the euphotic zone of open coastal waters.

Based on its review of receiving water monitoring data, EPA has concluded the applicant has not demonstrated that the discharge will comply with water quality standards for DO and turbidity at and beyond the ZID. Analysis of monitoring data indicates that the water quality criteria for DO and turbidity are not met consistently at the ZID, but the criterion for light penetration is met. However, predictive equations for DO indicate that the discharge alone may not result in exceedance of water quality criteria for DO; whereas predictive equations for TSS show potential water quality impacts due to the discharge alone. Nevertheless, while it is possible that there may be other sources that contribute to DO depressions and turbidity observed in the receiving water, 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 modified discharge, but also taking into account the applicant's modified discharge in combination with pollutants from other sources. 40 CFR 125.62(f). Therefore, EPA has concluded that the applicant has not demonstrated that the discharge will comply with water quality criteria for DO and turbidity. However, EPA has concluded that the applicant has demonstrated that the discharge will comply with the water quality criterion for light penetration 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 Act generally 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 of shellfish, fish and wildlife; and allows recreational activities, in and on the water. In addition, section 301(h)(9) requires that the applicant must be discharging effluent which meets the water quality criteria established under section 304(a)(1) of the Act after initial dilution. This portion of the Tentative Decision Document addresses these requirements as specified in EPA regulations, most specifically in 40 CFR 125.62.

1. Attainment of 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, at and beyond the ZID, the discharge does not exceed any and all applicable water quality standards, nor exceed Clean Water Act section 304(a) water quality criteria for pollutants for which there are no applicable EPA-approved water quality standards. Additionally, 40 CFR 125.59(b)(1) prohibits issuance of a modified permit that would not assure compliance with all applicable NPDES requirements of 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, turbidity, and light penetration was previously discussed. However, in accordance with 40 CFR 125.62(a), the applicant must also demonstrate that the proposed modified discharge will attain other water quality standards, including those for nutrients, toxic pollutants, pathogens, toxicity, and pH. Although American Samoa also has water quality standards for ammonia, EPA was unable to assess attainment of water quality standards for ammonia because ammonia data were unavailable for review; the existing section 301(h)-modified NPDES permit did not require effluent or receiving water monitoring for ammonia.

As previously discussed, ASWQS are found at Administrative Rule No. 006-2005. Water quality standards applicable to the Tafuna STP discharge are those for open coastal waters at section 24.0206(o). Other provisions relevant to interpreting ASWQS are those regarding enforcement, compliance, and water quality monitoring, found at section 24.0210. Under section 24.0210(b)(1), compliance with numeric water quality criteria for toxic pollutants shall be determined by any single sample, while compliance for other criteria shall be determined utilizing the median of at least four consecutive measurements over a time period of not less than three months or greater than 12 months, or at a frequency specified by the American Samoa EQC. ASEPA, as a representative of the EQC, has indicated to EPA that where the frequency of sampling events is low, each sample is evaluated against the numeric water quality criteria listed in section 24.0206, and any exceedance is considered to be a violation of water quality standards (Buchan 2007). ASEPA also has indicated that when it is possible to calculate medians, comparable samples at the same station and same depth are used, i.e., ASEPA does not average samples across different depths. Therefore, where applicable, EPA has calculated median values. However, because of the limited monitoring data available, for the purpose of the section 301(h) evaluation, EPA has evaluated both individual samples and median values to determine compliance with water quality criteria for nutrients, toxic pollutants, pathogens, toxicity, and pH.

a. Nutrients

Nutrients such as phosphorus and nitrogen play a critical role in the health and productivity of the open coastal 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 open coastal waters, section 24.0206(o) of ASWQS provides that total phosphorus and total nitrogen concentrations shall not exceed 0.015 and 0.130 mg/l, respectively. Furthermore, ASWQS provide that chlorophyll *a* concentrations shall not

exceed 0.25 µg/l. Chlorophyll *a* is a common indicator of phytoplankton (algal) biomass caused by nutrient enrichment. Section 24.0210 of ASWQS provides that compliance with these criteria shall be determined utilizing the median of at least four consecutive measurements, or at a frequency specified otherwise. ASEPA generally determines compliance with numeric water quality criteria based on the median of at least four consecutive measurements over a calendar year. For the purpose of the section 301(h) evaluation, EPA assessed compliance with water quality criteria for nutrients and chlorophyll *a* based on both individual measurements and the median of four samples within a calendar year across depths.

Pursuant to the existing section 301(h)-modified permit, the applicant is required to conduct quarterly monitoring of total phosphorus, total nitrogen, and chlorophyll *a* in the receiving water. In the application, the applicant provided a summary of nutrient and chlorophyll *a* concentrations for the period of 1999 to 2003. EPA reviewed these and subsequent receiving water monitoring data from 2004 to 2008 collected by the applicant pursuant to the existing permit to evaluate receiving water concentrations of nutrients and chlorophyll *a* upon initial dilution. Between 1999 and 2008, the applicant conducted 22 receiving water monitoring events with a total of 264 individual samples collected at the ZID, ZOM and reference sites. In accordance with 40 CFR 125.62(a), EPA evaluated attainment of water quality criteria for total phosphorus, total nitrogen, and chlorophyll *a* at the ZID based on each monitoring event.

i. Total Phosphorus

Pursuant to section 24.0210(b) of ASWQS, EPA assessed attainment of the water quality criterion for TP based on the median concentration of at least four measurements over a calendar year. Based on receiving water monitoring data from 1999 to 2007, the only year in which four receiving water sampling events occurred was in 2005. Table 14 provides a summary of median TP, TN and chlorophyll *a* concentrations for 2005. At ZID stations A1 and A2, annual median TP concentrations were above the criterion of 0.015 mg/l for TP at all three depths. TP concentrations greater than the criterion were also observed at ZOM station B and reference station C with annual median concentrations of 0.02 mg/l calculated for the bottom depth at ZOM station B and at the surface for reference station C.

Due to the limited monitoring data, EPA also assessed attainment of the water quality criterion for TP based on the individual measurements across depths. Table 15 provides a summary of receiving water monitoring data for TP at the surface, middle and bottom depths. Exceedances of the water quality criterion of 0.015 mg/l for TP were observed at the ZID, ZOM, and at the reference station throughout the water column. From 1999 to 2008, 77 percent of all samples collected at both ZID stations A1 and A2 showed TP concentrations greater than the water quality criterion. A majority of these concentrations were observed at the surface and middle depths. At ZID station A1, concentrations of TP ranged from zero (TP concentration was reported as 0.000 mg/l) to 0.04 mg/l. At ZID station A2, concentrations of TP ranged from 0.010 to 0.08 mg/l. At the ZOM and reference stations, 50 and 41 percent of all individual samples collected showed elevated concentrations of TP, respectively. Similar to the ZID stations, a

Table 14. Summary of 2005 median concentrations of TP, TN, and chlorophyll a at the surface (S), middle (M) and bottom (B) depths at Tafuna STP receiving water monitoring stations. Shaded cell indicates concentrations above ASWQS.

Site	Station	2005 Median Concentration		
		TP (mg/l)	TN (mg/l)	Chlorophyll *a* (µg/l)
ZID	A1-S	0.02	0.32	0.14
	A1-M	0.02	0.200	0.27
	A1-B	0.02	0.201	0.10
	A2-S	0.02	0.290	0.5
	A2-M	0.02	0.205	0.2
	A2-B	0.02	0.149	0.12
ZOM	B-S	0.01	0.183	0.2
	B-M	0.01	0.259	0.05
	B-B	0.02	0.129	0.05
REF	C-S	0.02	0.169	0.2
	C-M	0.01	0.129	0.2
	C-B	0.01	0.214	0.16

majority of the exceedances observed were at surface and middle depths. At the ZOM station B, concentrations of TP ranged from 0.006 to 0.08 mg/l. At reference station C, concentrations of TP ranged from 0.009 to 0.09 mg/l.

Based on receiving water data for TP, most sampling events at ZID stations A1 and A2 showed an exceedance of the water quality criterion of 0.015 mg/l. From the last sampling event in 2001 through the first in 2005, all seven sampling events showed an exceedance at every ZID station at every depth. Even if the analysis was limited to calculations of the median of four consecutive samples, the 2005 data for each ZID station showed exceedances at two out of three depths. Recent years do not show an improving trend. For example, all the ZID samples in the second 2007 monitoring event exceeded the water quality criterion. Although it is possible that there may be other sources of TP, 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 modified discharge, but also taking into account the applicant's modified discharge in combination with pollutants from other sources. Therefore, EPA has concluded that the applicant has not demonstrated that the discharge will comply with water quality criteria for TP.

Table 15 - Summary of receiving water monitoring data for TP concentrations at the surface (S), middle (M) and bottom (B) depths at Tafuna STP receiving water monitoring stations. Shaded cell indicates TP concentration above the ASWQS criterion of 0.015 mg/l for open coastal waters.

Site	Station-Depth	TP Concentrations (mg/l)																					
		Monitoring Events by Calendar Year																					
		1999		2000			2001			2002		2003		2004	2005				2006		2007		2008
ZID	A1-S	0.015	0.024	0.014	0.016	0.021	0.017	0.017	0.028	0.027	0.021	0.022	0.020	0.021	0.020	0.020	0.040	0.020	0.030	0.020	0.010	0.030	0.040
	A1-M	0.016	0.011	0.015	0.017	0.022	0.018	0.018	0.025	0.028	0.021	0.022	0.020	0.022	0.030	0.020	0.020	0.020	0.010	0.020	0.020	0.020	0.020
	A1-B	0.013	0.016	0.000	0.017	0.022	0.015	0.016	0.021	0.026	0.021	0.022	0.019	0.019	0.020	0.010	0.030	0.010	0.008	0.020	0.020	0.020	0.010
	A2-S	0.025	0.017	0.014	0.017	0.024	0.018	0.014	0.017	0.023	0.019	0.018	0.021	0.020	0.020	0.020	0.020	0.020	0.030	0.020	0.020	0.020	0.080
	A2-M	0.015	0.016	0.013	0.015	0.024	0.015	0.015	0.018	0.021	0.019	0.016	0.020	0.017	0.020	0.010	0.020	0.010	0.020	0.030	0.010	0.020	0.010
	A2-B	0.015	0.011	0.063	0.016	0.024	0.014	0.015	0.016	0.019	0.019	0.017	0.018	0.018	0.020	0.010	0.030	0.020	0.020	0.050	0.010	0.060	0.010
ZOM	B-S	0.012	0.011	0.015	0.013	0.022	0.014	0.017	0.016	0.018	0.016	0.015	0.022	0.016	0.010	0.010	0.020	0.010	0.020	0.020	0.020	0.010	0.010
	B-M	0.013	0.006	0.014	0.013	0.024	0.015	0.016	0.016	0.016	0.016	0.015	0.020	0.017	0.010	0.010	0.040	0.010	0.020	0.020	0.020	0.010	0.080
	B-B	0.012	0.006	0.012	0.015	0.021	0.014	0.013	0.015	0.016	0.016	0.016	0.020	0.017	0.020	0.010	0.030	0.010	0.010	0.020	0.010	0.010	0.020
REF	C-S	0.015	0.013	0.010	0.014	0.016	0.014	0.016	0.012	0.014	0.015	0.014	0.020	0.017	0.010	0.020	0.030	0.010	0.020	0.020	0.020	0.040	0.010
	C-M	0.012	0.010	0.017	0.013	0.017	0.013	0.016	0.014	0.013	0.015	0.012	0.024	0.017	0.010	0.010	0.040	0.009	0.010	0.020	0.020	0.020	0.010
	C-B	0.011	0.009	0.032	0.013	0.017	0.013	0.014	0.012	0.014	0.015	0.013	0.022	0.014	0.010	0.010	0.020	0.010	0.020	0.020	0.020	0.010	0.090

ii. Total Nitrogen

Under section 24.0210(b) of ASWQS, EPA assessed attainment of the TN criterion based on the median concentration calculated from receiving water monitoring data from 2005. Table 14 provides a summary of median TP, TN and chlorophyll *a* concentrations for 2005. Similar to TP, all depths showed annual median concentrations that were above the criterion of 0.130 mg/l for TN at ZID stations A1 and A2. Concentrations of TN at both ZID stations ranged from 0.149 to 0.32 mg/l, with surface concentrations reported as the highest of the three depths. At the ZOM, median TN concentrations were above the water quality criterion at the surface and middle depths. Surface and middle depths showed calculated annual median TN concentrations of 0.183 and 0.259 mg/l, respectively. At reference station C, EPA calculated surface, middle, and bottom median concentrations of TN as 0.169, 0.129, and 0.214 mg/l, respectively.

In addition, exceedances of the water quality criterion for TN were observed at the ZID, ZOM, and at the reference station based on individual samples at each depth. Table 16 provides a summary of receiving water monitoring data for TN within the surface, middle and bottom depths. From 1999 to 2008, 69 percent of all samples collected at both ZID stations A1 and A2 showed elevated TP concentrations above the water quality criterion of 0.130 mg/l. A majority of elevated concentrations were observed at ZID station A1 where surface and mid depths showed an equal number of exceedances (i.e., 16 samples at each depth over the nine year time period). At ZOM station B and reference station C, 70 percent of all individual samples collected at each site showed elevated concentrations of TN. A majority of these exceedances at the ZOM station were observed at the surface followed by middle and bottom depths. However, at the reference station, a greater number of exceedances of the TN criterion were seen at bottom depths.

