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

AMERICAN SAMOA POWER AUTHORITY'S UTULEI 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 Utulei 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 Utulei 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 Pago Pago Harbor, 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, 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.

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

[1] A section 301(h) variance from secondary treatment is often referred to informally as a "waiver."
[2] Section 502(3) of the Act defines "State" to include territories, specifically including American Samoa. 33 USC 1362(3).

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;
>
> (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's proposed discharge will comply with the American Samoa water quality standards for dissolved oxygen and suspended solids (i.e., TSS). [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 beyond the zone of initial dilution. The specific water quality standards 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 Utulei 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 adequate 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.

Description of Facility and Treatment System

A. Background

The original section 301(h) decision for a variance from secondary treatment requirements at the Utulei Sewage Treatment Plant (STP) was issued in 1985. Utulei STP’s first section 301(h)

renewal application was submitted to EPA on March 26, 1991. The renewal application was based on an altered discharge, as defined in 40 CFR 125.58(b). Subsequently, EPA requested additional information and on January 8, 1996, the applicant submitted a revised application under 40 CFR 125.59(d)(3) proposing treatment plant upgrades and a new outfall and diffuser system. The revised application was based on an improved discharge, as defined in 40 CFR 125.58(i). The new outfall and diffuser system began operation in 1996. On April 9, 2001, 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 revisions to the existing monitoring program and demonstration that the applicant had the resources capable to implement any new monitoring requirements.

On October 5, 2001, EPA issued a Final Decision Document based upon the applicant's ability to meet the contingencies identified in the April 2001 Tentative Decision Document. In accordance with the 2001 Final Decision Document, EPA Region IX issued the current section 301(h)-modified NPDES permit (AS0020001) on October 5, 2001. The permit became effective on October 9, 2001, and expired on October 9, 2006. Pursuant to 40 CFR 122.21, the terms of the existing permit have been administratively extended. On May 1, 2006, the applicant again submitted a 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. On March 2, 2008, the applicant submitted supplemental information to EPA supporting its 2006 renewal application.

B. Treatment System

The Utulei STP is located in the town of Utulei on Tutuila Island, the largest and principal island of American Samoa. Utulei STP is a primary treatment plant that collects and treats wastewater from several nearby residential areas and the downtown area. The service area includes the villages of Faga'alu (including the hospital), Utulei, Fagatogo, Pago Pago (both upper and lower parts of the village), and Atu'u (including the sanitary wastewater from the two local tuna canneries). The service area also includes the villages of Leloaloa, Au'a, and Onesosopo which are not yet connected but were included in the original design of the Harbor Sewer System and the Utulei STP. In the application, the applicant indicated that the wastewater collected from these areas is largely organic and domestic in nature. Domestic wastewater includes waste or wastewater from humans or household operations that is discharged to or that otherwise enters the treatment plant (40 CFR 122.2). In the application, the applicant indicated that there are currently no industrial sources of wastewater flow to the treatment plant and none planned in the near future. The plant currently serves a population of 8,000 people. Future expansions of the collection system are expected to provide service to approximately 13,000 people by 2012.

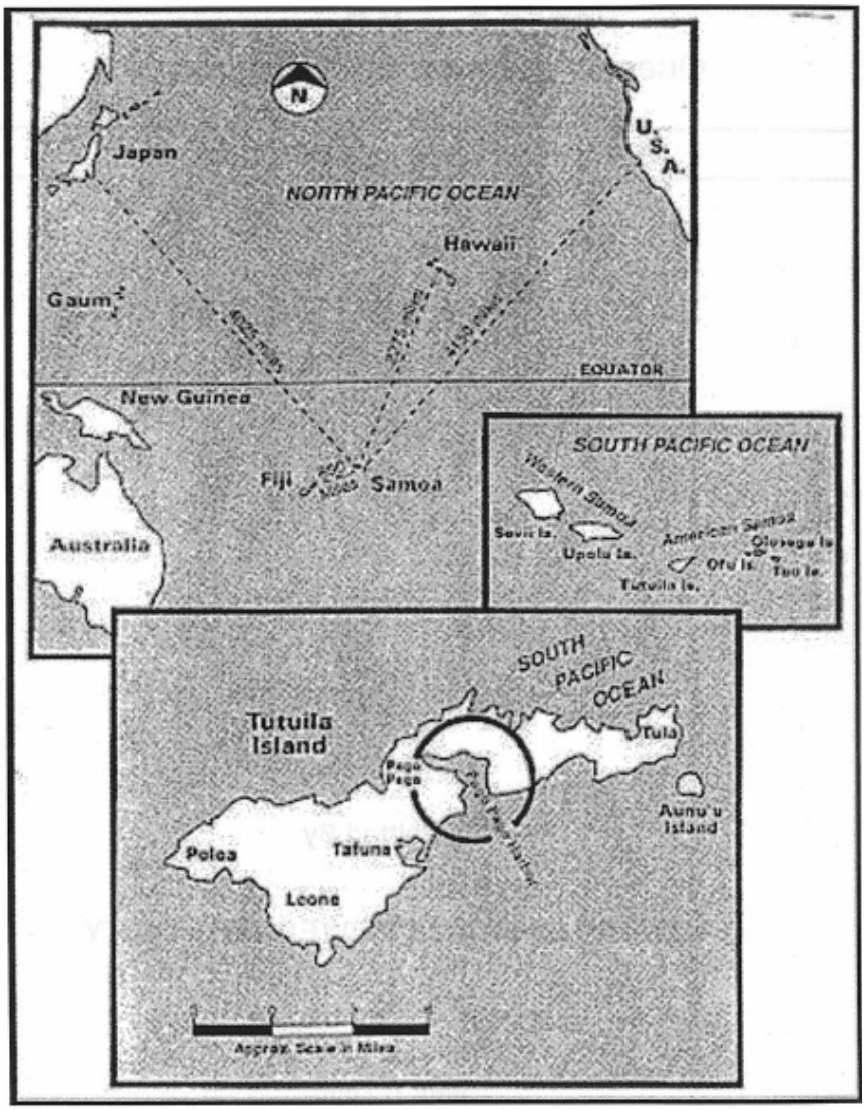

Figure 1a – Map of the location of American Samoa and Pago Pago Harbor. Reprinted from the 2006 section 301(h)-modified NPDES permit renewal application.

The Utulei STP discharges treated effluent directly into Pago Pago Harbor through a 24-inch high-density polyethylene pipe and outfall. The terminus of the outfall is located approximately 954 feet off of Tulutulu Point in outer Pago Pago Harbor at a depth of 150 feet. This places the end of the outfall at 14º 16' 49.44" South latitude and 170º 40' 07.98" 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 alternatively opposite directions through a linear multiport diffuser. The diffuser consists of six ports and has a total length of approximately 47 feet, with the ports spaced approximately seven feet apart. The ports have a diameter of 7.75-inches and the average depth of the ports is 145 feet.

Figure 1b – Map of the location of Utulei STP and outfall. Reprinted from the 2006 section 301(h)-modified NPDES permit renewal application.

The existing outfall and diffuser first began operation in 1996 and were constructed to improve the discharge by enhancing the initial dilution and dispersal of pollutants in the receiving water. The improvements included a 47 foot diffuser with six ports to enhance dilution and mixing within the water column. Sludge from the primary treatment process is transported to the Tafuna STP on the southeastern portion of the island where it 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 Utulei outfall and diffuser.

From April 2005 to June 2008, the maximum daily flow of the discharge ranged between 1.3 and 4.0 MGD. In the application, the applicant indicated an annual daily average flow of 1.47 MGD. In addition, the applicant projected an annual daily average flow of 3.0 MGD and an instantaneous maximum daily flow rate of 6.0 MGD[3] during the next permit cycle at the Utulei STP.

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

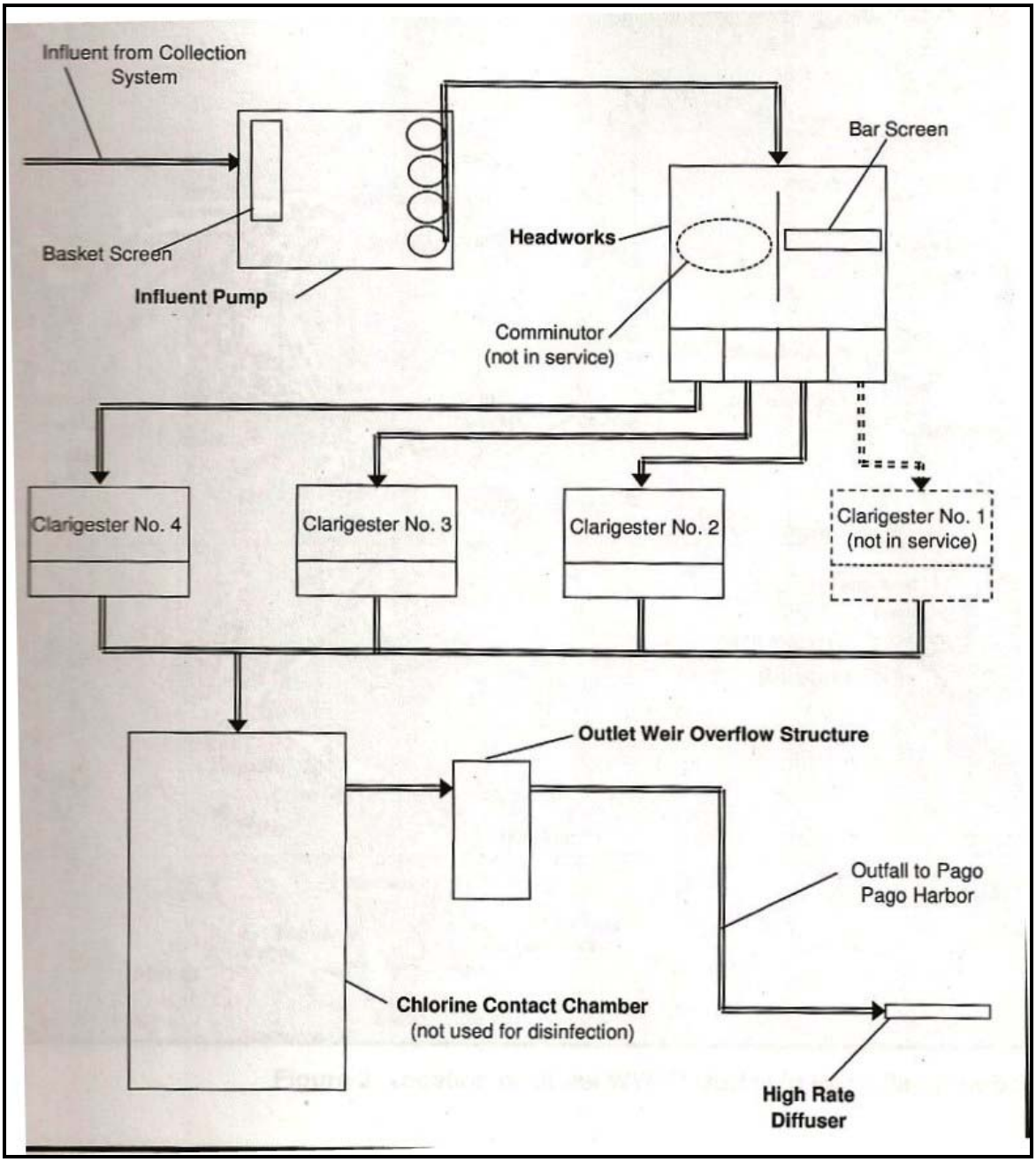

Figure 2. Diagram of Utulei STP's wastewater treatment system. Reprinted from the 2006 section 301(h)-modified NPDES permit renewal application.

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

Parameter	Description
Total outfall + diffuser length, ft	1,001
Outfall diameter, in	21
Diffuser depth, ft	150
Diffuser diameter, in	21
Diffuser length, ft	47
Port configuration	alternate
Port number	6
Port spacing, ft	7
Port diameter, in	7.75
Angle of port orientation from horizontal, degrees	0
Port depth below the surface, ft	145
Design maximum hydraulic rate for ports 1-6, MGD[1]	1.04, 1.04, 1.02, 0.99, 0.95, 0.97

[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 Utulei STP is based on an altered discharge to waters of American Samoa. The applicant identifies the altered discharge as an anticipated increase in annual average flow from 2.2 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 from April 2005 to June 2008 for the Utulei STP.

Description of Receiving Water

The Utulei STP discharges into the outer portion of Pago Pago Harbor. Pago Pago Harbor is located on the northeastern portion of Tutuila Island in American Samoa and empties into the South Pacific Ocean. In the application, the applicant indicated Pago Pago Harbor has a typical estuarine circulation pattern, with upper layers of water near the mouth of the harbor that move out continuously while lower layers move in. However, the applicant also indicated that,

Table 2 - Summary of existing and the applicant's requested effluent limitations and effluent monitoring data based on Discharge Monitoring Reports from April 2005 to June 2008 for the Utulei STP.

Parameter	Existing Effluent Limits			Requested Effluent Limits			Effluent Monitoring Data (2005-2008)		
	30-Day Average	Average Weekly	Daily Maximum	30-Day Average	Average Weekly	Daily Maximum	Highest 30-Day Average	Highest Average Weekly	Daily Maximum
BOD, mg/l	78.3	117	157	78.3	117	157	69	78	110
BOD, lbs/day[2]	1,085	1,628	2,170	1,973	2,948	3,956	1,247	1,918	-[1]
TSS, mg/l	75	113	150	75	113	150	35	38	60
TSS, lbs/day[3]	1,377	2,065	2,754	1,890	2,848	3,780	737	992	-
Settable Solids, ml/l	1	-	2	1	-	2	0.2	-	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			6.8 (Minimum) to 7.5 (Maximum)		

[1]Data not required or available for review
[2]Mass-based effluent limitations for BOD based on average flow of 1.66 MGD; mass-based requested effluent limits for BOD based on end-of-permit flow of 3.0 MGD
[3]Mass-based effluent limitations for TSS based on existing permit's end-of-permit average flow of 2.2 MGD; mass-based requested effluent limits for TSS based on end-of-permit flow of 3.0 MGD

because of the lack of distinct stratification patterns common to estuarine systems, the harbor can be generally characterized as typical open coastal waters. In the application, the applicant indicated that Pago Pago Harbor is not considered a stressed water, as defined in 40 CFR 125.58(z).

