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

Response to Comments
from the City and County of Honolulu

on the Environmental Protection Agency's
March 27, 2007 Tentative Decision
regarding the

City and County of Honolulu's request for a Variance at the
Honouliuli Wastewater Treatment Plant under
Section 301(h) of the Clean Water Act

January 5, 2009

Response to CCH comments on Honouliuli TDD

This document responds to the comments received from the City and County of Honolulu on the Honouliuli tentative decision. A separate document responds to all other comments received from the public on the Honouliuli tentative decision. Each comment in this document is given a number with the prefix "C." Comments in the Response to Comments from the Public are given numbers with the prefix "P." Any reference in this document to "public" comments should be interpreted to include both the comments in this document and the other comments received from the public.

Note: Various commenters refer to a section 301(h) "waiver," whereas EPA uses the term "variance." In the context of the Honouliuli decision and response to comments document, these terms can be considered interchangeable.

General comments

Comment C1: Congress amended the CWA in 1977 by adding Section 301(h), giving EPA authority to issue modified NPDES permits for primary treatment by publicly owned treatment works (POTW) discharges to marine waters, provided that the applicant meet nine specific criteria. According to Congressional records, Section 301(h) was promulgated "[i]n order to achieve needed savings in the cost of treatment of municipal wastes [; thus,] the committee considers it desirable to make the option of ocean discharges available where it can be shown that unacceptable adverse environmental effects will not result" (H.R. Rep. No. 97-270, at 27 (1981), reprinted in 1981 U.S.C.C.A.N. 2629, 2645).

The modifications allowed by Section 301(h) are focused on potential relaxation of 5-day biochemical oxygen demand (BOD), total suspended solids (TSS), and hydrogen ion concentration (pH) criteria. No other relaxations of secondary treatment requirements or environmental standards are allowed. Congress expressly identified criteria that the applicant must meet to obtain a 301(h) waiver. These criteria include compliance with water quality standards, industrial pretreatment requirements, monitoring programs, and the elimination of toxic substances from nonindustrial sources, among others. In essence, all waiver criteria concern direct or indirect impacts on the marine environment and the public uses thereof; their overarching goal is to prevent ocean degradation by the discharge of primary effluent.

The nine 301(h) waiver criteria are listed in CCH's comments.

Response: EPA agrees that Section 301(h), as added to the Clean Water Act in 1977 and amended by the Water Quality Act of 1987, allows EPA to modify the secondary treatment requirements of CWA section 301(b)(1)(B) for certain dischargers that demonstrate that the proposed discharge complies with a set of criteria intended to protect the marine environment, including attaining water quality standards. EPA does not dispute the commenter's quotation from the legislative history or general summary of the 301(h) requirements.

Comment C2: HWWTP Plant Upgrades

Prior to 1984, the HWWTP discharged less than primary treated effluent. It was upgraded in 1984 as a primary treatment facility with 33 million gallons per day (mgd) of primary treatment capacity. Effluent from the plant is discharged through a deep ocean outfall that extends approximately 8,760 feet (1.7 miles) from shore. It discharges through a high-rate diffuser at a depth of approximately 200 feet. The diffuser is located at a point near the convergence zone for tidal currents flowing around the island of Oahu where the net flow of water is south and west, which carries the greatly diluted effluent away from public recreation areas. The facility was expanded in 1992 to provide 51 mgd of capacity, but it is currently rated to have 38 mgd of capacity because one clarifier is held off-line for redundancy purposes. Additionally, because of solids processing limitations, the 38 mgd of capacity is restricted to approximately 29 mgd. In 1996, secondary treatment was added for 13 mgd of the plant flow. In 2000, tertiary treatment for 12 mgd of those 13 mgd was added to provide high-quality water for reuse in industrial and landscape applications.

Specifically, CCH has improved the plant since EPA's 1988 TD to approve a 301(h) waiver, including the following upgrades:

1. HWWTP Expansion, Phase 1 Part A, 1993; addition of two primary clarifiers, pre-aeration and grit hopper and odor control, for more than $19 million
2. HWWTP Expansion, Phase 1 Part B, 1994; addition of a process steam boiler, odor control, brackish water wells, sludge pumps, and scum piping system improvements, for more than $5 million
3. HWWTP Maintenance Building, 1996, for nearly $4 million
4. HWWTP Unit 1A Secondary Treatment Facilities, 1997; construction of bio-towers, solids contact tanks, two secondary clarifiers, and all ancillary secondary treatment facilities, for nearly $26 million
5. HWWTP Effluent Reuse Demonstration Project, 1998; installation of pumps, piping, meters, and percolation trench required to serve reuse project, for more than $1 million
6. HWWTP Solids Handling Facilities—Interim Modifications, 2006; construction of improvements to the heat treatment solids processing system, solids tanks, and associated piping, for nearly $2 million
7. Fort Weaver Road Reconstruction Sewer, 2006; rehabilitation of the 24-inch, 30-inch, and 36-inch sewer mains in Fort Weaver Road in the vicinity of Ewa Beach, which reduced saltwater intrusion entering the sewer system to the HWWTP, for nearly $3.3 million

On February 6, 2007, CCH issued a Notice to Proceed (included in the Appendix) with construction of new solids handling facilities at the HWWTP, including new anaerobic digester tanks to replace the current heat treatment solids processing system. When completed, the high-strength BOD return flow coming from the current system will be eliminated, which will allow return flows to be redistributed to the two primary channels and to the secondary treatment system. Currently, due to the color of the centrate from the solids heat treatment facilities, the centrate is discharged to a single primary channel (channel No. 1) to avoid color in the final reuse water.

New solids handling facility improvements will improve the overall plant operations and reliability, providing additional assurance that the plant will meet its treatment removal requirements. The contract price for construction of these new facilities is more than $41 million.

Response: EPA acknowledges that the Honouliuli WWTP has been upgraded since 1988. To the extent that these upgrades affected effluent quality, the effects would have been reflected in the effluent data reviewed by EPA in its consideration of the application. As to the planned new solids handling facilities, CCH has not indicated any way in which these facilities would improve Honouliuli's performance as to any of the section 301(h) criteria the applicant fails to meet. EPA has evaluated the proposed discharge against the regulatory and statutory criteria pertaining to section 301(h). Notwithstanding CCH's completed and planned improvements, EPA finds that the proposed discharge will not meet the regulatory and statutory criteria. Notably, the proposed discharge does not comply with all applicable water quality standards.

Comment C3: HWWTP Performance Has Improved Since EPA Approved the Waiver in 1988**.** CCH initially applied for a waiver of secondary treatment under Section 301(h) in 1979. In 1981, EPA granted a variance for 5-day BOD but denied a variance for TSS because the plant, at the time, did not provide full primary treatment. Because the facility was being upgraded to provide full primary treatment, CCH reapplied for a 301(h) waiver in 1983. EPA issued a TD to grant this request in 1988. The modified NPDES permit incorporating a 301(h) waiver for BOD and TSS was issued in 1991 and went into effect in December 1993. In anticipation of permit expiration in 1996, CCH reapplied for a 301(h)-modified NPDES permit in 1995, and submitted updated reapplications in 2000 and 2004. The plant has been operating under an administrative extension of its permit since the permit expired on its face in 1996.

Today, the plant is meeting primary treatment requirements and discharging fewer pounds of TSS than it did in 1991, when EPA issued the 301(h) permit. As shown in the effluent data table below, even with the extensive growth in the Ewa area served by the plant, total solids discharged through the deep marine outfall are less than that discharged in 1991. On the basis of the environmental information provided by CCH collected through its EPA approved monitoring program, the addition of reuse treatment facilities (which significantly lowered the amount of TSS in the effluent), and the new information provided in this Response and Comments, CCH demonstrates that it is meeting the criteria for continuation of its 301(h) waiver.

Year	**BOD (mg/L)**	**TSS (mg/L)**	**Flow (mgd)**	**BOD (lb/d)**	**TSS (lb/d)**
1991	106	56	23.6	20,913	11,130
1992	124	52	23.7	24,399	10,218
2005	141	52	21.7	25,310	9,430

mg/L = milligrams per liter.
lb/d = pounds per day.

When EPA issued the 301(h) permit in 1991 for the HWWTP, it found that CCH met each of the nine waiver criteria. While the nine statutory criteria have remained the same, overall quality of the effluent has improved. In 2007, the facility provides secondary treatment to 13 mgd—nearly half the daily plant flow—of which 8 mgd are reused and do not enter marine waters. The remaining 5 mgd, on average, are blended with the effluent from the primary treatment plant prior to discharge through the outfall.

Despite the facts that: (a) the effluent quality has improved, (b) CCH has made significant upgrades to the plant, and (c) environmental monitoring confirms CCH compliance with the nine 301(h) criteria, EPA has reversed course in its March 2007 TD, a decision that is contradictory to its prior analysis when issuing the permit and is unsupported in light of the evidence provided by CCH that clearly warrants a positive decision.

Response: EPA acknowledges that the Honouliuli WWTP has been upgraded since 1988, and that EPA approved a 301(h)-modified permit in 1991. However, since EPA's 1991 decision, several applicable water quality standards have changed, and more information on the discharge is now available to EPA. For example, the enterococcus standard to protect recreational users from bacteria was promulgated in 2004, and did not apply to the discharge that was granted a variance in 1991. There was no evaluation of whole effluent toxicity in the 1991 decision. The 1991 decision did not consider the impacts on *Tripneustes gratilla*, an indigenous Hawaiian sea urchin, which has been used to evaluate toxic effects on marine life in Hawaii since the late 1990's. EPA's consideration of whether the Honouliuli WWTP application has met the criteria of section 301(h) of the CWA must be based on current water quality standards and currently available information on attainment of these standards as submitted in CCH's application and subsequent submissions by CCH. Specifically, EPA's assessment of effluent and receiving water monitoring data from 1991 through 2006 (and, for some parameters, through 2008) indicates that the discharge does not meet water quality standards for bacteria, whole effluent toxicity, chlordane, dieldrin, and ammonia nitrogen. These exceedances lead EPA to conclude that CCH's proposed discharge will not meet water quality standards, will interfere with the protection and propagation of a balanced, indigenous population of fish, shellfish, and wildlife, and will negatively impact recreational activities. See also response to comment C4.

Comment C4: In 1988, EPA issued a TD approving a 301(h) waiver for the HWWTP, finding that:

1. The HWWTP would comply with State WQS for dissolved oxygen (DO) and turbidity.
2. The plant would not adversely affect public water supplies or the protection and propagation of a balanced, indigenous population of fish, shellfish, and wildlife. The HWWTP would allow for recreational activities.
3. CCH had proposed a system of monitoring to which EPA specified necessary changes to ensure adequacy of the monitoring program.
4. The HWWTP discharge would not result in additional treatment requirements on any other point or nonpoint source.
5. CCH had a program in place to enforce all applicable pretreatment requirements.

6. CCH certified that it did not have any industrial sources of toxic pollutants in its discharge. As noted in the 1988 TD, EPA stated: “Thus, the applicant would not discharge greater levels of industrial toxic pollutants in its primary effluent than it would if it did not have a pretreatment program and were discharging at secondary levels. In addition, the applicant has demonstrated the lack of toxic pollutants through chemical analysis of effluent in the altered discharge
7. CCH had proposed an acceptable schedule of activities to limit pesticides and toxic pollutants from nonindustrial sources entering the treatment works.
8. CCH would not substantially increase the discharge from the HWWTP to which the waiver applies (BOD, TSS).
9. The State of Hawaii would make its concurrence decision following preparation of a draft modified NPDES permit.

On the basis of these findings, EPA concluded in its 1988 TD that CCH’s proposed discharge from the HWWTP would comply with the requirements of Section 301(h).

The nine criteria and the EPA guidance used in 1988 remain unchanged and in effect as the basis for the EPA Regional Administrator (acting through the Region 9 EPA Administrator) to decide to continue the waiver in 2007. Moreover, since 1988, there have been significant changes to the HWWTP (see Section IB) and almost two decades of monitoring and reporting that support the conclusion that the nine 301(h) criteria still are being consistently met.

Despite these facts, EPA has reached a Tentative Decision to deny a waiver based on very selective and often peripheral or immaterial elements of the record rather than on the entire weight of evidence. Unlike 1988, the 2007 TD is based on inconsistent findings regarding environmental information, speculation, disregard of relevant data, and arbitrary and unduly narrow interpretations of compliance with the 301(h) waiver criteria.

Response: Since EPA’s 1988 TD approving a variance for the Honouliuli WWTP, the relevant facts have changed. Several water quality standards have changed, and CCH’s application includes more extensive data on the makeup of the Honouliuli discharge. For example, the enterococcus standard to protect recreational users from bacteria was promulgated in 2004, and did not apply to the discharge that was granted a variance in 1991. There was no evaluation of whole effluent toxicity in the 1991 decision. The 1991 decision did not consider the impacts on *Tripneustes gratilla*, an indigenous Hawaiian sea urchin, which has been used to evaluate toxic effects on marine life in Hawaii since the late 1990’s. EPA’s consideration of whether the Honouliuli WWTP application has met the criteria of section 301(h) of the CWA must be based on current waters quality standards and currently available information on attainment of these standards as submitted in CCH’s application and subsequent submissions by CCH.

Regarding the proposed weight-of-evidence approach, section 301(h) does not allow for such an approach. Rather, each of the section 301(h) criteria needs to be met for a variance to be granted. Thus, EPA first analyzed each of the 301(h) criteria. Based on those analyses, EPA determined that, because not all the criteria were met, EPA could not grant the variance under the Clean Water Act.

Comment C5: The following are examples of instances where in 2007, without explanation or justification, EPA deviated from its 1988 approach to enable it to arrive at its predetermined conclusion.

Response: Comment C5 is a summary listing several issues pointing out how the current Honouliuli decision denying CCH's application is different from the decision EPA made in 1988 granting a 301(h) variance. Most of the listed issues are covered in more detail in subsequent specific comments. As was noted in responses to comments C3 and C4, the relevant facts applicable to these decisions have changed significantly since 1988. More data are now available for EPA to consider, and several applicable water quality standards have changed. For more details regarding changes since the previous 1988 decision in general, please see responses to comments C3 and C4. With regard to the rest of the specific points set forth by the commenter, responses are provided after the eight summarized points listed below, and in the referenced responses throughout this document.

Comment C5.1. In 1988, with respect to Hawaii WQS, EPA based its decision to approve the 301(h) waiver on its determination that the Zone of Mixing (ZOM) takes precedence in determining compliance with state WQS and that the ZID is used to determine compliance only for the parameters (BOD and TSS) for which a variance from secondary treatment requirements has been requested. In its 1988 TD, EPA stated: *"Although dimensions of an approved ZOM would take precedence in determining compliance with State water quality standards, the zone of initial dilution was recalculated by Tetra Tech, Inc. (1987) to determine compliance with 301 (h) regulations for parameters for which the applicant is requesting a variance (i.e., BOD TSS)."*

In 2007, EPA based its negative TD on **all** WQS, including BOD and TSS, being met at the edge of the ZID instead of at the edge of the ZOM despite the fact that the State of Hawaii WQS are established at the edge of the ZOM. If the State WQS had been formulated on the basis of being measured at the edge of the ZID, it is logical to conclude that the standards would have taken into account the degree of mixing that occurs in the ZID and, therefore, that different numerical standards would have been set for the ZID than were established for the ZOM.

Response: Pursuant to Clean Water Act regulations implementing 301(h) variances, all water quality standards must be achieved at and beyond the zone of initial dilution (ZID) (40CFR125.62(a)(i), 125.58(dd)). A Zone of Mixing (ZOM), which encompasses a larger area, allows for more dilution than does the ZID. Numeric water quality standards are established to protect beneficial uses at levels which protect against potential harm (e.g. to human health, aquatic life, etc.). The specific numeric standards which have been exceeded by the Honouliuli discharge are standards that apply to Hawaii's marine waters, not solely to waters in the vicinity of wastewater treatment plant outfalls. It is not correct to conclude that varying numeric water quality standards would be established based on varying discharge scenarios or varying dilution calculations. Water quality criteria are established by states at the level necessary to protect the designated uses, with no consideration of the size of the mixing zone or even whether or not a mixing zone will be allowed. The regulatory language in 40 CFR 125.62(a)(i) regarding the need to achieve water quality standards at the ZID is clear, and EPA's analysis of CCH's application has determined that the Honouliuli discharge exceeds applicable water quality standards at and beyond the ZID. To the extent the language quoted in the comment suggests that the ZID is only relevant to BOD and TSS, that was in error.

Comment C5.2. In 1988, EPA reviewed bacteria concentration information with respect to the potential of nearshore areas exceeding State fecal coliform bacteria standards. In 2007, EPA accepts that there are no discharge-related bacterial concentrations at the shoreline, but is requiring that State WQS for a different organism, *Enterococcus*, be met at the edge of the ZID. The Federal Beach Act is being used as the basis for this evaluation, but the Beach Act defers to the states for implementing the regulation. As acknowledged in its 2007 TD, EPA has contradicted the Hawaii Department of Health (HDOH) advice on the appropriate *Enterococcus* concentration to apply at the edge of the ZID and/or ZOM.