Based on receiving water data for TN, nearly every sampling event at ZID station A1 showed exceedances of the water quality criterion of 0.130 mg/l, as did the majority of sampling events at the other ZID station A2. Between 1999 and 2008, 45 and 50 percent of the 22 sampling events showed an exceedance at ZID station A1 and A2, respectively, at every depth. For every monitoring event, there are exceedances of the criterion observed, and recent year data do not show an improving trend. Although it is possible that there may be other sources of TN, 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 modified discharge, but also taking into account the applicant's modified discharge in combination with pollutants from other sources. Therefore, EPA has concluded that the applicant has not demonstrated that the discharge will comply with water quality standards for TN.

Table 16 - Summary of receiving water monitoring data for TN concentrations at the surface (S), middle (M) and bottom (B) depths at Tafuna STP monitoring stations. Shaded cell indicates TN concentration above the ASWQS criterion of 0.130 mg/l for open coastal waters.

Site	Station-Depth	TN Concentrations (mg/l)																					
		Monitoring Events by Calendar Year																					
		1999		2000			2001			2002		2003		2004	2005				2006		2007		2008
ZID	A1-S	0.130	0.118	0.137	0.161	0.136	0.142	0.130	0.232	0.114	0.158	0.156	0.183	0.170	0.110	0.400	0.602	0.240	0.530	0.275	0.130	0.274	0.234
	A1-M	0.132	0.108	0.100	0.132	0.142	0.148	0.145	0.209	0.112	0.158	0.144	0.161	0.172	0.180	0.130	0.244	0.220	0.130	0.284	0.140	0.104	0.134
	A1-B	0.120	0.163	0.000	0.159	0.141	0.149	0.191	0.185	0.126	0.158	0.122	0.167	0.161	0.110	0.600	0.292	0.107	0.140	0.191	0.106	0.172	0.404
	A2-S	0.215	0.109	0.106	0.170	0.142	0.158	0.144	0.192	0.098	0.142	0.104	0.192	0.172	0.120	0.260	0.321	0.389	0.130	0.367	0.120	0.164	1.104
	A2-M	0.116	0.140	0.105	0.154	0.134	0.144	0.110	0.213	0.110	0.142	0.099	0.177	0.159	0.110	0.240	0.171	0.737	0.310	0.293	0.110	0.104	0.164
	A2-B	0.107	0.129	1.430	0.167	0.136	0.163	0.147	0.206	0.108	0.142	0.107	0.163	0.159	0.130	0.240	0.169	0.112	0.210	0.231	0.110	0.554	0.434
ZOM	B-S	0.121	0.133	0.228	0.157	0.147	0.157	0.174	0.237	0.116	0.149	0.108	0.181	0.129	0.120	0.270	0.230	0.136	0.180	0.526	0.170	0.507	0.251
	B-M	0.142	0.131	0.111	0.152	0.145	0.272	0.129	0.202	0.102	0.149	0.095	0.175	0.138	0.110	0.360	0.159	0.436	0.190	0.216	0.180	0.664	0.183
	B-B	0.117	0.120	0.152	0.156	0.152	0.150	0.112	0.218	0.107	0.149	0.104	0.160	0.144	0.110	0.130	0.219	0.128	0.130	0.119	0.366	0.204	0.203
REF	C-S	0.152	0.121	0.102	0.145	0.152	0.148	0.111	0.190	0.112	0.131	0.093	0.160	0.134	0.110	0.350	0.138	0.201	0.240	0.353	0.290	0.169	0.794
	C-M	0.143	0.134	0.606	0.152	0.140	0.124	0.112	0.217	0.106	0.131	0.101	0.209	0.142	0.110	0.240	0.131	0.127	0.200	0.266	0.110	0.614	0.104
	C-B	0.138	0.134	1.980	0.165	0.134	0.171	0.171	0.224	0.156	0.131	0.095	0.194	0.134	0.110	0.230	0.197	0.362	0.120	0.214	0.120	0.104	0.374

iii. Chlorophyll *a*

Under section 24.0210(b) of ASWQS, EPA assessed attainment of the chlorophyll *a* criterion based on the median concentration calculated from receiving water monitoring data from 2005. Table 14 provides a summary of median concentrations for 2005. Similar to TP and TN, median concentrations at the ZID were above the water quality criterion of 0.25 µg/l for chlorophyll *a*. At ZID stations A1 and A2, annual median chlorophyll *a* concentrations were above the criterion at the middle and surface depths, respectively. Concentrations of chlorophyll *a* at both ZID stations ranged from 0.17 to 0.47 µg/l. No annual median concentrations of chlorophyll *a* above the criterion were observed at ZOM station B or reference station C.

Due to the limited monitoring data, EPA also assessed attainment of the water quality criterion for chlorophyll *a* based on the individual measurements across depths. Table 17 provides a summary of receiving water monitoring data for chlorophyll *a* within the surface, middle and bottom depths. For chlorophyll *a*, exceedances of the water quality criterion of 0.25 µg/l were observed at the ZID, ZOM, and at the reference station at all depths monitored. From 1999 to 2008, 36 percent of all individual samples collected at both ZID stations A1 and A2 showed chlorophyll *a* concentrations above the water quality criterion. Concentrations at both ZID stations showed an equal number of exceedances at each depth (i.e., eight samples at each depth over the nine year time period), except for the surface at station A1. At ZOM station B and reference station C, 32 percent of all individual samples collected at each site showed concentrations of chlorophyll *a* greater than the water quality criterion of 0.25 µg/l. A majority of these exceedances at the ZOM station were observed at the middle depth followed by surface and bottom depths. A majority of exceedances at the reference station were observed at the surface. Although exceedances of the water quality criterion for chlorophyll *a* were fewer than for TP and TN, they nevertheless represent a large portion of total samples. For some recent sampling events, such as the second sampling events in 2006, 2007 and 2008, exceedances were reported at all depths and at all stations.

iv. Attainment of Water Quality Standards for Nutrients and Chlorophyll *a*

Nutrients are common components of domestic wastewater discharges. Chlorophyll *a* is often used as an indicator of algal growth caused by excessive concentrations of total phosphorus and total nitrogen. Section 20.0206(o) of ASWQS has established water quality criteria for TP, TN, and chlorophyll *a*. Based on receiving water monitoring data, a large number of exceedances of these criteria have been observed at the ZID. While it is possible that there may be other sources of nutrients and chlorophyll *a* production, 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 modified discharge, but also taking into account the applicant's modified discharge in combination with pollutants from other sources. 40 CFR 125.62(f). Therefore, EPA has concluded that the applicant has not demonstrated that the discharge of nutrients will comply with water quality standards for TP, TN, and chlorophyll *a* in the receiving water.

Table 17 - Summary of receiving water monitoring data for chlorophyll *a* concentrations at the surface (S), middle (M) and bottom (B) depths at Tafuna STP monitoring stations. Shaded cell indicates chlorophyll *a* concentration above the ASWQS criterion of 0.25 µg/l.

Site	Station-Depth	Chlorophyll *a* Concentrations (µg/l)																		
		Monitoring Events by Calendar Year																		
		1999		2000			2001		2002	2003	2004	2005				2006		2007		2008
ZID	A1-S	0.14	0.23	0.28	0.35	0.09	0.22	0.1	0.3	0.01	0.06	0.15	0.13	0.8	0.05	0.05	0.27	0.09	0.31	0.3
	A1-M	0.09	0.06	0.25	0.49	0.05	0.41	0.1	0.3	0.01	0.04	0.55	0.13	0.4	0.05	0.13	0.27	0.09	0.8	0.3
	A1-B	0.09	0.09	0.28	0.35	0.09	0.19	0.2	0.3	0.01	0.03	0.14	0.27	0.05	0.05	1.3	0.8	0.09	0.3	0.3
	A2-S	0.1	0.02	0.26	0.5	0.08	0.17	0.1	0.3	0.01	0.06	1.05	0.13	0.05	0.8	0.05	0.27	0.09	0.3	0.3
	A2-M	0.1	0.04	0.28	0.47	0.04	0.2	0.1	0.3	0.01	0.06	0.32	0.01	0.05	0.8	0.05	0.8	0.09	0.3	0.3
	A2-B	0.16	0.04	0.29	0.41	0.04	0.11	0.1	0.4	0.01	0.03	0.18	0.05	0.27	0.05	0.27	0.27	0.09	0.3	0.3
ZOM	B-S	0.08	0.05	0.25	0.42	0.14	0.03	0.2	0.6	0.02	0.06	0.03	0.27	0.13	0.3	0.13	0.27	0.09	0.3	0.3
	B-M	0.05	0.3	0.1	0.48	0.12	0.03	0.1	0.4	0.02	0.03	0.9	0.05	0.05	0.05	0.29	0.53	0.09	0.3	0.3
	B-B	0.08	0.06	0.12	0.41	0.04	0	0.2	0.3	0.02	0.07	0.27	0.05	0.05	0.05	0.05	0.27	0.09	0.3	0.3
REF	C-S	0.08	0.05	0.35	0.29	0.03	0.23	0.2	0.2	0.03	0.05	0.3	0.13	0.05	0.7	0.28	0.8	0.09	0.3	0.3
	C-M	0.1	0.05	0.25	0.15	0.04	0.32	0.1	0.2	0.02	0.03	0.27	0.13	0.05	0.8	0.13	0.8	0.09	0.3	0.3
	C-B	0.08	0.03	0.24	0.4	0.03	0.14	0.1	0.1	0.03	0.06	0.95	0.27	0.05	0.05	0.48	0.27	0.09	0.3	0.3

[1]Detection limit above the water quality criterion

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 section 304(a) water quality criteria for pollutants for which there are no EPA-approved water quality standards. Section 24.0206 of ASWQS provides that for open coastal waters the concentration of toxic pollutants shall not exceed the more stringent of the aquatic life criteria for marine waters or the human health concentration criteria for the consumption of organisms found in the most recent EPA National Recommended Water Quality Criteria (EPA 2006). The existing section 301(h)-modified permit does not require the applicant to conduct receiving water monitoring or effluent monitoring for toxic pollutants. However, the applicant conducted effluent monitoring for toxic pollutants (September 2004 and March 2005) as part of the NPDES permit renewal process. For the purpose of the section 301(h) evaluation, EPA assessed attainment of water quality standards and section 304(a) criteria for toxic pollutants established to protect aquatic life and human health based on individual measurements of the effluent, as described in section 24.0210(b)(1) of ASWQS, and a critical initial dilution of 187:1.[5]

In the application, the applicant provided results of a 1990 priority pollutant analysis on wastewater from the Tafuna STP. Because significant advances have been made in analytical procedures since 1990, EPA reviewed the most recent toxic pollutant data from September 2004 and March 2005 submitted by the applicant to evaluate attainment of water quality criteria for these pollutants at the boundary of the ZID. Appendix B provides a comparison of predicted concentrations of toxic pollutants at the boundary of the ZID and water quality criteria. With consideration of critical initial dilution, EPA calculated predicted receiving water concentrations of toxic pollutants at the ZID to be below the more stringent of the aquatic life or human health criteria. While some toxic pollutants such as copper, mercury, phthalates, alpha-BHC, 4-4-DDT, and dioxins were detected in the effluent, concentrations of these pollutants were below water quality criteria in the receiving water after consideration of critical initial dilution. Therefore, based on effluent analyses of toxic pollutants, EPA has concluded that pollutant concentrations at the ZID are below applicable water quality standards for toxic pollutants.

c. Pathogens

Undisinfected wastewater from sewage treatment plants often contains high levels of pathogenic organisms that can adversely affect designated uses. Enterococcus concentrations are important indicators in assessing the impact of pathogens on recreational uses. Section 24.0206(o) of ASWQS has established water quality criteria for enterococcus to protect whole and limited body-contact recreation, e.g., swimming, snorkeling, and scuba diving, in open coastal waters (section 24.0205(f) of ASWQS). Section 24.0206(o) of ASWQS provides that the number of enterococcus bacteria shall not exceed 124 colony forming units (CFU) per 100 ml in any one sample (i.e., single sample maximum or SSM) nor have a geometric mean density exceeding 35 CFU per 100 ml. The SSM criterion allows for the direct evaluation of enterococcus bacteria in

[5]Section 24.0210 of ASWQS states that for the determination of compliance with water quality standards for toxic substances compliance shall be determined by any single sample, unless otherwise specified by American Samoa's Environmental Quality Commission.

an individual water sample to determine whether water quality on a particular day is protective of recreational activities in the water body. In contrast, the geometric mean calculation allows a means of evaluating long-term water quality. Pursuant to ASWQS, both criteria apply to open coastal waters. Because the Tafuna STP does not disinfect its effluent, effluent from the treatment plant can be expected to be a significant source of bacteria since primary treated effluent can have enterococcus concentrations of as much as 100,000 CFU per 100 ml (Miescier and Cabelli 1982). In particular, samples collected from primary treatment plants in Hawaii have shown enterococcus concentrations of 830,000 CFU per 100 ml (GMP Associates 2001).