A. Stratification

The application indicates that there is little seasonal variation in the water column with respect to temperature and salinity. 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, the applicant indicated that little freshwater drains from Tulutulu Point, the land feature closest to the outfall, which might otherwise affect stratification. The applicant also indicated that ambient water temperatures near the outfall range from 27.2 to 30.6 degrees Celsius with an average of 28.7 based on monitoring data collected during tradewind and non-tradewind seasons (2002-2005), and that salinity ranges from 33.0 to 36.4 parts per thousand, with an average of 34.9 parts per thousand. Salinity in the open ocean of American Samoa has generally been found to be 36 parts per thousand and, therefore, the applicant concluded that the outer portion of Pago Pago Harbor, where the outfall is located, is characteristic of open coastal waters.

B. Current Speed and Direction

No recent data exist for current speed and direction at the discharge site. In the application, the applicant indicated that wind direction is generally from the east and southeast during the tradewind season (i.e., April/May through October/November). However, during the non-tradewind season, winds from the northwest to northeast become more prevalent, although southeast winds still dominate. In the application, the applicant indicated that currents become more complicated and variable farther inward from the harbor mouth with current direction changing every one to ten days at both upper and lower depths. In the application, the applicant described the tides in the vicinity of the discharge as semi-diurnal with a range of 2.5 feet and little diurnal inequality.

C. Protected and Prohibited Uses

To protect the designated uses of surface waters of American Samoa, American Samoa has adopted water quality standards for marine waters depending on the level of protection required. Section 24.0205(e)(1) of American Samoa water quality standards (ASWQS) identifies the following protected uses for Pago Pago Harbor:

(1) recreational and subsistence fishing;
(2) boat-launching ramps and designated mooring areas;
(3) subsistence food gathering, e.g., shellfish harvesting;
(4) aesthetic enjoyment;
(5) whole and limited body-contact recreation, e.g., swimming, snorkeling, and scuba diving;

(6) support and propagation of marine life;
(7) industrial water supply;
(8) mari-culture development;
(9) normal harbor activities, e.g., ship movements, docking, loading and unloading, marine railways and floating drydocks; and
(10) scientific investigations.

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

(1) dumping or discharge of solid waste;
(2) animal pens over or within 50 feet of any shoreline;
(3) dredging and filling activities; except as approved by the Environmental Quality Commission;
(4) toxic, hazardous and radioactive waste discharges; and
(5) discharge of oil sludge, oil refuse, fuel oil, bilge waters, or any other wastewater from any vessel or unpermitted shoreside facility.

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 provides a depiction of initial dilution. Initial dilution is an important parameter for determining compliance with Territory and Federal water quality standards and criteria. Initial dilution varies with oceanographic (e.g., temperature and salinity) and effluent (e.g., flow rate) conditions. Pursuant to EPA's ATSD, the 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-

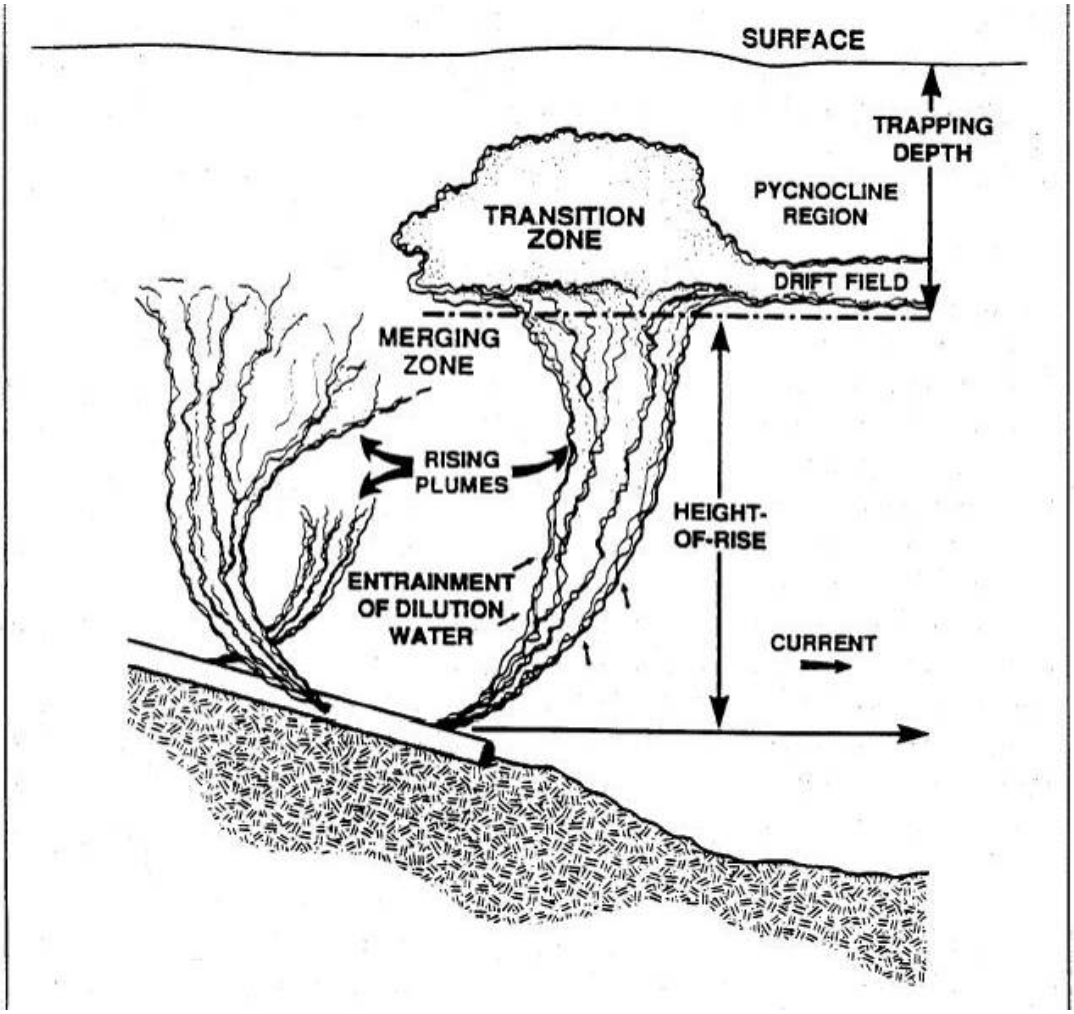

Figure 3. Depiction of initial dilution in the receiving water. Reprinted from EPA's ATSD (EPA 1994a).

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 an instantaneous maximum 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 instantaneous maximum 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 instantaneous maximum effluent flow, the most critical density profile of the receiving water, and a current speed conservatively assumed to be zero in the absence of significant monitoring data.

In the application, the applicant calculated critical initial dilution using the 1985 EPA-approved mixing zone model, UDKHDEN, based on the predicted instantaneous maximum flow of 6.0 MGD. The UDKHDEN model requires the specification 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 modeled based on the worst-case assumption of zero ambient current in the absence of detailed current data. The various density profiles used to find critical environmental conditions with the model were collected at station U (the diffuser midpoint station), with up-cast and down-cast profiles showing good agreement for each monitoring event. Profiles were collected for five monitoring events, from the 2002 tradewind season through the 2003 and 2004 non-tradewind and tradewind seasons. Based on the results of the UDKHDEN model, the applicant determined the most critical case is represented by the March 2003 (2003 non-tradewind) season, with a density gradient between the surface and 150-foot depth of 0.72 σ-t (sigma-t units). This profile also matches the description of a typical worst-case profile on page A-3 of EPA's ATSD, namely "having sufficiently steep density gradients some distance [on the order of 16 feet] above a diffuser port". The diffuser is at 150 feet and this profile shows a rapid and significant change in density at the 150-foot depth. The applicant did not account for effluent temperature effects and based the density of the effluent on the density of freshwater at standard conditions, 1.00 g/cm^3. Based on the UDKHDEN model, the applicant estimated a critical initial dilution of 91:1 at the trapping depth of 17.6 feet.[4] For comparison purposes, the applicant estimated an initial dilution of 127:1 for the proposed annual average end-of-permit flow of 3.0 MGD (ASPA 2008).

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 127:1 and 91:1, respectively, are adequately calculated for the purpose of this 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 91:1.

B. Application of Initial Dilution to Water Quality Standards

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,

[4] Critical initial dilution is based on the alternate diffuser configuration that contains six equal 7.75-inch ports; this configuration is proposed as part of the new permit application.

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 91:1 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 limits the ZID to the depth of the outfall, i.e., subtending the depth of the outfall on each side of the diffuser and above it. In the application, the applicant calculated the ZID as having a horizontal distance of 150 feet from the diffuser, or 300 feet wide, and 350 feet in length. This is consistent with EPA's ATSD. No changes in these dimensions are anticipated for the proposed modified discharge. However, in the application the applicant noted that, in the onshore direction, the dimensions of the ZID are limited by the reef slope bathymetry. The applicant also indicated that since the reef slope topography directs currents in an alongshore direction it is the shore parallel dimension that is of most concern.

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. Although the existing section 301(h)-modified NPDES permit requires that water quality criteria for pollutants such as bacteria be met at the boundary of the ZID, as required by section 301(h) regulations, the permit currently does not require monitoring at the ZID, but instead requires monitoring at the ZOM, which is larger than the ZID. The ZOM is characterized as having a horizontal distance of 550 feet from the mid-point of the diffuser. Therefore, there are no monitoring data for bacteria at the ZID.

Furthermore, since the issuance of the existing permit, which became effective October 9, 2001, there are no other data regarding pollutants (e.g., nutrients) in the receiving water at the boundary of the ZID, except for benthic monitoring data. The existing permit originally required the applicant to conduct semi-annual monitoring at the diffuser, ZID, beyond the ZID (i.e., ZOM and farfield) and at a reference site. Monitoring stations are described in Table 3. Figure 4 shows the locations of receiving water monitoring stations in Pago Pago Harbor. However, in 2002, during the permit term, EPA and ASEPA altered the receiving monitoring stations established in the permit. For water quality monitoring, since 2002, the applicant has been required to conduct semi-annual monitoring only at the diffuser, ZOM, farfield and reference stations. No water quality monitoring has been conducted at the ZID. Receiving water conditions at stations A1 and B1 are considered to represent conditions at the ZOM. Receiving water conditions at

stations C, 16, and 18 are considered to represent conditions in the farfield, i.e., beyond the ZID and ZOM. Receiving water conditions at stations OH-4 and 5 are thought not to be influenced by the discharge, and therefore are considered reference conditions. For sediment monitoring, the applicant is required to monitor at ZID stations A and B, and reference station OH-4. The changes to the monitoring program were designed to allow for coordination between the applicant and the two tuna canneries in conducting their respective receiving water monitoring programs in Pago Pago Harbor.

Table 3 – Description of current receiving water monitoring stations for the Utulei STP in Pago Pago Harbor.

Stations	Description	Location	Purpose
U	Diffuser Midpoint	Diffuser midpoint	Water Quality
A	ZID	170 feet northwest of diffuser midpoint; 170 foot depth	Sediment Quality
B	ZID	170 feet southwest of diffuser midpoint; 140 foot depth	Sediment Quality
A1	ZOM	550 feet northwest of diffuser midpoint; off reef flat edge	Water Quality
B1	ZOM	550 feet southwest of diffuser midpoint; off reef flat edge	Water Quality
C	Farfield	2,953 feet northwest of the diffuser midpoint; 83 foot depth	Water Quality
16	Farfield	See Figure 4	Water Quality
18	Farfield	See Figure 4	Water Quality
OH-4	Reference	Outer harbor between Tulutulu Pt and Tafagamanu Pt, 180 foot depth	Sediment Quality
5	Reference	See Figure 4	Water Quality

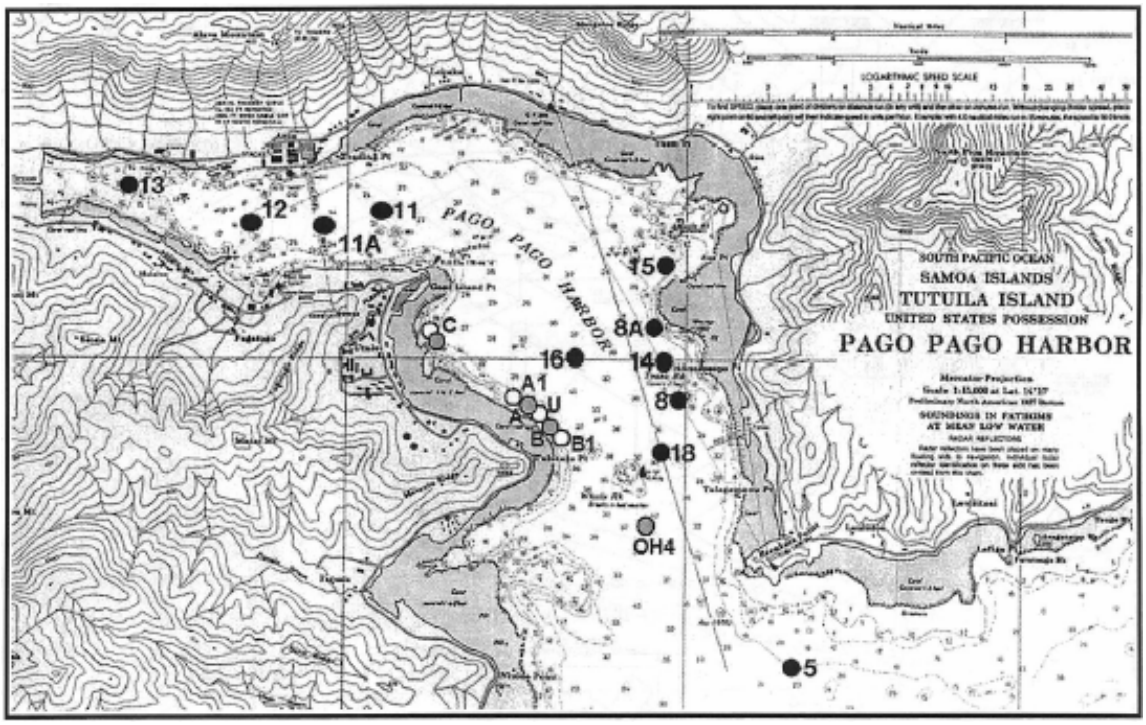

Figure 4 – Map of receiving water monitoring stations for Pago Pago Harbor. Reprinted from the 2006 section 301(h)-modified NPDES permit renewal application. Stations A, A1, B, B1, C, U, OH-4, 5, 16, and 18 are receiving water monitoring stations for the Utulei STP. All other stations are historical monitoring stations or part of the Joint Cannery Outfall receiving water monitoring program implemented by the two cannery facilities.