Response: As noted in the responses to comments C3 and C4, the applicable water quality standards for bacteria have changed since 1988. In response to the Beaches Environmental Assessment and Coastal Health (BEACH) Act of 2000, EPA promulgated bacteria criteria for coastal recreational waters in November 2004. The promulgated criteria apply to waters designated for recreation where states have not adopted appropriate water quality standards for coastal recreation waters. These criteria became effective in Hawaii on December 16, 2004, and apply to Hawaii's marine waters not previously covered by the State's criteria. EPA promulgated a geometric mean of 35 cfu /100 mL and a range of four single sample maximum values between 104 and 501 cfu/100 mL. In Hawaii, the EPA-promulgated criteria apply to marine waters between 300 meters (1,000 feet) from shore and three miles from shore. EPA's rule expects States to apply the appropriate single sample maximum value based on the frequency of use in coastal recreational waters. EPA has not disregarded HDOH's input on this issue; please see response to comment C17.

Comment C5.3. In its 1988 TD, EPA concluded that disinfection would be required if unacceptably high concentrations of bacteria were to occur within recreational areas. EPA noted the following in its 1988 TD:

"Fecal coliform bacteria concentrations in recreational areas must be frequently monitored (preferably in the evening or early morning) at the initiation of the 301 (h) monitoring program, and effluent disinfection be initiated if unacceptable high concentrations occur within these areas."

Yet, in 2007, EPA fails to acknowledge that disinfection could be used to control bacterial concentrations in the discharge if they prove to be a potential public health and/or recreational problem. Further, EPA makes no reference to disinfection as a common industry practice for controlling bacterial concentrations.

Response: EPA's decision is based on the permit renewal application provided by CCH. CCH did not include the use of disinfection in their application. See also response to comment C21.

Comment C5.4. In its 1993 defense of its 1988 TD, EPA relied on the nutrient and phytoplankton assessment conducted by Dr. Edward Laws, currently Dean of the School of the Coast & Environment and Professor in the Department of Oceanography & Coastal Sciences, Louisiana State University. In his 1993 testimony in support of the waiver, Dr. Laws reported that there were no significant differences in chlorophyll *a* concentrations between the control station and stations near the outfall and that phytoplankton photosynthetic rate at the discharge site are characteristic of oligotrophic waters, indicating no adverse effect of the discharge.

In 2007, EPA failed to follow the approach used by Dr. Laws when EPA approved the waiver. Instead, to achieve its desired result, EPA based its TD in part on monitoring data showing that ammonia levels sometimes exceed State WQS at the edge of the ZID and "may" cause increased algal production, although none has been demonstrated as a result of the many years of EPA-approved 301(h) monitoring studies. Indeed, EPA notes in its TD that past biological data do not indicate the presence of phytoplankton blooms or other signs of excessive marine plant growth.

Dr. Laws has reviewed the 2007 TD. He concludes that, after all the intervening years, the monitoring results show that there is still no significant difference in chlorophyll *a* concentrations between control stations and stations near the outfall. Dr. Laws also finds that none of the total ammonia concentrations measured at any of the stations and depths has violated the EPA criterion continuous concentration for toxicity, and that the geometric means are not remotely close to the criterion continuous concentration.

Response: Based on the data provided in the application, EPA has determined that the discharge does not attain the State of Hawaii's water quality standard for ammonia nitrogen. These points regarding reviews by Dr. Laws are made in comments #C41, C44, C45, and C46. Please see the responses to these comments. EPA has reassessed the available data in view of comments received regarding chlorophyll *a*. As a result, EPA has determined that the discharge has generally attained the State of Hawaii's water quality standard for chlorophyll *a*. The final decision reflects this change from the Tentative Decision Document.

Comment C5.5. With respect to toxicity and the protection of a balanced, indigenous population of fish and shellfish (BIP), WET test results were not available to EPA in 1988 when it reached its decision to approve a 301(h) waiver. Rather, EPA relied on CCH certification that the HWWTP influent does not contain industrial sources of toxic pollutants and that CCH had a schedule of activities to limit entrance of pesticides and toxic pollutants from nonindustrial sources.

In 2007, EPA relies solely on WET test results associated with one of two test species (the indigenous sea urchin *Tripneustes gratilla*) to tentatively conclude that there are toxic compounds in the effluent that may potentially affect the BIP. Sole reliance on this one test is unwarranted for a number of reasons, including: (a) this indigenous sea urchin species is not on the EPA list of approved species, (b) the bioassay test guidance is still in draft form, (c) EPA is basing its conclusion on an evaluative technique (statistical hypothesis testing) that its own TSD and a good deal of subsequent EPA guidance discourage for use in compliance evaluations, and

(d) the other test species used for reporting, as well as additional EPA-approved species tested by CCH, provide sufficient evidence showing no unacceptable toxicity. EPA further concludes that this flawed analysis is evidence that a BIP is not being maintained outside the ZID despite 13 years of intensive and expensive EPA-approved monitoring that clearly contradicts this finding. In doing so, EPA is clearly reaching for a conclusion that is not supported by the weight of evidence provided by CCH.

Response: EPA agrees that WET test results were not available in 1988. Based on currently available WET test results, EPA has determined that the discharge will interfere with the attainment or maintenance of that water quality which assures protection and propagation of a balanced, indigenous population (BIP) of fish, shellfish, and wildlife. The same points made in comment C5.5 are made in comments C27, C30, and C33. Please see the responses to these comments.

Comment C5.6. In its 1988 positive 301(h) waiver decision, no bioaccumulation was expected by EPA. However, EPA required that fish tissue analysis be included in the CCH monitoring program to test the hypothesis. EPA concludes in its 1988 TD:

> *"Marine organisms caught from or off the shore around the outfall may bioaccumulate these pollutants [copper and zinc], which could then transfer to humans through ingestion. Bioaccumulation monitoring will, thus, be required in the monitoring program."*

Since then, fish tissue data have shown no unacceptable bioaccumulation (including the pesticides dieldrin or chlordane for which EPA has expressed concern). Metals concentrations in fish tissues are not statistically different between control stations and the outfall stations. However, the apparent presence of dieldrin and chlordane in the effluent data provided to EPA caused EPA to tentatively conclude in 2007 that the altered discharge "could cause" bioaccumulation. (Note: dieldrin and chlordane have been banned in the United States since 1974 and 1988, respectively; they are found in sediments in Hawaiian waters, but not above aquatic criteria at any of the 301(h) monitoring stations for the HWWTP.)

Additional recent analysis of the HWWTP effluent by CCH, using a more precise and definitive analytical technique than that contained in the EPA-approved 301(h) monitoring program, indicates that, in the samples analyzed to date, (a) dieldrin is absent in the effluent and (b) chlordane is present at levels that do not exceed its permit limitations. (See Section IIB.II.C for discussion of the results of gas chromatograph/mass spectrometer [GC/MS] analysis completed by CCH.)

Response: Based on the results of the applicant's effluent testing, EPA has determined that the discharge does not attain the State of Hawaii's water quality standards for the pesticides chlordane and dieldrin. These standards have been established at levels designed to prevent bioaccumulation in fish at levels that would pose risks to human health. The same points raised in comment C5.6 are also made in comments C63, C64, and C65. Please see responses to these comments.

Comment C5.7. In its 1988 positive 301(h) waiver decision, EPA used 1,500 feet from shore as the area within which "most" water contact recreation occurs. EPA concluded that:

> *"In summary, based upon a combination of several conservative assumptions, the analysis indicates that the State standard of a 200/100 mL geometric mean may be exceeded at the stations during certain periods within a 24 hour cycle. However, it is expected that under normal sewage treatment plant operating conditions, nearshore waters will be safe for recreational uses and that fishing, swimming, and other activities would be protected."*

The 1988 TD clearly indicates that EPA, while taking a conservative view, applied a rational standard of protection of water contact activities in reaching its decision to approve the waiver.

In contrast, in 2007 EPA is evaluating bacterial concentrations at "nearshore" stations that are greater than 1,500 feet from shore and is using individual measurements from all depths at each of the offshore stations (over the outfall, nearly 2 miles from shore) in the vicinity of the ZID and ZOM, to determine compliance with direct water contact recreation criteria for *Enterococcus*. It is noted that the State of Hawaii has not yet issued final guidance on where to apply direct water contact recreation criteria, but it is highly unlikely that they will be applied at the "nearshore" stations monitored for 301(h) purposes or at the deep area around the outfall diffuser.

In fact, HDOH, which is responsible for setting the *Enterococcus* criteria, recommended using a single sample criterion of 501 colony-forming units (cfu)/100 milliliters (mL) as the appropriate measure of compliance in the discharge area. However, EPA has chosen to ignore that advice in its evaluation of *Enterococcus* concentrations as they relate to compliance with State WQS.

Response: As is noted in the response to comments C3, C4, and C5.2, the applicable water quality standards for bacteria have changed since 1988. These same points are made in comment C17. Please see response to comment C17.

Comment C5.8. In its 1988 positive waiver decision, EPA required improvements to the monitoring program proposed by CCH in order to ensure compliance with waiver requirements and to validate the conclusions reached by EPA in approving the waiver. CCH accepted and implemented these changes. The 1988 TD specified that EPA or the State could require additional monitoring if it were determined that other parameters or more frequent sampling were needed.

In its 2007 decision, EPA ignores this language in the 1988 TD and simply concludes that, given new WQS, the current monitoring program (developed as directed in the 1988 TD and in the permit) is "not sufficient." In drawing this conclusion, EPA did not state any specific deficiency in the current program. This conclusion is in direct contrast to the 1988 TD, in which monitoring requirements were specified. Moreover, the permit itself allows for changes in monitoring requirements, yet neither EPA nor HDOH directed that changes be made.

In light of EPA's 1988 approach, which granted the waiver with a required EPA-approved monitoring program, and the suggested areas of improvement CCH recommended in its current application, it is unjustified and inconsistent for EPA to use the adequacy of the monitoring program as a basis for tentative denial of the 301(h) waiver.

The inconsistencies between EPA's 1988 TD and EPA's 2007 TD demonstrate an abrupt and unjustified change in approach, an arbitrary and inconsistent interpretation of environmental information, and an apparent attempt to reach pre-drawn conclusions that are not supported by the scientific and engineering data provided by CCH. EPA has demonstrated throughout its 2007 TD a consistent failure to consider the weight of evidence—the only appropriate and rational approach and the approach used by EPA in making its positive decision in 1988. A review of historical and current information provided by the 301(h) monitoring program indicates that the conditions observed in the environment today, including at the mixing zone edge, are consistent with the data used by EPA in its 1988 decision to approve the 301(h) permit. In short, based on the weight of available evidence, the waiver was justified in 1988 and is still justified in 2007. EPA's TD contains nothing to demonstrate otherwise.

Response: Please see response to comment C69, which explains that issues related to CCH's monitoring program are not a basis of EPA's conclusion that the discharge does not meet the criteria for a renewed variance. See also response to comment C4 regarding the proposed weight-of-evidence approach and response to comment C3 regarding changes since 1988.

Comment C6: On May 21, 2007, CCH requested an evidentiary hearing regarding the TD. On July 12, 2007, EPA denied CCH's request. EPA's denial of CCH's request for an evidentiary hearing violates CCH's Constitutional rights under the Due Process Clause of the Fifth Amendment to the U.S. Constitution, and has irreparably injured CCH. CCH's request was based on EPA's tentative findings regarding CCH's credibility, such as, but not limited to, CCH's ability to consistently achieve State WQS and CCH's intent to enforce its pretreatment requirements.

Response: The commenter is correct that EPA denied CCH's request for an evidentiary hearing. As discussed in EPA's letter denying the request, evidentiary hearings are neither required nor provided for by either EPA's specific regulations regarding the Section 301(h) process, or by the general regulations for NPDES permitting that are applicable to the Section 301(h) process. Rather, interested persons can rebut, refute, and/or counter EPA's tentative findings by testifying at a public hearing and/or by submitting written comments. EPA is required to consider the comments, and to address them in a written response to comments. EPA's regulations further provide that a final decision may be appealed to the Environmental Appeals Board, which is a prerequisite to judicial review.

The bases for EPA's TDD did not involve the type of credibility determination for which cross-examination may be necessary to provide due process. EPA's tentative decision was based on analysis of data and information submitted by CCH, not determinations regarding the credibility of witness testimony. Specifically, EPA's tentative decision-making regarding achievement of State water quality standards was based on data and analysis provided in the administrative record. EPA's tentative decision regarding compliance with pretreatment requirements was also based on information in the administrative record as to the compliance history of CCH's users. In that regard, we note that CCH submitted comments on the pretreatment issues, and, after considering these comments, EPA changed its tentative findings and has concluded that CCH has satisfied the Section 301(h) requirements as to pretreatment. See response to comments C75 and C77.

Altered Discharge

Comment C7: In the December 1, 1995, HWWTP 301(h) waiver renewal reapplication to EPA, CCH applied for an altered discharge and requested that the BOD limit be changed from 160 to 200 milligrams per liter (mg/L) to accommodate increases that had occurred in the influent BOD. In its TD to deny the waiver, EPA has cited this proposed altered discharge, which would be of a lower quality than the current discharge, as support for denying the waiver.

After review of the current BOD and TSS loadings and operational characteristics of the HWWTP, CCH has concluded that the request for an altered discharge is not necessary and, accordingly, hereby withdraws its request for further relaxation of the technology-based standard for BOD. Specifically, CCH withdraws its request for a BOD limit of 200 mg/L and instead requests that the current NPDES permit limit for BOD (160 mg/L) be maintained as a condition of the renewed 301(h) waiver application.

Response: EPA's tentative decision was based on the application and supplemental information submitted to EPA by CCH. EPA considered the application to be for an altered discharge for two reasons. First, as the comment correctly indicates, the application was based on a monthly average BOD concentration of 200 mg/L, whereas the current permit limit is 160 mg/L. Second, in its letter of 15 April 2005, CCH described six possible discharge scenarios intended to be covered by the application, some of which would result in a poorer quality effluent than had been discharged under the existing permit.

EPA explicitly used the proposed BOD limit of 200 mg/L when assessing the ability of the proposed discharge to meet the water quality standards for dissolved oxygen (and concluded that the proposed discharge would meet the applicable standard). Additionally, however, EPA assessed the ability of the proposed discharge to meet the 301(h) criteria using monitoring data of various types. As monitoring data are, by their nature, associated with the effluent quality at the time the monitoring was conducted, EPA qualified many of its conclusions based on monitoring data with the statement that the proposed discharge may have more of an impact on water quality than the monitoring data suggested, because the applicant was proposing discharge scenarios which resulted in poorer quality effluent than the existing discharge. These statements related more to the applicant's proposal to discharge under any of the six possible discharge scenarios than to the requirement for an increased BOD limit.

The comment on altered discharge submitted by CCH was submitted during the public comment period, but it is a request to revise its application, rather than a comment on the tentative decision. The application before EPA is for renewal of a 301(h)-modified permit. EPA regulations do not allow applications for permit renewal to be revised subsequent to a tentative decision in most circumstances, as set forth in 40 CFR 125.59(d)(5). And while EPA regulations at 40 CFR 125.59(d)(3) and 125.59(g) allow revisions in some circumstances, when the applicant has additional information it was previously not able to provide despite diligent efforts, and EPA has specifically authorized the submission of such information, those provisions do not apply here, as CCH has not indicated any newly-available information to justify revision of its application. Therefore, no changes to EPA's analysis are required.

Nevertheless, EPA has considered whether using the current BOD limit of 160 mg/L rather than the requested limit of 200 mg/L would change any of the conclusions in the tentative decision. In general, even if we were to consider the requested revision to CCH's renewal application, the Honouliuli WWTP would not quality for a variance under section 301(h). Based on the monitoring data submitted by CCH during operations under the existing BOD limit of 160 mg/L, the HWWTP did not meet the 301(h) criteria. Therefore, if the proposed discharge had retained this existing limit, and did not seek to discharge with a higher BOD limit, the proposed discharge would still not meet the criteria for a renewed variance.

We have also reviewed the specific sections of the tentative decision where the requested 200 mg/L BOD limit was taken into consideration. We have determined that considering a BOD limit of 160 mg/L rather than the originally-request limit of 200 mg/L could affect some of our analyses, but would not affect the overall result that a 301(h) variance is not appropriate. The specific analyses that took into consideration a BOD limit of 200 mg/l were as follows:

- In section A of the tentative decision, compliance with primary treatment requirements, EPA analyzed data based on past performance and concluded that the 30% removal requirement for BOD is currently being met and would be met during the term of a renewed modified permit. While EPA noted in the tentative decision that CCH is proposing a higher 30-day average limit for BOD than the limit in the existing permit and higher than its current performance, EPA did not use that proposal in its analysis, and no changes in the decision are necessary.

- In section B.1 of the tentative decision, EPA determined that CCH's discharge would meet the water quality standard for BOD, even at 200 mg/L, as noted above. Although our calculations would change using a BOD limit of 160 mg/L, our conclusion that this standard would be met would not change. Therefore, changing the BOD limit to 160 mg/L would not affect our final decision. However, the applicant's request to change the requested BOD limit has been noted in the final decision.