In the existing section 301(h)-modified permit, the applicant is required to conduct quarterly receiving water monitoring of enterococcus bacteria at the surface, middle and bottom depths. In the application, the applicant provided a summary of enterococcus bacteria concentrations for intermittent quarters of 2000, 2002, and 2003. EPA reviewed these data and subsequent receiving water monitoring data from 2005 to 2008, submitted by the applicant pursuant to the existing permit, to evaluate receiving water densities of enterococcus bacteria at and beyond the boundary of the ZID. For monitoring conducted in 2000, 2002, and 2003, EPA determined that the applicant presented receiving water data for densities of fecal coliform instead of enterococcus. ASWQS do not have criteria for fecal coliform in open coastal waters. Since 2005, ASEPA has been conducting enterococcus bacterial analysis for samples collected by the applicant. Because of the uncertainty in the type of bacterial indicator reported in sample results from 2000, 2002, and 2003, EPA limited its assessment to monitoring data collected since 2005.

SSM Criterion. Between 2005 and 2008, the applicant conducted nine receiving water monitoring events. Table 18 provides a summary of enterococcus densities at the surface, middle and bottom depths. Exceedances of the SSM criterion were observed at all receiving water monitoring stations. However, a majority of these exceedances were observed at the ZID stations. Of the nine monitoring events, seven (78 percent) showed elevated levels of bacteria at the ZID. Moreover, at ZID station A1, 41 percent of the individual samples showed bacterial densities greater than the SSM, with a majority of elevated levels occurring near the surface. These levels were one or two orders of magnitude higher than the SSM criterion. Exceedances ranged from 161 to 12,031 CFU per 100 ml. At ZID station A2, exceedances of the SSM criterion were observed in 19 percent of individual samples, with a majority observed at the surface depth. Elevated enterococcus densities at ZID station A2 ranged from 223 to 4,352 CFU per 100 ml. At the ZOM station, only one of the 27 samples (i.e., four percent) showed enterococcus densities above the SSM criterion. At reference station C, 13 percent of the samples had enterococcus densities greater than the SSM criterion. Although the cause of elevated bacterial densities at the reference site is unclear, the higher frequency and magnitude of enterococcus levels observed at both ZID stations suggest that the discharge plume may be impacting this site.

Geometric Mean Criterion. Because the geometric mean density of enterococcus can provide valuable information on long term water quality, EPA evaluated the ability of the applicant's discharge to attain the ASWQS water quality criterion for enterococcus based on the geometric mean density of 35 CFU per 100 ml. In EPA's 1986 criteria for bacteria document, EPA

Table 18. Summary of 2005-2008 enterococcus concentrations recorded at the surface (S), middle (M) and bottom depths (B) at the Tafuna STP monitoring stations. Shaded cell indicates an exceedance of the SSM criterion of 124 CFU per 100 ml for open coastal waters.

Site	Station-Depth	Enterococcus (CFU per 100 ml)								
		Monitoring Events by Calendar Year								
		2005				2006		2007		2008
ZID	A1-S	10	3,255	52	1,565	1	12,031	7,701	2,723	1,989
	A1-M	10	10	31	85	0	86	20	2,359	1,100
	A1-B	10	0	256	10	0	187	161	10	20
	A2-S	10	305	0	4,352	0	20	0	31	2755
	A2-M	20	10	10	52	0	31	223	0	269
	A2-B	10	0	10	20	0	98	63	52	41
ZOM	B-S	10	0	0	539	0	0	0	20	0
	B-M	20	0	0	0	20	52	0	20	20
	B-B	10	0	0	0	0	10	0	10	10
REF	C-S	10	2,909	63	41	10	0	0	988	31
	C-M	52	0	256	0	20	85	31	31	10
	C-B	10	10	52	0	472	20	73	0	20

[1]Enterococcus concentrations reported below the detectable level

indicated that the geometric mean of enterococcus densities of 35 per 100 ml (i.e., recommended criterion for marine waters) be based on a statistically sufficient number of samples defined as generally not less than five samples equally spaced over a 30-day period, although it allowed Territories to exercise discretion in deciding how to apply the averaging period for the geometric mean (EPA 1986). Yet ASWQS do not specify the duration over which the geometric mean is calculated, or how the geometric mean criteria, in general, shall be applied for infrequently monitored waters. Although EPA recognizes that the infrequent sampling of enterococcus in the receiving water may result in the inability to collect sufficient samples to perform a robust statistical analysis and assess long-term water quality, lack of data does not preclude EPA from assessing bacterial data against the geometric mean criterion for section 301(h) variances. Therefore, because of the limited bacterial data available to calculate a geometric mean in accordance with EPA's 1986 criteria, EPA compared the geometric mean criterion to both individual samples and annual geometric mean values that were calculated for each depth from monitoring data collected from 2005 through 2008. EPA believes that the comparison of the geometric mean criterion to both the EPA-calculated geometric mean and individual single samples can provide additional information on the attainment of water quality standards for bacteria.

Table 19. Summary of annual geometric mean calculations of enterococcus concentrations calculated at the surface (S), middle (M) and bottom depths (B) for each Tafuna STP monitoring station. Shaded cell indicates an exceedance of the ASWQS geometric mean density of 35 CFU/100 ml.

Site	Station-Depth	Enterococcus (CFU/100 ml)[1]		
		2005	2006	2007
ZID	A1-S	227	110	4,579
	A1-M	23	29	217
	A1-B	23	43	40
	A2-S	107	14	18
	A2-M	18	18	47
	A2-B	12	31	57
ZOM	B-S	27	10	14
	B-M	12	32	14
	B-B	10	10	10
REF	C-S	93	10	99
	C-M	31	41	31
	C-B	15	97	27

[1]Enterococcus concentrations that were recorded as zero were assigned a detection level of 10 CFU/100 ml for the purpose of calculating a geometric mean

Table 19 identifies annual geometric mean values calculated for each depth at all receiving water monitoring stations. Exceedances of the geometric mean criterion were observed at the ZID and reference stations whereas no exceedances of the criterion were observed at the ZOM station. Exceedances were observed at all depths. Of nine annual geometric mean values calculated for each depth at each station, 67 and 33 percent of exceedances were observed at ZID station A1 and A2, respectively. At reference station C, 44 percent of exceedances were observed based on the geometric mean criterion.

In contrast, Table 20 compares single individual samples and the geometric mean criterion for each sampling event. Exceedances of the geometric mean criterion were observed at all monitoring stations. Of the 27 individual samples collected at each station, 52 and 37 percent showed an exceedance of the geometric mean criterion at ZID stations A1 and A2, respectively. At the ZOM station, seven percent of exceedances were observed. At reference station C, 37 percent of the 27 individual samples showed enterococcus concentrations observed the geometric mean criterion.

Based on receiving water monitoring data, exceedances of bacteria criteria have been observed at and beyond the boundary of the ZID. Although it is possible that there may be other sources of bacteria, the Tafuna STP does not disinfect its wastewater and its primary treated wastewater is likely to contain significant levels of bacteria that even with consideration of critical initial

Table 20. Summary of 2005-2008 enterococcus concentrations recorded at the surface (S), middle (M) and bottom depths (B) at the Tafuna STP monitoring stations. Shaded cell indicates an exceedance of the ASWQS geometric mean density of 35 CFU/100 ml.

Site	Station-Depth	Enterococcus (CFU per 100 ml)								
		Monitoring Events by Calendar Year								
		2005				2006		2007		2008
ZID	A1-S	10	3,255	52	1,565	1	12,031	7,701	2,723	1,989
	A1-M	10	10	31	85	0	86	20	2,359	1,100
	A1-B	10	0	256	10	0	187	161	10	20
	A2-S	10	305	0	4,352	0	20	0	31	2755
	A2-M	20	10	10	52	0	31	223	0	269
	A2-B	10	0	10	20	0	98	63	52	41
ZOM	B-S	10	0	0	539	0	0	0	20	0
	B-M	20	0	0	0	20	52	0	20	20
	B-B	10	0	0	0	0	10	0	10	10
REF	C-S	10	2,909	63	41	10	0	0	988	31
	C-M	52	0	256	0	20	85	31	31	10
	C-B	10	10	52	0	472	20	73	0	20

dilution would not meet the water quality standards for bacteria at and beyond the ZID. In addition, 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 modified discharge, but also taking into account the applicant's modified discharge in combination with pollutants from other sources. Therefore, EPA has concluded that the applicant has not demonstrated that the discharge of bacteria will meet water quality standards for bacteria in the receiving water.

d. 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 23868 at 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, effluent or different concentrations of a particular pollutant combined with dilution water, 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. Promulgated in 1989, NPDES regulations at 40 CFR 122.44(d)(1) establish 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.

ASWQS include narrative water quality criteria that all territorial waters be "…substantially free from substances and conditions or combinations thereof attributable to sewage, industrial wastes, or other activities of man which may be toxic to humans, other animals, plants, and aquatic life or produce undesirable aquatic life" (section 24.0206(d) of ASWQS). This is often referred to as "no toxics in toxic amounts." Additionally, section 24.0205(a)(3) of ASWQS contains a prohibition against the discharge of toxic, hazardous or radioactive waste directly into the water or in a manner that could reasonably be expected to adversely affect water quality. ASWQS do not provide a numeric standard for toxicity. In EPA's Technical Support Document for Water Quality-based Toxics Control, EPA recommends that in the absence of a numeric criterion for the parameter toxicity, a criterion continuous concentration (CCC) of 1.0 Toxic $Unit_{chronic}$ (TU_c) be used to ensure aquatic life protection against chronic toxicity in the receiving water (EPA 1994b). To evaluate the chronic toxicity of an effluent, TU_c can be calculated using the No Observed Effect Concentration (NOEC) determined during WET testing, where $TU_c = 100 \div$ NOEC. The NOEC is the highest tested effluent concentration (in percent effluent) that does not cause an adverse effect on the test organism (i.e., the highest effluent concentration at which the values for the observed responses are not statistically different from the control). Therefore, in terms of chronic toxicity, it can be viewed that as the TU_c value increases so does the toxicity of the effluent.

i. Direct Comparison of WET Monitoring Data to Water Quality Criterion

Pursuant to the existing section 301(h)-modified NPDES permit, the applicant conducted chronic WET testing on flow-weighted 24-hour composite effluent samples using the Purple Urchin, *Strongylocentrotus purpuratus*, fertilization test method as specified in EPA's Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms (EPA 1995). In the application, the applicant provided chronic WET testing data from 2000 to 2004. EPA reviewed these and subsequent WET data from NPDES monitoring reports (2005-2008) to assess effluent toxicity following critical initial dilution. These data are summarized in Table 21.

For the purpose of the section 301(h) evaluation, EPA evaluated receiving-water toxicity with consideration of a critical initial dilution of 187:1. As described in EPA's Technical Support Document for Water Quality-based Toxics Control, EPA applied critical initial dilution to existing effluent WET data and calculated the receiving water concentration (RWC) for chronic toxicity at the ZID. EPA then compared the RWC to the water quality criterion of 1.0 TU_c. Reviewing the WET monitoring data, of the 27 chronic toxicity tests conducted between 2000 and 2008, EPA determined that one WET test result indicated a RWC significantly above the 1.0 TU_c criterion.

Table 21. Summary of WET test results for the Tafuna STP. Dark shaded cell indicates a receiving water concentration (RWC) chronic toxicity value greater than the chronic toxicity criterion of 1.0 TU_c. Light shaded cell indicates an effluent TU_c greater than the assessment value of 153 TU_c.

Sample Collection Date	NOEC (% Effluent)	Effluent TU_c (100 ÷ NOEC)	RWC at ZID (TU_c ÷ 187)
February 2000	1.2	83.3	0.45
August 2000	1.2	83.3	0.45
November 2000	0.6	166.7	0.89
February 2001	>2.312	<43.3	>0.23
May 2001	>2.312	<43.3	>0.23
July 2001	>2.312	<43.3	>0.23
December 2001	>2.312	<43.3	>0.23
May 2002	1.156	86.5	0.46
August 2002	1.16	86.20	0.46
November 2002	>2.312	<43.3	>0.23
February 2003	0.578	173	0.93
May 2003	0.578	173	0.93
August 2003	>2.312	<43.3	>0.23
November 2003	1.156	86.5	0.46
February 2004	1.156	86.5	0.46
May 2004	2.312	43.3	0.23
November 2004	2.312	43.3	0.23
September 2005	1.156	86.5	0.46
November 2005	0.578	173	0.93
June 2006	0.578	173	0.93
August 2006	0.578	173	0.93
December 2006	1.156	86.5	0.46
February 2007	0.144	694.4	3.71
March 2007	2.312	43.3	0.23
June 2007	2.312	43.3	0.23
November 2007	0.578	173	0.93
March 2008	0.578	173	0.93

WET test results from February 2007 reported an effluent WET value of 694.4 TU_c, which corresponds to a RWC at the ZID of 3.71 TU_c. Additionally, several other tests revealed levels of toxicity near the water quality criterion that warranted further evaluation. In fact, 50 percent of WET results from 2005 to 2008 reported a TU_c of 173, which equates to a RWC of 0.93 TU_c after consideration of critical initial dilution. Because so many tests were near or above the toxicity criterion, EPA conducted an additional statistical analysis to determine whether the proposed discharge would consistently meet the criterion.

ii. Further Statistical Analysis

For the additional statistical analysis, EPA used established NPDES permitting procedures to determine whether or not the proposed discharge would consistently meet the water quality criterion for toxicity of 1.0 TU_c. Effluent is variable and monitoring is only occasional. Thus, an effluent may be toxic during periods when monitoring is not occurring. EPA has developed

statistical procedures to account for variability that enable EPA to assess the likelihood that water quality will be protected. EPA applied these statistical procedures to assess the proposed discharge.