EPA notes that information on monitoring station locations in the applicant's receiving water quality monitoring reports has not been consistent with the locations specified in the existing permit. The specified stations are defined in the permit based on distance and direction from the diffuser midpoint, as listed in Table 3. The applicant's monitoring reports specify GPS coordinates for each point sampled, and these coordinates do not always agree with the directions and distances listed. EPA has based its analysis on the station locations as specified in the permit (Table 3) and indicated on the map in Figure 4.

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 Utulei STP contains effluent monitoring requirements for TSS and BOD. EPA reviewed average monthly percent removal data to evaluate the applicant's compliance with section 301(h) primary treatment requirements.

Between April 2005 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. No data prior to April 2005 are available. However, based on review of Discharge Monitoring Reports (DMRs), EPA has determined that the percent removal was incorrectly calculated and reported to EPA. For TSS and BOD data from April 2005 through December 2007, the applicant calculated and submitted in their DMRs percent removal values based on average weekly concentrations of TSS and BOD, rather than monthly average concentrations as required by the existing section 301(h)-modified permit and federal regulations at 40 CFR 125.60. Percent removal values for January through June 2008 were also incorrectly calculated and reported to EPA; however, EPA was unable to determine how they were calculated. Consequently, for the purpose of the section 301(h) evaluation, EPA has re-calculated percent removal based on monthly average influent and effluent concentrations of BOD and TSS as reported in DMR data. Appendix A provides a summary of monthly average influent and effluent concentrations of TSS and BOD, along with re-calculated monthly average

Table 4 - Comparison of monthly average BOD and TSS removal rates from the Utulei STP. Shaded cell indicates percent removal below the 30 percent primary treatment requirement.

Month	TSS and BOD Percent Removal by Calendar Year							
	2005		2006		2007		2008	
	TSS	BOD	TSS	BOD	TSS	BOD	TSS	BOD
January	-[1]	-	43	54	45	51	39	59
February	-	-	53	60	50	61	44	50
March	-	-	45	58	57	44	40	53
April	53	57	52	36	39	49	53	53
May	57	42	34	47	20	49	43	45
June	52	51	42	61	60	41	44	45
July	47	54	-	48	43	32	-	-
August	51	59	42	55	56	41	-	-
September	38	56	46	57	38	30	-	-
October	46	60	40	65	53	41	-	-
November	39	62	33	65	47	51	-	-
December	52	55	55	45	43	44	-	-

[1]Dashes indicate data not available for review

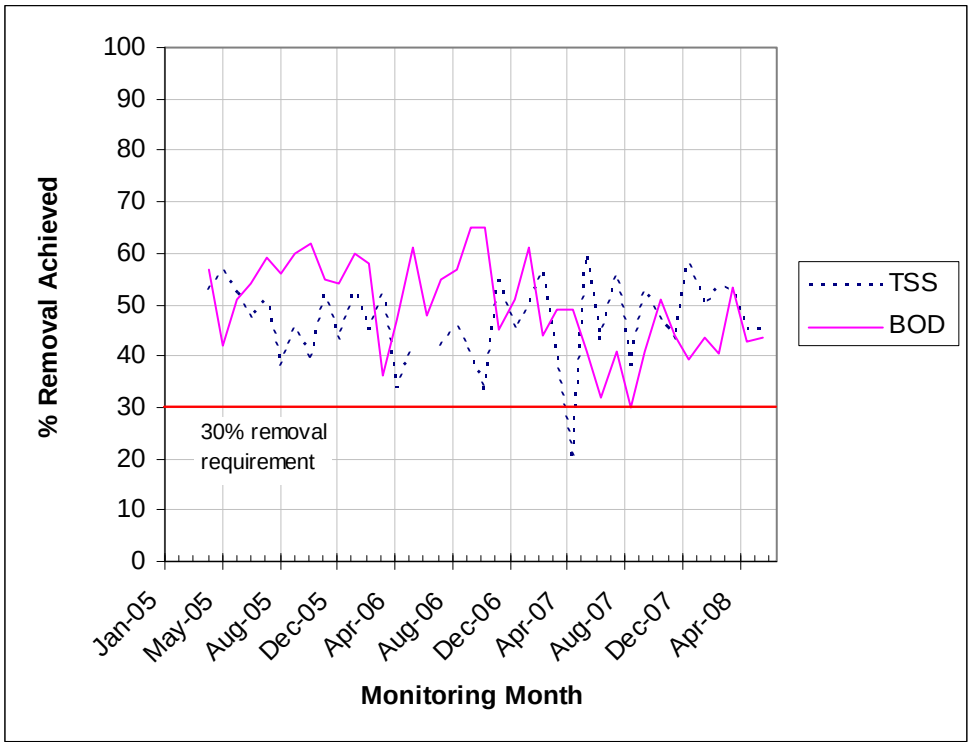

Figure 5 - Comparison of TSS and BOD percent effluent removal for the Utulei STP.

percent removal rates. Table 4 provides a comparison of TSS and BOD monthly average percent removal rates. Of the 39 months that were monitored for TSS removal, the Utulei STP met the 30 percent removal requirement 97 percent of the time. The monthly average percent removal of TSS ranged between 20 and 60 percent, with one month reported below the 30 percent removal requirement (May 2007). For BOD, the Utulei STP met the 30 percent removal requirement for all months reviewed. The monthly average percent removal efficiency rate of BOD ranged between 30 and 65 percent, with September 2007 reporting the lowest percent removal. Figure 5 shows a comparison of TSS and BOD removal rates over the monitoring period.

Based on available data, EPA has determined that the Utulei STP is consistently 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 Pago Pago Harbor. Furthermore, the applicant has also demonstrated that the Utulei STP is able to meet primary treatment requirements for its proposed increase in maximum daily effluent flow from 2.2 MGD to 3.0 MGD for renewal of its NPDES permit. Recent influent and effluent monitoring data (2006-2008) have shown that the facility has operated at a maximum daily flow of 3.5 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 Utulei 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(m) 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 Utulei STP discharge are those for Pago Pago Harbor at section 24.0206(m) 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 standards for toxic pollutants shall be determined by any single sample, while compliance for other standards 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 criteria 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 able to calculate medians, comparable samples at the same station and same depth are used, i.e., ASEPA does not average samples across different depths. Pursuant to the existing NPDES permit, the applicant is required to conduct only semi-annual monitoring in the receiving water. Therefore, because EPA is unable to calculate median values in accordance with section 24.0210(b)(1) of ASWQS, EPA has evaluated all individual samples to determine attainment of water quality criteria for DO, turbidity and light penetration. In addition, EPA has used models to predict the impact of the proposed discharge on concentrations of DO and turbidity in the receiving water and whether the proposed discharge can attain 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 effluent BOD load is exerted. Pursuant to 40 CFR 125.61(b)(1), the applicant must demonstrate that the modified discharge will comply with water quality criteria for DO and that the outfall and diffuser are located and designed to provide adequate initial dilution, dispersion, and transport of wastewater such that the discharge does not exceed criteria at and beyond the ZID (40 CFR 125.62(a)(1)). Section 24.0206(m) of ASWQS provides that the DO concentration for Pago Pago Harbor shall not be less than 70 percent of saturation or less than 5.0 mg/l. If the natural level of DO is less than 5.0 mg/l,

ASWQS require that the natural level become the standard. To determine whether 70 percent of saturation, or 5.0 mg/l, or the natural level of DO shall be applied, EPA reviewed information provided by the applicant in the application and receiving water monitoring data.

To evaluate whether 70 percent of saturation is the appropriate criterion for DO, EPA reviewed temperature and salinity vertical profile data from reference station 5 and calculated average ambient 100 percent DO saturation based on Table B-4 of EPA's ATSD. EPA used vertical profile data from March 2002 at reference station 5 since it was determined to be the most critical profile in the analysis conducted for the nearby Tafuna STP. EPA determined this more appropriate to use than the only critical profile determined by the applicant, which was based on vertical profile data from diffuser station U, which may be influenced by the discharge. EPA concluded that using vertical profile data from reference station 5 provided the best representation of ambient DO concentrations under critical conditions (i.e., minimum temperature and salinity). For all surface, middle, and bottom depths at reference station 5, EPA calculated an average temperature of 30 degrees Celsius and an average salinity of 35 ppt, which resulted in a 100 percent DO saturation value of 6.75 mg/l. From a 100 percent DO saturation value of 6.75 mg/l, EPA calculated a 70 percent saturation value of 4.7 mg/l.

To determine if the natural level of DO is below the 5.0 mg/l criterion, EPA reviewed monitoring data at reference station 5 to better evaluate the natural level of DO from the surface to the depth of the Utulei STP outfall. Based on receiving water monitoring data collected from 2002 to 2007, EPA calculated, for all monitoring events combined, an average surface (i.e., at 3 feet) DO concentration of 6.43 mg/l, an average mid-depth (i.e., at 60 feet) DO concentration of 6.32 mg/l, and an average bottom depth (at 120 feet) DO concentration of 6.13 mg/l. For March 2002 receiving water data, 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 receiving water data at reference station 5, there were no individual samples that were below the water quality criterion of 5.0 mg/l.

ASWQS provide that the DO concentrations for Pago Pago Harbor shall not be less than 70 percent of saturation or less than 5.0 mg/l, unless the natural level of DO is less than 5.0 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 the reference station, EPA has concluded that the natural level of DO is not less than 5.0 mg/l. Therefore, the natural level is not the standard under ASWQS. Also, EPA has calculated the 70 percent DO saturation value based on temperature and salinity values from reference station 5 to be 4.7 mg/l, which is less than 5.0 mg/l. Since under ASWQS the DO concentration shall not be less than 70 percent of saturation or less than 5.0 mg/l, the 5.0 mg/l becomes the criterion. Therefore, EPA has applied the DO criterion of 5.0 mg/l as established in ASWQS to assess DO concentrations in the receiving waters surrounding the Utulei STP discharge.

a. Analysis of DO Based on Monitoring Data

As part of the existing 301(h)-modified permit, the applicant is required to conduct seasonal (semi-annual) monitoring of DO in the receiving water. Figure 4 shows the location of receiving water monitoring stations. Note that certain stations were dropped from or added to the

Table 5 - Summary of receiving water monitoring data for DO concentrations at Utulei STP monitoring stations. Shaded cell indicates DO concentration observed below the ASWQS criterion of 5.0 mg/ for DO.

Location	Station	Depth	DO Concentrations (mg/L)											
			Aug-02	Mar-03	Aug-03	Feb-04	Sep-04	Feb-05	Aug-05	Feb-06	Nov-06	Feb-07	Sep-07	Mar-08
Diffuser	U	Surface	6.17	6.52	6.17	6.22	6.14	5.82	6.45	6.33	6.24	5.85	6.61	4.90
		Middle	6.09	6.18	6.12	6.07	6.34	5.90	6.60	6.23	6.18	5.60	6.51	4.93
		Bottom	5.94	5.78	6.13	6.01	6.13	5.63	6.39	6.03	6.16	5.76	6.28	5.23
ZOM	A1	Surface	6.32	6.36	6.85	6.17	6.11	5.94	6.52	6.34	6.02	6.04	6.53	5.22
		Middle	6.25	5.85	6.19	6.00	6.11	5.78	6.51	6.03	6.09	5.67	6.46	5.14
		Bottom	6.04	5.64	5.95	5.88	6.03	5.85	6.69	5.75	6.05	5.62	6.28	5.42
	B1	Surface	6.30	6.11	6.23	6.03	6.18	5.87	6.47	6.31	6.12	6.05	6.68	4.54
		Middle	6.21	5.89	6.18	6.14	6.19	5.91	6.28	6.20	5.94	5.88	6.57	4.70
		Bottom	6.18	5.08	6.08	6.01	5.97	5.93	6.37	5.98	6.13	6.09	6.37	5.13
Farfield	C	Surface	5.84	5.86	5.69	5.64	7.37	5.15	6.87	6.02	5.93	6.52	7.04	4.59
		Middle	5.97	5.84	6.17	5.99	6.19	5.73	6.69	6.60	6.07	5.94	6.76	4.31
		Bottom	6.01	5.67	6.19	5.80	6.14	5.63	6.73	6.41	6.11	5.75	5.69	4.63
	16	Surface	6.18	6.05	6.24	5.77	6.15	5.84	6.79	6.74	6.04	6.07	6.14	6.85
		Middle	6.22	6.09	6.28	6.10	6.12	5.90	6.56	6.46	6.03	6.01	5.98	6.57
		Bottom	6.07	5.86	6.17	5.83	6.22	5.80	6.88	6.45	6.16	6.11	5.92	6.49
	18	Surface	6.37	6.17	6.32	6.06	6.12	5.97	6.53	6.56	6.08	5.96	6.70	5.83
		Middle	6.27	6.05	6.30	5.76	5.98	5.98	6.86	6.22	6.24	5.74	6.47	5.53
		Bottom	6.14	5.90	6.13	6.04	6.05	5.97	7.04	6.21	6.16	5.80	6.41	5.24
Reference	5	Surface	6.53	6.26	6.01	5.82	6.25	5.97	6.31	8.35	6.47	5.95	6.83	5.09
		Middle	6.55	5.89	6.27	6.41	6.49	6.06	6.25	6.62	6.25	5.93	6.75	5.24
		Bottom	6.33	5.58	6.16	5.51	6.28	5.95	6.30	6.51	6.17	6.00	6.67	5.25

monitoring plan during the existing permit; specifically ZID stations A and B were discontinued and farfield station D was replaced by stations 16 and 18, which are also monitoring stations for the tuna cannery monitoring program. Reference station OH4 was replaced by reference station 5. The most recent set of stations has been in use since August 2002, so a coherent analysis of these data is possible. As previously described, there are currently seven stations where monitoring is conducted.