- In section H of the tentative decision, EPA analyzed whether CCH's modified discharge would satisfy the requirement of 40 CFR 125.67 that the discharge not increase above the amount specified in the 301(h)-modified NPDES permit. In that section of the tentative decision, we questioned whether the applicant could discharge effluent with a BOD_5 limitation of 200 mg/L and still achieve 30% removal. We have revised this section and now specifically state that the applicant has met the requirements of 40 CFR 125.67.

Finally, even if the application were considered to request the current BOD limit of 160 mg/L, it would still be considered an application for an altered discharge because of the six possible discharge scenarios the applicant indicated were covered by the application, some of which would result in a poorer quality effluent than is being discharged under the existing permit.

Primary treatment requirements

Comment C8: EPA does not dispute that applicable water quality criteria exist for BOD and turbidity.

Response: As stated on page 54 of the tentative decision, EPA clearly states that the State of Hawaii has established water quality standards for dissolved oxygen and turbidity. Hawaii's water quality standards do not contain criteria for BOD. Instead, dissolved oxygen is assessed as a surrogate for BOD.

Comment C9: As EPA acknowledges, CCH has clearly demonstrated that the HWWTP can consistently meet the BOD and TSS concentration and mass requirements in the existing NPDES permit, in addition to the 30 percent BOD removal requirement for primary treatment. CCH will continue to meet the existing BOD, TSS, and 30 percent BOD removal requirements in the next NPDES permit cycle.

Response: EPA concluded in the tentative decision that the 30% removal requirement for BOD was currently being met and would be met during the term of a renewed modified permit; however, BOD levels in the treatment plant would have to be closely monitored to ensure the 30% removal requirement for BOD would be achieved even during the worst-case scenario for plant operations (discharge of primary-treated effluent alone.) EPA retains that conclusion in the final decision.

Dilution

Comment C10: EPA evaluated 27 density profiles from a single station (HB6) and used the most conservative profile data it could find to define the critical condition. The profile from August 30, 2000, at station HB6 produced the lowest initial dilution in EPA's analysis. The data are from a station well outside the mixing zone boundary (in contrast to the four profiles that CCH used for its modeling), even though there was no reason to suspect plume interference in the mixing zone profiles. Figure IIB-1 shows all density profiles for August 30, 2000. On close examination, there are no apparent plume effects in any of the density profiles at the mixing zone stations (if there had been plume effects, they would only have made the dilution lower, not higher, than that calculated). Therefore, restricting the evaluation of initial dilution using data from the EPA-selected station does not fairly represent the physical location of the profile.

As indicated in Figure IIB-1, the density profiles in the vicinity of the discharge are transitory and change dramatically over short times and distances within the general area in which the profiles were taken. Using these profiles to evaluate initial dilution would result in dramatic and substantial differences over quite small space and time scales.

EPA selected only the most critical of these profiles to represent a specific season and flow condition. In doing so, it appears that EPA used an anomalous profile within the available data set that resulted in an equally anomalous and transitory initial dilution prediction. It would be more reasonable and appropriate to select a condition representative of a defined critical case (such as the 10th percentile lowest dilution case, similar to the use of the 10th percentile current speed), rather than the absolute worst case. This is the procedure used by EPA for selecting the appropriate current speed input for the critical initial dilution (CID) modeling. EPA's use of the most restrictive profile in an area not directly adjacent to the mixing zone boundary renders its conclusions regarding initial dilution unrepresentative of marine conditions at the outfall.

Response: EPA's Amended Section 301(h) Technical Support Document (ATSD) provides technical guidance on preparing applications for section 301(h) modified permits and evaluating the effects of 301(h) discharges on water quality. The ATSD indicates that the lowest (i.e. critical) initial dilution must be computed for each of the critical environmental seasons. EPA followed the ATSD guidance when assessing the initial dilution calculated by CCH in its Honouliuli application and when calculating a revised critical initial dilution from additional data submitted by the applicant.

When estimating the critical initial dilution provided by an ocean outfall, an initial step is to identify a monitoring station that is representative of the receiving water without being overly affected by the discharge. In the initial dilution modeling presented in Appendix F of its application, CCH characterized the receiving water using temperature, salinity, and density profiles collected during four events in 1993 and 1994 at station HZ. Station HZ, located directly over the outfall diffuser, was not viewed by EPA as a location indicative of the receiving water because temperature, salinity, and density profiles from this station would be easily disturbed by the effluent plume. EPA entered these four sets of data from station HZ into the Visual Plumes model and found agreement with CCH's results in DOS Plumes using similar data. However, EPA also assessed profiles from other locations, in order to find a monitoring station that is representative of the receiving water without being overly affected by the discharge.

In addition to the four profiles from 1993-1994 at station HZ, EPA also assessed 23 other profiles from various locations. Of the 23 other profiles, four profiles were provided by CCH in Section III of its application and 19 profiles were submitted to EPA by CCH as part of its annual assessment reports of the Honouliuli WWTP for the six years from 2000 to 2005. The four temperature and salinity profiles presented in Section III of the application were collected in the early 1970s at a location not identified in the application. In the annual assessment reports submitted to EPA from 2000 to 2005, CCH provided temperature, salinity, and density data from the 12 established offshore monitoring stations in the Honouliuli receiving waters (see Figure 3 in EPA's Honouliuli TDD for map of receiving water monitoring stations). There were 19 monitoring events during this six-year period.

It was neither practical nor necessary to model data from all monitoring stations. Therefore, from this large data set for the 19 events, an EPA oceanographer selected stations HB6, HB4, and HM3 for initial consideration when determining a station to represent receiving water conditions not impacted by the discharge plume. These three stations were chosen because of depth and distance from the outfall. Station HB4 is located on the boundary of the zone of initial dilution and station HM3 is located on the boundary of the zone of mixing. Stations HB4 and HM3 were considered by EPA to be too close to the diffuser to be unaffected by the plume. In contrast, HB6 is located beyond the boundary of the zone of mixing, but not as far away as reference station HB7. Further review of the profiles from these three stations identified HB6 as least likely to be influenced by the effluent plume and, therefore, the most representative of unaffected receiving water conditions. Temperature, salinity, and density data from the 19 individual profiles at station HB6 were then entered into the Visual Plumes model and used to determine critical initial dilution. For consistency, EPA calculated the critical initial dilution from all combinations of flows and profiles at station HB6. CCH also consistently modeled data from a single station, HZ, which however was located directly over the outfall diffuser.

It is not more appropriate, as CCH suggests, to select a condition representative of a defined critical case rather than the absolute worst case. The 27 profiles modeled already represent a very small portion of the total discharge period reviewed in the TDD. It is likely that the small number of profiles available to be assessed is already representative of the lowest tenth percentile dilution value over the entire period reviewed, including times and conditions not captured by the 27 monitoring events. For example, only 19 receiving water profiles were available to represent the receiving water conditions over a six year period, yet effluent was discharged continuously from the Honouliuli WWTP for this same period. Furthermore, while the guidance suggests use of the lowest tenth percentile current speed in the model to determine initial dilution, it does not suggest use of the lowest tenth percentile dilution value. Instead, the guidance provides directions for determining the lowest initial dilution from a substantial amount of data.

In EPA's assessment, the profile at station HB6 from August 30, 2000, produced the lowest (most critical) initial dilution. Although this is the profile that presented the lowest initial dilution, it does not equate to being an anomalous profile. It is simply the most critical value of all the situations modeled, which is what the ATSD requires.

Comment C11: EPA used the dilution that occurred at the trapping level rather than taking into account the dilution through the maximum height of rise of the plume, which its own model supports. On the basis of basic physics, plume dynamics, and actual dilution results, using the maximum height of rise of the plume provides a more realistic appraisal. Figure IIB-2 indicates the variety of alternative CID conclusions that could be reached.

Using the EPA procedure, the CID is 118. As indicated in Figure IIB-2, if using the same worst-case density profile and taking into account the maximum height of rise, it appears that a more realistic CID is at least 170:1. The CID obviously would be even greater (224:1) if the 10th percentile density profile and height of maximum rise were used, as provided for by the EPA model.

If the absolute worst-case conditions were used and an unrealistic CID of 118 were accepted, the EPA model shows that the plume would be trapped at approximately 5 meters above the bottom. It is noted that this represents a condition of maximum protection with respect to bacterial concentrations reaching human receptors. Further, none of the ecological, sediment quality, or water quality data indicate that there are negative consequences of sporadic plume trapping under these hypothetical critical conditions.

Response: In accordance with the ATSD, EPA determined the critical initial dilution for the Honouliuli receiving water based on the dilution value (118:1) predicted by the model at the trapping depth. Similarly, in its application, CCH also presented a critical initial dilution value (210:1) set at the trapping depth. Print-outs of the CCH's calculations, indicating the initial dilution at the trapping depth, are presented on page 9 in Appendix F, Attachment 1, of the Honouliuli 301(h) application. Seasonal initial dilutions and their associated trapping levels are also listed in Table III.A.1-3 of CCH's application.

In accordance with the ATSD, it is appropriate to determine the critical initial dilution at the trapping level using the worst-case density profile (i.e. the profile producing the lowest initial dilution). The ATSD does not provide instructions for considering the amount of dilution gained by the maximum height of rise of the plume. EPA calculated initial dilution at the trapping depth, because doing so is in accordance with the guidance presented in the ATSD and consistent with EPA's practice in prior years and at other facilities.

The critical initial dilution applied in EPA's Honouliuli tentative decision from 1988 was 146:1. This dilution value was further reduced to 127:1 after the comment period for the 1988 tentative decision. Therefore, a critical initial dilution of 118:1, based on modeling of 27 profiles, is not a significant change from the critical initial dilution value used in the 1988 decision, with which CCH did not disagree.

The critical initial dilution describes the worst-case situation. This calculation of the worst-case situation does not imply that the plume is always trapped at a depth of approximately 5 meters above the bottom. There are times when the plume surfaces and bacteria discharged at lower depths would rise to the surface. However, application of the minimum initial dilution to other parameters, as required by Hawaii's water quality standards (e.g., whole effluent toxicity), protects against toxic spikes that can produce a negative consequence yet go undetected by monitoring conducted on a quarterly or annual basis.

Comment C12: An arithmetic mean is believed to be more appropriate than a geometric mean to evaluated human health-based criteria. The appropriate dilution factor (according to EPA's own model) would substantially exceed the 412 that EPA is currently using. Initial evaluation indicates that the following dilutions would apply:

Mean Value	Dilution at Trapping Level	Dilution at Maximum Rise
Geometric Mean	411.6:1	526.4:1
Arithmetic Mean	481.6:1	569.7:1

Response: There are several statistical approaches for measuring the central tendency of a group of numbers, and it is EPA's opinion that the geometric mean is the preferred approach for estimating average initial dilution. The geometric mean is more appropriate than the arithmetic mean, because the geometric mean dampens the effect of very high or low values, whereas the arithmetic mean is influenced by extreme values. Moreover, use of the geometric mean is the appropriate method to describe average dilution, as required according to Hawaii's water quality standards [HAR 11-54-4(b)(4)(A)(iii)] when assessing carcinogenic pollutants.

As discussed in response to comment C11, pursuant to the ATSD, dilution is estimated based on the dilution at the trapping depth rather than the maximum rise depth. Therefore, the data CCH presents for the geometric mean and the arithmetic mean of the dilution at the maximum rise is not relevant.

BOD and Turbidity

Comment C13: The WQS for dissolved oxygen in Class A waters is 5 mg/L.

Response: As described on pages 29 and 30 of the tentative decision, the Hawaii water quality standard for Class A, open coastal waters requires dissolved oxygen to not be less than seventy-five percent saturation, determined as a function of ambient water temperature and salinity. EPA calculated the DO saturation concentration from ambient temperature and salinity values from CTD data for receiving water monitoring events conducted from 2000 through 2006 at the upcurrent reference station HB1. For the years from 2000 through 2006, DO saturation concentration values for all three monitoring depths (surface, middle, and bottom) ranged from 6.90 to 7.15 mg/L at station HB1, and the corresponding 75% values ranged from 5.18 to 5.36 mg/L. The final decision concludes, as does the TDD, that the discharge achieves the Hawaii state standard for DO

Comment C14: In its TD, EPA has stated the following: *EPA concludes that the altered discharge will not significantly affect ambient DO concentrations outside the zone of initial dilution for the Honouliuli outfall.*

CCH has withdrawn its request for an altered discharge and will continue to produce effluent that meets its current NPDES permit limits and the State water quality standard for DO. EPA does not dispute that CCH will continue to meet DO water quality standard.

Response: EPA concluded that the Hawaii water quality standard for dissolved oxygen was met at the ZID, ZOM, beyond ZOM, and nearshore stations. EPA continues to conclude that the proposed discharge will result in attainment of the Hawaii water quality standard for DO. Regarding the statement that CCH has withdrawn its request for an altered discharge, please see response to comment C7**.**

Comment C15: In its TD, EPA has stated the following: EPA concludes that the receiving water for the Honouliuli outfall meets the Hawaii water quality standards for turbidity and LEC in Class A "wet" open coastal waters.

CCH will continue to meet the State WQS for turbidity and light extinction coefficient (LEC). EPA does not dispute that CCH will continue to meet these standards for turbidity and LEC.

Response: EPA concluded that receiving water for the Honouliuli outfall meets the Hawaii water quality standards for turbidity and LEC in Class A "wet" open coastal waters. EPA continues to conclude that the proposed discharge will result in attainment of the Hawaii water quality standards for turbidity and LEC.

<u>Bacteria</u>

Comment C16: Appropriate use of geometric mean: In its review, EPA compared geometric mean-based criteria with single samples taken on a monthly or quarterly basis for several parameters. For Enterococcus, this is appropriate for shoreline and nearshore stations, where the geometric means could be based on five to six samples. For offshore water, however, where sampling was conducted monthly from November 2003 through November 2004 (but otherwise conducted on a quarterly basis), EPA inappropriately compared geometric mean criteria against the one monthly, or one quarterly, monitoring result. In the case of Enterococcus, this approach is contrary to Hawaii law. HAR 11-54-8 is specific that the geometric means should be calculated on the basis of five samples taken within 25 to 30 days of one another. As EPA notes in its TD, the HAR does not refer to a monthly, rolling average, annual, or other form of geometric mean manipulation. EPA's use of a geometric mean to establish compliance with single sample values is inappropriate.

Further, although the Hawaii WQS are written in terms of geometric means, EPA has elected to ignore HDOH recommendations with respect to the appropriate standards to use for Enterococcus. Therefore, despite the language of the statutory criterion and the implementing regulations, it is apparent that EPA believes that it is not constrained to State of Hawaii WQS in relation to making a 301(h) decision for the HWWTP.

Response: EPA's approach is not contrary to Hawaii's water quality standards. As discussed on pages 43 through 45 of the Honouliuli tentative decision, EPA assessed attainment of HAR Chapter 11-54-8 recreational standards at the four shoreline monitoring locations and attainment of EPA's promulgated criteria at the four nearshore and nine offshore monitoring stations. Bacteria criteria in HAR Chapter 11-54-8 and EPA's promulgated criteria both contain a geometric mean value as well as a single sample maximum value. With regard to the geometric mean, EPA followed the guidelines set in two parts of HAR 11-54-8 (specific criteria for recreational areas) when assessing data from offshore receiving water of the Honouliuli outfall against EPA promulgated criteria.

HAR 11-54-8(b)(1) states the following:

> Within 300 meters (one thousand feet) of the shoreline, including natural public bathing or wading areas, enterococcus content shall not exceed a geometric mean of seven per one hundred milliliters in not less than five samples which shall be spaced to cover a period between twenty-five and thirty days. No single sample shall exceed the single sample maximum of 100 CFU per 100 milliliters or the site-specific one-sided 75 per cent confidence limit. Marine recreational waters along sections of coastline where enterococcus content does not exceed the standard, as shown by the geometric mean test described above, shall not be lowered in quality.

HAR 11-54-8(b)(2) states the following:

> At locations where sampling is less frequent than five samples per twenty-five to thirty days, no single sample shall exceed the single sample maximum nor shall the geometric mean of these samples taken during the thirty-day period exceed 7 CFU per 100 milliliters.

In offshore waters, where EPA's promulgated criteria apply, EPA followed the approach described in HAR 11-54-8(b)(2) for applying the geometric mean when sampling was less frequent than five samples per twenty-five to thirty days. In accordance with HAR 11-54-8(b)(2), when only one sample was available from offshore waters, EPA assessed that sample against the geometric mean criterion. If CCH had monitored more frequently, more data would have been available for development of a geometric mean and subsequent assessment against the geometric mean criterion. Lack of data should not limit EPA's assessment when specific State criteria address such a situation.

In fact, CCH did conduct more frequent monitoring in 2007 and 2008. During this period, CCH collected and analyzed three to six samples per month. EPA has calculated monthly geometric means using these data. The results show exceedances at the surface, mid-depth, and bottom depth. The high frequency of the exceedances at the bottom depths indicates that the discharge would likely often exceed the water quality criterion, regardless of the frequency of monitoring.