The statistical analysis was conducted in two stages. First, EPA assessed whether or not the proposed discharge has the reasonable potential to exceed the water quality criterion for WET. Then, EPA calculated an appropriate assessment value and compared the existing data on WET to that value. This approach provides an assessment of whether the proposed discharge will consistently meet the WET criterion when accounting for expected effluent variability.

When drafting NPDES permits, EPA assesses whether or not the discharge has the reasonable potential to exceed water quality standards. If there is reasonable potential for a discharged pollutant to exceed water quality standards, then an effluent limitation based on the water quality standard is required in the permit. In this case, EPA applied these procedures, which account for effluent variability, to determine if there is reasonable potential for the Tafuna discharge to exceed the water quality criterion for WET. In conducting this analysis, EPA followed the procedures set forth in section 3.3 of EPA's Technical Support Document for Water Quality-based Toxics Control, using existing WET data. To account for a limited sample size and effluent variability, EPA used a coefficient of variation of 0.6, the 99 percent confidence interval of the 99th percentile based on an assumed lognormal distribution of daily effluent values, a TU_c of 173 based on WET data, and a value for initial dilution of 187. This calculation projected a RWC of 2.13 TU_c at the ZID, which is greater than the water quality criterion of 1.0 TU_c. Thus, the analysis indicated that the discharge has the reasonable potential to cause an excursion of the narrative water quality criterion for chronic toxicity.

EPA's Technical Support Document for Water Quality-based Toxics Control also contains procedures for calculating effluent limitations for permits once the permitting authority has concluded that a discharge has the reasonable potential to exceed a standard. EPA determined that these procedures also are useful in determining whether a facility's effluent will be able to consistently comply with the water quality standard for toxicity. In accordance with the statistical procedures outlined in EPA's Technical Support Document for Water Quality-based Toxics Control, EPA calculated an assessment value of 153 TU_c in the effluent. This value takes into account critical initial dilution as well as effluent variability. Thus, results of effluent monitoring above this value would indicate that even when accounting for initial dilution the discharge may exceed the water quality criterion of 1.0 TU_c in the receiving water at times, given that the toxicity of the effluent is variable,. EPA compared the assessment value of 153 TU_c to the WET results in Table 21. Of the 27 chronic toxicity tests conducted between 2000 and 2008, 33 percent of WET test results were above 153 TU_c. This shows that, when accounting for effluent variability, the proposed discharge is unlikely to consistently attain the water quality criterion for WET.

iii. Conclusion on WET

For all territorial waters of American Samoa, section 24.0205(a)(3) of ASWQS provides narrative water quality standards that prohibit the discharge of toxic, hazardous or radioactive waste directly into the water or in a manner that could reasonably be expected to adversely affect water quality. Additionally, section 24.0206(d) of ASWQS provides that all territorial waters be "…substantially free from substances and conditions or combinations thereof attributable to sewage, industrial wastes, or other activities of man which may be toxic to humans, other animals, plants, and aquatic life or produce undesirable aquatic life." In the absence of a numeric criterion in state or territory water quality standards, EPA performs its analyses using 1.0 TU_c as the numeric water quality criterion. EPA has compared the available data on WET directly to the water quality criterion, after accounting for initial dilution, and also used statistical procedures to determine whether the proposed discharge will likely consistently attain the criterion when accounting for effluent variability. The direct comparison to the criterion shows that the discharge has exceeded the criterion once and approached the criterion on several additional occasions. The statistical procedure indicates that the proposed discharge cannot consistently attain the WET criterion. Based on this analysis of WET data, EPA has determined that it cannot be reasonably assured that toxic impact will not occur as a result of the proposed modified discharge and issuance of a modified permit. Therefore, since toxicity has been observed and is predicted to occur frequently if a modified permit were issued, EPA has concluded that the applicant has not demonstrated that the proposed discharge will meet water quality standards for toxicity in the receiving water.

e. pH

As previously described, 40 CFR Part 133 provides secondary treatment requirements that include pH. In the application, the applicant has not requested a variance from these pH requirements. Secondary treatment requirements state that effluent values for pH shall be maintained within the range of 6.0 to 9.0 standard units. In addition to these technology-based requirements, section 24.0205(o) of ASWQS has established a water quality criterion for pH for open coastal waters which states that the pH ranges shall be 6.5 to 8.6 and be within 0.2 pH units of that which would occur naturally. The existing section 301(h)-modified permit requires the applicant to conduct effluent and receiving water monitoring for pH.

For effluent monitoring, DMR data from April 2005 to December 2007 indicate that the applicant conducted 33 effluent monitoring events for pH during this period. During this period, the applicant reported an effluent pH minimum of 6.8 and an effluent pH maximum of 7.5. Therefore, based on effluent monitoring data, the discharge meets secondary treatment requirements. In addition, ASWQS provide water quality criteria for pH and, pursuant to 40 CFR 125.61 and 125.62, section 301(h) applicants must demonstrate that the modified discharge, at and beyond the ZID, will comply with water quality criteria for pH. In the application, the applicant provided intermittent receiving water monitoring data for pH from 1999 through 2003. EPA reviewed these data and other pH receiving water data from 2002 through 2007. The pH concentrations were collected at surface, middle and bottom depths at all stations. At the ZID,

99 percent of the individual samples met the water quality criteria for pH. At the ZOM and reference station, levels of pH at all depths were within the range of 6.5 and 8.6 standard units based on ASWQS. Therefore, EPA has concluded that the applicant has demonstrated that the proposed discharge will meet water quality criteria for pH in the receiving water.

2. Impact of Discharge on Public Water Supplies

Pursuant to 40 CFR 125.62(b), which implements section 301(h)(2) of the Act, the applicant's discharge must allow for the attainment or maintenance of water quality that assures the protection of public water supplies. The applicant's modified discharge must also not prevent a planned or existing public water supply from being used, or from continuing to be used, as a public water supply or have the effect of requiring treatment over and above that which would be necessary in the absence of such discharge in order to comply with local and federal drinking water standards. According to the applicant, there is neither an existing nor planned seawater supply (desalinization facility) intake for public water uses in the area of the Tafuna STP discharge. Therefore, EPA has concluded that the modified discharge will not affect public water supplies.

3. Impact of Discharge on Shellfish, Fish, and Wildlife

Pursuant to 40 CFR 125.62(c)(2), the applicant's proposed modified discharge must allow for the attainment or maintenance of water quality which assures protection and propagation of a balanced indigenous population of shellfish, fish, and wildlife. A balanced indigenous population (BIP) of shellfish, fish, and wildlife must exist immediately beyond the ZID of the applicant's modified discharge and in all other areas beyond the ZID where marine life is actually or potentially affected by the applicant's proposed modified discharge.[6] 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 162(c)(3).

Discharges from wastewater treatment plants can contain a variety of pollutants that can cause adverse impacts to the marine environment. In Part A of this Tentative Decision Document, EPA evaluated individual pollutants and assessed whether the 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 that includes review of three types of data: chemical-specific data, WET data, and bioassessment data. This is consistent with the approach described in EPA's Technical Support Document for Water Quality-based Toxics Control (EPA 1991):

[6]As defined 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."

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

a. Review of Chemical-specific Data

Monitoring of water quality can provide valuable information when assessing the impact of discharges on marine life. Parameters such as DO, turbidity, total phosphorus, total nitrogen, and chlorophyll *a*, are key components in the assessment of open coastal environments, where biological communities are often sensitive to small changes in water quality. Domestic wastewater discharges contribute significant amounts of organic material to receiving waters that can impact water quality, and the uses it supports. Pursuant to the existing section 301(h)-modified permit, the applicant conducted receiving water monitoring at and beyond the ZID. As previously discussed, receiving water monitoring data have shown levels of DO, turbidity, total phosphorus, total nitrogen and chlorophyll *a* at the ZID that do not attain ASWQS, and combined may result in potential adverse biological impacts in areas surrounding the Tafuna STP discharge.

i. DO

Marine organisms such as fish need oxygen to survive. The depletion of DO in receiving waters is associated with high levels of oxygen consumption that may be due to many environmental factors such as nutrient enrichment leading to too much algal growth or when algae die and bacteria break down the organic material. Wastewater from sewage treatment plants naturally consists of nutrients and biological oxygen-demanding substances. Based on receiving water monitoring data, DO depressions have been observed at and beyond the ZID along with concentrations of total phosphorus, total nitrogen, and chlorophyll *a* that exceed water quality criteria. While general fluctuations in DO concentrations to low levels may occur naturally due to seasonal fluxes in the water column, there is little seasonal variation in the water column expected in the open coastal waters of American Samoa. Therefore, EPA concludes that the loading of nutrients and biological oxygen-demanding substances from the proposed modified discharge may cause depressed oxygen levels that result in the potential for adverse biological impacts.

ii. Turbidity

Suspended solids in the effluent can result in a significant loading of solids to the water column and their subsequent deposition onto the seafloor in the vicinity of the discharge. The main environmental impacts of increased turbidity levels are a reduction in penetration of light in the water column and suspended-sediment impacts to filter-feeding organisms, fish, and corals. The extent of these impacts is largely dependent on the duration of turbidity, which is governed by

the size, shape, and density of the particles among many other factors. However, pursuant to the existing permit, the applicant is not required to perform any benthic surveys or sediment studies making it difficult for EPA to directly evaluate the biological impacts of turbidity for the purpose of this section 301(h) review.

Nevertheless, EPA has concluded that levels of turbidity have been observed above ASWQS at and beyond the ZID, although the light penetration criterion is being met. But because of the limited frequency in monitoring (generally two or three times per year), a cause and effect relationship between turbidity and light penetration would not be expected. Therefore, it is reasonable to conclude that frequent elevated turbidity levels in the water column could contribute to periods of reduced light penetration and increased sedimentation that could significantly impact the biotic community. As a result, EPA has concluded that there is a potential for the proposed modified discharge to cause or contribute to turbidity-related impacts to biological communities at and beyond the ZID. EPA has based this conclusion on the following: The applicant has proposed a 50 percent increase in effluent flow from existing permit conditions for the modified discharge that would result in an increased loading of total suspended solids, which affects turbidity. Moreover, because of the frequency at which turbidity levels were observed above the water quality criterion combined with observed DO depressions, and nutrient and chlorophyll *a* concentrations above water quality standards, there is a strong possibility the proposed modified discharge will cause or contribute to receiving water impacts adversely affecting the biotic community.

iii. Nutrients

Eutrophication in the marine environment can adversely affect aquatic life and habitats. Eutrophication can contribute to periods of oxygen depression in bottom waters, death of benthic-dwelling organisms during anoxic conditions, changes in the species composition and long-term reductions in the distribution of macrophyte communities, and increases in reports of harmful algal blooms. Measurements of nutrient concentrations, chlorophyll *a* (a measure of algal biomass), and light penetration (e.g., Secchi disc) are useful parameters for assessing eutrophication in marine environments. As previously discussed, concentrations of nutrients and chlorophyll *a* have been frequently observed above ASWQS at and beyond the ZID. Although it is clear that nutrients and chlorophyll *a* are not attaining water quality criteria at the ZID, it is less clear whether concentrations are at levels that are impacting water quality and biological communities. Based on limited monitoring data, EPA determined that the light penetration standard has been met, and, based on information provided in the application, there has been no report or presence of phytoplankton blooms or other sign of excessive marine plant growth in the area of the Tafuna STP discharge. Yet, assessing results of receiving water monitoring to ascertain cause and effect is difficult because of the limited frequency in receiving water monitoring (generally two or three times per year) conducted by the applicant. Also, a linear relationship between total phosphorus and total nitrogen, and eutrophication and other water quality impacts (e.g., light penetration) is not always readily apparent. Nevertheless, it is reasonable to conclude that elevated nutrients in the water column could contribute to periods of increased algal biomass that result in chlorophyll *a* levels that are above the water quality criterion. Presumably, levels exceeding the criterion could cause phytoplankton blooms that can significantly affect the biotic community.

As a result, EPA has concluded that there is a potential for the proposed modified discharge to cause or contribute to nutrient-related impacts to biological communities at and beyond the ZID. EPA has based this conclusion on the following: The applicant has proposed a 50 percent increase in effluent flow from existing permit conditions for the modified discharge that would result in an increased loading of nutrients, which can affect algal growth in the water column and DO levels due to algal dieoff; the Tafuna STP does not currently contain nutrient removal technology nor is any proposed; and because of the frequency at which nutrient concentrations are observed above water quality criteria combined with observed DO depressions, chlorophyll *a* and turbidity levels above water quality standards, there is a strong possibility the proposed modified discharge will cause or contribute to biological impacts in the receiving water.

b. Review of WET Data

Section 101(a)(3) of the Act states that it is the national policy that the discharge of toxic pollutants in toxic amounts be prohibited. 33 USC 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 23868 at 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 1997). 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" (i.e., NOEC) of wastewaters (EPA 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).

In accordance with the existing section 301(h)-modified permit, the applicant conducted WET testing using the Purple Urchin, *Strongylocentrotus purpuratus*, fertilization test method, where the observed toxicological measurement endpoint is based on reproduction. As previously discussed, WET tests have shown that the effluent is sometimes toxic or has the potential to be under the worst case scenario. Toxicity has been predicted to occur at the ZID based on a comparison of WET data and the water quality criterion for chronic toxicity. As discussed above, EPA compared the available data on WET directly to the water quality criterion, after accounting for initial dilution, and also by using statistical procedures to determine whether the proposed discharge will likely consistently attain the criterion when accounting for effluent variability. One WET test demonstrated toxicity above the 1.0 TU_c criterion at the ZID even when accounting for critical initial dilution. Moreover, when EPA calculated assessment values using statistical procedures that take effluent variability into account, EPA found that the discharge exceeded the assessment values on several occasions.