The application contains a summary of monitoring data for DO concentrations from August 2002 through August 2005. EPA reviewed these 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 sought to assess attainment of the water quality criterion for DO based on the median concentration of at least four measurements over a calendar year. However, based on receiving water monitoring data from 2002 to 2007, no year saw the collection of more than two samples. Consequently, EPA based its analysis of compliance with DO standards on individual samples. At all monitoring stations, including diffuser station U and ZOM stations A1 and B1, single-sample DO concentrations were uniformly above the criterion of 5.0 mg/l for all depths during 2002-2007. The lowest value reported was a DO concentration of 5.08 mg/L at bottom depth (120 feet) at ZOM station B1 in March 2003. Table 5 provides a summary of receiving water monitoring data for DO at the surface, middle and bottom depths.

DO concentrations below the water quality criterion for DO were observed at the diffuser, ZOM and farfield during one monitoring event in March 2008. However, all monitoring events prior to March 2008 demonstrated DO concentrations above the DO criterion, and in many cases significantly above the criterion. Therefore, EPA finds that the monitoring data indicate that the discharge can consistently attain the water quality criterion for DO.

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. The chemical composition of the effluent can cause an immediate reduction in DO in the receiving water, even during the initial dilution process. 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 requested annual average flow of 3.0 MGD. S_a was based on the estimated initial dilution factor of 127:1; and IDOD was based on Table B-3 of EPA's ATSD for primary treatment using an effluent BOD concentration of 157 mg/l, which is the applicant's requested maximum daily effluent permit limitation, and a travel time from the treatment plant through the diffuser of 29 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. The applicant used a DO_a value of 5.63 mg/l, which is the minimum DO value reported at diffuser station U during the monitoring period. The applicant estimated a final DO concentration of 5.55 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 conditions of 3.0 MGD flow would result in only a minor depression of 1.5 percent in DO concentrations in the receiving water. Thus, the applicant concluded that final DO concentrations in the receiving water would comply with the water quality criterion for DO. However, the applicant did not provide information on final DO concentrations in the receiving water based on critical initial dilution using a peak daily flow of 6.0 MGD and ambient DO concentrations at a reference station up current of the diffuser, as required by EPA's ATSD.

In accordance with EPA's ATSD, EPA calculated DO_f using Equation B-5 and critical conditions to assess DO concentration at the completion of initial dilution. EPA applied the instantaneous maximum flow of 6.0 MGD and its corresponding S_a of 91:1. Additionally, EPA applied a DO_a value of 6.16 mg/l based on water quality monitoring data from reference station 5. As specified in EPA's ATSD, DO_a should represent critical conditions immediately upcurrent of the diffuser 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

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

Parameter	Applicant Values	EPA Values
Critical flow, MGD	3.0	6.0
S_a	127:1	91:1
IDOD, mg/l	5.0	5.0
DO_e, mg/l	0.0	0.0
DO_a, mg/l	5.63	6.16
DO_f , mg/l	5.55	6.04
ΔDO_{a-f} , mg/l	-0.08	-0.12

discussed, the applicant modeled a critical initial dilution of 91:1 with a trapping depth of 17.6 feet from the March 2002 data. Based on a critical initial dilution of 91:1 and a DO_a of 6.16 mg/l, EPA calculated a DO_f of 6.04 mg/l, which results in a depression of 0.12 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, final DO concentrations in the receiving water were predicted to be above the ASWQS criterion of 5.0 mg/l for DO. The differences in the final DO concentrations calculated by the applicant and EPA are based on the use of different critical initial dilution and 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.

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. EPA's ATSD includes simplified farfield depletion models for both open coastal waters and coastal areas or estuaries. In the application, and as previously described, the applicant indicated that Pago Pago Harbor exhibits characteristics more similar to open coastal waters than

an estuarine system. Nevertheless, EPA conducted modeling using both models and found no significant difference between the two results. Therefore, for the purpose of the section 301(h) evaluation, EPA has assessed DO depression in the farfield based on equations developed 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 from 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 submerged wastefield as a function of travel time, t, in mg/l;

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

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

k_c = CBOD decay rate coefficient;

k_n = NBOD nitrification rate;

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

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

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

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.

The applicant used a DO_a value of 5.63 mg/l and a DO_f of 5.55 mg/l. In contrast, EPA used the previously calculated DO_a and DO_f values of 6.16 and 6.04 mg/l, respectively.

For the CBOD decay rate coefficient, k_c, the applicant calculated a CBOD decay rate of 0.325/day (base e) based on a value of 0.23/day, adjusted for ambient water temperature. In

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	5.63	6.16
DO_f, mg/l	5.55	6.04
k_c, day^{-1}	0.325	0.35
k_n, day^{-1}	0.141	0.200
L_{fc}, mg/l	2.63	3.16
L_{fn}, mg/l	1.04	1.46
D_s	See Table 8	See Table 8

accordance with Equation B-13 specified in EPA's ATSD, the CBOD decay rate coefficient was calculated as follows:

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

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 27.5 degrees Celsius since maximum water temperatures have shown to be between 28 and 29 degrees Celsius. In contrast, EPA calculated a k_c of 0.35/day based on an average water temperature of 29 degrees Celsius, which EPA calculated from March 2002 receiving water data from reference station 5.

Similarly, for the nitrogenous BOD (NBOD) decay rate coefficient, k_n, the applicant calculated a NBOD decay rate of 0.141/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, 27.5 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. However, in embayments such as Pago Pago Harbor where there are other discharges (runoff and the tuna

cannery outfall), nitrification may be more important as a source of oxygen depletion. Consequently, EPA has assumed that, in the vicinity of modified discharge, oxygen depletion occurs due to both carbonaceous BOD (CBOD) and nitrogenous BOD (NBOD) and that both must be considered when modeling farfield dissolved oxygen. For ultimate CBOD concentration, $L_{fc,}$ the final $CBOD_5$ concentration BOD_f 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 (flux-averaged);

And based on Equation B-12b,

$$L_{fc} = BOD_{fu} = BOD_f \times [1 \div (1 - e^{(-kc*t)})]$$

where,

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

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

BOD_f = BOD_5 concentration at the conclusion of initial dilution, in mg/l;

k_c = CBOD decay rate coefficient;

t = time since discharge, in seconds.

In the application, the applicant calculated an L_{fc} value of 2.63 mg/l based on a BOD_f of 1.80 mg/l, BOD_a of 0.0 mg/l, a requested permit BOD_e effluent limitation of 157 mg/l, and S_a of 127:1. 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 157 mg/l. However, EPA applied the critical S_a value of 91:1 and a temperature of 29 degrees Celsius, which resulted in a BOD_f of 1.73 mg/l. As a result, EPA calculated an L_{fc} value of 2.09 mg/l.

For D_s, the centerline dilution in the farfield was calculated by the applicant using Equation B-19 of EPA's ATSD:

$$D_s = 1 \div erf \{1.5 \div [(1 + (8\ \varepsilon_o\ t \div b^2))^3 - 1]^{1/2}\}$$

and

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

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 (approximated by 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 100 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. 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 1/6-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 0.082 mg/l resulted 600 seconds after the completion of initial dilution resulting in a DO concentration of 5.548 mg/l in the wastefield. The applicant concluded that DO is not reduced below 5.0 mg/l in the farfield and that this would comply with American Samoa water quality standards.

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. Because the applicant's lowest modeled DO concentration occurred at the earliest time-step in their modeling, EPA decided to model on a shorter interval. Based on EPA's input values listed in Table 7, the maximum farfield DO depression was found to be 0.0028 mg/l at a time of 330 seconds after completion of initial dilution resulting in a DO concentration of 6.034678 mg/l in the wastefield. This would represent a maximum DO depression of 2.04 percent at the plume trapping depth from the affected ambient condition. Although both EPA and the applicant predicted a depression of DO after initial dilution, final concentrations were predicted to be above the ASWQS of 5.0 mg/l for DO for Pago Pago

Table 8. Comparison of predicted dilution, D_s, 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. EPA calculated on a 30-second timestep (vs. the applicant's 600-second basis) and the minimum DO occurred before 600 seconds.

Time, t, in seconds	Applicant Calculations		EPA Calculations	
	D_s	DO(t)	D_s	DO(t)
0	-	5.55	-	6.04
30	-	-	1.000000	6.037029
60	-	-	1.000000	6.036695
90	-	-	1.000000	6.036362
120	-	-	1.000004	6.036028
150	-	-	1.000038	6.035699
180	-	-	1.000182	6.035384
210	-	-	1.000570	6.035099
240	-	-	1.001348	6.034863
270	-	-	1.002651	6.034693
300	-	-	1.004579	6.034601
330	-	-	1.007190	6.034596
360	-	-	1.010515	6.034678
390		-	1.014554	6.034849
		…		
600	1.06048	5.5480727	1.060484	6.038070
1200	1.28713	5.5571618	1.287126	6.054371

Harbor. Therefore, EPA has concluded that the applicant has demonstrated that the proposed modified discharge after initial dilution would comply with 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. Large applicants for a section 301(h) variance 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 in EPA's ATSD, 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

Since there are no receiving water monitoring data at the ZID for EPA to evaluate, it is difficult to directly evaluate whether the water quality criterion for DO is met at the ZID. Receiving water monitoring at the diffuser and ZOM demonstrates that the DO criterion is consistently met in the receiving water. Moreover, based on predictive modeling, the criterion for DO is predicted to be met at the ZID and in the farfield with consideration of critical initial dilution. And, given the small volume of discharge, EPA does not expect that DO depression due to sediment oxygen demand will prevent attainment of the DO criterion. Based on this analysis, EPA has concluded that the applicant has demonstrated that the discharge will comply with the water quality criterion 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 standards 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 standards.

Section 24.0206(m) of ASWQS provides that turbidity in Pago Pago Harbor shall not exceed 0.75 Nephelometric Turbidity Units (NTU) and that light penetration depth shall exceed 65.0 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 discharge-related impacts to turbidity and light penetration in the receiving water. Since no water quality data for turbidity and light penetration are available at the ZID boundary, EPA evaluated monitoring data for these parameters at the ZOM; however, EPA also performed predictive modeling to analyze potential suspended sediment concentrations at the ZID.

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 semi-annual monitoring of turbidity in the receiving water. In the application, the applicant provided a summary of turbidity measurements from 2002 through 2005. To evaluate turbidity

in the receiving water, EPA reviewed these data and subsequent receiving water monitoring data from 2005 through 2008 submitted pursuant to the existing permit.

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, no single monitoring station had data collected four times in a calendar year. In accordance with the permit requirements, most stations were sampled twice a year. In 2003, three samples were taken at farfield stations 16 and 18 and reference station 5; however, two of those sets were collected simultaneously, with one analyzed on location with a CTD probe and the other sent for laboratory analysis. As a result, EPA assessed attainment of the water quality criterion for turbidity across the monitored sites and depths based on individual samples. Table 9 provides a summary of receiving water monitoring data for turbidity at the surface, middle and bottom depths.

Table 9. Summary of turbidity values at the surface (S), and middle (M) and bottom (B) depths at Utulei STP receiving water monitoring stations. Shaded cells indicate turbidity above the ASWQS criterion of 0.75 NTU for Pago Pago Harbor.

Site	Station-Depth	Turbidity (NTU)													
		Monitoring Events by Calendar Year													
		2002	2003			2004			2005		2006		2007		2008
Diffuser	U-S	0.03	0.67	-[1]	0.20	-	-	0.55	0.17	0.16	0.20	0.00	0.20	0.49	0.46
	U-M	0.13	0.36	-	0.36	-	-	0.58	0.20	0.14	0.20	0.20	0.00	0.47	0.22
	U-B	0.15	0.40	-	0.27	-	-	0.44	0.19	0.12	0.20	0.20	0.00	0.12	0.22
ZOM	A1-S	0.06	0.24	-	0.32	-	-	0.69	0.15	0.12	0.20	0.20	0.30	0.56	0.30
	A1-M	0.07	0.20	-	0.37	-	-	0.59	0.18	0.14	0.20	0.20	0.00	1.14	0.36
	A1-B	0.15	0.22	-	0.51	-	-	0.93	0.20	0.15	0.30	0.20	0.30	0.10	0.24
	B1-S	0.20	0.38	-	0.31	-	-	0.59	0.15	0.16	0.20	0.20	0.30	0.51	0.38
	B1-M	0.06	0.14	-	0.30	-	-	0.36	0.11	0.13	0.20	0.20	0.00	0.28	0.21
	B1-B	0.09	0.24	-	0.28	-	-	0.62	0.16	0.18	0.20	0.20	-	0.23	0.18
Farfield	C-S	0.46	0.30	-	0.29	-	-	0.67	0.20	0.12	0.30	0.20	0.10	1.12	0.63
	C-M	0.10	0.16	-	0.26	-	-	0.59	0.17	0.14	0.20	0.20	0.10	0.26	0.47
	C-B	0.05	0.41	-	0.51	-	-	0.48	0.19	0.16	0.20	0.20	-	0.22	0.40
	16-S	0.05	0.15	0.31	0.44	0.20	0.20	0.60	0.18	0.13	0.20	0.00	0.10	0.11	0.29
	16-M	0.08	0.13	0.05	0.27	0.12	0.16	0.33	0.14	0.14	0.20	0.00	0.00	0.39	0.32
	16-B	0.09	0.10	0.06	0.38	1.60	0.17	0.31	0.19	0.15	0.30	0.20	0.00	0.14	0.07
	18-S	0.11	0.40	0.12	0.35	0.20	0.20	0.82	0.18	0.13	0.20	0.20	0.40	0.23	0.18
	18-M	0.20	0.11	0.11	0.21	0.30	0.16	0.46	0.14	0.14	0.20	0.20	-	0.24	0.23
	18-B	0.19	0.12	0.08	0.38	0.15	0.15	0.25	0.15	0.11	0.20	0.10	-	0.25	0.12
REF	5-S	0.07	0.12	0.70	0.28	-	0.20	0.23	0.16	0.11	0.20	0.20	-	0.10	0.07
	5-M	0.09	0.17	0.45	0.27	-	0.17	0.22	0.17	0.11	0.20	0.20	-	0.10	0.08
	5-B	0.12	0.24	0.45	0.25	-	0.18	0.28	0.15	0.13	0.20	0.20	-	-	0.01

[1]Dashes indicate data not available for review

Turbidity values above the criterion of 0.75 NTU were observed in individual samples at the ZOM and farfield stations. At diffuser station U, turbidity ranged from 0.03 to 0.67 NTU. Of the 33 individual samples taken at station U, none showed turbidity values above the turbidity criterion for Pago Pago Harbor. At ZOM station A1, turbidity ranged between 0.00 NTU and 1.14 NTU with six percent (or two samples) of the 33 samples showing turbidity values above the criterion. At ZOM station B1, turbidity values ranged between 0.00 NTU and 0.62 NTU, which was reported at bottom depth. At farfield station C, turbidity ranged between 0.00 NTU to 1.12 NTU. One sample or 3.13 percent of all samples taken at farfield station C showed an elevated turbidity value. Similarly, at farfield station 16 turbidity ranged between 0.00 NTU and 1.60 NTU with 2.38 percent (one sample) of the 42 samples showing exceedance of the turbidity criterion. At farfield station 18, turbidity values ranged from 0.10 NTU to 0.82 NTU in 40 samples, with 2.5 percent (one sample) observed to be above the criterion. At reference station 5, the maximum turbidity value was reported at the surface, with values for all monitoring events and depths ranging between 0.01 and 0.70 NTU. Of the 35 samples taken at the reference station, none showed elevated turbidity values.