HDOH has not contradicted EPA's interpretation of HAR11-54-8(b)(2) as described in the TDD. EPA notified HDOH that the TDD was available for public review, but HDOH did not submit any comments to EPA on the interpretation of HAR11-54-8(b)(2).

Comment C17: EPA inappropriately uses the geometric mean standard for offshore stations in contrast to the State of Hawaii's recommendations. The Beach Act gives states the authority to establish Enterococcus criteria, and the manner in which they will be applied, in the recreational zone that extends from the shore to 1,000 feet offshore. If the states do not set criteria farther offshore, EPA uses its promulgated values in the area that extends from 1,000 feet offshore to 3 nautical miles offshore. The State of Hawaii has not yet finalized its offshore criteria for Enterococcus. However, it has advised EPA that it believes that a single sample maximum value of 501 cfu/100 ml is the appropriate criterion to apply in the ZID/ZOM area. EPA has disregarded the State's advisement.

Response: In response to the Beaches Environmental Assessment and Coastal Health (BEACH) Act of 2000, EPA promulgated bacteria criteria for coastal recreational waters in November, 2004. The promulgated criteria apply to waters designated for recreation where states have not adopted appropriate water quality standards for coastal recreation waters. EPA promulgated a geometric mean of 35 cfu /100 mL and a range of four single sample maximum values between 104 and 501 cfu/100 mL. In Hawaii, the promulgated criteria went into effect on December 16, 2004, and apply to marine waters between 300 meters (1,000 feet) from shore and three miles from shore. (EPA did not promulgate bacteria criteria for Hawaii waters less than 300 meters from shore because Hawaii already had standards applicable to those waters that were consistent with the BEACH Act requirements.)

With regard to the geometric mean, this standard is in effect and compliance with it must be evaluated as part of the 301(h) analysis. EPA disagrees with the commenter's statement that EPA's use of the geometric mean is in contrast to the State of Hawaii's recommendations as to the geometric mean. In its letter to EPA of September 6, 2005, HDOH specifically stated its agreement with use of 35 cfu/100 mL as the geometric mean.

As to the single sample maximum, EPA's rule expects States to apply the appropriate single sample maximum (SSM) value based on the frequency of use in coastal recreational waters. By letter dated December 15, 2004, EPA specifically asked HDOH to indicate which of the SSM values set forth in the rule would apply to Hawaii's waters more than 300 meters from shore. In its response, dated September 6, 2005, HDOH responded that it "intends to propose that the 100 cfu/100 mL SSM be extended to 500 m from shore, and the SSM beyond 500 m be set at 501 cfu/100 mL." EPA has not disregarded HDOH's input on this issue. EPA applied the SSM of 501 cfu/ 100mL when assessing bacteria concentrations of samples collected at monitoring stations located in waters outside the ZID, but beyond 500 meters from shore. However, EPA also assessed the same sampling results against a SSM of 104 cfu per 100 mL, because this is the SSM value applied by HDOH in the Kailua Regional Wastewater Treatment permit (permit number H10021296). Because the Kailua permit was issued after HDOH's 2005 letter, it was unclear whether HDOH still considered the higher SSM number appropriate.

We also note that HDOH has not contradicted EPA's use of the SSM as described in the TDD. EPA notified HDOH that the TDD was available for public review, but HDOH did not submit any comments to EPA on the interpretation of the SSM. We are also not aware of any action on

HDOH's part to follow through on its statement that it intended to propose that 501 cfu/100 mL be the SSM for waters beyond 500 meters from shore.

Comment C18: EPA asserts the following:

> *"Lack of data does not preclude assessment against the geometric mean value in an analysis for 301(h) variances. HAR Chapter 11-54 requires data to be assessed against the geometric mean criterion, even if sampling is less frequent than five samples per 30-day period."*

However, as EPA also notes, what is actually stated in HAR Chapter 11-54-8(b)(2) with respect to Enterococcus concentrations in marine recreational waters (currently defined as those up to 300 meters [1,000 feet] offshore) is as follows:

> *"At locations where sampling is less frequent than five samples per twenty-five to thirty days, no single sample shall exceed the single sample maximum nor shall the geometric mean of these samples taken during the thirty-day period exceed 7 CFU per 100 milliliters."*

When there are insufficient data to calculate the geometric mean, HAR Chapter 11-54 requires application of a single sample criterion. CCH can find no guidance that requires application of geometric mean criteria to single sample results for Enterococcus, nor is it technically appropriate to do so. Moreover, HAR Chapter 11-54 is currently silent on the subject of acceptable Enterococcus concentrations in offshore marine waters (that is, those beyond the defined recreational zone). As EPA is aware, HDOH is in the process of amending HAR Chapter 11-54 to provide such guidance, and its current draft proposes the use of 501 cfu/100 ml for single sample maximum. Further, although HDOH informed EPA that an offshore limit of 501 cfu/100 ml is specifically appropriate for the HWWTP discharge (see TD, page 44), EPA performed Enterococcus evaluations for stations greater than 1,000 feet from the shoreline as follows:

• Using its own promulgated criteria, per 40 CFR Section 131.41(c)(2), of a geometric mean of 35 cfu/100 ml and a single sample maximum of 501 cfu/100 ml for waters beyond 1,000 feet from shore

• Using a single sample limitation of 104 cfu/100 ml imposed in a 2006 NPDES permit for the Kailua outfall

There is no support for EPA opting to include the second evaluation in contradiction to the advice offered by HDOH. Further, EPA applied geometric mean criteria to the offshore monitoring stations, even though there are no data from these stations that would allow such a calculation based on the HAR Chapter 11-54 guidance. Given the lack of data available to calculate geometric means for these stations, and the direct advice offered to EPA by HDOH with respect to acceptable Enterococcus levels, CCH believes that the only applicable criterion for the offshore stations is the single sample value of 501 cfu/100 ml.

Response: As indicated in the tentative decision, HAR Chapter 11-54-8(b)(2) requires assessment of the geometric mean criterion using the total number of samples taken in the twenty-five to thirty day period as well as an assessment of the individual samples against the single sample criterion. It does not state that only the single sample criterion be applied when there is a single sample; it clearly states that the geometric mean still applies to any number of samples taken in the twenty-five to thirty day period and no single sample shall exceed the single sample maximum. Therefore, EPA applied the geometric mean, as specified in HAR Chapter 11-54-8(b)(2), even if there was only a single sample during the twenty-five to thirty day period.

CCH did, however, conduct more frequent monitoring in 2007 and 2008. During this period, CCH collected and analyzed three to six samples per month. EPA has calculated monthly geometric means using these data. The results show exceedances at the surface, mid-depth, and bottom depth. The high frequency of the exceedances at the bottom depths indicates that the discharge would likely often exceed the water quality criterion, regardless of the frequency of monitoring.

Although HAR Chapter 11-54 is silent on the subject of bacteria criteria in waters beyond 300 meters (1,000 feet) from shore, EPA's promulgated bacteria criteria for coastal recreational waters apply. Recreation is a designated use in Hawaii's marine waters out to and beyond 300 meters (1,000 feet) from shore. Therefore, EPA's promulgated criteria apply to these recreational waters where the State of Hawaii does not apply its own criteria. Consequently, EPA assessed offshore monitoring results against a geometric mean of 35 cfu/100 mL, as well as against the SSM values. Regarding the SSM values, please see response to comment C17.

EPA's conclusion that the discharge does not meet water quality standards is based on several points: (1) exceedances of the single sample maximum of 501 cfu/100 mL; (2) exceedances of the alternative single sample maximum of 104 cfu/100 mL; and (3) exceedances of the geometric mean of 35 cfu/100 mL.

Comment C19: EPA concluded that shoreline stations do not appear to be exceeding WQS due to influence from the discharge. CCH concurs with this conclusion.

Response: EPA continues to conclude that shoreline stations do not appear to be exceeding water quality standards due to influence from the discharge.

Comment C20: Nearshore Stations (Nearshore stations are all the HN stations. They range from 3,823 feet to 6,547 feet from the shoreline.): EPA acknowledged that there have been no geometric mean or single sample exceedances at these stations since the offshore Enterococcus standards were promulgated in 2005. A retroactive evaluation by EPA of 6,184 samples taken between 1991 and 2004, using the 501 cfu/100 ml limit that HDOH believes is appropriate, indicated only three exceedances (0.05 percent) throughout that entire period of record; none were geometric mean exceedances and two were just barely above the single sample limitation.

In addition, there have been only two exceedances (both in July) of the single sample limit throughout the increased monitoring period (March 2007 to date), with one occurring at Station HB5 and the other at Station HM4. However, throughout the entire period, there have been zero exceedances of the geometric mean criterion at the surface (the only location where the public is even potentially exposed).

EPA also used the inappropriate 104 cfu/100 ml limit for screening, which resulted in a 1.64 percent single sample exceedance rate during 2005–2006 and a 0.92 percent single sample exceedance rate during 1991–2004. There were no geometric mean exceedances during this period.

Despite only three exceedances of WQS at nearshore stations in 13 years of monitoring data, EPA tentatively concluded that the effluent plume may occasionally affect surface samples as well as bottom samples taken at 11 meters (36 feet), a depth not likely to be encountered by recreational divers as there is no known recreational diving in the areas in which the samples were taken. Indeed, EPA failed to acknowledge in its conclusion that this is a restricted area. As set forth in 33 CFR 334.1360—Danger Zone and Restricted Area Regulations the area around the HWWTP outfall is an area where recreational activities are restricted and is closed to all surface craft, swimmers, divers, and fishermen except to craft and personnel authorized by the enforcing agency (in this case, the Commanding Officer, Naval Air Station, Barbers Point, Hawaii 96862). Figure IIB-3 illustrates the location of the outfall in relation to the restricted area.

Moreover, EPA notes:

"The single sample maximum value allows a single data point to be evaluated. It is a tool for making beach notification and closure decisions and is an appropriate tool for determining whether water quality on a particular day is protective of the designated use."

In other words, a single sample maximum value is not a tool for determining long-term compliance trends. EPA also failed to acknowledge that bacterial standards are risk-based standards and that the risks posed by the very low exceedance rate multiplied by the restricted use of the area for body contact recreation reduces the potential for human health risk to a *de minimis* and speculative level.

Because there are no geometric mean exceedances in this entire data set, because the stations are well beyond most recreational use, because recreational use in the area of the outfall is prohibited, and because the most appropriate single sample criterion (501 cfu/100 ml) to apply to these waters was exceeded on only three occasions out of 6,184 samples over the 13-year period, there is no basis to conclude that the discharge affects WQS for bacteria at stations or depths that adversely affect recreational use or endanger public health. EPA's conclusion to the contrary is unjustified and should be reconsidered.

Response: It is true that there were no exceedances of the geometric mean criterion in nearshore waters. However, the exceedances of the single sample maximum values, at risk levels associated with 501 and 104 cfu/100 mL, are important data to be considered in addition to the geometric mean for an overall assessment of water quality standards. Like all marine waters out to and beyond 300 meters (1,000 feet) from shore in Hawaii, waters surrounding the Honouliuli nearshore sample stations are designated for recreational use and must be protected by adherence to both parts of the bacteria criteria. CCH comments that the single sample maximum is not a tool for determining long-term compliance trends. CCH also comments that the risk posed by the very low exceedance rate reduces the potential for human health risk. Regardless of these comments, the single sample maximum value, as well as the geometric mean, must still be met. As discussed in the TDD, where the SSM portion of the water quality standard is not met, swimmers have a greater risk of illness, and, therefore, recreational uses are not protected.

There were no exceedances of the single sample maximum limit of 501 cfu/100 mL at nearshore stations in the period from 2005 through 2006, after EPA's promulgated criteria became effective. For the period from 1991 through 2004, EPA retroactively applied promulgated criteria to determine whether past monitoring results, and past treatment practices, would have met current criteria. There were three exceedances of the single sample maximum limit of 501 cfu/100 mL during this period. CCH states that two of the three exceedances of the single sample maximum were just barely above the single sample limit. As stated on page 47 of the tentative decision, the enterococcus concentration in one surface sample was 2,800 cfu/100 mL, one bottom sample contained a concentration of 800 cfu/100 mL, and another bottom sample contained a concentration of 570 cfu/100 mL. These samples are not barely above the single sample limit; they are significantly above the limit of 501 cfu/100 mL, which is the least protective single sample value of the four promulgated by EPA. These numbers suggest that the plume may occasionally hit nearshore waters.

As discussed in response to comment C17, EPA assessed monitoring results against both the 104 and 501 cfu/100 mL SSM values. As stated on page 48 of the tentative decision, if the single sample maximum limit were set at 104 cfu/100 mL rather than 501 cfu/100 mL, one of the 244 nearshore bottom samples taken in 2005 and 7 of the 248 bottom samples taken in 2006 would have exceeded the more protective single sample value. Likewise, 57 of 6,216 samples taken between 1991 and 2004 would have exceeded the lower single value limit. Of these 57 exceedances, 23 occurred in the surface and 34 occurred in the bottom samples. Nearshore monitoring stations meet the geometric mean, but do not always meet the single sample maximum limit set at the more protective value of 104 cfu/100 mL.

Based on these assessments of both single sample values for both time periods, EPA concludes that the effluent plume may occasionally affect surface samples as well as bottom samples taken at 11 meters (36 feet), a depth likely to be encountered by recreational divers. Despite the low number of exceedances of the 501 cfu/100 mL limit, these exceedances are still a meaningful indicator of influence of the effluent plume on receiving waters located between the shoreline and the ZID, where all water quality standards must be met.

CCH claims that there is no known diving in the areas where the samples are taken but does not provide supporting evidence for this claim. Hawaii's marine waters are designated for recreation. Therefore, this use must be protected with criteria, and, in accordance with 40 CFR 125.62(a), the discharge must meet these criteria at the boundary of the ZID. Although CCH's comments state that the surface is the only location where the public is potentially exposed to high bacteriological counts, bacterial concentrations detected at bottom depths do not always stay at the bottom of the water column. With the changing environmental conditions that affect the receiving waters, a trapped plume of discharged effluent containing a high concentration of bacteria can surface to depths where recreation is more plentiful.

CCH's comments discuss the Danger Zone and Restricted Area Regulations set forth in 33 CFR 334.1360 and state that the area around the HWWTP outfall is an area where recreational activities are restricted and is closed to all surface craft, swimmers, divers, and fishermen. This restriction is not mentioned in Hawaii's water quality standards, the application does not mention these regulations, and this restriction is not described in CCH's annual assessment reports for the Honouliuli WWTP. Furthermore, this restriction was not mentioned in the 2003 survey conducted for CCH to determine recreational uses on the south shore of Oahu. Figure IIB-3 from CCH's comments indicates that the danger zone is located to one side of the outfall, leaving the area on the other side of the outfall open for unrestricted recreational activities. Review of Figure IIB-3 indicates that White Plains Beach is also located within the danger zone restricted by 33 CFR 334.1360. HDOH conducts bacteriological monitoring of this designated beach two to three times a week, indicating that frequent recreation occurs at this beach. Therefore, this restriction is not applicable to a review of 301(h) criteria.

Comment C21: Offshore Stations (Offshore stations are those stations noted as HM stations that are located over the outfall zone of mixing, approximately 2 miles from the shoreline.): EPA applied both the geometric mean and the single sample criteria in its evaluation of compliance with Enterococcus standards at these stations. As noted above, the data collected at these stations under the EPA-approved monitoring program do not provide the basis for calculating geometric means. Lacking the appropriate data to calculate a geometric mean, the only appropriate criterion (to the extent that any human health criterion based on body contact is appropriate to an area that gets almost no human use) is the single sample maximum of 501 cfu/100 ml applied at the surface.

EPA concluded that, during 2005 and 2006, there were no single sample exceedances at the surface and a total of only 10 exceedances of the 501 cfu/100 ml standard at the bottom. In retroactively evaluating the 1991–2004 period of record, EPA concluded that there was only one single sample exceedance at the surface during the period (November 2003–November 2004) in which monthly samples were taken and that there were only four exceedances (1 percent) at the surface during the period of 1991–2003.

Because there is no recreational diving at the outfall depth, the surface is the only area where the public might possibly come into contact with the water and is the appropriate point at which to evaluate single sample compliance. It is obvious from EPA's own analysis that there is essentially no threat to the public from surface waters in the offshore stations due to the presence of Enterococcus bacteria. On page 82 of the TD, EPA concludes the following:

> *"As noted previously, the single sample value describes the water quality actually encountered by swimmers and divers on the day the sample was collected, and thus it is a useful tool in*

determining the risk to persons engaged in water-contact recreation. When this portion of the water quality criteria is not met, swimmers have a greater risk of illness, and, therefore, recreational uses are not protected."

With this conclusion, while EPA is apparently accepting that the single sample criterion is appropriate, it ignores two crucial facts that completely undermine its conclusion. First, there is no swimming in the area of the outfalls. Second, even if there was swimming, there were only five single sample exceedances of the surface water single sample criteria throughout the entire period of record between 1991 and 2005.