In addition, the purpose of the Purple Urchin fertilization test method is to estimate the chronic toxicity of an effluent and receiving water mixture to the gametes of sea urchins. Pollutants that adversely affect egg fertilization under these test conditions are usually toxic to other marine test species, and presumably toxic to other untested marine species (EPA 1995). As described in EPA's ATSD, benthic macroinvertebrates are an important component of a BIP since EPA has found that major potential affects of municipal discharges are associated with benthic macro-

invertebrates. Since the Purple Urchin is a benthic macroinvertebrate and is considered a representative of other tropical invertebrate species that would be present in American Samoa, it is reasonable to conclude that any toxicity observed with the Purple Urchin may potentially affect other benthic macroinvertebrates in the open coastal waters of American Samoa. Therefore, since toxicity has been observed and is predicted to occur based on critical conditions for the proposed modified discharge, EPA has concluded that the discharge could contribute to adverse biological impacts for this reason as well.

c. Review of Biological Data

The third line of analysis is to review biological data. However, as discussed in EPA's ATSD, an applicant that is considered a small applicant who has not been required to perform biological surveys or conduct field studies as part of its existing section 301(h)-modified permit may use other available information to assess biological impact to demonstrate that the characteristics of the discharge and receiving water indicate a very low potential for adverse impact. Pursuant to the existing permit, the applicant is not required to perform any biological surveys or studies. As a result, there is no biological information available for EPA to evaluate for the purpose of this section 301(h) review. Instead, in the application, the applicant concluded that the modified discharge has a low potential for an adverse impact based on the discharge meeting the four general characteristics described in EPA's ATSD. EPA's ATSD identifies the following characteristics that generally indicate a low potential for impact:

(1) Location of the discharge is in water depths greater than 33 ft;

(2) Hydrographic conditions that result in a low predicted solids accumulation rate;

(3) The absence of known or suspected sources of toxic pollutants and pesticides in the effluent;

(4) The absence of distinctive habitats of limited distribution and the absence of fisheries in the vicinity of the outfall, when such absences are not due to anthropogenic stresses.

Since no biological data are available for review, EPA has evaluated the discharge based on these four general characteristics as a surrogate for the collection of biological data.

i. Location of the discharge is in water depths greater than 33 ft

In the application, the applicant indicated that the existing outfall discharges at a water depth of 95 feet. The applicant has proposed no alterations to the depth of the discharge for the proposed modified discharge. Therefore, since the proposed modified discharge point is located at water depths greater than 33 feet, EPA has concluded that the proposed modified discharge would exhibit this characteristic.

ii. Hydrographic conditions that result in a low predicted solids accumulation rate

Most potential biological impacts are associated with the discharge of particulate matter. The discharge of effluent solids tends to accumulate near the outfall where bottom-dwelling marine organisms (e.g., marine macroinvertebrates and bottom-feeding fishes) may potentially be affected by these accumulations because they live in or on the sediment. Based on the relationship of height-of-rise and mass emissions of solids from Figure B-1 of EPA's ATSD, open coast discharges with sediment accumulation rates predicted to be less than 50 g/m^2 can generally be regarded as having minimal biological effects.

In the application, the applicant predicted a steady-state solids accumulation rate of less than 50 g/m^2 based on the effluent flow of 2.0 MGD. The applicant calculated the steady-state solids accumulation rate based on the existing permitted annual average flow of 2.0 MGD, a corresponding plume's height-of-rise of 18.7 meters, and the average monthly effluent limitation (emission rate) of 568 kg/day (1,252 lbs/day) for total suspended solids. EPA also calculated a steady-state solids accumulation rate using the requested permit annual average flow of 3.0 MGD and critical peak hourly flow of 6.0 MGD, height-of-rise predicted for each flow scenario, and corresponding mass emission rates based on an average monthly effluent limitation of total suspended solids concentration of 75 mg/l. In the application, the applicant predicted a height-of-rise of 19.1 meters for an effluent flow of 3.0 MGD and 22.4 meters for an effluent flow of 6.0 MGD. Based on the discharge flow of 3.0 and 6.0 MGD, EPA calculated the average monthly effluent limitation (emission rate) of 851 kg/day (1,876 lbs/day) and 1,702 kg/day (3,753 lbs/day), respectively, for total suspended solids. Using Figure B-1 of EPA's ATSD and the applicant's predicted height-of-rise for effluent flows of 3.0 and 6.0 MGD as X coordinates, EPA determined the predicted steady-state solids accumulation rate would be less than 50 $g/m.^2$ Consequently, EPA has concluded that the proposed modified discharge would exhibit this characteristic.

iii. Absence of known or suspected sources of toxic pollutants and pesticides in the effluent

The potential effects of discharged solids may not always be associated with sediment accumulation alone, but may be compounded by toxic substances adsorbed to these solids. In the application, the applicant indicated that there is an absence of known or suspected sources of toxic pollutants and pesticides in the effluent. The applicant indicated that the existing and proposed modified discharge is generally characterized as domestic in nature with no current or proposed industrial sources. However, toxic pollutant analyses on effluent conducted in September 2004 and May 2005 have demonstrated detectable levels of heavy metals and pesticides. Concentrations of copper, mercury, phthalates, dioxin, alpha-BHC, and DDT have been observed above water quality criteria in the effluent. Although these compounds were below the section 304(a) water quality criteria necessary to protect aquatic life and human health after consideration of critical initial dilution, a potential may exist for these compounds to cause toxic impacts at very low concentrations in marine organisms once in the marine environment. Moreover, based on WET testing, toxicity has been observed, although the cause of the toxicity is undetermined. EPA has concluded that the applicant has not demonstrated that there is an

absence of known or suspected sources of toxic pollutants and pesticides in the effluent. Therefore, EPA has concluded that the proposed modified discharge would not exhibit this characteristic.

iv. The absence of distinctive habitats of limited distribution and the absence of fisheries in the vicinity of the outfall, when such absences are not due to anthropogenic stresses

As defined in EPA's ATSD, distinctive habitats of limited distribution are habitats whose protection is of special concern because of their ecological significance, such as coral reefs or value to humans, such as for subsistence fishing. Because of their nature, distinctive habitats of limited distribution may be highly susceptible to the potential effects of discharged suspended solids, nutrients, and other pollutants on the unique faunal components of marine communities. In the application, the applicant indicated that several historical documents are available that describe the biological community in the general discharge area of the Tafuna STP. The applicant indicated that these studies were considered in the original 1985 and 1995 section 301(h) decisions, and specifically applied to the original Tafuna outfall, which was located in shallower depths (25 feet shallower than the existing terminus) and more inland than the existing outfall (1,100 feet more inland from the existing terminus). Since the original section 301(h) variance approval in 1985, no biological studies have been conducted in the vicinity of the discharge.

However, in the application, the applicant indicated that there is an absence of distinctive habitats of limited distribution and that fisheries do not exist in the vicinity of the discharge point as a result of hydrographical conditions. Although the east and south shores of Tutuila Island have a nearly continuous fringing coral reef, the applicant described that the nearest coral reef habitat to the Tafuna STP is located at Matautuotafuna Point, which is approximately 1.1 miles east of the proposed modified discharge point. In addition, the applicant described that the nearest recreational and subsistence fishery is located in the shallow waters (0-33 feet deep) along the coast and in these coral reef areas. The applicant described that these are located away from any areas potentially impacted by the discharge and that there have been no warnings, restrictions, closures, mass mortalities, or increased incidence of disease in marine organisms caused by the existing modified discharge to any commercial, subsistence, or recreational fishery since there is an absence of these fisheries in the vicinity of the discharge due to the rough and dangerous wave conditions in the area. The net direction of the prevailing current is offshore, away from the fringing reef and towards the open ocean. As a result, the applicant concluded the effluent plume and any associated pollutants are transported away from the coastline and any sensitive biological communities.

On the other hand, ASWQS have established fishing as a beneficial use for all open coastal waters in American Samoa. Additionally, as discussed above, coral reefs are located near the discharge site. Although the results of this analysis are mixed, EPA has concluded that the applicant has not demonstrated that there is an absence of distinctive habitats of limited distribution or fisheries in the vicinity of the discharge point that may be impacted by the proposed modified discharge. Therefore, EPA has concluded the proposed modified discharge would not exhibit this characteristic.

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

While no biological data are available to directly assess impact on aquatic life, EPA has concluded that the applicant has failed to demonstrate that a modified discharge would not interfere with the attainment or maintenance of water quality which assures protection of a balanced, indigenous population of shellfish, fish, and wildlife. This conclusion is based on the data and analysis indicating depressed oxygen levels, elevated turbidity, elevated nutrient concentrations, elevated chlorophyll *a* concentration (an indication of unacceptable algal growth), and toxicity, all of which individually and combined can be expected to contribute to adverse biological impacts in the receiving water. Additionally, the discharge would not meet all the characteristics that, under the EPA's ATSD, generally indicate a low potential for impact and can be used as a substitute for biological data for small dischargers.

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 adverse effects beyond the ZID. Although EPA has concluded that the proposed discharge will interfere with the attainment of water quality criteria for DO, turbidity, nutrients, and WET, EPA has no information that exceedances of these criteria would be so severe that they would result in extreme events such as major fish kills. EPA concludes that the proposed discharge will 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 modified 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 necessary that the proposed modified 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 facility (Tafuna STP) were updated to secondary treatment (EPA 1994). Section 24.0205(f) of ASWQS provides protected uses for open coastal waters that include, but are not limited to, recreational activities such as fishing and water contact recreation (e.g., swimming, snorkeling, and scuba diving). For the purpose of the section 301(h) evaluation, EPA assessed effluent data regarding priority toxic pollutants and receiving water monitoring data regarding pathogens collected pursuant to the existing section 301(h)-modified NPDES permit to determine the impact of the discharge on fish consumption and water contact recreation.

a. Fish Consumption

Tutuila Island's fringing coral reefs provide habitat for a variety of fish, invertebrates and shellfish that are often harvested by local American Samoans. The discharge of effluent containing toxic pollutants such as heavy metals and some pesticides can result in bioaccumulation of these pollutants in aquatic organisms that can be consumed by humans. In the application, the applicant indicated that recreational fishing occurs in shallow waters (up to 30 feet) and on coral reeftops throughout the island, although, according to the applicant, there is no recreational or subsistence fishery located in the vicinity of the discharge since the discharge is located in an area too dangerous for fishermen due to the rough and dangerous wave conditions. Although the applicant believes no fishing activities exist or will occur in the area of the modified discharge, there have been no surveys conducted on the extent of fishing activities. Nevertheless, 40 CFR 131.10 requires Territories to adopt designated uses in their water quality standards for all water bodies and to promulgate the appropriate water quality criteria to protect those uses. Therefore, in accordance with 40 CFR 131.10, section 24.0205(f) of ASWQS has designated commercial, subsistence, and recreational fishing as protected uses in all open coastal waters.

The existing section 301(h)-modified permit does not require the applicant to implement a monitoring program that would include the analysis of sediment, fish tissue, effluent, or receiving water for toxic bioaccumulative pollutants. However, in the application, the applicant provided results of a 1990 toxic pollutants analysis of effluent from the Tafuna STP. In addition, subsequent to the application, the applicant conducted two additional toxic pollutant analyses (September 2004 and March 2005) to better characterize the effluent for toxic pollutants. Results of these analyses showed detectable concentrations of bioaccumulative compounds such as mercury and 4'4-DDT in the effluent. Although these compounds were below the ASWQS human health criteria for the consumption of organisms after consideration of critical initial dilution, a potential may exist for these compounds to bioaccumulate at very low concentrations in marine organisms once in the marine environment. Yet, because biological monitoring is not required by the existing NPDES permit, there is no toxicological data in the vicinity of the Tafuna STP outfall currently available to adequately assess whether sediment or fish in the vicinity of the outfall are impacted by toxic pollutants discharged in the effluent (ASEPA 2006). According to the applicant, there have been no warnings, restrictions, closures, or mass mortalities of any commercial, subsistence, or recreational fishery in the vicinity of the outfall. Also, because bioaccumulative pollutants adsorb onto particulates suspended in wastewater, and since the applicant calculated the proposed modified discharge has a low predicted solids accumulation rate, the applicant concluded that there is a low potential for bioaccumulation in sediments.