Few turbidity values above 0.75 NTU were observed and none were observed at the diffuser station. Therefore, EPA has concluded that the receiving water data indicates that the proposed discharge will comply with the water quality criterion for turbidity.

ii. Light Penetration

Section 24.0206(m) of ASWQS provides that the light penetration depth shall exceed 65.0 feet 50 percent of the time. However, the data available to EPA are for Secchi disc depth, not light penetration. Measurements of Secchi depth are widely used to estimate light penetration 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;

Table 10. Summary of Secchi disc depth recorded at each monitoring station for the Utulei STP. Shaded cells indicate Secchi disc depth less than the corresponding Secchi disc depth of 24 feet based on the ASWQS light penetration criterion of 65.0 feet.

Site	Station	Secchi Disc Depth (ft) by Year									
		2002	2003	2004	2005		2006		2007		2008
Diffuser	U	40	48	57	38	44	40	35	36	25	26
ZOM	A1	55	55	57	42	44	50	40	33	31	26
	B1	45	53	72	41	-[1]	45	35	34	30	23
Farfield	C	12	45	51	32	43	60	30	24	-	17
	16	55	65	75	38	45	55	35	38	29	28
	18	60	76	81	57	51	60	40	40	31	33
REF	5	83	62	68	49	-	60	45	47	40	37

[1]Dashes indicate data not available for review

d = Length of the path, in meters; and

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

Based on Equations B-51 and B-54, the applicant determined that light penetration of one percent at 65.0 feet (19.8 meters) in Pago Pago Harbor, as specified in ASWQS, corresponded to a Secchi disc depth of 24 feet (7.3 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 0.232 per meter based on a length of path, d, of 19.8 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 65.0 feet (19.8 meters). Based on extinction coefficient of 0.232 per meter calculated using a k_2 of 1.7, EPA then used Equation B-54 to estimate a Secchi disc depth of 24 feet. Therefore, for the purpose of the section 301(h) evaluation, EPA believes that a Secchi disc depth of 24 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 discharge monitoring reports submitted to EPA pursuant to the existing NPDES permit. Between 2002 and 2008, the applicant recorded Secchi disc depth during ten monitoring events at stations U, A1, B1, C, 16, 18 and 5. Table 10 provides a summary of Secchi disc depth in the receiving water. Based on receiving water monitoring data, Secchi disc depth was recorded greater than 24 feet at all stations for more than 50 percent of the monitoring events. At ZOM station B1, Secchi disc depth was observed greater than 24 feet 89 percent of the time whereas at farfield station C Secchi depth was greater than 24 feet 78 percent of the time. All other monitoring stations showed Secchi depth greater than 24 feet 100 percent of the time. Although individual monitoring events did show Secchi disc depth below 24 feet, ASWQS for light penetration specifically state that the criterion must be met 50 percent of the time. Since

Secchi disc depth at both the ZOM and at the diffuser has been observed greater than 24 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 11 provides a summary of predicted suspended solids concentrations at completion of initial dilution predicted by EPA and the values used to estimate these concentrations.

In the application, the applicant did not provide 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. Instead, the applicant indicated that based on average turbidity and light penetration data and, after accounting for initial dilution, suspended solids accumulation is not expected to have a significant impact on water quality. However, in accordance with EPA's ATSD, EPA 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 5 for all depths combined. Table 12 provides a summary of suspended solids concentrations at reference station 5 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 at each depth since the

Table 11. Summary of factors used to predict ambient suspended solids concentrations, SS_f, upon critical initial dilution and predicted SS_f values.

Parameter	EPA Value
S_a	91:1
SS_a, mg/l	2.0
SS_e, mg/l	157
SS_f, mg/l	3.7
ΔSS_{a-f}, mg/l	+1.70
ΔSS_{a-f}, %	+85

Table 12 - Summary of 2005 quarterly receiving water monitoring data for suspended solids concentrations at the surface, middle and bottom depths at reference station 5.

Reference Station 5 - Depth	Suspended Solids Concentration (mg/l)		Avg. Suspended Solids Concentration (mg/l) at Each Depth
	February 2005	August 2005	
Surface	2	1	1.5
Middle	3	2	2.5
Bottom	2	2	2
Total Average Suspended Solids Concentration			2

distance between the diffuser and trapping depth of 17.6 feet overlapped with all three measurements (e.g., measurements from the bottom to the surface ranged between 120 to 3 feet, the next station below 3 feet is 60 feet, and the diffuser ports are located at a depth of 145 feet).

As a result, EPA calculated a SS_a of 2 mg/l. Based on this value, a S_a of 91:1, and SS_e of 157 mg/l, EPA calculated a SS_f of 3.7 mg/l upon initial dilution. This is a discharge-related increase in ambient suspended solids concentration of 1.70 mg/l, which is an 85 percent increase from the affected ambient concentration of 2 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. EPA predicted an 85 percent increase in suspended solids concentrations in the ambient water based on the proposed modified discharge under critical conditions. However, EPA does not think this predictive modeling outweighs the actual data regarding turbidity and light penetration, and has concluded that the applicant has demonstrated that these criteria would be met under the proposed discharge.

3. Conclusion on Compliance with Water Quality Standards 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.

EPA concludes that the applicant has demonstrated that the proposed discharge will comply with water quality standards for DO at and beyond the ZID. Analysis of monitoring data indicates that the water quality criterion for DO is met consistently at the ZOM. In addition, predictive equations for DO indicate that the proposed discharge will comply with water quality criteria for DO at the ZID boundary.

In addition, EPA concludes that the applicant has demonstrated the proposed discharge will comply with water quality standards for TSS. Predictive modeling indicates that the proposed discharge will result in an 85 percent increase in TSS, but there is no water quality criterion directly for TSS, and the relationship between TSS and turbidity and light penetration is not readily quantified. Moreover, analysis of the available receiving water data indicates that the actual water quality criteria for turbidity and light penetration are consistently met in the vicinity of the discharge. On balance, EPA concludes that the proposed discharge will comply with water quality standards for TSS.

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 Utulei STP discharge are those for Pago Pago Harbor at section 24.0206(m). 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. However, because of the semi-annual monitoring data available, EPA is unable to calculate median values in compliance with section 24.0206 of ASWQS. Therefore, for the purpose of the section 301(h) evaluation, EPA has evaluated each individual sample 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 marine environment. However, domestic wastewater can contain high levels of phosphorus and nitrogen, and significant loadings of these nutrients into the environment can result in excessive algal growth and eutrophication that can adversely impact marine biota and habitats. To protect the beneficial uses of Pago Pago Harbor, section 24.0206(m) of ASWQS provides that total phosphorus and total nitrogen concentrations shall not exceed 0.030 and 0.200 mg/l, respectively. Furthermore, ASWQS provide that chlorophyll *a* concentrations shall not exceed 1.0 µg/l. Chlorophyll *a* is commonly used as an indicator of phytoplankton (algal) biomass caused by nutrient overenrichment.

Pursuant to the existing section 301(h)-modified permit, the applicant is required to conduct semi-annual monitoring of total phosphorus, total nitrogen, and chlorophyll *a* in the receiving water. In the application, the applicant provided a summary of nutrients and chlorophyll *a*

Table 13 - Summary of receiving water monitoring data for TP concentrations at the surface (S), and middle (M) and bottom depths (B) at Utulei STP receiving water monitoring stations. Shaded cell indicates TP concentration above the ASWQS criterion of 0.030 mg/l for Pago Pago Harbor.

Site	Station-Depth	TP Concentrations (mg/l)											
		Monitoring Events by Calendar Year											
		2002	2003		2004		2005		2006		2007		2008
Diffuser	U-S	0.012	0.005	0.042	0.03	0.03	0.01	0.03	0.008	0.01	0.05	0.02	0.01
	U-M	0.009	0.006	0.032	0.02	0.01	0.02	0.01	0.01	0.005	0.02	0.02	0.01
	U-B	0.018	0.024	0.030	0.02	0.01	0.02	0.02	0.01	0.005	0.04	0.01	0.02
ZOM	A1-S	0.017	0.005	0.025	0.14	0.02	0.02	-[1]	0.01	0.01	0.02	0.02	0.03
	A1-M	0.014	0.005	0.037	0.03	0.02	0.01	0.05	0.01	0.008	0.03	0.02	0.01
	A1-B	0.005	0.005	0.043	0.02	0.02	0.01	0.04	0.01	0.006	0.03	0.02	0.008
	B1-S	0.015	0.005	0.043	0.03	0.01	0.02	0.02	0.01	0.009	0.030	0.02	0.004
	B1-M	0.005	0.005	0.017	0.02	0.01	0.01	0.03	0.01	0.005	0.030	0.02	0.004
	B1-B	0.005	0.016	0.031	0.03	0.02	0.01	0.02	0.01	0.003	0.030	0.01	0.004
Farfield	C-S	0.005	0.005	0.032	0.03	0.18	0.02	0.01	0.01	0.009	0.020	0.02	0.004
	C-M	0.005	0.028	0.025	0.03	0.03	0.01	0.03	0.01	0.006	0.030	0.02	0.006
	C-B	0.005	0.005	0.030	0.02	0.03	0.01	0.03	0.01	0.007	0.020	0.02	0.009
	16-S	0.005	0.005	0.005	0.02	0.02	0.01	0.02	0.02	0.01	0.017	0.03	0.010
	16-M	0.005	0.005	0.005	0.02	0.01	0.01	0.03	0.03	0.009	0.018	0.02	0.010
	16-B	0.005	0.005	0.005	0.03	0.01	0.02	0.01	0.04	0.006	0.019	0.04	0.01
	18-S	0.230	0.073	0.005	0.01	0.03	0.01	0.01	0.01	0.01	0.04	0.02	0.006
	18-M	0.180	0.005	0.005	0.03	0.01	0.01	0.01	0.02	0.006	0.03	0.02	0.004
	18-B	0.056	0.005	0.005	0.02	0.01	0.01	0.01	0.01	0.006	0.04	0.02	0.007
Reference	5-S	0.005	0.005	0.032	0.03	0.01	0.02	0.01	0.007	0.005	0.019	0.02	0.009
	5-M	0.071	0.005	0.022	0.03	0.02	0.02	0.02	0.01	0.004	0.017	0.02	0.010
	5-B	0.021	0.005	0.020	0.02	0.02	0.02	0.01	0.02	0.003	0.016	0.03	0.007

[1]Dashes indicate data not available for review

concentrations for the period of 2002 to 2005. EPA reviewed these and subsequent receiving water monitoring data from 2006 to 2008 based on Utulei STP receiving water quality monitoring reports to evaluate receiving water concentrations of nutrients and chlorophyll *a* upon initial dilution. Between 2002 and 2008, the applicant conducted 12 semi-annual receiving water monitoring events with a total of 252 individual samples collected at diffuser, ZOM, farfield, and reference stations. Individual samples were collected at three depths as previously described. Because no data are available at the ZID, EPA evaluated attainment of water quality criteria for total phosphorus, total nitrogen, and chlorophyll *a* at the ZOM based on each monitoring event.

i. Total Phosphorus

As a result of semi-annual monitoring data, EPA assessed attainment of the water quality criterion for TP based on individual measurements taken at each depth. Table 13 provides a summary of receiving water monitoring data for TP within the surface, middle and bottom depths. Exceedances of the water quality criterion of 0.030 mg/l for TP were observed at all stations. From 2002 to 2008, 10 percent of all samples collected at both ZOM stations A1 and B1 showed elevated TP concentrations above the water quality criterion. The greatest number of exceedances was observed at ZOM station A1 with 14 percent of the individual samples showing TP concentrations greater than the criterion. At the farfield stations C, 16, and 18, monitoring data show that between six and 11 percent of all samples collected at these stations showed elevated concentrations of TP. At reference station 5, six percent of the individual samples showed TP concentrations greater than the criterion of 0.030 mg/l. However, since 2003, there have been no exceedances of the TP criterion at reference station 5 whereas there have been TP concentrations greater than the criterion observed at the ZOM.

Based on receiving water monitoring data, TP concentrations greater than the water quality criterion have been observed at the ZOM. 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 consistently comply with the water quality criterion for TP.

ii. Total Nitrogen

As a result of semi-annual monitoring data, EPA assessed attainment of the water quality criterion for TN based on individual measurements taken at each depth. Table 14 provides a summary of receiving water monitoring data for TN within the surface, middle and bottom depths. Exceedances of the water quality criterion for TN were observed at the diffuser, ZOM, farfield, and at the reference station based on individual samples at each depth. From 2002 to 2008, 28 percent of all samples collected at both ZOM stations A1 and B1 showed elevated TN concentrations above the water quality criterion. Individually, more exceedances were observed at ZOM station A1 with 31 percent of the individual samples with TN concentrations above the criterion compared to 25 percent for ZOM station B1. At the three farfield stations, 29 percent of all samples taken at the farfield stations combined showed TN concentrations above the criterion. At reference station 5, 25 percent of samples showed concentrations greater than the TN criterion.