Perhaps even more important, even if CCH were exceeding the criteria in a manner that could be attributed to the outfall, EPA is also ignoring the fact that bacterial concentrations can be controlled through disinfection (if the ultimate decision on the part of EPA and HDOH is that bacterial concentrations need to be reduced). Contrary to EPA's interpretation of earlier statements made to EPA by Frank Doyle in 2004 (which were referring specifically to the ultraviolet disinfection facility being constructed at Sand Island and are irrelevant here), CCH can accomplish effective disinfection of the current HWWTP effluent without secondary treatment.

Therefore, even under EPA's questionable analysis, exceedance of Enterococcus standards is in no way pertinent to whether a waiver is continued. EPA's decision to tentatively deny the waiver based on bacteria WQS is unjustified and should be reconsidered.

Response: As stated earlier, HDOH's water quality standards at HAR 11-54-8(b)(2) clearly indicate that the geometric mean criterion still applies when less than five samples are collected in twenty-five to thirty days. Please see response to comment C16. In addition, the single sample maximum value also applies. As discussed on pages 48 through 53 of the tentative decision, there were exceedances of the geometric mean and single sample maximum values of 501 and 104 cfu/100 mL in offshore waters in all three periods reviewed (2005-06; 2003-04; and 1991- 2003).

Regarding the appropriate SSM numbers, please see the responses to comments C17 and C20. In light of the considerations discussed in those responses, EPA provided a thorough review by assessing the data against both the single sample values of 104 and 501 cfu/100 mL.

Although CCH claims that there is no diving at the outfall depth, these waters are, in fact, designated for recreation and must be protected for recreation. In November 2004, when EPA promulgated bacteria criteria in response to the BEACH Act requirements, it determined that Hawaii's recreational use applies to all Hawaii's marine waters out to and beyond 300 meters (1,000 feet) from shore. CCH's own recreational use survey, which was conducted in 2003, confirmed that residents participated in recreational activities in ocean waters out to two miles from shore and beyond. The survey identified recreational activities including swimming, surfing/bodyboarding/windsurfing, snorkeling, paddling/canoeing/kayaking, fishing, diving, sailing, boating, and waterskiing. In comment P156, one commenter on EPA's tentative decision discussed recreation that occurs in offshore waters. This commenter described outrigger canoe paddling events in waters up to three miles offshore and occasionally farther. Based on the description of events described by the commenter, it appears that it is common practice for paddlers to jump out of the boats and swim in the waters of Mamala Bay when taking a break from paddling or changing crews in long distance regattas.

CCH comments that there is no recreational diving at the outfall depth, and that the surface is the only area where the public might possibly come into contact with the water. CCH believes the surface is the appropriate point at which to evaluate single sample compliance. EPA does not agree with this comment, because bacterial concentrations detected at bottom depths do not always stay at the bottom of the water column. With the changing environmental conditions that affect the receiving waters, a trapped plume of discharged effluent containing a high concentration of bacteria can surface to depths were recreation is more plentiful. It is necessary for bacteria criteria to be met at all depths and at all times in order for the 301(h) discharge to meet water quality standards.

EPA is aware that bacterial concentrations can be addressed through disinfection. In fact, in the 2007 Sand Island tentative decision, EPA recognized that the ultraviolet disinfection unit can adequately disinfect the SIWWTP effluent, so long as the system is adequately operated and maintained. However, EPA disagrees with CCH's comment that denial of its 301(h) variance request due to failure to meet bacteria standards is inappropriate, because the effluent could be disinfected. EPA evaluates applications for 301(h) variances on the basis of the proposal made in the application. In this case, CCH did not propose disinfection as part of its application. Indeed, when EPA requested clarification of CCH's proposal, CCH responded with a description of six operating scenarios, but none of these scenarios included disinfection. EPA's finding that the proposed discharge will not meet bacteria standards is based on the treatment scenarios proposed by CCH. EPA regulations do not allow applications for permit renewal to be revised in most circumstances subsequent to a tentative decision, as set forth in 40 CFR 125.59(d)(5).

While EPA regulations at 40 CFR 125.59(d)(3) and 125.59(g) allow revisions in some circumstances when the applicant has additional information it was previously not able to provide despite diligent efforts, and EPA has specifically authorized the submission of such information, those provisions do not apply here, as CCH has been aware for several years that it would not be able to meet the new criteria for bacteria. As stated in the Honouliuli tentative decision on page 53, CCH responded to EPA's July 9, 2004 notice of proposed rulemaking for bacteria in coastal recreation waters (Federal Register Vol.69, No. 131) in comments submitted to EPA on August 12, 2004. In its comments, CCH stated that primary treated wastewater from the Honouliuli WWTP would not meet EPA's criteria at the point of discharge unless the plant was upgraded to secondary treatment to allow effective disinfection (Doyle, 12 August 2004).

Overall, EPA continues to conclude that CCH has failed to show it can consistently achieve water quality standards for bacteria beyond the ZID. Based on data collected in 2005 and 2006, after the BEACH Act criteria were promulgated, bacteria standards were consistently exceeded outside the zone of initial dilution. These exceedances occur when considering CCH's monitoring data on a geometric mean basis, when comparing the data to a single sample maximum value of 104 cfu/100 mL, and when comparing to a single sample maximum value of 501 cfu/100mL. The exceedances have also continued in 2007 and 2008.

Toxic Pollutants

Comment C22: In its TD, EPA stated the following:

"The Honouliuli discharge contains concentrations of chlordane and dieldrin that exceed water quality standards. These standards were established to protect human health from ingestion of carcinogens through fish consumption. Based on three 24-hour composite samples, the discharge meets all other water quality standards for toxic pollutants and pesticides. The proposed discharge is of a lower quality than the current discharge. Therefore, EPA concludes that the proposed discharge, at a minimum, will not comply with water quality standards for chlordane and dieldrin."

As noted earlier, CCH is withdrawing its request for an altered discharge. Therefore, there is no longer any reason for EPA to conclude that the proposed discharge would be any different from the current discharge.

Response: In this comment, CCH refers to a previous comment which states CCH is withdrawing its request for an altered discharge. The previous comment goes on to explain that CCH is withdrawing its request for further relaxation of the technology-based effluent limit for BOD. As explained more fully in response to comment C7, EPA regulations do not generally allow applications for renewal of a 301(h)-modified permit to be revised subsequent to a tentative decision, as set forth in 40 CFR 125.59(d)(5). Furthermore, CCH does not state in its comments that it is withdrawing its request to operate under any one of six treatment scenarios. Prior to reviewing CCH's application, EPA asked CCH to clarify the basis of its proposal. CCH responded, by letter dated April 15, 2005, with a description of six operating scenarios that they wanted EPA to consider. Some of the operating scenarios would likely result in effluent of generally poorer quality than the existing discharge. EPA reviewed the application as clarified in the April 15, 2005 letter and prepared the TDD on this basis. Notwithstanding CCH's request to amend its BOD limit, EPA's conclusion that the discharge results in exceedances of the water quality standards for chlordane and dieldrin is based on the data provided in the application, which reflects "the current discharge," not an altered discharged based on a relaxation of the BOD limit. Therefore, no changes to EPA's analysis on this basis are required.

Comment C23: Existing Priority Pollutant Results: State of Hawaii guidance in HAR 11-54-4(b)(3) specifies WQS that are to be met for discharges to waters of the State. CCH has monitored the HWWTP effluent for priority pollutants since 1986. The current NPDES permit specifies monitoring once per year, using a 24-hour composite sample. These analyses have included more than 160 target analytes on the EPA priority pollutant list. The available database of priority pollutant data spans the period from September 1986 to January 2007. A total of 4,483 analytical records are in the effluent database (and a similar number of records exist for the influent). Annual priority pollutant and pesticide data are available since 2004 on the primary clarifier effluent at the HWWTP.

The evaluation in this Response and Comments is limited to a 5-year period between February 20, 2002, and January 17, 2007, consistent with the regulatory NPDES permitting cycle. Constituents detected in effluent over this period were compared with the WQS, using EPA's unrealistically low calculated Average Dilution Coefficient (ADC) of 412 for consumption of fish containing carcinogens, and an unrealistically low Minimum Dilution Coefficient (MDC) of 118 for consumption of fish containing noncarcinogens, and for protection of marine chronic aquatic toxicity. For the purposes of this evaluation, a correction was made for a 10-fold error inherent in the water quality criteria (WQC) reported in HAR 11-54-4(b)(3) for chlordane (as EPA recognizes, corrected value is 0.00016 micrograms per liter [μg/L]).

Table IIB-1 (a table attached to the commenter's comments) provides a summary of the detected concentrations of chlordane and dieldrin that have exceeded WQS-based effluent limits for fish consumption (sorted by factor of exceedance). The results indicate that, out of 1,090 analytical records since 2002, fish consumption-based effluent limits were exceeded only 11 times. There were six detections of dieldrin that exceeded the WQS (by up to 5.3-fold), four detections of chlordane that exceeded the WQS (by up to 3.2-fold), and a single detection of 4,4'-DDT that exceeded the WQS (by 59-fold; this is considered an analytical outlier in the database and is not listed on the table). It should be noted that, when using the most current EPA National Recommended Water Quality Criteria (which include the most current toxicity factors and regulatory defaults for fish consumption, etc.), there were only two detections of dieldrin that exceeded the WQS (by up to 2.5-fold), a single detection of 4,4'-DDT that exceeded the WQS (by 2.2-fold), and no exceedances of chlordane over the 5-year period.

Response: Despite this comment's discussion of annual monitoring for priority pollutants, it was not until December 1, 2003, that the applicant confirmed that an effluent flow meter was installed in order to meet permit requirements to monitor both influent and effluent flow. Without this effluent flow meter, the applicant was unable to provide accurate and certified flow-weighted 24 hour composite effluent sample results. Since the effluent flow meter was installed, the results of effluent monitoring have led EPA to determine that the water quality standards for the pesticides chlordane and dieldrin have not been attained.

This comment (second paragraph) refers to an evaluation against a "corrected" version of the state water quality standard. This is not appropriate. The Hawaii water quality standard for fish consumption for chlordane is 0.000016 μg/L. It is not appropriate to assess an altered value. Earlier reviews of the Hawaii water quality standards by HDOH did not determine the chlordane fish consumption criterion to be incorrect. HDOH reviewed its water quality standards and presented corrections of inadvertent typographical errors in the State of Hawaii's Office of Environmental Quality Control publication *The Environmental Notice* on November 8, 2000. The fish consumption value associated with chlordane was not mentioned in this correction. In 2003, a package of amendments to the water quality standards, including the correction of inadvertent typographical errors, was distributed for public comment. Again, the fish consumption value associated with chlordane was not mentioned in this 2003 package of draft amendments, when it was presented to the public. In 2004, HDOH formalized the correction of the inadvertent typographical errors that were posted for the public's review in 2003. As part of a larger package of amendments, the corrections of these typographical errors in the Hawaii water quality standards were adopted by the State of Hawaii on August 31, 2004, and approved by EPA on October 28, 2004. The fish consumption value associated with chlordane was not amended in this 2004 action by the State of Hawaii. Although, in October 2007, HDOH stated their intent to amend the fish consumption water quality standard for chlordane, they have not yet conducted the formal process to amend the Hawaii water quality standards. In accordance with 40 CFR section 131.20, this process requires the State to present the proposed amendments and the rational for the amendments, conduct public meetings to explain and discuss the proposed amendments with the public, receive and respond to public comments on the proposed amendments, formally adopt the amendments, and then request and receive EPA's approval for the amendments. To date, HDOH has not made any formal proposal to change their water quality standards with respect to chlordane. Until an alternative criterion is approved, 0.000016 µg/L remains the water quality standard for fish consumption for chlordane and is the appropriate value for the 301(h) evaluation.

Nevertheless, EPA has examined whether or not the levels of chlordane would exceed 0.00016 µg/L, the value CCH asserts is the corrected value. Figures 4 in the final decision document shows that the levels of chlordane in the effluent have exceeded 0.00016 µg/L. (Figure 5 in the final decision document shows that the levels of dieldrin in the effluent exceed the water quality criterion.)

Nor is it appropriate to assess concentrations of these pesticides against general EPA criteria when the State of Hawaii has specifically adopted criteria for these pesticides to ensure the fish caught by anglers in Hawaii's waters will be safe to eat.

In sum, it is not valid to assess chlordane concentrations against an unapproved standard, to assess results against general EPA guidance values when specific state water quality standards exist, or to assess chlordane and dieldrin results during a period of time when the effluent flow meter was not present or accurate.

Finally, EPA disagrees with the implication in the comment that there were very few exceedances of the chlordane and dieldrin standards despite numerous samples. In fact, there have been very few samples of chlordane and dieldrin since the effluent flow meter was installed. When the TDD was written, there were only three samples each of chlordane and dieldrin since the flow meter was installed. In the final decision, EPA had available three additional samples each of chlordane and dieldrin that were submitted by CCH since the tentative decision. Please see also response to comment C25.

Comment C24: Chronic Aquatic Marine Life WQS: A comparison of the effluent priority pollutant data with chronic WQS protective of marine aquatic organisms indicates that, over the entire course of the analytical record since 1986 (approximately 20 years), there has been only a single exceedance of WQS, for 4,4'-DDT by only 1.7-fold, in January 2007. It is believed that this anomalous exceedance is likely a false positive due to the analytical method used, as discussed in the next subsection. These results provide a strong line of evidence that the effluent is not interfering with the protection and propagation of a BIP of fish, shellfish, and wildlife, supporting the conclusions of the WET test evaluation (the CCH WET test evaluation is provided in Section IIB.II.D) and the many years of marine biological community monitoring around the outfall.

Response: As noted in the response to C23, the applicant's failure to install the required effluent flow meter prevents a valid analysis of effluent quality with respect to priority pollutants over most of the past 20 years. Since the effluent flow meter was installed, the results of a total of six priority pollutant scans have been made available to EPA, three prior to the tentative decision and three subsequent. EPA agrees that, based on these six samples, the single exceedance of DDT was the only exceedance of numeric criteria established to protect aquatic life. In these six samples, DDT was detected only once, and EPA concludes that its occurrence at elevated levels is likely anomalous, though we disagree that it is likely a false positive due to the analytical method used. EPA disagrees that the priority pollutant data offset the repeated failure of the discharge to meet the water quality criterion for whole effluent toxicity. See also response to comment C25.

The primary basis for EPA's conclusion that the applicant has failed to demonstrate that a modified discharge would not interfere with the attainment or maintenance of that water quality which assures protection of a balanced, indigenous population of shellfish, fish, and wildlife were the failure to pass WET tests and exceedances of the ammonia nitrogen water quality standard. See also response to comment C50.

Comment C25: New Information Regarding Analytical Detection of Pesticides with GC/MS: The compliance limits for pesticides, as outlined in HAR 11-54-4(b)(3), are inherently very low due to the conservative assumptions used for their derivation. These include assumptions regarding the extent and rate of bioaccumulation in fish, assumed fish consumption rates that are three times the national average, assumed daily frequency of fish ingestion, and a target of one in one million excess cancer risk. It should be noted that these WQS are currently under revision by HDOH to potentially address outdated assumptions.

Given these conservative assumptions, the WQS for several pesticides are at levels below or very near the levels of detection using the standard analytical techniques specified in the EPA-approved 301(h) monitoring program (EPA Method 608) that uses gas chromatography with an electron capture detector (GC/ECD). Moreover, the matrix characteristics typical of municipal wastewater (that is, co-occurrence of many interfering constituents such as fats and proteins) make it difficult for standard analytical methods to provide reliable results for pesticides such as chlordane, dieldrin, and DDT. To overcome these deficiencies, a GC/MS method (EPA Method SW8270SIM) was used to provide more sensitivity and, more important, better selectivity of analytical response for the individual parameters that are of concern to EPA. A white paper describing the advantages of using GC/MS and the associated quality assurance and quality control (QA/QC) methods is provided in the Appendix.

To test the benefit of using GC/MS versus the conventional GC/ECD, split samples were analyzed using each method. A total of 12 split samples were analyzed (six from the HWWTP and six from the Sand Island WWTP) from April 24 to May 5, 2007. The GC/MS samples were analyzed by the CH2M HILL Applied Sciences Laboratory (an EPA-certified laboratory), and the GC/ECD samples were analyzed by CCH using its normal compliance testing analytical protocol. The laboratory analytical reports, and associated QA/QC documentation, are provided in the Appendix.

Figures IIB-4 and IIB-5 (of the comments) show the comparison of the GC/MS and GC/ECD results for dieldrin and technical chlordane, respectively. As shown in Figure IIB-4, dieldrin was not detected using GC/MS at a detection limit of 0.002 μg/L, well below the effluent limit of 0.01 μg/L. However, the corresponding GC/ECD results showed dieldrin detections over an order of magnitude higher, up to 0.029 μg/L, and well above the effluent limit of 0.01 μg/L. For chlordane (Figure IIB-5), detected levels using GC/MS were 20 to 70 percent lower than the levels detected using GC/ECD. However, none of the levels detected during this sampling event was above the effluent limits. The GC/MS detection limits for both dieldrin and chlordane were half the values reported for GC/ECD. Although not analyzed by CCH during this study, preliminary results indicate that DDT was not detected using GC/MS in any of the 12 samples at a detection limit of 0.002 μg/L, below the effluent limit of 0.0033 μg/L.