For reasons set forth by the applicant, and since levels of bioaccumulative pollutants in the effluent were predicted to be low in the receiving water with consideration of critical initial dilution, EPA has concluded that the applicant has demonstrated that the proposed modified discharge has a low potential to cause significant bioaccumulation of toxic pollutants, and will, at and beyond the ZID, allow for the attainment or maintenance of water quality which allows for fishing.

b. Water Contact Recreation

Because of the potential for pathogenic microorganisms to be transmitted by contaminated water, monitoring of indicator microorganisms (e.g., enterococcus) is used to identify the presence of sewage and fecal contamination and to ensure the protection of the protected uses of the waterbody, such as water contact recreation. Since effluent from the Tafuna STP is currently not disinfected and the applicant has not proposed any plans to install a disinfection system, effluent discharged from the facility is a source of bacterial contamination in the receiving water. In the application, the applicant indicated that no existing or potential recreational activities will likely be affected by the proposed modified discharge because the ocean in the vicinity of the ZID is too dangerous for recreational activities. Although the applicant believes no recreational activities exist or will occur in the area of the modified discharge, there have been no surveys conducted on the extent of recreational activities to better understand designated uses. Moreover, 40 CFR 131.10 requires Territories to adopt in their water quality standards designated uses for all water bodies and to promulgate the appropriate water quality criteria to protect those uses. And, in accordance with 40 CFR 131.10, section 24.0205(f) of ASWQS has designated whole and limited body-contact recreation, e.g., swimming, snorkeling, surfing, and scuba diving, as protected uses in all open coastal waters. To protect these uses, ASWQS provide that the number of enterococci bacteria shall not exceed 124 CFU per 100 ml in any one sample (SSM) nor have a geometric mean indicator density above 35 CFU per 100 ml. Therefore, these criteria apply to open coastal waters in the vicinity of the discharge.

Pursuant to the existing NPDES permit, the applicant is required to conduct enterococcus monitoring in the receiving water. Results showed that enterococcus concentrations routinely exceeded water quality standards at and beyond the boundary of the ZID, which indicate that the waterbody may not be supporting the water contact recreational use. Based on the SSM criterion, 38 percent of the single sample measurements collected at the ZID stations A1 and A2 combined showed elevated bacteria concentrations. In the application, the applicant indicated that there have been no reported restrictions on recreational activities by federal or territorial authorities in the vicinity of the discharge as a result of these exceedances. However, according to shoreline monitoring data collected by ASEPA from 2005 to 2007, beach advisories have been issued for beaches near the Tafuna STP. During this period, beach advisories were issued for seven days for Fogagogo South Hole and 12 days for Fogagogo Beach. Fogagogo South Hole and Fogagogo Beach are located adjacent to the Maliu Mai Beach Resort and are approximately 171 and 302 feet south from the Tafuna STP facility, respectively.

While it is possible that there may be other sources of pathogens and, thus, causes of beach advisories, EPA notes that under section 301(h)(9), the applicant must demonstrate that the discharge will not interfere, alone or in combination with pollutants from other sources, with the attainment or maintenance of that water quality which allows recreational activities. In addition, 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 modified discharge, but also taking into account the applicant's modified discharge in combination with pollutants from other sources. Because elevated concentrations of pathogens have been observed at the ZID and at nearby shoreline areas, and since the Tafuna STP currently does not disinfect its effluent nor has the applicant proposed to do so for the modified discharge, 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 such as water contact recreation.

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

Pursuant to 40 CFR 125.62(e), where the proposed modified discharge is based on an improved or altered discharge, the applicant must demonstrate that the proposed improvements or alterations to the existing discharge have been thoroughly planned and studied, and that the improved or altered discharge will comply with the requirements of 40 CFR 125.62(a) through (d).

In the application, the applicant requested a waiver from secondary treatment requirements for BOD and TSS, and has based its application on an altered discharge as a result of a planned increase in wastewater flow. The applicant has proposed no treatment or physical improvements to the existing discharge. The applicant identified the altered discharge as an anticipated average daily flow increase from 2.0 MGD to 3.0 MGD during the next permit period. As a result of the altered discharge, the applicant also requested an increase in the loading of BOD and TSS into the receiving water, but has requested concentration limitations in the renewed permit to remain the same. In the application, the applicant indicated that the altered discharge has been thoroughly planned and studied, as required by 40 CFR 125.62(e)(1).

However, based on available information, EPA has concluded that the altered discharge will not ensure compliance with water quality standards; will not provide for the attainment or maintenance of water quality which assures the protection and propagation of a balanced indigenous population of shellfish, fish, and wildlife; and will not allow for recreational activities. Receiving water monitoring data have shown exceedances of water quality standards for pathogens, nutrients, and toxicity at and beyond boundary of the ZID. In general, domestic wastewater is a known source of total phosphorus and total nitrogen, and since the Tafuna STP does not disinfect its wastewater, a source of pathogens. While it is possible that there may be other sources of these contaminants, 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 modified discharge, but also taking into account the applicant's modified discharge in combination with pollutants from other sources. In the application, the applicant has not proposed any improvements to the discharge that would result in better control of nutrients, pathogens, or toxicity. Therefore, EPA has concluded that the applicant has not demonstrated that the discharge would meet the requirements of 40 CFR 125.62(e)(4).

D. Establishment of a Monitoring Program

Under 40 CFR 125.63, which implements section 301(h)(3) of the Act, the applicant must have a monitoring program designed to evaluate the impact of the modified discharge on the marine biota, demonstrate compliance with applicable water quality standards or water quality criteria, as appropriate, 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 reissuance of a section 301(h)-modified permit and to carry it out for the life of the permit (40

CFR 125.63(a)(1)(iii)). The frequency and extent of the program are to be determined by taking into consideration the applicant's rate of discharge, quantities of toxic pollutants discharged, and the potential significant impacts on the receiving water (40 CFR 125.63(a)(1)(iv)).

In the application, the applicant proposed continuation of the existing effluent monitoring program and addition of a sediment and bacterial monitoring study, but discontinuation of the existing receiving water quality monitoring program. The applicant requested that the receiving water quality monitoring should be discontinued due to the high dilution achieved by the diffuser and the good flushing characteristics of the receiving water and that, based on the available data, the variability in concentrations of the targeted parameters is not attributable to the discharge. Instead, the applicant recommended a one-time shoreline bacteria study and dye study to better understand plume dilution and transport. For the sediment monitoring study, the applicant proposed that the monitoring study be conducted once during the five-year permit term and would include the analysis of chemical and physical parameters in the sediment and benthic communities at the boundary of the ZID, in the farfield along the expected trajectory of the plume, and at the reference site. On September 27, 2006, the applicant provided a letter to EPA stating it has the resources necessary to conduct a monitoring program and meet all the requirements of a renewed NPDES permit.

Based on review of the applicant's proposed monitoring program, EPA has determined that the proposed program is not sufficient to provide data for determining compliance with applicable water quality standards and criteria and to measure the presence of toxics identified or expected in the effluent. EPA agrees that the collection of shoreline bacterial data and additional data on plume dynamics is important when establishing a comprehensive monitoring program; however, collecting such data alone will not provide adequate information to determine whether the proposed modified discharge would be in compliance with water quality standards. Receiving water monitoring data for the existing modified discharge, for instance, have shown exceedances of the water quality criteria for several parameters at the boundary of the ZID. Therefore, the continuance of receiving water monitoring is important to better evaluate both short and long-term impacts to ambient conditions that may be related to the modified discharge. In addition, 40 CFR 125.63(d) requires, to the extent practicable, the monitoring of effluent for toxic substances and pesticides to assess the effectiveness of a toxics control program. As proposed in the application, the effluent monitoring program excludes toxic pollutant monitoring.

In this Tentative Decision Document, EPA is not recommending specific changes to the monitoring program; rather, EPA intends to work with the applicant in the development of an appropriate monitoring program for the renewed permit.

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

In accordance with section 301(h)(4) of the Act, 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 nonpoint source. Under 40 CFR 125.64, which implements section 301(h)(4) of the Act, the applicant's proposed modified discharge may not result in any additional pollution control requirements on any other point or nonpoint source, and

the applicant is required to obtain a determination from the state or territory on whether the applicant's discharge will result in any additional requirements.

In the application, the applicant indicated that there are no streams or other point source discharges within several miles in either direction of the discharge. The applicant also indicated it received certification from ASEPA on May 15, 1991, based on the previous application, that the discharge will not result in additional treatment, pollution control, or other requirement on any other point or nonpoint source; however, the applicant did not provide a new certification for the proposed modified discharge as described in the application submitted to EPA on May 4, 2004, as required to support issuance of a renewal modified permit. However, since EPA's tentative decision is that a modified permit would not be appropriate and, therefore, no modified permit has been prepared, a determination by the Territory is unnecessary at this time.

F. Toxics Control Program

In accordance with section 301(h)(7) of the Act, 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 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.

1. Chemical Analysis

Under 40 CFR 125.66(a), at the time of the 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) unless a small applicant certifies that there are no known or suspected sources of toxic pollutants or pesticides and documents the certification with an industrial user survey as described by 40 CFR 403.8(f)(2). In the application, the applicant indicated that there are no known or suspected sources of toxic pollutants or pesticides in the service area of the Tafuna STP, and that it provided certification of this in the 1994 section 301(h) permit renewal application based on the results of an industrial user survey that indicated that the sewage flowing into the Tafuna STP from all industrial park renters is domestic in nature only. The applicant also indicated that there are no future industrial inputs planned and, therefore, concluded that, as a small discharger, it is not required to submit in its application a chemical analysis of its current discharge based on the requirements of 40 CFR 125.66(a)(1). However, in the application, pursuant to 40 CFR 125.62, the applicant provided a summary of a 1990 effluent analysis of toxic pollutants and pesticides. In addition, since submittal of the May 2004 application, the applicant has performed two chemical analyses of toxic pollutants and pesticides in the effluent (September 2004 and March 2005). Although the applicant has not provided a new certification in accordance with 40 CFR 125.66(a)(2) (i.e., more recent industrial user survey), EPA has concluded that the applicant has met the requirement of 40 CFR 125.66(a)(1) since it has submitted chemical analysis of the effluent.

2. Identification of Sources

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). To the extent practicable, the applicant is required to categorize the sources according to industrial and non-industrial types. As discussed previously, in the application, the applicant provided that it certified in its previous 1994 section 301(h) permit renewal application that there are no known or suspected sources of toxic pollutants or pesticides based on an industrial user survey. However, based on results of analyses performed by the applicant, toxic pollutants and WET exceedances have been observed in the effluent of the Tafuna STP. For example, analytical results from toxic pollutant analyses from September 2004 and March 2005 show concentrations of metals (e.g., copper and mercury), dioxins, and pesticides in the effluent above water quality standards. Therefore, EPA has concluded that the applicant has not met the requirements of 40 CFR 125.66(b) since it has not submitted an analysis of the known or suspected sources of the toxic pollutants that the analytical data show are present in the effluent.

3. Industrial Pretreatment Requirements

Under 40 CFR 125.66(c)(2), an applicant shall have an approved pretreatment program unless it certifies that it has no known or suspected industrial sources of toxic pollutants. In the application, the applicant certified that no major industrial sources currently discharge to the Tafuna STP nor are any planned. Therefore, EPA has concluded that the applicant has met the requirements of 40 CFR 125.66(c)(2).

4. Nonindustrial Source Control Program

40 CFR 125.66(d)(1) requires all applicants to submit a proposed public education program designed to minimize the entrance of nonindustrial toxic pollutants into the treatment plant, which shall be implemented no later than 18 months after issuance of a section 301(h)-modified permit. In the application, the applicant proposed the continuation of its Non-industrial Source Control Education Program that consists of newspaper articles, radio and television announcements, and informational pamphlets to increase the awareness of the need for the proper disposal of toxic pollutants. The program includes personnel from ASPA, ASEPA, Public Health, and the Office of Samoan Affairs. Therefore, EPA has concluded that the applicant has met the requirements of 40 CFR 125.66(d)(1) based on its proposed public education program.

Under 40 CFR 125.66(d)(2), an applicant shall also develop and implement additional nonindustrial source control programs unless a small applicant certifies that there are no known or suspected water quality, sediment accumulation, or biological problems related to toxic pollutants or pesticides in its discharge. Because the applicant has not met the requirements of 40 CFR 125.66(b) and toxicity has been observed in the effluent, EPA has concluded that the applicant has not met the requirements of 40 CFR 125.66(d)(2) since monitoring data demonstrate that additional nonindustrial source control programs may be warranted.

G. Urban Area Pretreatment Program

In accordance with section 301(h)(5) and (6) of the Act, 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. Pursuant to 40 CFR 125.65, which implements section 301(h)(5) and (6) of the Act, an urban area pretreatment program is required only for large applicants (i.e., POTWs serving a population of 50,000 or more) that have toxic pollutants introduced into the POTW by industrial dischargers. By definition, the applicant is a small applicant and, therefore, EPA has determined that the applicant is not required to implement an urban area pretreatment program (40 CFR 125.58(c)).

H. Increase in Effluent Volume or Amount of Pollutants Discharged

In accordance with section 301(h)(8) of the Act and 40 CFR 125.67, EPA may not issue a section 301(h)-modified NPDES permit 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, 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 projected an increase in the average daily flow from 2.0 MGD (0.088 m^3/sec) to 3.0 MGD (0.131 m^3/sec) by 2012. In the application, the applicant projected effluent volume and mass loadings for BOD and TSS from 2010 to 2020. In accordance with EPA's ATSD, during this period, the applicant projected an average annual effluent volume of 0.131 m^3/sec for 2010, 2015, and 2020. In addition, the applicant calculated BOD and TSS mass loadings of 414 and 311 metric tons/year, respectively. These loads were based on the applicant's proposed 30-day average effluent limitations of 2,502 and 1,877 lbs/day for BOD and TSS, respectively, and correspond to a flow of 3.0 MGD and requested permit effluent limitations for BOD and TSS of 100 and 75 mg/l, respectively. The applicant's facility is not a combined sewer system and since the applicant provided projections of effluent volume and mass loadings for BOD and TSS for the facility over the next permit period and beyond, EPA has concluded that the applicant has satisfied section 40 CFR 125.67.