Based on receiving water monitoring data, TN concentrations greater than the water quality criterion have been observed at the ZOM. 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

Table 14 - Summary of receiving water monitoring data for TN concentrations at the surface (S), mid-depth (M) and bottom depth (B) at Utulei STP receiving water monitoring stations. Shaded cell indicates TN concentration above the ASWQS criterion of 0.200 mg/l for Pago Pago Harbor.

Site	Station-Depth	TN Concentrations (mg/l)											
		Monitoring Events by Calendar Year											
		2002	2003		2004		2005		2006		2007		2008
Diffuser	U-S	0.06	0.32	0.15	0.21	0.11	0.12	0.11	0.125	0.168	0.190	0.181	0.754
	U-M	0.19	0.23	0.15	0.23	0.11	0.15	0.11	0.188	0.307	0.177	0.279	0.544
	U-B	0.18	0.36	0.15	0.30	0.11	0.11	0.11	0.160	0.115	0.113	0.171	0.104
ZOM	A1-S	0.06	0.25	0.12	0.23	0.12	0.12	-[1]	0.111	0.178	0.234	1.013	0.124
	A1-M	0.06	0.31	0.10	0.28	0.11	0.12	0.13	0.114	0.147	0.132	0.334	0.127
	A1-B	0.18	0.26	0.14	0.18	0.12	0.11	0.19	0.110	0.247	0.215	0.706	0.194
	B1-S	0.08	0.28	0.05	0.16	0.12	0.12	0.15	0.122	0.214	0.169	0.115	0.242
	B1-M	0.07	0.21	0.08	0.19	0.11	0.11	0.14	0.110	0.278	0.124	0.111	0.571
	B1-B	0.06	0.28	0.09	0.31	0.12	0.11	0.16	0.111	0.114	0.190	0.109	0.624
Farfield	C-S	0.07	0.24	0.05	0.32	0.12	0.12	0.18	0.121	0.267	0.113	0.110	0.464
	C-M	0.06	0.23	0.09	0.27	0.11	0.14	0.12	0.109	0.137	0.107	0.107	4.025
	C-B	0.07	0.31	0.12	0.37	0.11	0.11	0.11	0.113	0.303	0.113	0.619	0.451
	16-S	0.16	0.06	0.15	0.19	0.12	0.12	0.11	0.111	0.380	0.112	0.339	0.413
	16-M	0.21	0.06	0.06	0.17	0.12	0.18	0.11	0.237	0.131	0.106	0.285	0.742
	16-B	0.26	0.05	0.20	0.17	0.11	0.31	0.11	0.108	0.419	0.116	0.216	0.784
	18-S	0.17	0.04	0.09	0.15	0.12	0.11	0.11	0.110	0.184	0.120	0.107	0.252
	18-M	0.18	0.06	0.09	0.16	0.11	0.21	0.11	0.278	0.368	0.106	0.106	0.403
	18-B	0.27	0.29	0.05	0.16	0.11	0.10	0.11	0.286	0.162	0.110	0.109	0.164
Reference	5-S	0.40	0.13	0.14	0.18	0.22	1.11	0.11	0.112	0.453	0.107	0.110	0.311
	5-M	0.13	0.06	0.13	0.16	0.11	0.15	0.11	0.111	0.676	0.106	0.176	0.254
	5-B	0.15	0.05	0.17	0.14	0.11	0.11	0.11	0.241	0.321	0.108	0.106	0.564

[1]Dashes indicate data not available for review

sources. Therefore, EPA has concluded that the applicant has not demonstrated that the discharge will consistently comply with the water quality criterion for TN.

iii. Chlorophyll *a*

As a result of semi-annual monitoring data, EPA assessed attainment of the water quality criterion for chlorophyll *a* based on individual measurements taken at each depth. For chlorophyll *a*, exceedances of the water quality criterion of 1.0 µg/l were observed at all stations, except farfield station 16. Table 15 provides a summary of receiving water monitoring data for chlorophyll *a* within the surface, middle and bottom depths. From 2002 to 2008, 11 percent of all individual samples collected at both ZOM stations A1 and B1 showed chlorophyll *a* concentrations above the water quality criterion. Concentrations at ZOM station A1 showed a majority of exceedances compared to ZOM station B1 (i.e., five individual samples versus three

over the seven year time period). At farfield stations C and 18, six and three percent of all samples, respectively, showed concentrations of chlorophyll *a* above the criterion. At the reference station, three percent of the samples showed an exceedance of the chlorophyll *a* criterion. In addition, since 2006, four of the five monitoring events at the ZOM stations showed chlorophyll *a* concentrations above the criterion when no exceedances were observed at the reference station and farfield stations 16 and 18.

Based on receiving water monitoring data, concentrations of chlorophyll *a* that are greater than the water quality criterion have been observed at the ZOM. Although it is possible that there may be other sources of chlorophyll *a*, 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

Table 15 - Summary of receiving water monitoring data for chlorophyll a concentrations at the surface (S), mid-depth (M) and bottom depth (B) at Utulei STP receiving water monitoring stations. Shaded cell indicates chlorophyll *a* concentration above the ASWQS criterion of 1.0 µg/l for Pago Pago Harbor.

Site	Station-Depth	Chlorophyll *a* Concentrations (µg/l)											
		Monitoring Events by Calendar Year											
		2002	2003		2004		2005		2006		2007		2008
Diffuser	U-S	0.150	2.800	0.300	0.40	0.33	0.32	0.40	0.40	0.8	0.09	0.3	0.80
	U-M	0.550	1.500	0.700	0.27	0.53	0.30	0.80	0.32	0.8	0.09	0.5	0.30
	U-B	0.340	0.720	0.700	0.27	0.08	0.32	0.27	0.53	0.8	0.09	0.3	0.30
ZOM	A1-S	0.440	2.100	0.150	0.08	0.90	0.27	0.05	0.27	0.8	0.09	1.1	1.10
	A1-M	0.560	1.200	0.300	0.40	0.53	0.03	0.27	0.14	0.8	0.8	0.5	0.50
	A1-B	0.470	1.100	0.150	0.08	0.53	0.27	0.40	0.67	0.8	0.09	0.3	0.50
	B1-S	0.200	3.100	0.300	0.08	0.53	0.03	0.13	0.40	1.1	0.09	0.5	0.50
	B1-M	0.350	0.940	0.830	0.08	0.27	0.14	0.13	1.0	0.53	0.08	0.5	0.50
	B1-B	0.430	0.860	0.150	0.08	0.90	0.18	0.13	0.29	0.53	0.09	0.3	0.30
Farfield	C-S	0.440	1.400	0.150	0.08	0.27	0.32	0.13	0.40	0.8	0.09	0.5	0.50
	C-M	0.560	0.820	0.150	0.08	0.08	0.50	0.13	0.28	0.09	0.09	0.3	1.10
	C-B	0.490	0.790	0.150	0.27	0.40	0.05	0.13	0.27	0.53	0.8	0.5	0.30
	16-S	0.340	0.910	0.440	0.08	0.27	0.03	0.13	0.28	0.09	0.09	0.53	0.50
	16-M	0.370	0.640	0.150	0.08	0.67	0.55	0.13	0.27	0.09	0.09	0.27	0.80
	16-B	0.360	0.740	0.150	0.50	0.53	0.14	0.27	0.42	0.27	0.09	0.27	0.30
	18-S	0.700	1.100	0.300	0.08	0.69	0.18	0.27	0.27	0.53	0.09	0.3	0.50
	18-M	0.460	0.490	0.150	0.08	0.08	0.40	0.27	0.05	0.27	0.8	0.5	0.30
	18-B	0.450	0.740	0.300	0.13	0.27	0.20	0.27	0.40	0.09	0.09	0.3	0.30
Reference	5-S	0.360	0.780	0.430	0.08	0.13	0.32	0.13	0.27	0.09	0.09	0.27	0.30
	5-M	0.370	0.730	0.150	0.08	0.67	0.30	0.27	0.15	0.09	0.09	0.27	0.50
	5-B	0.150	0.740	0.170	0.08	1.10	0.40	0.13	0.35	0.09	0.09	0.09	0.50

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 consistently comply with the water quality criterion for chlorophyll *a*.

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 24.0206(m) of ASWQS has established water quality criteria for TP, TN, and chlorophyll *a* for Pago Pago Harbor. Based on receiving water monitoring data, a large number of exceedances of these criteria have been observed at the ZOM based on semi-annual sampling. Since ZOM monitoring stations are located beyond the ZID boundary, there is a likelihood that exceedances observed at the ZOM would indicate exceedances at the ZID boundary. 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.

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(g)(3) of ASWQS provides that for all ocean waters, open coastal waters, and embayments (which includes Pago Pago Harbor), the concentration of toxic pollutants shall not exceed the more stringent of the aquatic life criteria for marine waters or the human health criteria (which account for the consumption of marine 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 in 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 91:1.[5]

In the application, the applicant provided results of September 2004 and March 2005 priority pollutant analyses on wastewater from the Utulei STP. Appendix B provides a comparison of

[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.

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, 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 the proposed discharge will comply with applicable water quality criteria for individual toxic pollutants.

c. Pathogens

Undisinfected wastewater from sewage treatment plants 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(m) 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 Pago Pago Harbor (see protected uses in section 24.0205(e)(1) of ASWQS). Section 24.0206(m) of ASWQS provides that the number of enterococcus bacteria shall not exceed 104 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 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 Pago Pago Harbor. Because the Utulei 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 well above 100,000 CFU per 100 ml (Miescier and Cabelli 1982). In particular, effluent 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 semi-annual receiving water monitoring of enterococcus bacteria at the surface, middle and bottom depths at ZOM and farfield stations only. The applicant is not required to conduct enterococcus monitoring at the diffuser station U or reference station 5. In the application, the applicant provided a summary of receiving water enterococcus bacteria concentrations from 2002 to 2005. Because no bacterial data exists for within (e.g., diffuser) or at the boundary of the ZID, EPA reviewed these and subsequent receiving water monitoring data from 2006 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 ZOM.

SSM Criterion. Between 2002 and 2008, the applicant conducted 12 semi-annual receiving water monitoring events. Table 16 provides a summary of enterococcus densities at the surface, middle and bottom depths for each monitoring event. Exceedances of the SSM criterion of 104 CFU/100 ml were observed at all ZOM and farfield stations, with a majority of these exceedances were observed at the ZOM stations. Of the 12 monitoring events, nearly all (83 percent) showed elevated levels of bacteria at the ZOM. Moreover, 25 percent of the individual

samples at the ZOM stations showed bacterial densities greater than the SSM. Exceedances at ZOM station A1 ranged from 109 to 1,043 CFU per 100 ml. Elevated enterococcus densities at ZOM station B1 ranged from 134 to 428 CFU per 100 ml. In addition, since 2005, all seven monitoring events showed elevated concentrations of bacteria at the ZOM.

At farfield stations C and 18, three of the 36 individual samples (i.e., eight percent) at each station showed enterococcus densities above the SSM criterion. At farfield station 16, only one individual sample had enterococcus densities greater than the SSM criterion. Although the cause of elevated bacterial densities at the farfield stations is unclear, the higher frequency of enterococcus levels observed at both ZOM stations suggest that the discharge plume may be impacting the ZOM sites. Since 2002, there have been more than twice as many monitoring events that showed exceedances at the ZOM stations than at the farfield stations.

Table 16. Summary of enterococcus densities at the surface (S), and middle (M) and bottom depths (B) at Utulei STP receiving water monitoring stations. Shaded cells indicate an exceedance of the ASWQS single sample maximum criterion of 104 CFU/100 ml for Pago Pago Harbor.

Site	Stat.-Depth	Enterococcus Density (CFU/100 ml)											
		Monitoring Events by Calendar Year											
		2002	2003		2004		2005		2006		2007		2008
ZOM	A1-S	41	0	0	0	0	0	250	0	171	10	121	0
	A1-M	0	30	727	10	20	85	41	0	10	591	10	1,043
	A1-B	0	0	132	20	0	109	120	86	0	0	31	10
	B1-S	327	0	10	10	41	0	238	10	10	0	74	0
	B1-M	91	41	0	0	0	0	145	197	223	74	341	246
	B1-B	0	428	10	0	0	0	134	73	0	20	10	0
Farfield	C-S	1,421	0	0	52	0	0	0	0	97	0	1,354	31
	C-M	0	10	0	0	0	0	0	52	30	0	132	0
	C-B	0	41	0	0	0	0	0	0	0	0	10	10
	16-S	0	0	0	10	0	0	0	63	0	0	97	0
	16-M	0	0	0	10	0	0	10	0	63	0	41	10
	16-B	0	0	0	0	0	10	20	0	0	173	10	0
	18-S	0	0	0	0	20	0	10	0	0	0	108	0
	18-M	0	0	0	0	0	0	31	0	20	52	74	393
	18-B	0	0	0	10	0	41	0	0	0	0	10	0

[1]Dashes indicate data not available for review

Geometric Mean Criterion. The geometric mean density of enterococcus can provide valuable information on long-term water quality. As previously mentioned, the ASWQS water quality criterion for enterococcus is the geometric mean density of 35 CFU per 100 ml. In EPA's 1986 criteria document, EPA described 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 it 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. EPA believes that the comparison of the geometric mean criterion to both the EPA-calculated annual geometric mean and individual single samples can provide additional information on the attainment of water quality standards for bacteria. Therefore, EPA compared the geometric mean criterion to both individual samples and annual geometric mean values.

Table 17 provides a summary of geometric mean enterococcus densities at the surface, middle and bottom depths calculated on an annual basis. Exceedances of the geometric mean criterion

Table 17. Summary of annual geometric mean enterococcus for surface (S), mid-depth (M) and bottom depth (B) at Utulei STP receiving water monitoring stations. Shaded cells indicate an exceedance of the ASWQS geometric mean criterion of 35 CFU/100 ml for Pago Pago Harbor.