These results indicate that a more appropriate conclusion concerning pesticides in the HWWTP effluent is that there is a considerable likelihood that those constituents noted by EPA as exceeding WQS are false positives. During this comparative testing series, dieldrin and DDT appeared to be absent from the effluent, and chlordane was detected at substantially lower levels using GC/MS. CCH will continue to evaluate the correspondence of results between GC/MS and GC/ECD to further support a recommendation for the most appropriate analytical protocol for pesticides in the next NPDES permit.

It is important to note that these results do not question the quality of laboratory performance conducted by CCH during its compliance monitoring; rather, they reflect only the limitations inherent within the conventional EPA-approved analytical methods themselves, relative to the very low compliance limits for the HWWTP.

Response: States have flexibility when adopting criteria for toxic pollutants. This flexibility allows states to incorporate conservative assumptions when setting criteria. For example, when developing its numeric standards for toxic pollutants in 1989, the State of Hawaii applied a fish consumption value of 19.9 grams per day. This rate reflected the higher consumption rate of fish by Hawaii residents. At that time, EPA assumed a nationwide average daily consumption rate of 6.5 grams per day. However, in 2000, EPA increased this national average daily consumption rate to 17.5 grams per day but at the same time recognized much higher consumption values for various populations. Regardless of the basis for Hawaii's adoption of State criteria for pesticides, the numeric criteria adopted by the State are the criteria that must be met. See response to comment C23 for discussion about the formal process for amending State water quality standards.

In conducting its supplemental analysis of pesticides in Honouliuli effluent, CCH used an inappropriate test method. As described below, Method 608 and Method 625 are the appropriate methods for the detection of pesticides in wastewater. Use of an alternate test method must follow the steps listed in 40 CFR 136.5, which CCH has not done. Following the requirements of this regulation would ensure that correct and clearly defined laboratory procedures are applied and resulting data are presented in a clear manner for review by EPA.

The Honouliuli permit requires the use of EPA Method 608 to detect concentrations of the pesticides chlordane and dieldrin in the Honouliuli final effluent. This is an EPA-approved test method procedure listed in Table 1D of 40 CFR 136.3 for detecting pesticides in wastewater and is the method listed in EPA's Amended Section 301(h) Technical Support Document (ATSD). EPA Method 608 (40 CFR 136, App. A, Method 608) includes clean-up procedures to decrease detection interference from chemicals not targeted for analysis.

The ATSD also lists EPA Method 625 (40 CFR 136, App. A, Method 625) as an approved method for detecting chlordane and dieldrin. EPA Method 608 detects pesticides by use of the gas chromatographic (GC) method with electron capture detection (GC/ECD), and EPA Method 625 detects pesticides with the use of a gas chromatographic/mass spectrometry (GC/MS) method. In its comments on the tentative decision, CCH included a technical memorandum from CH2M Hill Applied Sciences Laboratory discussing the differences between Method 608 and 625. In this technical memorandum, the writer states the following: "The major drawback of Method 625, and GC/MS detection, is that the typical reporting limits are much higher than the typical reporting limits obtained from GC/ECD analysis of organochlorine pesticides." Organochlorine pesticides include chlordane and dieldrin. This memorandum goes on to describe improvements made to Method 625 to decrease the reporting limit. The memorandum also includes the following statement: "…the modified Method 625 meets the acceptance criteria for Method 625 and has greater sensitivity and specificity than GC/ECD for the organochlorine pesticides of concern in the effluent matrix under investigation."

Despite the discussion presented in CCH's technical memorandum on the two EPA-approved methods used to determine pesticide concentrations, CCH disregarded Methods 625 and instead presented data using a third detection method for chlordane and dieldrin. In its comments on the tentative decision, CCH provided a comparison of laboratory results determining concentrations of the organochlorine pesticides chlordane, dieldrin, and DDT in the Honouliuli WWTP and Sand Island WWTP final effluent using Method 608 and Method SW8270SIM. The SW- prefix added to Method 8270 indicates it is published by EPA's Office of Solid Waste. The –SIM ending added to Method 8270 indicates the use of selected ion monitoring (SIM).

Although both methods utilize GC/MS, Method 8270 is not entirely equivalent to Method 625. For example, sample preparation and extraction prior to injection into the GC may be different. Method 8270 cites 5 different preparation methods that may be used. Method 625 utilizes serial separatory funnel extractions with methylene chloride at a pH greater than 11 and again at a pH less than 2.

SW8270SIM is not an EPA-approved method for determining concentrations of pesticides in wastewater, nor is Method 8270 listed in the ATSD as a method suitable for the detection of pesticide concentrations in 301(h) monitoring programs. Furthermore, the procedure for Method 8270 states the following:

> "In most cases, this method is not appropriate for the quantification of multicomponent analytes, e.g., Aroclors, Toxaphene, Chlordane, etc., because of limited sensitivity for those analytes. When these analytes have been identified by another technique, Method 8270 may be appropriate for confirmation of the identification of these analytes when concentration in the extract permits."

The procedure for Method 8270 also includes the following statement:

> "The use of SIM is acceptable for applications requiring quantitation limits below the normal range of electron impact mass spectrometry. However, SIM may provide a lesser degree of confidence in the compound identification, since less mass spectral information is available."

Therefore, Method 8270 is not an appropriate alternative to Method 608 for the analysis of pesticides, especially chlordane, for wastewater monitoring in the NPDES program.

In addition to the use of a method that was inappropriate, the supplemental analyses conducted by CCH were deficient or misleading for several reasons.

CCH did not provide sufficient information for EPA to confirm that the tests they conducted using Method 608 and Method SW8270SIM were truly based on split samples. In its comments on the tentative decision, CCH asserted that split samples were analyzed using each method (608 and SW8270SIM), where CH2MHill performed the analysis via Method SW8270SIM, and CCH performed the analysis via Method 608. However, only the CH2M Hill laboratory reports were provided, and the dates of the samples do not correlate with the CCH's monitoring data. Thus, if split samples were analyzed by both methods, EPA was not provided with the CCH (Method 608) data for those samples. Furthermore, the technical memorandum presented in an appendix to CCH's comments suggests that analysis of the Honouliuli effluent was conducted using Method 625, but these data were not presented in CCH's comments on the Honouliuli tentative decision.

CCH did not report the appropriate detection limits for its supplemental analyses using method 608. The minimum level (ML) is the level at which the entire analytical system gives a recognizable reading and acceptable calibration points. The method detection limit (MDL) is the minimum concentration of a substance that can be measured and reported with 99-percent confidence. Quantitation in the range between the MDL and the ML is not as precise or accurate as it is in the range above the ML. In their comments, CCH did not provide the data sheets from the CCH laboratory analysis conducted from April 24, 2007, through May 4, 2007, using Method 608 to determine chlordane and dieldrin concentrations. Without these data, EPA cannot fully assess the data presented in CCH's comments.

The samples analyzed by CCH were not equivalent to the samples collected as required by the Honouliuli permit. The six samples collected by CCH from April 4, 2007, through May 4, 2007, were grab samples (i.e. a sample from one point in time). The Honouliuli permit requires composite samples for the analysis of pesticides. Collection of a composite sample over a 24-

hour period ensures that fluctuating levels of pollutants are captured. A grab sample only captures the pollutants discharged at the moment the sample is collected.

In its comments on the tentative decision, CCH describes CH2MHill’s laboratory as EPA-certified. However, EPA only certifies laboratories for drinking water analysis. EPA does not certify laboratories for the analysis of pesticides in wastewater. Consequently, this sentence about the Applied Sciences Lab certification is misleading.

Based on CCH's use of an unapproved and inappropriate test method and the additional deficiencies described above, EPA disagrees with CCH's conclusion that there is a considerable likelihood that those constituents noted by EPA in the tentative decision as exceeding water quality standards are false positives. Rather, EPA concludes that the additional laboratory data submitted by CCH in its comments do not provide sufficient reason to disregard the existing laboratory data reviewed by EPA in the tentative decision.

Although the supplemental pesticide analysis conducted by CCH using Method SW8270SIM are of questionable reliability, CCH has submitted, since preparation of the tentative decision, the results of additional priority pollutant scans using Method 608. EPA has reviewed these data and reassessed its conclusions as to whether the proposed discharge would meet water quality standards for pesticides. In the tentative decision, EPA concluded that the reported concentrations of chlordane and dieldrin exceeded the water quality criteria protective of human consumption of fish. CCH collected and analyzed three scans of priority toxic pollutants and pesticides in the Honouliuli effluent, since the last data set (January 2005) that was reviewed for the tentative decision. The three samples were collected in July 2006, January 2007, and July 2008.

<u>Chlordane</u>

The results of three effluent samples analyzed for chlordane were reviewed in the tentative decision. As described on page 55 of the tentative decision, data collected prior to December 1, 2003, were not included in EPA's review, because CCH had not installed an effluent flow meter. Without an effluent flow meter, accurate flow readings were not available for determining flow weighted 24-hour composite samples, as required by the permit. Of the three samples reviewed, two had concentrations of chlordane (0.00017 µg/L and 0.00024 µg/L) that exceeded the water quality criterion of 0.000016 µg/L, after accounting for average initial dilution (412:1).

Chlordane was detected in all three additional samples that are now available. The effluent concentration of chlordane was 0.045 µg/L in the 2006 sample, 0.125 µg/L in the 2007 sample, and 0.043 µg/L in the 2008 sample. When the average initial dilution value (long-term effective dilution value) of 412:1 is applied to these three sample results, the concentration of chlordane in the receiving water at the ZID is calculated to be 0.00011 µg/L in 2006, 0.00030 µg/L in 2007, and 0.00010 µg/L in 2008. Accordingly, all three of these samples exceeded the water quality criterion for chlordane.

In total, of the six effluent samples now available using Method 608 since the effluent flow meter was installed, five of the samples exceed the water quality criterion, when accounting for average initial dilution. EPA is, therefore, retaining its conclusion that the proposed discharge will not attain the water quality criterion for chlordane protective of human consumption of fish.

Dieldrin

The results of three effluent samples analyzed for dieldrin were reviewed in the tentative decision. The reported concentrations of dieldrin in the effluent are 0.013, 0.035, and 0.055 µg/L. After the average dilution value of 412:1 is applied to the effluent results, dieldrin concentrations in the receiving water at the ZID were calculated to be 0.000032, 0.000085, and 0.00013 µg/L, all of which exceed the water quality criterion of 0.000025 µg/L.

Dieldrin was detected in all three of the additional samples. The effluent concentration of dieldrin was 0.017 µg/L in the 2006 sample, 0.016 µg/L in the 2007 sample, and 0.010 µg/L in the 2008 sample. When the average initial dilution value (long-term effective dilution value) of 412:1 is applied to these three sample results, the concentration of dieldrin in the receiving water at the ZID is calculated to be 0.000041 µg/L in 2006, 0.000039 µg/L in 2007, and 0.000024 µg/L in 2008. Two of the three samples exceed the water quality criterion for chlordane.

In total, of the six effluent samples now available using Method 608 since the effluent flow meter was installed, five of the samples exceed the water quality criterion, when accounting for average initial dilution. EPA is, therefore, retaining its conclusion that the proposed discharge will not attain the water quality criterion for dieldrin protective of human consumption of fish.

DDT

DDT was not detected in any of the three samples reviewed in the tentative decision, but it was detected in one of the three additional samples that are now available at levels that exceed water quality criteria established to protect human health and aquatic life. Specifically, DDT was detected in the effluent sample collected in 2007, at a concentration of 0.196 µg/L in the 2007 sample. When the average initial dilution value (long-term effective dilution value) of 412:1 is applied to this sample result, the concentration of DDT in the receiving water at the ZID is calculated to be 0.00048 µg/L. This exceeds the water quality criterion for DDT for protection of human health via consumption of fish of 0.000008 µg/L. When the critical initial dilution value of 118:1 is applied to the detected effluent concentration of DDT, the concentration of DDT in the receiving water at the ZID is calculated to be 0.0016 µg/L. This exceeds the chronic criterion for DDT in salt water of 0.001 µg/L.

In comment C24, CCH states that the detection of DDT in 2007 is an anomalous exceedance and likely a false positive due to the analytical method used.

EPA agrees that the detection of DDT in 2007 appears to be an anomalous occurrence, but EPA disagrees that it is likely a false positive due to the analytical method used. EPA continues to support the use of Method 608 and considers the method, if properly implemented, to be reliable.

EPA thinks it is more likely that there was a spike of DDT in the Honouliuli wastewater. This could be due to a resident dumping old pesticide down the drain into the sewer system. As DDT was only detected in one of six samples, EPA concludes that the proposed discharge will likely attain the water quality criteria for DDT.

Comment C26: Conclusions of WQS: The analytical methods for pesticides specified by EPA in the HWWTP permit led to the reporting of probable false positives. This, in turn, has led EPA to reach a mistaken conclusion concerning the potential for adverse effects of pesticides on human health and maintenance of a BIP beyond the ZID boundary. It is noted that EPA has reached this conclusion in contradiction to years of evidence from the marine monitoring program that indicates that the pesticides of concern are not bioaccumulating in the target species that are specified in the permit. Therefore, alleged priority pollutant exceedances do not provide a justification for denial of CCH's waiver application and, in light of this information, EPA's tentative conclusion should be reconsidered.

Response: As noted in the response to comment C25, EPA does not agree that the analytical methods specified in the permit resulted in false positives (see response to comment C25).

EPA continues to find that the Honouliuli discharge contains concentrations of chlordane and dieldrin that exceed water quality standards that were established to protect human health from ingestion of carcinogens through fish consumption. These water quality standards are established at levels intended to prevent severe environmental impacts, such as the bioaccumulation of toxic chemicals in wildlife. The fact that no actual bioaccumulation of these substances has been observed is not conclusive. One cannot conclude that water quality standards have not been exceeded just because the adverse effects of bioaccumulation have not yet been observed.

Additionally, the findings of elevated levels of pesticides did not lead to EPA's conclusion that the discharge fails to demonstrate that a modified discharge would not interfere with the attainment or maintenance of that water quality which assures protection of a balanced, indigenous population of shellfish, fish, and wildlife. This conclusion was based on the discharge's failure to pass WET tests and exceedances of the ammonia nitrogen water quality standard. See also response to comment C50.

<u>Whole effluent toxicity (WET)</u>

Comment C27: The EPA protocol for the Hawaiian sea urchin method is still in draft form and has not been finalized; therefore, *Tripneustes gratilla* is not on EPA's current approved species list (72 Fed. Reg. 11200-11249, March 12, 2007).

Response: The commenter is correct that the *T. gratilla* method has not been listed in 40 CFR part 136; however, this does not mean that the results of monitoring conducted using the method are inappropriate for use in assessing attainment of water quality standards.

The use of *T. gratilla* is consistent with EPA policy and Hawaii's water quality standards. Since first promulgating acute and chronic whole effluent toxicity (WET) methods in 1995, EPA has continued to recommend that NPDES permitting authorities implement chronic WET tests in permits for facilities that discharge into the Pacific Ocean based on test methods and species in *Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms* (USEPA, 1995; "West Coast manual") and/or based on other alternative guidance as directed by state permitting authorities. Consistent with this recommendation, HAR 11-54-4(b)(2)(B) specifies that all state waters shall also be free from chronic toxicity as measured using the toxicity tests listed in HAR 11-54-10, or other methods specified by the director. This practice corresponds with EPA's 2002 Final WET Rule (USEPA, 2002b). In the preamble to this rulemaking, EPA states:

> Because test procedures for measuring toxicity to estuarine and marine organisms of the Pacific Ocean are not listed at 40 CFR part 136, permit writers may include (under 40 CFR 122.41(j)(4) and 122.44(i)(1)(iv)) requirements for the use of test procedures that are not approved at part 136, such as the *Holmesimysis costata* Acute Test and other West Coast WET methods (USEPA, 1995b) on a permit-by-permit basis.

Regulations for publicly owned treatment works at 40 CFR 122.21(j)(5)(viii) clarify that West Coast facilities, including those in Hawaii, are exempted from 40 CFR part 136 chronic test methods and species and must use alternative guidance as directed by the permitting authority. Consistent with these regulations, HDOH has been incorporating sea urchin testing in permits for many years. In this case, HDOH and EPA jointly issued the permit for Honouliuli, which specifies use of Hawaiian sea urchin species.

Comment C28: EPA's own WET test guidance suggests that development of WET tests for indigenous species be avoided.

Response: EPA's 2002 Final WET Rule (USEPA, 2002b), which establishes standard test methods and species for discharges to marine waters of the East Coast, specifically allows the use of test methods on a permit-by-permit basis for marine and estuarine discharges to the Pacific Ocean (67 Fed. Reg. 69955). The primary reason for this provision was to allow species indigenous to the Pacific Ocean, rather than the Atlantic Ocean, to be used for toxicity testing for discharges to estuarine and marine waters of the Pacific Ocean.