I. Compliance with Other Applicable Laws

40 CFR 125.59(b) 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 USC 1451 *et seq.*; the Endangered Species Act of 1973, as amended, 16 USC 1531 *et seq.*; Title III of the Marine Protection, Research and Sanctuaries Act, as amended, 16 USC 1431 *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 of 1972

Under 40 CFR 125.59(b)(3), a section 301(h)-modified permit must comply with the Coastal Zone Management Act of 1972, as amended, 16 USC 1451 *et seq*. In accordance with 16 USC 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 to be consistent with the Territory's Coastal Zone Management Program. In the application, the applicant indicated that the American Samoa Coastal Management Project Manager certified that the issuance of a section 301(h)-modified permit complied with the goals and polices of the American Samoa Coastal Management Program. However, this certification was issued on February 28, 1991, on the previous section 301(h)-modified permit renewal application. The applicant indicated that improvements to the Tafuna STP since 1991 have resulted in better water quality and that it would seek another certification if necessary. To comply with 40 CFR 125.59(b)(3), the applicant must obtain a new certification for the application renewal. However, since EPA's tentative decision is that a modified permit would not be appropriate and, therefore, no modified permit has been prepared, a certification or concurrence from the American Samoa government is unnecessary 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 USC 1431 *et seq*. In accordance with 40 CFR 125.59(b)(3), 16 USC 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, the applicant indicated that the proposed modified discharge is not located in a marine sanctuary designated under Title III of the Marine Protection, Research and Sanctuaries Act. The closest marine sanctuary, Fagatele Bay, is located approximately four miles southwest of the discharge point of the Tafuna STP. Due to the prevailing northeast currents and dilution, the applicant believes the proposed modified discharge is not likely to significantly impact the marine sanctuary. If EPA's tentative decision was 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, 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 MPRSA and/or National Marine Fisheries Service concurrence is necessary at this time.

3. Endangered Species Act of 1973

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 USC 1531 *et seq*. In accordance with 16 USC 1536(a)(2), a section 301(h)-modified permit may not be issued if the proposed modified discharge will adversely impact threatened or endangered species or critical habitat listed pursuant to the ESA. In the application, the applicant indicated that the Tafuna STP discharge is

consistent with the ESA as was documented in the original section 301(h) waiver application in 1985. The applicant also indicated that there is no federally designated critical habitat, as defined in section 3 of the ESA, located near the discharge that will be affected by the proposed modified discharge. Because each application for permit reissuance is considered to be an application for a new NPDES permit, applicants are required to provide new determinations of compliance with all applicable laws and regulations during the section 301(h)-modified permit renewal process. However, the applicant did not specify nor provide a list of threatened or endangered species that inhabit or obtain nutrients from waters that may be affected by the modified discharge as required. If EPA's tentative decision was 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, 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 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 cannot be issued where such issuance would conflict with applicable provisions of other laws. One such law is 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, ASPA did not provide any information on whether the proposed discharge will adversely impact impacts to EFH, or on compliance with the requirements of MSA. ASPA 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 and Concurrence on Compliance with Water Quality Standards

Under 40 CFR 125.59(f)(1)(iii) the applicant must submit a copy of the application to the American Samoa government to provide certification/concurrence under 40 CFR 124.53 through 124.55 on or before the date the application is submitted to EPA. In addition, under 40 CFR 125.61(b)(2), the applicant is required to submit a determination from the American Samoa government that the modified discharge will comply with all applicable provisions of Territorial law, including water quality standards. On May 4, 2004, the applicant provided a copy of its application to ASEPA. At this time, EPA has not received a certification/concurrence from ASEPA pursuant to 40 CFR 124.53 through 124.55. 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 concurrence from the American Samoa government is unnecessary at this time.

References

ASPA, 2004. Section 301(h)-Modified NPDES Permit Reissuance Application and Questionnaire for Small Dischargers for the Tafuna Wastewater Treatment Plant, NPDES Permit No. AS0020010. Submitted to EPA by American Samoa Power Authority, May 4, 2004.

Buchan, E. 2006. Memo to Sara N. Greiner, NPDES Permits Office, Water Division, EPA Region IX, San Francisco, CA, dated November 17, 2006 from Edna Buchan, ASEPA, Pago Pago, American Samoa.

EPA, 1986. Ambient Water Quality Criteria for Bacteria - 1986. Prepared by EPA, Office of Water, Regulations and Standards Division, Washington, D.C. EPA/440/5-84-002.

EPA, 1994a. Amended section 301(h) Technical Support Document. Prepared by EPA, Office of Wetlands, Oceans, and Watersheds, Oceans and Coastal Protection Division (4504F), Washington, D.C. EPA/842/B-94-007.

EPA, 1994b. Technical Support Document for Water Quality-based Toxics Control. Prepared by EPA, Office of Water (EN-336)), Washington, D.C. EPA/505/2-90-001.

EPA, 1995. Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms. Prepared by EPA, Office of Research and Development, Washington, D.C. EPA/600R-95/136.

EPA, 2006. National Recommended Water Quality Criteria. Prepared by EPA, Office of Water, Office of Science and Technology (4304T), Washington, D.C.

EPA, 2007. EPA Region 9 and 10 Tox Training Tool. Principal authors are D. Denton, R. Stuber and A. Wagner, EPA Region 9, San Francisco, CA.

GMP Associates, Inc. 2001. Basis of Design: Northern District Treatment Plant Outfall Extension Tumon Bay Infrastructure and Beautification Project. Prepared for Guam Waterworks Authority and Department of Public Works, Hagatna, Guam.

Grothe, D.R., K.L. Dickson and D.K. Reed-Judkins. 1996. Whole effluent toxicity testing: An evaluation of methods and prediction of receiving system impacts. Society of Environmental Toxicology and Chemistry (SETAC) Pellston Workshop on Whole Effluent Toxicity; 16-25 Sep 1995; Pellston MI. Pensacola FL: SETAC. 340 p.

Miescier, J.J., and V.J. Cabelli. 1982. Enterococci and Other Microbial Indicators in Municipal Wastewater Effluents. Journal Water Pollution Control Federation, Vol. 54(12):1599-1606.

Appendices

APPENDIX A

Summary of monthly average TSS influent and effluent concentrations and removal rates for the Tafuna STP. Shaded cells indicate percent removal below the 30 percent primary treatment requirement.

Month	TSS Concentrations and Percent Removal Based on Calendar Year														
	1999			2000			2001			2002			2003		
	Influent (mg/l)	Effluent (mg/l)	% Removal	Influent (mg/l)	Effluent (mg/l)	% Removal	Influent (mg/l)	Effluent (mg/l)	% Removal	Influent (mg/l)	Effluent (mg/l)	% Removal	Influent (mg/l)	Effluent (mg/l)	% Removal
January	63	18	71	61	26	57	169	41	76	136	29	79	148	38	74
February	49	22	55	53	16	70	66	34	48	143	48	66	101	32	68
March	107	13	88	91	32	65	180	35	81	125	67	46	112	33	71
April	86	20	77	103	20	81	57	30	47	158	55	65	161	38	76
May	126	18	86	77	12	84	114	57	50	173	44	75	139	29	79
June	83	15	82	63	19	70	100	52	48	103	28	73	88	29	67
July	103	23	78	97	19	80	91	47	48	93	39	58	83	31	63
August	126	30	76	63	29	54	90	36	60	130	45	65	205	50	76
September	120	19	84	109	33	70	68	48	29	166	50	73	163	69	58
October	118	23	81	157	43	73	94	42	55	119	31	74	171	36	79
November	-[1]	-	-	134	48	64	122	46	62	127	25	80	113	40	65
December	130	25	81	97	35	64	130	32	75	100	16	84	90	39	56

[1]Data not available for review

APPENDIX A

Summary of monthly average TSS influent and effluent concentrations and removal rates for the Tafuna STP. Shaded cells indicate percent removal below the 30 percent primary treatment requirement.

Month	TSS Concentrations and Percent Removal Based on Calendar Year														
	2004			2005			2006			2007			2008		
	Influent (mg/l)	Effluent (mg/l)	% Removal	Influent (mg/l)	Effluent (mg/l)	% Removal	Influent (mg/l)	Effluent (mg/l)	% Removal	Influent (mg/l)	Effluent (mg/l)	% Removal	Influent (mg/l)	Effluent (mg/l)	% Removal
January	75	35	53	-[1]	-	-	58	31	46	74	38	49	45	21	53
February	160	56	65	-	-	-	54	31	42	75	41	46	54	28	48
March	132	51	61	-	-	-	73	36	49	73	39	47	60	32	47
April	86	56	35	43	26	38	70	38	48	69	36	48	44	26	41
May	91	50	46	47	27	43	83	46	45	37	21	40	57	32	44
June	122	38	69	52	31	40	51	33	33	50	23	53	39	27	31
July	42	32	24	55	28	48	59	29	49	49	27	45	-	-	-
August	50	35	30	51	29	42	65	37	43	46	26	45	-	-	-
September	55	32	42	89	48	44	69	36	48	46	25	44	-	-	-
October	48	27	44	67	38	44	69	41	41	45	24	46	-	-	-
November	49	27	45	62	34	46	67	33	50	58	32	44	-	-	-
December	49	28	43	66	37	44	66	42	38	47	29	39	-	-	-

[1]Data not available for review

APPENDIX A

Summary of monthly average BOD influent and effluent concentrations and removal rates for the Tafuna STP. Shaded cells indicate percent removal below the 30 percent primary treatment requirement.

Month	BOD Concentrations and Percent Removal Based on Calendar Year														
	1999			2000			2001			2002			2003		
	Influent (mg/l)	Effluent (mg/l)	% Removal	Influent (mg/l)	Effluent (mg/l)	% Removal	Influent (mg/l)	Effluent (mg/l)	% Removal	Influent (mg/l)	Effluent (mg/l)	% Removal	Influent (mg/l)	Effluent (mg/l)	% Removal
January	52	29	44	80	34	58	-[1]	-	-	-	-	-	82	36	56
February	53	33	38	75	28	63	-	-	-	98	41	58	82	41	50
March	50	30.5	39	-	-	-	-	-	-	120	33	73	88	43.7	50
April	52	39	25	-	-	-	-	-	-	118	30	75	90.8	48.5	47
May	53	26	51	-	-	-	112	41	63	102	45	56	67	42	37
June	61	32.75	46	-	-	-	96	42	56	61	29	52	69	45	35
July	71	31.6	55	-	-	-	88	42	52	80	44	45	128	70	45
August	106	33	69	-	-	-	85	34	60	74	37	50	126	64	49
September	86	34	61	-	-	-	96	48	50	99	52	48	161	75	53
October	103	43.75	58	-	-	-	106	43	59	125	49	61	115	64	55
November	-	-	-	-	-	-	66	32	52	104	57	55	105	67	36
December	84	29	66	-	-	-	56	36	36	82	36	56	326	57	83

[1]Data not available for review

APPENDIX A

Summary of monthly average BOD influent and effluent concentrations and removal rates for the Tafuna STP. Shaded cells indicate percent removal below the 30 percent primary treatment requirement.

Month	BOD Concentrations and Percent Removal Based on Calendar Year														
	2004			2005			2006			2007			2008		
	Influent (mg/l)	Effluent (mg/l)	% Removal	Influent (mg/l)	Effluent (mg/l)	% Removal	Influent (mg/l)	Effluent (mg/l)	% Removal	Influent (mg/l)	Effluent (mg/l)	% Removal	Influent (mg/l)	Effluent (mg/l)	% Removal
January	113	46	59	-[1]	-	-	141	71	50	169	77	54	133	83	38
February	120	60	50	-	-	-	126	68	46	168	76	55	215	92	57
March	106	49	54	-	-	-	185	83	55	173	85	51	135	81	40
April	119	51	59	184	89	51	202	100	41	110	55	50	164	88	46
May	120	55	54	136	68	50	147	82	44	98	63	36	170	98	42
June	119	50	58	136	68	50	123	63	49	146	67	54	85	60	29
July	139	55	61	154	68	56	128	65	49	147	64	57	-	-	-
August	220	107	51	147	74	50	121	55	55	162	82	49	-	-	-
September	145	71	51	171	75	56	140	65	54	139	83	40	-	-	-
October	121	75	38	147	63	57	157	68	57	135	72	47	-	-	-
November	164	87	47	157	66	58	131	65	50	206	92	55	-	-	-
December	213	96	55	139	59	57	100	53	47	147	69	53	-	-	-