Site	Station-Depth	Annual Geometric Mean Enterococcus Density (CFU/100 ml)				
		2003	2004	2005	2006	2007
ZOM	A1-S	148	1	16	13	35
	A1-M	98	14	59	3	77
	A1-B	3	5	114	9	6
	B1-S	6	20	15	10	9
	B1-M	65	1	12	210	159
	B1-B	1	1	12	9	14
Farfield	C-S	3	7	1	10	37
	C-M	6	1	1	39	11
	C-B	1	1	1	1	3
	16-S	1	3	1	8	10
	16-M	1	3	3	8	6
	16-B	1	1	14	1	42
	18-S	1	4	3	1	10
	18-M	1	1	6	4	62
	18-B	1	3	6	1	3

Table 18. Summary of enterococcus densities of individual samples taken at the surface (S), and middle (M) and bottom depths (B) at Utulei STP receiving water monitoring stations. Shaded cells indicate an exceedance of the ASWQS geometric mean criterion of 35 CFU/100 ml for Pago Pago Harbor.

Site	Stat.-Depth	Enterococcus Density (CFU/100 ml) by Calendar Year											
		2002	2003		2004		2005		2006		2007		2008
ZOM	A1-S	41	0	0	0	0	0	250	0	171	10	121	0
	A1-M	0	30	727	10	20	85	41	0	10	591	10	1,043
	A1-B	0	0	132	20	0	109	120	86	0	0	31	10
	B1-S	327	0	10	10	41	0	238	10	10	0	74	0
	B1-M	91	41	0	0	0	0	145	197	223	74	341	246
	B1-B	0	428	10	0	0	0	134	73	0	20	10	0
Farfield	C-S	1,421	0	0	52	0	0	0	0	97	0	1,354	31
	C-M	0	10	0	0	0	0	0	52	30	0	132	0
	C-B	0	41	0	0	0	0	0	0	0	0	10	10
	16-S	0	0	0	10	0	0	0	63	0	0	97	0
	16-M	0	0	0	10	0	0	10	0	63	0	41	10
	16-B	0	0	0	0	0	10	20	0	0	173	10	0
	18-S	0	0	0	0	20	0	10	0	0	0	108	0
	18-M	0	0	0	0	0	0	31	0	20	52	74	393
	18-B	0	0	0	10	0	41	0	0	0	0	10	0

of 35 CFU/100 ml were observed at all ZOM and farfield stations. However, a majority of these exceedances were observed at the ZOM stations. Of the five years for which annual geometric means could be calculated, nearly all (80 percent) showed bacteria concentrations at one or more ZOM stations above the geometric mean criterion. Moreover, at ZOM stations A1 and B1, 33 percent and 20 percent, respectively, of the annual geometric means calculated at each depth showed bacterial densities greater than the geometric mean.

Table 18 compares single individual samples with the geometric mean criterion for each sampling event. Exceedances of the geometric mean criterion were observed at all monitoring stations. Of the 36 individual samples collected at each ZOM station, 36 and 42 percent of the samples showed an exceedance of the geometric mean criterion at ZOM stations A1 and B1, respectively. At farfield station C, 19 percent of the 36 individual samples showed enterococcus concentrations above the geometric mean criterion whereas 14 percent were shown for both fairfield stations 16 and 18.

Based on receiving water monitoring data, exceedances of bacteria criteria have been observed at and beyond the boundary of the ZOM. Since the ZID is closer to the discharge, it is a high likelihood that there would be similar, or greater, exceedances at the ZID. Although it is possible that there may be other sources of bacteria, the Utulei STP does not disinfect its wastewater and un-disinfected primary treated wastewater is likely to contain significant levels of bacteria and consequently not meet water quality standards for bacteria, even with consideration of critical initial dilution. 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 consistently meet water quality criteria 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, dilution water containing different concentrations of effluent or a particular pollutant, or receiving water). Observations are then made and recorded at predetermined exposure periods and at the end of the test. The measured responses of the test organisms are used to evaluate the effects of the aqueous test sample. In the NPDES program, WET test results are used to evaluate both the toxicity of wastewater discharges and compliance with water quality standards that prohibit the discharge of toxic pollutants in toxic amounts, or otherwise provide for the maintenance and propagation of a balanced population of aquatic life. 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 quarterly chronic WET testing on flow-weighted 24-hour composite effluent samples using the Purple Urchin, *Strongylocentrotus purpuratus*, Fertilization 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 through 2008) to assess effluent toxicity following critical initial dilution. These data are summarized in Table 19.

For the purpose of the section 301(h) evaluation, EPA evaluated receiving-water toxicity with consideration of a critical initial dilution of 91:1. 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. In its review of WET monitoring data, specifically the 19 chronic toxicity tests conducted between 2002 and 2008, EPA determined that three WET test results indicated a RWC above the 1.0 TU_c criterion.

Table 19. Summary of WET test results for the Utulei STP. Dark shaded cells indicate a receiving water concentration (RWC) chronic toxicity value greater than the chronic toxicity criterion of 1.0 TU_c. Light shaded cells indicate an effluent TU_c greater than the assessment value of 74 TU_c.

Sample Collection Date	**NOEC (% Effluent)**	**Effluent TU_c (100 ÷ NOEC)**	**RWC at ZID (TU_c ÷ 91)**
June 2002	>2.40	<41.67	<0.46
November 2002	>2.40	<41.67	<0.46
February 2003	1.20	83.33	0.92
May 2003	0.60	166.67	1.83
August 2003	>2.40	<41.67	<0.46
November 2003	0.60	166.67	1.83
February 2004	1.20	83.33	0.92
May 2004	0.60	166.67	1.83
November 2004	1.20	83.33	0.92
September 2005	2.40	41.67	0.46
November 2005	1.20	83.33	0.92
February 2006	>2.40	<41.67	<0.46
June 2006	2.40	41.67	0.46
August 2006	2.40	41.67	0.46
December 2006	>2.40	<41.67	<0.46
February 2007	2.40	41.67	0.46
June 2007	2.40	41.67	0.46
November 2007	2.40	41.67	0.46
March 2008	2.40	41.67	0.46

Two WET test results from 2003 and one from 2004 reported effluent WET values of 166.67 TU_c, which corresponds to a RWC at the ZID of 1.83 TU_c. Additionally, three tests reported effluent WET values of 83.33 TU_c, which corresponds to a RWC at the ZID of 0.92 TU_c.

ii. Further Statistical Analysis

Because so many tests were near or above the 1.0 TU_c toxicity criterion, EPA conducted additional statistical analysis, using 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 Utulei 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 83.33 based on WET data, and a value for initial dilution of 91. This calculation projected a RWC of 2.10 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 exceedance 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 74 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 74 TU_c to the

WET results in Table 18. Of the 19 chronic toxicity tests conducted between 2002 and 2008, 37 percent of WET test results were above 74 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 for the parameter chronic toxicity. 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 three times 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 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 24.0206(m) of ASWQS has established water quality criterion for pH for Pago Pago Harbor 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.

Based on DMR data from April 2005 and June 2008, the applicant conducted 39 effluent monitoring events for pH. During this period, the applicant reported an effluent pH minimum of 6.8 and an effluent pH maximum of 7.5. As a result, EPA concludes that the Utulei STP is consistently able to meet the secondary treatment requirements for pH.

Additionally, 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 2002 to 2005. EPA reviewed these and subsequent receiving water monitoring data from 2006 to 2008. During the period of 2002 through 2008, the applicant conducted 12 receiving water monitoring events at seven receiving water monitoring stations as previously described. The pH concentration was collected at surface, middle, and bottom depths at all stations. During this period, levels of pH at all monitoring stations and all depths were within the range of 6.5 to 8.6 standard units set forth in ASWQS. No levels of pH were observed below 6.5 or above 8.6 standard units. Therefore, EPA concludes that the applicant has demonstrated that the discharge will not exceed 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. In the application, the applicant indicated that there is neither an existing nor planned seawater supply (desalinization facility) intake for public water uses in the area of the Utulei 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,

[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."

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 several types of data: chemical-specific data, WET data, and bioassessment data, and sediment data. This is consistent with the approach described in EPA's Technical Support Document for Water Quality-based Toxics Control (EPA 1991):

> 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. As previously discussed, EPA has concluded that the proposed discharge will comply with water quality standards for DO, turbidity and light penetration. However, receiving water monitoring data have shown levels of total phosphorus, total nitrogen and chlorophyll *a* at the ZOM that do not consistently comply with ASWQS, and combined may result in potential adverse biological impacts in areas surrounding the Utulei STP discharge.

Domestic wastewater discharges contribute significant amounts of organic material to receiving waters that can impact water quality, and the uses it supports. Eutrophication caused by nutrient loading 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 depth) 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 ZOM. Although it is clear that nutrients and chlorophyll *a* are not consistently attaining water quality criteria at the ZOM, it is less clear whether concentrations are at levels that could impact water quality and biological communities.

However, phytoplankton blooms have been documented in Pago Pago Harbor, as described in the September 2007 Utulei WWTP Receiving Water Quality Monitoring report submitted to EPA pursuant to the existing permit, though a cause of these blooms was not reported. 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. Because of the limited frequency in receiving water monitoring (two times per year) conducted by the applicant, it is difficult to ascertain cause and effect since 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. 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 Utulei STP does not currently contain nutrient removal technology nor is any proposed; phytoplankton blooms have been reported in Pago Pago Harbor; and because of the frequency at which nutrient and chlorophyll *a* concentrations are observed above water quality criteria, 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 2007). Generally WET tests are designed to detect toxicity in whole effluents as well as predict receiving water impacts. The objective of a toxicity test is to estimate the highest "safe" or "no-effect concentration" (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. Three WET tests 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 (Balanced Indigenous Population) 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. Pursuant to the existing permit, the applicant was required to perform two coral reef surveys as part of its benthic community monitoring program. In addition, as discussed in EPA's ATSD, an applicant that is considered a small applicant 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. As a result, in the application, the applicant concluded that the coral reef surveys have shown no degradation and, furthermore, 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.

EPA's analysis of the fourth characteristic includes evaluation of the coral reef surveys discussed in the application.

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 150 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

Many 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. Because the applicant has indicated that Pago Pago Harbor exhibits characteristics more similar to an open coastal environment, a relationship of height-of-rise and mass emissions of solids to biological impacts can be established using Figure B-1 of EPA's ATSD. Based on Figure B-1, sediment accumulation rates predicted to be less than 50 g/m^2 can generally be regarded as having minimal biological effects in open coastal environments.

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 2.2 MGD and the average monthly effluent limitation (emission rate) of 625 kg/day (1,377 lbs/day) for total suspended solids. Since the sediment accumulation rate is less than 50 g/m^2, the applicant concluded that there would be minimal biological affects associated with the Utulei STP discharge.

In accordance with EPA's ATSD, EPA calculated a steady-state solids accumulation rate using the requested permit annual average flow of 3.0 MGD and critical instantaneous peak 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. Based on the applicant's predicted trapping depths for each flow described in the application, EPA calculated a height-of-rise of 131 feet for an effluent flow of 3.0 MGD and a height-of-rise of 120 feet 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 and mass emission rates for each flow scenario, 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, alpha-BHC, 4,4'-DDT, and dioxins 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 (p. 48), 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 there are coral reefs located in proximity to the existing discharge. Although the applicant states that these coral reefs are not limited in distribution in American Samoa on Tutuila Island, all coral reefs are considered to be distinctive habitats of limited distribution as defined in the ATSD. Pago Pago Harbor has a nearly continuous fringing coral reef that runs parallel to the shoreline, including the vicinity of the Utulei STP discharge. The discharge point for the Utulei STP is located approximately 950 feet from the shoreline, north of Tulutulu Point, and approximately 400 feet offshore of the reef edge. Since coral reefs are in the vicinity of the outfall, there is a presence of distinctive habitats of limited distribution.

Furthermore, the existing section 301(h)-modified permit requires the applicant to conduct two coral reef surveys as part of a benthic community monitoring program. These surveys were conducted at four locations within Middle Harbor and two in Outer Harbor. However, between 1991 and 2005, there have been a total of six coral reef surveys in Pago Pago Harbor conducted by the applicant to assess potential impacts of the discharge on coral reef communities. Surveys were conducted in February 1993, March 1995, March 1997, January 2001, March 2003, and March 2005. Coral reef surveys were conducted using video recording along transect lines at constant depth contours at three depths at each site. In the application, the applicant indicated that based on these surveys no degradation has been shown and that potentially an improvement to the overall coral reef health has been observed in terms of number of species of hard coral and percent coverage. This further demonstrates the presence of coral reefs, and thus, that there is not an absence of distinctive habitats of limited distribution. EPA also reviewed the March 2003 and March 2005 coral reef survey data and determined that no distinct differences between coral reef communities could be ascertained between the stations.

In the application, the applicant indicated that although a recreational fishery is located within Pago Pago Harbor, the fishery is generally located in shallow waters (from surface to 30 feet depth) and on coral reef tops. The applicant also indicated that the Utulei STP discharges into deep water into the harbor and, therefore, is not likely to cause any adverse effects to the marine

environment. In addition, the applicant indicated that there have been no warnings, restrictions, closures, or mass mortalities or increased incidence of disease in marine organisms caused by the existing modified discharge to any commercial, subsistence, or recreational fishery. 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, section 24.0205(e) of ASWQS has established fishing as a beneficial use for all of Pago Pago Harbor. Additionally, as discussed above, coral reefs are located near the discharge site. As a result, 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. Review of Sediment Data

Because benthic infauna are sedentary, changes in benthic community structure and function due to sediment enrichment can often describe the spatial extent and magnitude of biological impacts in the vicinity of a sewage discharge. As the organic enrichment of sediments increases, for example, the number of species and abundance of benthic organisms can be drastically reduced as conditions become intolerable for most taxa (EPA 1994a). As previously discussed, 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. Changes in sediment grain size distributions and organic content near the outfall can provide useful information in evaluating impacts to benthic infauna.

Pursuant to the existing section 301(h)-modified permit, the applicant is required to monitor sediment quality on an annual basis at stations A, B, C, and OH-4. Sampling at stations A and B alternates between each sediment sampling period. The applicant is required to conduct sediment analysis for grain size, total organic carbon content, and redox potential, which is a measure of the depletion of oxygen in the sediment due to decomposition of organic matter. From 2004 to 2007, the applicant has conducted four sediment monitoring events (February 2004, August 2005, November 2006, and September 2007). Sediment samples were collected from stations that are different from receiving water monitoring stations. Sediment samples were collected from ZID station A or B (alternating in each sediment sampling event), farfield station C, and reference station OH-4. In the application, the applicant did not provide an analysis of sediment data collected pursuant to the existing permit. However, in the sediment monitoring reports submitted to EPA pursuant to the existing permit, the applicant determined that the grain size distribution, total organic carbon content, and redox potential were similar at each station. Therefore, the applicant concluded that there were no changes in the sediment characteristics at the ZID that could be attributable to the existing discharge. EPA also reviewed sediment data and concluded that no distinct differences between grain size, total organic carbon content, and redox potential could be determined between the stations.