HAR 11-54-4(b)(2)(B) specifies that all state waters shall also be free from chronic toxicity as measured using the toxicity tests listed in HAR 11-54-10, or other methods specified by the director. Accordingly, HDOH routinely issues NPDES permits that require the use of toxicity tests using the *T. gratilla* test method for discharges to marine waters. These include permits for other CCH facilities, such as the Kailua and Waianae WWTPs. For estuarine and marine waters of Hawaii and other Pacific islands, EPA supports the use of *T. gratilla*.

Furthermore, the State of Hawaii has strict regulations regarding the import of non-native species. EPA's document *Short-term Methods for Estimating the Chronic Toxicity for Effluents and Receiving Waters to Marine and Estuarine Organisms* (USEPA, 2002a), while discouraging use of indigenous species in general, allows their use under certain circumstances. Section 6.1.4 (USEPA, 2002a) states the following:

> Some states have developed culturing and testing methods for indigenous species that may be as sensitive or more sensitive, than the species recommended in Subsection 6.1.3. However, USEPA allows the use of indigenous species only where state regulations require their use or prohibit importation of the species in Subsection 6.1.3.

Hawaii's strict regulation of import of non-native species is one of the reasons HDOH began development of a toxicity test method using a test organism that is already present in Hawaii. EPA supports use of this method and considers it consistent with the EPA guidance.

Comment C29: A WET evaluation is intended, in part, to be one means for measuring compliance with HAR 11-54-4(a)(4). The HWWTP NPDES permit specifies an effluent limitation for WET of 159.7 TU_c, equating to an effluent concentration of 0.63 percent. The EPA tentative decision calculated that the minimum dilution for the proposed HWWTP discharge is 118:1. EPA based its evaluation of WET results on the assumption that the measured no observed effect concentration (NOEC) must be at or greater than 0.847 percent of effluent concentration to meet the current water quality standards at HAR 11-54-4(b)(4)(A). EPA's calculations are unjustified and overly conservative. Greater dilutions are more appropriate to reflect the actual conditions experienced in the vicinity of the HWWTP outfall.

Response: The issue in a section 301(h) analysis is not compliance with previous permit limits, but whether the discharge meets water quality standards, as required by 40 CFR 125.62. EPA assessed attainment of the water quality standard for WET using the appropriate initial dilution. In accordance with Hawaii's water quality standards, EPA applied the critical (i.e., minimum) initial dilution value when assessing WET test data from the Honouliuli WWTP for 301(h) purposes. HAR 11-54-4(b)(4)(A) specifically requires that the NOEC, expressed as percent effluent, of continuous discharges through submerged outfalls shall not be less than 100 divided by the minimum dilution. (For an explanation of the term NOEC, please see response to comment C30). EPA calculated that the minimum dilution for the proposed Honouliuli discharge is 118:1. Accordingly, the measured NOEC must be at or greater than 0.847 percent effluent (i.e., NOEC = $100/TU_c$ or, in this case 100/118 = 0.847 percent effluent) to meet the water quality standard at HAR 11-54-4(b)(4)(A). As discussed earlier in the response to CCH's comments on initial dilution calculations, EPA calculated the minimum dilution (118:1) according to the guidance presented in the ATSD. Please see responses to comments C10-12 and discussion of initial dilution under "Physical Characteristics of the Discharge" in the decision document.

Comment C30:

a. The HWWTP NPDES permit does not specifically dictate a hypothesis testing approach. [Our comments] provide an alternative statistical evaluation of the urchin WET test results from 2002 to 2007 using an EPA-recommended approach, giving a more reliable indication of whole effluent toxicity. It should be noted that these are simply WET test data evaluation alternatives; *they are not WET test protocol alterations.*

b. The WET test results used in the EPA evaluation in the TD apply the hypothesis-testing method that establishes a NOEC that is based on the statistical differences in variances between control and test populations of the organisms tested. As such, the selected NOEC is always one of the dilutions selected for testing.

One shortcoming of this approach is that the actual toxic threshold could be much higher than the statistically identified NOEC. As noted in the TSD, the point estimate method (that is, 25 percent inhibition concentration, or IC25) is superior to hypothesis testing in that it makes use of the entire range of the WET test data to estimate (through interpolation using a continuous dose response model) a biological response endpoint. Unlike hypothesis testing, the IC25 point estimation method allows interpolation between test concentrations, and is more statistically robust.

c. In its TSD, EPA compared results from hypothesis testing and point estimate endpoints such as the IC25 and concluded the following:

> *"Comparisons of both types of data indicate that a NOEC derived using the IC25 is the approximate analogue of a NOEC derived using hypothesis testing. For the above reasons, if possible,* ***the IC25 is the preferred statistical method for determining the NOEC."*** *(emphasis added)*

d. It should be noted that EPA Region 2 currently uses the IC25 as the measure of compliance with NPDES permit toxicity requirements for sea urchin tests in that region.

e. The previous citations [the commenter quotes or refers to various EPA guidance documents] provide the regulatory underpinning for the use of IC25 as the most appropriate basis for determining whether past WET results at HWWTP meet the permit limit of 159.7 TU_c or EPA's calculated value of 118 TU_c in its TD.

f. Using the point estimate method, only 10 of the 164 tests (6.1 percent) conducted over the period of January 6, 2002, through April 11, 2007, had an IC25 TU_c exceeding the permit limit of 159.7 TU_c, and only 18 of the 164 tests (11.0 percent) had an IC25 TU_c exceeding 118 TU_c.

Response: EPA is grouping the various comments in comment C30 into a single comment, because of the complex terminology associated with WET testing. However, the main points in each section (a through f) have been responded to by section.

a. The hypothesis testing method used in the CCH permit and EPA's 301(h) evaluation, and the point estimate method suggested by CCH in this comment, are alternative statistical methods to evaluate the biological results of toxicity tests. Both are based on the same method for conducting the tests and measuring the biological results. As explained below, the use of the alternative statistical method suggested by the commenter, is not appropriate, given Hawaii's water quality standards.

The purpose of whole effluent toxicity testing is to determine whether or not an effluent sample is toxic. In the *T. gratilla* method, toxicity is determined by observing whether or not exposing *T. gratilla* sperm to the effluent prior to contact with *T. gratilla* eggs results in a statistically significant reduction in fertilization.

In the type of experimental design used for toxicity testing, results are measured in multiple experimental units using various treatments and a control. When conducting toxicity testing using *T. gratilla*, the "treatments" are different dilutions of the effluent sample being tested, and the control is 100% dilution water. The different dilutions are known as the dilution series. When the amount of dilution equals the amount set by the permit limit, the resulting concentration is known as the instream waste concentration. In toxicity tests, the experimental units are typically called test chambers. Multiple test chambers, called replicates, are used for each treatment and the control to increase test precision. For example, an experimental design using 10 replicates of 5 treatments and a control would use a total of 60 test chambers. The laboratory conducting the testing records the biological responses in each test chamber and then interprets these biological responses using statistics to determine the toxicity of the effluent sample.

When testing the effluent from the Honouliuli WWTP using the *T. gratilla* method, the CCH laboratory measures fertilization success in 6 to 8 replicates of 5 treatments (0.16% effluent, 0.32%, 0.63%, 1.26%, and 2.52%) and a control. These treatments equate to TU_c values of 625, 312.5, 158.7, 79.4 and 39.7 TU_c. The toxicity testing was done as required by the existing permit, which contains a limit of 159.7 TU_c (based on EPA's estimate of minimum initial dilution at the time the permit was issued). In accordance with EPA's guidance, the dilution series applied by the CCH laboratory when testing the Honouliuli effluent includes the instream waste concentration and brackets the remaining concentrations around the instream waste concentration.

This comment points out that the permit does not explicitly specify that hypothesis testing be used to interpret the results of the toxicity testing, and states that use of an alternative statistical method would not be a change to the test method. The comment goes on to suggest point estimation as an appropriate alternative to hypothesis testing.

Generally, there are two statistical approaches that can be used to interpret the biological results of toxicity tests. The method used to date, including by EPA, to evaluate the WET data for Honouliuli WWTP is called hypothesis testing. The method now suggested by CCH is called point estimation.

In hypothesis testing, the results for each treatment are compared to the results for the control using a statistical test to determine if the difference is statistically significant (i.e., the hypothesis is that there is no statistically significant difference between the treatment and the control). Of the treatments, the one that contains the highest percentage of effluent without causing any adverse effects is the no observed effect concentration or NOEC. The treatment with the lowest percentage of effluent that causes adverse effects is the lowest observed effect concentration or LOEC. The NOEC and LOEC are expressed in terms of percent effluent. For example, if the treatment that contains the highest percentage of effluent without causing any adverse effects (as defined by statistically significant differences from the control) is the treatment that contains 0.63% effluent, then the NOEC is 0.63% effluent.

As discussed in the TDD, TU_c is a statistical construct defined as the reciprocal of the statistical endpoint of the test multiplied by 100, in this case a NOEC. Thus, if the NOEC for a given test is based on a treatment that contains a lower percentage of effluent than the instream waste concentration, then the equivalent TU_c will exceed the permit limit. For example, in the case of Honouliuli, the permit limit is 159.7 TU_c, which means the instream waste concentration is 1/159.7 or 0.63% effluent. If the NOEC for a given test is 0.32 % effluent, then the TU_c is 1/0.0032 or 312.5 and the permit limit is exceeded. In reviewing CCH's application for a 301(h) variance, EPA has not assessed compliance with the permit. Rather, EPA has assessed attainment of the water quality standards, which equates to 118 TU_c after allowance for minimum initial dilution. In the Honouliuli tentative decision (Table 19), EPA reported WET tests as both a TU_c and a NOEC, because the water quality standard is described as a NOEC while the State of Hawaii routinely writes permits in terms of TU_c. (Table 19 is retained without change in the final decision document, and is discussed further in section (b) of this response.)

There are several statistical endpoints that can be calculated using point estimation techniques. The endpoint suggested by CCH is the 25% inhibition concentration, or IC25. In this case of toxicity testing using *T. gratilla*, the "concentration" is measured as percent effluent and the IC25 is the percentage of effluent that would cause a 25% reduction in fertilization success. In this approach, the results of the various treatments are plotted on a graph and connected by a line (statistically, if not on paper). Then, one of several statistical techniques (e.g., interpolation) is used to estimate the point on the line (i.e., percent effluent) at which a 25% inhibition would occur.

EPA disagrees that point estimation is an appropriate alternative to hypothesis testing in this situation. In reviewing the application for a 301(h) variance, EPA is specifically assessing attainment of the water quality standard, not compliance with the permit (although the permit limit is based on the water quality standard, as it was interpreted when the permit was written). Therefore, the appropriate method for calculating toxicity is the method dictated by Hawaii's water quality standards.

As discussed in EPA's tentative and final decision documents, Hawaii has at least two water quality standards related to toxicity. HAR 11-54-4(a)(4) contains the general requirement that all waters shall be free of toxic substances at levels or in combinations sufficient to be toxic or harmful to human, animal, plant, or aquatic life, or in amounts sufficient to interfere with any beneficial use of the water. In addition, Hawaii water quality standards include a specific requirement for submerged outfalls, such as that at Honouliuli. For continuous discharges through submerged outfalls, HAR 11-54-4(b)(4)(A) requires the NOEC, in units of percent effluent, to not be less than 100 divided by the minimum dilution. Hawaii's standards dictate that hypothesis testing be used, because the standard is written in terms of the NOEC and the NOEC is calculated using hypothesis testing. In other words, Hawaii's standards dictate that there be no effects (as defined by statistically significant differences from the control), not that a 25% inhibition would be acceptable.

EPA agrees that use of point estimation may not require a change to the test method, but it would require a change in the water quality standards. Until and unless HDOH changes the WET standard to allow point estimation, and the change becomes effective, EPA must use the current standard, and it would be inappropriate to use point estimation to assess attainment of the standard.

b. The commenter notes that the actual toxic threshold could be higher than the NOEC. This is due to the definition of the NOEC and how it is determined. By definition, the actual toxic threshold may be expected to lie somewhere between the NOEC and the LOEC.

In this case, the situation is further complicated, because EPA's estimate of critical initial dilution has changed. The permit limit of 159.7 TU_c was based on a critical initial dilution of 146:1, whereas EPA's revised estimate of critical initial dilution is 118:1.

EPA acknowledges that, because of the change in its estimate of critical initial dilution from the last permit to this 301(h) review, it is not clear whether the effluent would have exceeded a toxicity level of 118 TU_c in those situations where adverse effects were observed in the concentration corresponding to a TU_c of 79.4, but no adverse effects were observed in the concentration corresponding to a TU_c of 159.7. However, review of the data presented in Table 19 of the TDD indicates that only four of the 15 daily maximum values reported the NOEC at the concentration corresponding to a TU_c of 159.7, meaning that the true no-effects level could have been in the range between this concentration and that corresponding to the next lower test concentration, which corresponded to a TUc of 79.4 – i.e., they could have been lower than 118 TU_c. Eleven of the remaining 12 daily maximum values clearly showed the no-effects level at a concentration higher than that corresponding to a TU_c of 159.7, meaning that there were effects in the 159.7 concentration – and thus at the 118 level (one daily maximum was 79.4 TU_c and thus below both 159.7 and 118 TU_c). In sum, only four of the exceedances of the daily maximum value fell between 118 TU_c and 159.7 TU_c; the remaining 11 exceedances fell above 159.7 TU_c and clearly exceed the standard.

Generally, the magnitude of the difference between the LOEC and the NOEC can be minimized by the careful selection of effluent concentrations for the treatments used in the test design. By using multiple treatments, the difference in range between the effluent concentrations of the treatments is reduced. In addition, when testing for permit compliance purposes, treatment should be set at the instream waste concentration, and the remaining treatments should be bracketed around the instream waste concentration. Here, however, use of the test results from the tests conducted by CCH under the current permit is appropriate for assessing attainment of the water quality standard for this 301(h) evaluation, as discussed above.

The commenter is correct that the IC25 approach often involves interpolation and uses the full dose-response relationship, or in the case of toxicity testing, the concentration-response relationship. The concentration-response relationship is the relationship between the treatment and the resulting level of toxicity. With point estimates, the concentration-response relationship is the line connecting results of the various treatments.

The hypothesis test approach, however, also uses the full concentration-response relationship in evaluating toxicity results. In a well designed toxicity test using hypothesis testing, an investigator plots the results from a test, even though hypothesis testing does not fit a line to the data. Examination of the plot allows the investigator to assess whether or not the NOEC and LOEC are reasonable and to see any anomalies in the data. During the data review and reporting process, the concentration-response relationship is reviewed to identify unexpected patterns and determine whether to accept or reject test data. Chapter 4 of EPA's *Method Guidance and Recommendations for Whole Effluent Toxicity (WET) Testing (40 CFR Part 136)* (USEPA 2000b) provides guidance for review of concentration-response patterns and recommended responses by the investigator. Ten typically observed concentration-response patterns are described and step-by-step guidance on how to interpret these patterns is presented. Recommended actions, based on review of the concentration-response relationship, include accepting the results (e.g., NOEC) as valid and reliable or retesting. Unexpected concentration-response relationships should not occur with any regular frequency.

While EPA allows permitting authorities the choice of either hypothesis testing or point-estimation techniques for developing permit conditions, determining compliance, and assessing water quality standards, what is relevant for this specific 301(h) analysis is that Hawaii, by specifying the NOEC in its water quality standards, has elected to use hypothesis testing, and the analysis under 301(h) is whether the water quality standards will be met.

c. The commenter included a quotation from EPA's TSD to support its position that the IC25 method is "preferred" by EPA. However, IC25 is not an acceptable alternative to hypothesis testing for the statistical process of actually determining a NOEC. Point estimation and hypothesis testing are different types of statistical procedures and they produce different statistical endpoints.

The full quote from the EPA's Technical Support Document for Water-Quality Based Toxics Control (USEPA, 1991; known as the "TSD") is as follows:

> "Comparisons of both types of data indicate that an NOEC derived using the IC25 is approximately the analogue of an NOEC derived using hypothesis testing (see Figure 1-1). For the above reasons, if possible, the IC25 is the preferred statistical method for determining the NOEC." [TSD, p. 6]

Figure 1-1 in the TSD displays the percentage of the time the mean NOEC was approximately equivalent to an IC10, IC15, IC20, IC25, IC30, and IC50 for all 23 effluent and reference toxicant data sets analyzed by EPA for this purpose.

The purpose of the paragraph quoted by CCH is made clear by Figure 1-1. The purpose of paragraph is to identify which type of IC should be considered the approximate equivalent to the NOEC, and the paragraph identifies this as the IC25. Thus, if one is using an IC to approximate the NOEC, the TSD recommends using the IC25 over other ICs.

d. The comment is misleading with respect to the use of the IC25 by EPA Region 2. Region 2 does not have a Regional policy of using the IC25 as a measure of compliance for sea urchin testing. Rather, Region 2 recently decided to use the IC25 as a measure of compliance for one combined discharge, which receives inputs from three NPDES permitted facilities. Due to the uncertainty in determining the source of chronic toxicity in the combined discharge, Region 2 chose to use the IC25 measure for compliance monitoring of a flow weighted composite of the three individual discharges, along with the reporting of IC25 results for split samples of the individual discharges from these three facilities. In Region 2's judgment, this practice will facilitate the toxicity reduction identification process should toxic results be observed, allowing for contemporaneous comparison of IC25 results to determine the source of toxicity. Region 2 also informs us that they did not use the IC25 in place of the NOEC. A more stringent limitation for the IC25 value was included in these three permits than would have been required for chronic toxicity units calculated from the NOEC endpoint.

e. EPA allows permitting authorities the choice of either hypothesis testing or point-estimation techniques for developing permit conditions, determining compliance, and assessing water quality standards. Each approach has advantages and disadvantages, and Hawaii has elected to use hypothesis testing. Therefore, EPA disagrees that the IC25 is an appropriate basis for determining whether past WET results at HWWTP meet water quality standards. Hawaii's standards require calculation of the NOEC, not the IC25.

f. The commenter's assessment using the IC25 is not relevant, because Hawaii's water quality standard for WET is written in terms of the NOEC, rather than the IC25.