[1]Data not available for review

APPENDIX B

Evaluation of Effluent Concentrations of Priority Pollutants from the Tafuna STP

Priority Pollutant	Effluent Conc. (µg/l)		Max. Effluent Conc. (µg/l)	Predicted Receiving Water Conc. (µg/l)[1]	Federal Water Quality Criteria				ASWQS (µg/l)	Exceeds Criteria at ZID?
					Saltwater Aquatic Life Criteria		Human Health Criteria For Consumption of:			
	September 2004	March 2005			CMC (µg/l)	CCC (µg/l)	Water + Organism (µg/l)	Organism Only (µg/l)		
Antimony	ND[2]	ND	-[3]	-	-	-	5.6	640	-	N
Arsenic	ND	ND	-	-	69	36	0.018	0.14	-	N
Beryllium	ND	ND	-	-	-	-	-	-	-	N
Cadmium	ND	ND	-	-	40	8.8	-	-	-	N
Chromium	ND	ND	-	-	1,000	50	-	-	-	N
Copper	7.2	7.4	7.4	0.04	4.8	3.1	1,300	-	-	N
Lead	ND	ND	-	-	210	8.1	-	-	-	N
Mercury	0.07	0.0464	0.07	3.7E-4	1.8	0.94	-	-	0.05	N
Methylmercury	-	-	-	-	-	-	-	0.3 mg/kg	-	-
Nickel	ND	ND	-	-	74	8.2	610	4,600	-	N
Selenium	ND	ND	-	-	290	71	170	4,200	-	N
Silver	ND	ND	-	-	1.9	-	-	-	-	N
Thallium	ND	ND	-	-	-	-	0.24	0.47	-	N
Zinc	50.6	38.6	50.6	0.27	90	81	7,400	26,000	-	N
Cyanide	ND	ND	-	-	1	1	140	140	-	N
2,3,7,8-TCDD (Dioxin)[4]	5.0E-7	1.5E-7	5.0E-7	2.7E-9	-	-	5.1E-9	5.1E-9	-	N
Acrolein	ND	ND	-	-	-	-	190	290	-	N

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					Saltwater Aquatic Life Criteria		Human Health Criteria For Consumption of:			
	September 2004	March 2005			CMC (µg/l)	CCC (µg/l)	Water + Organism (µg/l)	Organism Only (µg/l)		
Acrylonitrile	ND	ND	-	-	-	-	0.051	0.25	-	N
Benzene	ND	ND	-	-	-	-	2.2	51	-	N
Bromoform	ND	ND	-	-	-	-	4.3	140	-	N
Carbon Tetrachloride	ND	ND	-	-	-	-	0.23	1.6	-	N
Chlorobenzene	ND	ND	-	-	-	-	130	1,600	-	N
Chlorodibromomethane	ND	ND	-	-	-	-	0.40	13	-	N
Chloroethane	ND	ND	-	-	-	-	-	-	-	N
2-Chloroethylvinyl Ether	ND	ND	-	-	-	-	-	-	-	N
Chloroform	0.45	0.98	0.98	0.005	-	-	5.7	470	-	N
Dichlorobromomethane	ND	ND	-	-	-	-	0.55	17	-	N
1,1-Dichloroethane	ND	ND	-	-	-	-	-	-	-	N
1,2-Dichloroethane	ND	ND	-	-	-	-	0.38	37	-	N
1,1-Dichloroethylene	ND	ND	-	-	-	-	330	7,100	-	N
1,2-Dichloropropane	ND	ND	-	-	-	-	0.50	15	-	N
1,3-Dichloropropene	ND	ND	-	-	-	-	0.34	21	-	N
Ethylbenzene	ND	ND	-	-	-	-	530	2,100	-	N
Methyl Bromide	ND	ND	-	-	-	-	47	1,500	-	N

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					Saltwater Aquatic Life Criteria		Human Health Criteria For Consumption of:			
	September 2004	March 2005			CMC (µg/l)	CCC (µg/l)	Water + Organism (µg/l)	Organism Only (µg/l)		
Methyl Chloride	ND	ND	-	-	-	-	-	-	-	N
Methylene Chloride	0.64	0.56	0.64	0.003	-	-	4.6	590	-	N
1,1,2,2-Tetrachloroethane	ND	ND	-	-	-	-	0.17	4.0	-	N
Tetrachloroethylene	ND	ND	-	-	-	-	0.69	3.3	-	N
Toluene	4.7	0.94	4.7	0.025	-	-	1,300	15,000	-	N
1,2,-Trans-Dichloroethylene	ND	ND	-	-	-	-	140	10,000	-	N
1,1,1-Trichloroethane	ND	ND	-	-	-	-	-	-	-	N
1,1,2-Trichloroethane	ND	ND	-	-	-	-	0.59	16	-	N
Trichloroethylene	ND	ND	-	-	-	-	2.5	30	-	N
Vinyl Chloride	ND	ND	-	-	-	-	0.025	2.4	-	N
2-Chlorophenol	ND	ND	-	-	-	-	81	150	-	N
2,4-Dichlorophenol	ND	ND	-	-	-	-	77	290	-	N
2,4-Dimethylphenol	ND	ND	-	-	-	-	380	850	-	N

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					Saltwater Aquatic Life Criteria		Human Health Criteria For Consumption of:			
	September 2004	March 2005			CMC (µg/l)	CCC (µg/l)	Water + Organism (µg/l)	Organism Only (µg/l)		
2-Methyl-4,6-Dinitrophenol	ND	ND	-	-	-	-	13	280	-	N
2,4-Dinitrophenol	ND	ND	-	-	-	-	69	5,300	-	N
2-Nitrophenol	ND	ND	-	-	-	-	-	-	-	N
4-Nitrophenol	6.6	ND	6.6	0.035	-	-	-	-	-	N
3-Methyl-4-Chlorophenol	ND	ND	-	-	-	-	-	-	-	N
Pentachlorophenol	ND	ND	-	-	13	7.9	0.27	3.0	-	N
Phenol	84	82	84	0.45	-	-	2.1E4	1.7E6	-	N
2,4,6-Trichlorophenol	ND	ND	-	-	-	-	1.4	2.4	-	N
Acenaphthene	ND	ND	-	-	-	-	670	990	-	N
Acenaphthylene	ND	ND	-	-	-	-	-	-	-	N
Anthracene	ND	ND	-	-	-	-	8.3E3	4.0E4	-	N
Benzidine	ND	ND	-	-	-	-	8.6E-5	2.0E-4	-	N
Benzo(a)Anthracene	ND	ND	-	-	-	-	0.0038	0.018	-	N
Benzo(a)Pyrene	ND	ND	-	-	-	-	0.0038	0.018	-	N
Benzo(b)Fluoranthene	ND	ND	-	-	-	-	0.0038	0.018	-	N

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					Saltwater Aquatic Life Criteria		Human Health Criteria For Consumption of:			
	September 2004	March 2005			CMC (µg/l)	CCC (µg/l)	Water + Organism (µg/l)	Organism Only (µg/l)		
Benzo(ghi)Perylene	ND	ND	-	-	-	-	-	-	-	N
Benzo(k)Fluoranthene	ND	ND	-	-	-	-	0.0038	0.018	-	N
Bis(2-Chloroethoxy) - Methane	ND	ND	-	-	-	-	-	-	-	N
Bis(2-Chloroethyl)Ether	ND	ND	-	-	-	-	0.030	0.53	-	N
Bis(2-Chloroisopropyl) - Ether	ND	ND	-	-	-	-	1,400	65,000	-	N
Bis(2-Ethylhexyl)Phthalate	16	22	22	0.18	-	-	1.2	2.2	-	N
4-Bromophenyl Phenyl Ether	ND	ND	-	-	-	-	-	-	-	N
Butylbenzyl Phthalate	ND	1.2	1.2	0.0064	-	-	1,500	1,900	-	N
2-Chloronaphthalene	ND	ND	-	-	-	-	1,000	1,600	-	N
4-Chlorophenyl Phenyl Ether	ND	ND	-	-	-	-	-	-	-	N
Chrysene	ND	ND	-	-	-	-	0.0038	0.018	-	N
Dibenzo(a,h)Anthracene	ND	ND	-	-	-	-	0.0038	0.018	-	N
1,2-Dichlorobenzene	ND	ND	-	-	-	-	420	1,300	-	N
1,3-Dichlorobenzene	ND	ND	-	-	-	-	320	960	-	N
1,4--Dichlorobenzene	6.0/3.8	5.9	6.0	0.03	-	-	63	190	-	N

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					Saltwater Aquatic Life Criteria		Human Health Criteria For Consumption of:			
	September 2004	March 2005			CMC (µg/l)	CCC (µg/l)	Water + Organism (µg/l)	Organism Only (µg/l)		
3,3-Dichlorobenzidine	ND	ND	-	-	-	-	0.021	0.028	-	N
Diethyl Phthalate	7.5	6.2	7.5	0.04	-	-	1.7E4	4.4E4	-	N
Dimethyl Phthalate	ND	ND	-	-	-	-	2.7E5	1.1E6	-	N
Di-n-Butyl Phthalate	ND	0.58	0.58	0.003	-	-	2,000	4,500	-	N
2,4-Dinitrotoluene	ND	ND	-	-	-	-	0.11	3.4	-	N
2,6-Dinitrotoluene	ND	ND	-	-	-	-	-	-	-	N
Di-n-Octyl Phthalate	ND	ND	-	-	-	-	-	-	-	N
2,4-Diphenylhydrazine	ND	ND	-	-	-	-	0.36	0.20	-	N
Fluoranthene	ND	ND	-	-	-	-	130	140	-	N
Fluorene	ND	ND	-	-	-	-	1,100	5,300	-	N
Hexachlorobenzene	ND	ND	-	-	-	-	2.8E-4	2.9E-4	-	N
Hexachlorobutadiene	ND	ND	-	-	-	-	0.44	18	-	N
Hexachlorocyclo-pentadiene	ND	ND	-	-	-	-	40	1,100	-	N
Hexachloroethane	ND	ND	-	-	-	-	1.4	3.3	-	N
Ideno(1,2,3-cd)Pyrene	ND	ND	-	-	-	-	0.0038	0.018	-	N

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					Saltwater Aquatic Life Criteria		Human Health Criteria For Consumption of:			
	September 2004	March 2005			CMC (µg/l)	CCC (µg/l)	Organism Only (µg/l)	Organism + Water (µg/l)		
Isophorone	ND	ND	-	-	-	-	35	960	-	N
Naphthalene	ND	ND	-	-	-	-	-	-	-	N
Nitrobenzene	ND	ND	-	-	-	-	17	690	-	N
N-Nitrosodimethylamine	ND	ND	-	-	-	-	6.9E-4	3.0	-	N
N-Nitrosodi-n-Propylamine	ND	ND	-	-	-	-	0.0050	0.51	-	N
N-Nitrosodiphenylamine	ND	ND	-	-	-	-	3.3	6.0	-	N
Phenanthrene	ND	ND	-	-	-	-	-	-	-	N
Pyrene	ND	ND	-	-	-	-	830	4,000	-	N
1,2,4-Trichlorobenzene	ND	ND	-	-	-	-	35	70	-	N
Aldrin	ND	ND	-	-	1.3	-	4.9E-5	5.0E-5	-	N
alpha-BHC	ND	ND	-	-	-	-	2.6E-3	4.9E-3	-	N
beta-BHC	ND	ND	-	-	-	-	0.0091	0.017	-	N
gamma-BHC (Lindane)	0.021	ND	-	-	0.16	-	0.98	1.8	-	N
delta-BHC	ND	ND	-	-	-	-	-	-	-	N
Chlordane	ND	ND	-	-	0.09	0.004	8.0E-4	8.1E-4	-	N
4,4'-DDT	0.018	ND	0.018	9.6E-5	0.13	0.001	2.2E-4	2.2E-4	-	N
4,4'-DDE	ND	ND	-	-	-	-	2.2E-4	2.2E-4	-	N

APPENDIX B

Evaluation of Effluent Concentrations of Priority Pollutants from the Tafuna STP

Priority Pollutant	Effluent Conc. (µg/l)		Max. Effluent Conc. (µg/l)	Predicted Receiving Water Conc. (µg/l)[1]	Federal Water Quality Criteria				ASWQS (µg/l)	Exceeds Criteria at ZID?
					Saltwater Aquatic Life Criteria		Human Health Criteria For Consumption of:			
	September 2004	March 2005			CMC (µg/l)	CCC (µg/l)	Organism Only (µg/l)	Organism + Water (µg/l)		
4,4'-DDD	ND	ND	-	-	-	-	3.1E-4	3.1E-4	-	N
Dieldrin	ND	ND	-	-	0.71	0.0019	5.2E-5	5.4E-5	-	N
alpha-Endosulfan	ND	ND	-	-	0.034	0.0087	62	89	-	N
beta-Endosulfan	ND	ND	-	-	0.034	0.0087	62	89	-	N
Endosulfan Sulfate	ND	ND	-	-	-	-	62	89	-	N
Endrin	ND	ND	-	-	0.037	0.0023	0.59	0.060	-	N
Endrin Aldehyde	ND	ND	-	-	-	-	0.29	0.30	-	N
Heptachlor	ND	ND	-	-	0.053	0.0036	7.9E-5	7.9E-5	-	N
Heptachlor Epoxide	ND	ND	-	-	0.053	0.0036	3.9E-5	3.9E-5	-	N
Polyclorinated Biphenyls (PCBs)[5]	ND	ND	-	-	-	0.03	6.4E-5	6.4E-5	-	N
Toxaphene	ND	ND	-	-	0.21	0.0002	2.8E-4	2.8E-4	-	N

[1]Predicted receiving water concentration calculated by dividing the maximum effluent concentration by the critical initial dilution
[2]Concentration estimated to be below laboratory detectable levels
[3]Nondetect concentrations assumed to be zero and thus assumed to not be above the water quality criterion; or no water quality criterion available
[4]Effluent concentration based on 2,3,7,8-TCDD Toxic Equivalency Factors to determine Toxic Equivalents
[5]Effluent concentration based on "non-detect" concentrations reported for Aroclors 1016, 1232, 1242, 1248, 1254 and 1260