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

EPA has considered the available data to assess whether the proposed discharge could have impacts on marine life at and beyond the ZID. Chemical data indicate that the proposed discharge would interfere with the attainment of water quality criteria for total nitrogen, total phosphorus, and chlorophyll *a*. The available data also indicate that the proposed discharge would not be able to consistently meet the water quality criterion for whole effluent toxicity. In addition, although coral reef data are available and may indicate no adverse impacts on coral reefs have already occurred in the vicinity of the discharge, EPA has assessed whether the proposed discharge would meet the characteristics that, under the EPA's ATSD, generally indicate a low potential for biological impact and concluded that two of the four characteristics would not be exhibited by the discharge.

Therefore, based on elevated chemical-specific data, whole effluent toxicity data, and the proposed discharge not meeting some of the general characteristics that indicate a low potential for biological impact, EPA concludes 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.

f. Conclusion on Impacts on Shellfish, Fish and Wildlife within the ZID

Pursuant to 40 CFR 125.62(c)(3), conditions within the ZID must not contribute to extreme adverse biological impacts, including but not limited to, the destruction of distinctive habitats of limited distribution, the presence of disease epicenters, or the stimulation of phytoplankton blooms which have severe adverse effects beyond the ZID.

Although EPA has concluded that the proposed discharge will interfere with the attainment of water quality criteria for WET and nutrients, EPA has no information that WET or nutrient exceedances 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, Utulei STP , were upgraded to secondary treatment (EPA 1994a). Section 24.0205(e)(1) of ASWQS provides protected uses for Pago Pago Harbor 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 could result in bioaccumulation of these pollutants in aquatic organisms consumed by humans.

In the application, the applicant indicated although there is recreational and subsistence fishing that occurs in the harbor, these activities occur in shallow depths (from surface to 30 feet) and on reef tops that would not be affected by the proposed modified discharge. The applicant indicated that no fishing exists in the area because there is a significant water depth between the shoreline fishery and the outfall and, that given the high dilution of the effluent modeled under critical conditions and the depth of plume trapping level, there is no possibility of adversely impacting the subsistence fishery. 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 in their water quality standards designated uses 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(e) of ASWQS has designated commercial, subsistence, and recreational fishing, as protected uses in Pago Pago Harbor.

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 from two toxic pollutants analyses (September 2004 and March 2005) of effluent from the Utulei STP. The 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 considering 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 Utulei STP outfall currently available to assess directly whether sediment or fish in the vicinity of the outfall are impacted by toxic pollutants discharged in the effluent. In the application, the applicant indicated that 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 that 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 Utulei 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 while there are recreational beaches within Pago Pago Harbor, there is no beach or other area of primary water contact in vicinity of the outfall. Furthermore, the applicant indicated that the occasional spikes in bacterial levels observed in samples from the farfield stations were not attributable to the Utulei STP outfall. However, in the application, the applicant did not provide any evidence to support the conclusion that the exceedances are a result of other sources.

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(e)(1) of ASWQS has designated whole and limited body-contact recreation, e.g., swimming, snorkeling, surfing, and scuba diving, as protected uses throughout Pago Pago Harbor. To protect these uses, ASWQS provide that the number of enterococcus shall not exceed 104 CFU per 100 ml in any one sample (SSM, Single Sample Maximum) nor have a geometric mean indicator density above 35 CFU per 100 ml. Therefore, these criteria apply to 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 frequently exceeded water quality standards at and beyond the boundary of the ZOM, which indicate that the waterbody may not be supporting the water contact recreational use. Based on the SSM criterion, 25 percent of the individual samples collected at ZOM stations A1 and B1 showed elevated bacteria concentrations. In the application, the applicant concluded there have been no reported restrictions on recreational activities by federal or territorial authorities in the vicinity of the discharge as a result of bacteria exceedances in the receiving water. While it is possible that there may be other sources of pathogens, 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 ZOM, which is located outside the ZID and presumed to have a greater amount of dilution, and since the Utulei 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 2.2 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 ZOM. In general, domestic wastewater is a known source of total phosphorus and total nitrogen, and since the Utulei 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 section 301(h)(9) of the Act, 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, 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 the discontinuation or minimization of the existing receiving water quality monitoring program to include only ZOM stations (A1, B1) and reference station 5. This would mean the elimination of the diffuser station U and farfield stations C, 16, and 18 from the existing effluent monitoring program. The applicant requested that the receiving water quality monitoring be discontinued due to the high dilution achieved by the diffuser and the good flushing characteristics of the receiving water and argued 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 sediment monitoring study and one-time shoreline bacteria study. For the sediment monitoring study, the applicant proposed that the monitoring study be conducted once during the five-year permit term and 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. For the bacteria study, the applicant proposed that the study be designed to enable identification of other sources of bacteria. If the sediment study or bacteria study showed potential impact, the applicant recommended that a dye study be initiated to better understand the plume dilution and transport. 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 and sediment data is important when establishing a comprehensive section 301(h) 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 ZOM. In addition, no receiving water monitoring is conducted at the ZID and none is proposed to better assess the proposed modified discharge's compliance with section 301(h) regulations. Therefore, the continuance of receiving water monitoring, with the addition of ZID monitoring stations, would be 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 (a renewed section 301(h)-modified permit if EPA's final decision is to grant a variance, or a secondary-treatment permit if the final decision is to deny the variance).

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 the only other point source discharge is from the joint outfall of the two canneries which are regulated by individual NPDES permits for discharges to Pago Pago Harbor. The applicant also indicated that it coordinates receiving water monitoring activities with the two canneries. Furthermore, the applicant indicated it received certification from ASEPA, in compliance with 40 CFR 125.64(b), on the previous 1991 section 301(h) permit renewal application that the discharge is consistent with American Samoa water quality standards and sections 301, 302, 303, 306, and 307 of the Clean Water Act. However, the applicant did not provide a new certification for the proposed modified discharge in the renewal application submitted to EPA on May 1, 2006, or in the supplemental information submitted to EPA on March 2, 2008, 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 Utulei STP, and that it provided certification of this in the 1991 section 301(h) permit renewal application based on the results of an industrial user survey that indicated that the sewage flowing into the Utulei STP from all industrial park renters is domestic in nature only. The applicant also indicated that while Utulei STP services the canneries, only domestic wastewater is sent to the treatment plant. Also, the applicant indicated that there are no future industrial inputs planned and, therefore, concluded that, as a small discharger, it is not required to submit a chemical analysis of its current discharge in its application 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 two effluent analyses of toxic pollutants and pesticides. Although the applicant has not provided a new certification in accordance with 40 CFR 125.66(a)(2) (i.e., a 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 the two chemical analyses 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 1991 section 301(h)-modified 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 Utulei STP. For example, analytical results from toxic pollutant analyses from September 2004 and March 2005 show concentrations of pollutants such as copper, mercury, and 4,4'-DDT in the undiluted 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 Utulei STP nor are any planned. The applicant also indicated in the application that the Utulei STP services the two tuna canneries, however, only domestic waste is sent to the treatment plant. Industrial waste from the tuna canneries is independently treated via on-site wastewater

treatment systems and discharged in accordance with individual NPDES permits. 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, originally implemented in 1989, 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. 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 actual annual average effluent flow from 1.5 MGD (0.066 m^3/sec) (based on 2005 flow data) to 3.0 MGD (0.131 m^3/sec) by 2012. The existing 301(h)-modified NPDES permit has a permitted flow of 2.2 MGD and the applicant has also requested an increase in an annual average permitted flow from 2.2 to 3.0 MGD. In accordance with 40 CFR 125.67, the applicant projected effluent volume and mass loadings for BOD and TSS in five-year increments, from 2011 to 2021, based on a projected end-of-permit flow of 3.0 MGD. Based on a projected effluent average annual volume of 3.0 MGD (0.131 m^3/sec) for 2011, 2016, and 2021, the applicant calculated BOD and TSS mass loadings of 324 and 311 metric tons/year, respectively, for each year. These loads were based on the applicant's proposed 30-day average effluent limitations of 1,973 and 1,890 lbs/day for BOD and TSS, respectively, and correspond to a flow of 3.0 MGD and requested average monthly permit effluent limitations for BOD and TSS of 78.3 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 Utulei STP since this time 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. In the application, the applicant indicated that the closest marine sanctuary, Fagatele Bay, is located more than five miles from the discharge point of the Utulei STP. 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 Utulei STP discharge is consistent with the ESA which was documented in the original section 301(h) waiver application (1985). The applicant also indicated that there is no federally designated critical habitat 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. 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

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Appendices

APPENDIX A

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

Month	TSS Concentrations and Percent Removal Based on Calendar Year											
	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
January	-[1]	-	-	42	24	43	64	35	45	28	17	39
February	-	-	-	32	15	53	58	29	50	32	18	44
March	-	-	-	40	22	45	30	13	57	52	31	40
April	34	16	53	56	27	52	46	28	39	30	14	53
May	44	19	57	50	33	34	20	16	20	28	16	43
June	44	21	52	50	29	42	42	17	60	16	9	44
July	34	18	47	18	19	-5.6[2]	28	16	43	-	-	-
August	43	21	51	52	30	42	32	14	56	-	-	-
September	40	25	38	52	28	46	32	20	38	-	-	-
October	52	28	46	55	33	40	34	16	53	-	-	-
November	46	28	39	42	28	33	41	27	47	-	-	-
December	48	23	52	55	25	55	42	24	43	-	-	-

[1]Dashes indicate data not available for review

APPENDIX A

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

Month	BOD Concentrations and Percent Removal Based on Calendar Year											
	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
January	-[1]	-	-	114	52	54	115	56	51	41	17	59
February	-	-	-	119	48	60	90	35	61	137	69	50
March	-	-	-	113	48	58	55	31	44	107	50	53
April	100	43	57	64	41	36	91	46	49	85	40	53
May	99	57	42	66	35	47	59	30	49	89	49	45
June	94	46	51	84	33	61	64	38	41	40	22	45
July	128	59	54	107	56	48	85	58	32	-	-	-
August	125	51	59	99	45	55	56	33	41	-	-	-
September	80	35	56	94	40	57	53	37	30	-	-	-
October	124	50	60	113	40	65	98	58	41	-	-	-
November	125	47	62	55	19	65	126	62	51	-	-	-
December	102	46	55	86	47	45	120	67	44	-	-	-

[1]Dashes indicate data not available for review

APPENDIX B

Evaluation of Effluent Concentrations of Priority Toxic Pollutants from the Utulei 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	6.1	ND	6.1	0.067	4.8	3.1	1,300	-	-	N
Lead	ND	ND	-	-	210	8.1	-	-	-	N
Mercury	0.24	0.0657	0.24	0.0026	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	27.7	28.5	28.5	0.31	90	81	7,400	26,000	-	N
Cyanide	3	ND	3	0.03	1	1	140	140	-	N
2,3,7,8-TCDD (Dioxin)[4]	1.3E-7	1.0E-7	1.3E-7	1.4E-10	-	-	5.1E-9	5.1E-9	-	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)		
Acrolein	ND	ND	-	-	-	-	190	290	-	N
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	0.21	ND	0.21	0.002	-	-	130	1,600	-	N
Chlorodibromomethane	ND	ND	-	-	-	-	0.40	13	-	N
Chloroethane	ND	ND	-	-	-	-	-	-	-	N
2-Chloroethylvinyl Ether	ND[3]	ND	-	-	-	-	-	-	-	N
Chloroform	1.5	ND	1.5	0.016	-	-	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

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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 Bromide	ND	ND	-	-	-	-	47	1,500	-	N
Methyl Chloride	ND	ND	-	-	-	-	-	-	-	N
Methylene Chloride	0.42	ND	0.42	0.005	-	-	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	0.51	2.3	2.3	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	13	ND	13	0.143	-	-	-	-	-	N
3-Methyl-4-Chlorophenol	ND	ND	-	-	-	-	-	-	-	N
Pentachlorophenol	ND	ND	-	-	13	7.9	0.27	3.0	-	N
Phenol	12	32	32	0.35	-	-	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	8.6	12	12	0.13	-	-	1.2	2.2	-	N
4-Bromophenyl Phenyl Ether	ND	ND	-	-	-	-	-	-	-	N
Butylbenzyl Phthalate	ND	ND	-	-	-	-	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[5]	4.1/4.3	3.8/1.8	4.3	0.048	-	-	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	3.5	4.4	4.4	0.48	-	-	1.7E4	4.4E4	-	N
Dimethyl Phthalate	ND	ND	-	-	-	-	2.7E5	1.1E6	-	N
Di-n-Butyl Phthalate	ND	ND	-	-	-	-	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	0.38	0.38	0.004	-	-	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

APPENDIX B

Evaluation of Effluent Concentrations of Priority Toxic Pollutants from the Utulei 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)		
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	0.56	0.56	6.2E-3	-	-	-	-	-	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	0.011	ND	0.011	1.2E-4	-	-	2.6E-3	4.9E-3	-	N
beta-BHC	ND	ND	-	-	-	-	0.0091	0.017	-	N
gamma-BHC (Lindane)	ND	ND	-	-	0.16	-	0.98	1.8	-	N
delta-BHC	0.0052	ND	0.0052	5.7E-5	-	-	-	-	-	N
Chlordane	ND	ND	-	-	0.09	0.004	8.0E-4	8.1E-4	-	N
4,4'-DDT	0.018	0.019	0.019	2.1E-4	0.13	0.001	2.2E-4	2.2E-4	-	N

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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'-DDE	ND	ND	-	-	-	-	2.2E-4	2.2E-4	-	N
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)[6]	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 of 91:1
[2]Concentration estimated to be below laboratory detectable levels
[3]Dashes indicate 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]Two samples were analyzed for 1,4-Dichlorobenzene for each sampling event
[6]Effluent concentration based on "non-detect" concentrations reported for Aroclors 1016, 1232, 1242, 1248, 1254 and 1260