Comment C31: Another critical deficiency in the use of hypothesis testing for defining "toxicity," using an endpoint such as fertilization success in *Tripneustes gratilla*, is that simple <u>statistical</u> differences do not always represent <u>biological</u> effects. When the fertilization success in the control group replicates varies by only small percentages, a statistically significant difference between the control and a test group could be interpreted as a "toxic" response, without respect to biological significance (resulting in false positives).

In *Understanding and Accounting for Method Variability in Whole Effluent Toxicity Applications under the National Pollutant Discharge Elimination System* (EPA, 2000), EPA specifically addresses the issue of biological relevance by stating (on p. 6-4) that WET tests with

> *"…minimal variability in all treatments of a test may lead to such high statistical power that detected differences may not be biologically significant. Such tests should be interpreted with caution."*

In *Short-Term Methods For Estimating the Chronic Toxicity of Effluents and Receiving Water to Marine and Estuarine Organisms* (EPA, 2002), page 41, Section 9, EPA states that for continuous (that is, nonquantal) biological effects

> *"…estimates from a statistical analysis can only be used in conjunction with an assessment from a biological standpoint of what magnitude of adverse effect constitutes a "safe" concentration. In this instance, a "safe" concentration is not necessarily a truly "no-effect" concentration, but rather a concentration at which the effects are judged to be of no biological significance."*

An EPA-sponsored review committee was formed several years ago to assess the use of hypothesis testing in WET tests. The committee found that, in the case of a species with low control variability (such as that exhibited by *Tripneustes*), using only the NOEC derived from statistical hypothesis testing is problematic and may not be an effective approach for monitoring toxicity compliance and reporting.

As a result of these issues, EPA Region 1 modified the hypothesis testing approach to include the species test acceptability criteria (TAC) for determining permit compliance. This approach provides a more biologically relevant reporting endpoint for compliance evaluation.

Sea urchin WET tests results from 164 tests generated from January 6, 2002, through April 11, 2007, were evaluated to determine the statistical characteristics of the data set. Over the 5-year period evaluated, the average variability (as standard deviation) in the fertilization rate at the reported lowest observed effect concentration (LOEC, defined using hypothesis testing) was 5.4 percent, whereas the average variance in the control fertilization rate was 2.5 percent (less than half). These inherent conditions (very tight control variances relative to test group variances) have consistently resulted in statistically significant reductions in fertilization in treatment groups that have very high fertilization rates. Such a situation results in designation of "toxicity" that is artifactual and does not represent a true measure of biological relevance.

Of the tests with a reported LOEC (determined using statistical significance only), 66.4 percent (95 of 143) were identified where the fertilization rate at the identified LOEC was greater than or equal to 70 percent fertilization. Of the complete data set, the highest fertilization rate seen at an identified LOEC was 98 percent, seen in three separate tests. These results clearly indicate that two-thirds of the reported LOECs are not biologically relevant, and create a perception of unacceptable toxicity when that situation does not exist. That is, using the statistical significance criterion alone, the *Tripneustes gratilla* test is inherently susceptible to type I errors.

The problem with statistical hypothesis testing stems largely from the very low variability in the control test fertilization responses. Because of this low variability, a very small difference between test dilutions and controls may be found to be statistically significant and interpreted as "toxic," when instead the results may lie within the range of the normal biological variability that is considered to be acceptable for the control replicates.

Response: This comment appears to be combining two issues related to biological relevance. The main focus of the comment appears to be an assertion that hypothesis testing is not a suitable statistical method for interpreting the biological results of WET testing. In addition, the comment appears to be asserting that WET tests generally (which are based on statistical methods) do not have ecological relevance. EPA disagrees with both assertions.

<u>Ecological Relevance</u>

EPA disagrees with the assertion that WET tests do not have ecological or biological relevance. In the TSD (USEPA, 1991), EPA discussed the results of a number of studies that correlated effluent toxicity measurements to receiving water toxicity. The studies included discharges to both freshwater and saltwater. The TSD states:

> "Together, these studies comprise a large data base specifically collected to determine the validity of toxicity tests to predict receiving water community impact. In order to address the correlation of effluent and ambient toxicity tests to receiving water impacts, EPA evaluated the results of the studies discussed above. The results, when linked together, clearly show that if toxicity is present after considering dilution, impact will also be present." [TSD, p.7]

For the studies specific to saltwater, the TSD concludes as follows:

> "The results of the studies at these four sites indicate a 94 percent accuracy when using the marine and estuarine toxicity test to predict receiving water impacts. In only 6 percent of the cases did effluent toxicity tests predict receiving water toxicity that was not present (false positive)." [TSD, page 9]

<u>False Positive Results in WET Test</u>

In statistical terms, a conclusion that an effluent is toxic when it is not is known as a false positive result or a Type I error. Chapter 5 of EPA's document *Understanding and Accounting for Method Variability in Whole Effluent Toxicity Applications Under the National Pollutant Discharge Elimination System Program* (USEPA 2000a), known as the variability document, specifically addresses false positives. This document defines false positives as follows:

> "A Type I error (i.e., "false positive") results in the false conclusion that an effluent is toxic when it is not toxic. A Type II error (i.e., "false negative") results in the false conclusion that an effluent is not toxic when it actually is toxic. Power (1 - beta) is the probability of correctly detecting a true toxic effect (i.e., declaring an effluent toxic when it is in fact toxic).

WET tests, when properly conducted, are designed to minimize the likelihood of false positive results. Important design parameters include the number of replicates and establishing statistical controls on variability. EPA has addressed concerns related to false positives specifically for hypothesis testing in the variability guidance document (USEPA, 2000a) as follows:

> "The hypothesis test procedures prescribed in EPA's WET methods provide adequate protection against incorrectly concluding that an effluent is toxic when it is not. The expected *maximum* rate of such errors is the alpha level used in the hypothesis test. The hypothesis test procedure is designed to provide an error rate *no greater than* alpha when the default assumptions are met. The statistical flow chart provided with each EPA WET method identifies cases when default assumptions are not satisfied and, therefore, when data transformations or alternative statistical methods (e.g., a nonparametric test) should be used."

EPA evaluated and assessed the false positive rate in its study of interlaboratory variability of WET tests (USEPA, 2001). This study conclusively showed that measured false positive rates were below the theoretical rate of 5% estimated for the methods. EPA believes that the test design employed in WET testing, including controls, replication, and hypothesis testing or point estimation techniques, provides adequate protection from false positives.

EPA disagrees that hypothesis testing is an unacceptable method for interpreting the biological results of WET tests. Proper test design, including controls and replication, provides adequate protection from false positives, whether the results of the test are interpreted using hypothesis testing (as required by Hawaii water quality standards) or point estimation. EPA strongly recommends that WET testing laboratories carefully review the statistical procedures used to produce WET test results and other factors (i.e., biological and statistical quality assurance), and verify that test conditions and test acceptability criteria are achieved. If a test is properly conducted and correctly interpreted, either through hypothesis testing or point estimation, the rate of false positives should remain very low.

In its Final WET Rule (USEPA, 2000b), EPA continues to use a nominal error rate of 0.05 for its WET test methods. Reductions in the nominal error rate (reducing false positives) would improve confidence in test results that identify toxicity, but reduce confidence in results that do not identify toxicity, because of the relationship between Type I and Type II errors. This would reduce the power of the test and the chance of identifying toxic discharges, thereby reducing environmental protection. In the Final WET Rule, EPA concluded that there is no scientific justification for recommending reductions in nominal error rates below 0.05 to reduce false positives in order to improve permit compliance.

<u>Number of Replicates</u>

Hypothesis tests can be designed to increase the power to detect differences by decreasing variability. One important design parameter in this regard is the number of replicates tested. The Honouliuli WWTP NPDES permit requires a comparison between a dilution water control and different treatments that bracket the instream waste concentration. EPA toxicity test methods recommend a minimum number of replicates per test concentration, but the testing laboratory may increase the number of replicates. The City and County of Honolulu Water Quality Laboratory incorporates one and a half to two times the recommended replicate size by using 6-8 replicates per treatment to increase the power of testing and decrease variability.

<u>Statistical Controls on Variability</u>

The percent minimum significant difference (PMSD) is a measure of test sensitivity that establishes the minimum difference required between a control and a treatment in order for that difference to be considered statistically significant. To increase test precision, upper and lower bounds on PMSD can be applied when reporting the NOEC. Upper PMSD bounds are intended to control within-test variability, because high variability can mask toxicity. EPA recommends lower PMSD bounds to avoid penalizing permittees which use laboratories that achieve unusually high precision in their toxicity tests. When variability is very low, a small difference between a treatment and the control could be found to be statistically significant. Thus, a laboratory that achieves a very high precision, and hence low variability, might find that an effluent sample is toxic when another laboratory would not.

EPA recommends that laboratories track PMSD values over time so that the testing laboratory may assess the normal operating ranges of this parameter in the laboratory and identify periods of decreased consistency. This information is useful in quickly identifying and correcting potential problems and sources of variability. The tracking of PMSD values also is useful for evaluating whether a laboratory needs to increase test replication to consistently achieve the variability criteria.

Minimal variability in all treatments of a test may lead to such high statistical power that detected differences may not be biologically significant, but this is accounted for by setting a low PMSD criterion for the method. The CCH Water Quality Laboratory has established a lower PMSD bound of 3% for the *T. gratilla* fertilization toxicity tests it conducts, as described in CCH's Standard Operating Procedure #860, Revision #1 (City and County of Honolulu, 2003). Thus, to the extent CCH may have had concerns about the statistical significance of the *T. gratilla* WET tests, it has addressed those through its laboratory setting a low bound on PMSD.

If the relative difference between the means for the control and the instream waste concentration treatment is statistically significant, but smaller than the lower bound PMSD, the test is considered acceptable, but determination of the NOEC is more complex. Section 6.4.2 of EPA's variability guidance document (USEPA, 2000a), describes the procedures for determining the NOEC in this situation.

The current Honouliuli permit does not require analysis of PMSD when interpreting results of WET tests; however, that can be done retroactively. In response to this comment, EPA has re-reviewed the data on WET and taken into consideration information on PMSD, using the lower bound of 3% described in CCH's 2003 Standard Operating Procedure.

In the TDD, EPA focused its review of WET tests using *T. gratilla* on the 15 month period beginning September 2005 and ending November 2006. During some months, CCH conducted multiple WET tests. Table 19 of the TDD lists both the average value for each month and the highest of the individual values (daily maximum) for each month. Twelve of the 15 monthly average values, and 14 of the 15 daily maximum values, exceeded the water quality standard.

EPA reviewed the PMSD data from the detailed data sheets that were submitted by CCH along with their DMRs. CCH conducted a total of 55 tests during the 15 month period. The results of all 55 WET tests conducted between September 2005 and November 2006, including information on PMSD, are presented in the table below (Table 19a in the final decision document). Of the 55 tests, 41 had a PMSD above the lower bound of 3%. Of those 41 tests, 32 exceeded the water quality standard, using a critical initial dilution of 118:1. Of the 14 tests that had a PMSD below the lower bound of 3%, 7 had a TU_c that exceeded 118 TU_c.

Toxicity and PMSD values for Honouliuli WWTP WET tests from September 2005 through November 2006. Highlighted tests had a PMSD below the lower bound of 3% and exceeded 118 TU_c.

Date	Daily Maximum NOEC (% effluent)	Daily Maximum (Tu_c)	PMSD	Monthly Average (Tu_c)
9/14/2005	0.32	312.5	3.11	
9/21/2005	0.16	625	6.97	
9/29/2005	<0.16	>625	17.4	>520.8
10/6/2005	0.63	**158.7**	1.54	
10/11/2005	0.32	312.5	12.62	
10/18/2005	1.26	79.4	1.57	
10/26/2005	1.26	79.4	3.10	157.5
11/3/2005	0.63	158.7	4.02	
11/9/2005	1.26[1]	**79.4**[1]	2.13	
11/16/2005	1.26	79.4	1.51	
11/23/2005	0.63	158.7	4.87	119.05[2]
12/6/2005	0.63	158.7	3.19	158.7
1/6/2006	0.32	312.5	7.29	
1/14/2006	0.63	**158.7**	2.47	
1/18/2006	1.26	79.4	2.36	
1/24/2006	0.63	158.7	5.09	177.3
2/2/2006	1.26	79.4	3.00	
2/9/2006	0.32	312.5	3.90	
2/15/2006	0.63	158.7	3.34	
2/20/2006	0.63	158.7	3.01	177.3
3/4/2006	2.52	39.7	2.41	
3/7/2006	1.26	79.4	4.23	
3/16/2006	0.63	158.7	13.88	
3/24/2006	0.63	**158.7**	1.93	109.1
4/5/2006	1.26	79.4	1.63	79.4
5/4/2006	0.32	312.5	8.06	
5/7/2006	<0.16	>625	4.44	
5/16/2006	0.63	158.7	11.97	

[1] NOEC from November 9, 2005 test originally 0.63 (NOEC of 0.63 =158.7 Tu_c). Recalculated NOEC is 1.26 (NOEC of 1.26 = 79.4 Tu_c).
[2] Monthly average recalculated using 79.4 Tu_c

5/24/2006	0.63	158.7	5.15	>313.7
6/3/2006	0.63	158.7	4.56	
6/5/2006	0.63	158.7	4.17	
6/15/2006	0.63	158.7	8.50	
6/24/2006	0.16	625	3.94	
6/27/2006	<0.16	>625	9.49	>345.2
7/3/2006	<0.16	>625	3.81	
7/10/2006	0.63	158.7	6.37	
7/17/2006	1.26	79.4	5.42	
7/28/2006	1.26	79.4	4.70	>236
8/3/2006	2.52	39.7	0.63	
8/11/2006	<0.16	>625	10.6	
8/13/2006	0.32	312.5	4.92	
8/23/2006	<0.16	>625	7.58	>401
9/1/2006	0.16	625	4.73	
9/7/2006	0.32	**312.5**	1.67	
9/16/2006	0.32	312.5	9.34	
9/19/2006	0.63	158.7	3.62	
9/28/2006	0.63	**158.7**	2.91	313.5
10/2/2006	0.63	158.7	3.80	
10/13/2006	2.52	39.7	6.86	
10/18/2006	1.26	79.4	6.85	
10/25/2006	0.63	**158.7**	2.47	109.1
11/6/2006	<0.16	>625	6.01	
11/8/2006	<0.16	>625	18.79	
11/14/2006	1.26	79.4	1.98	
11/20/2006	1.26	79.4	5.09	>352.2

Using section 6.4.2 of the variability document (USEPA, 2000a), EPA calculated NOECs for the 7 tests that had PMSDs below 3% and exceeded 118 TU_c. The calculations show that 6 of the 7 NOECs remained unchanged. The remaining test, conducted on November 9, 2005, had a NOEC that changed the TU_c value from 158.7 to 79.4. After adjusting the monthly average for November 2005 based on the lower TU_c of 79.4, the recalculated monthly average is 119.05 TU_c. Thus, after incorporating the monthly average based on the recalculated NOEC for the November 9, 2005 sample, 12 of the 15 monthly averages still exceed 118 TU_c.

In summary, EPA still finds that 12 of the 15 monthly average values and 14 of the 15 daily maximum values exceeded the water quality standard. This is true if the NOEC values are recalculated according to the procedures in the variability document for those tests where the PMSD was less than 3%.

EPA Region 9 disagrees that the approach taken by EPA Region 1 is more appropriate in this situation. Region 1 has modified the test acceptability criterion established in the method published by EPA for toxicity testing using the sea urchin *Arbacia punctulata* (EPA 1995). The published methods apply a test acceptability criterion for defining acceptable rates of fertilization in **dilution water controls**. Region 1 has modified this test acceptability criterion to apply to rates of fertilization in **treatments**, to address high rates of fertilization in treatments that could lead to a false conclusion that the effluent was toxic. It is Region 9's opinion that a more appropriate approach for avoiding penalizing permittees using laboratories that achieve unusually high precision in their toxicity tests is use of the lower bound PMSD, which is the approach taken by the CCH laboratory.

Moreover, EPA allows permitting authorities the choice of either hypothesis testing or point-estimation techniques for developing permit conditions, determining compliance, and assessing water quality standards. Each approach has advantages and disadvantages.
By expressing its water quality standard in terms of the NOEC, HDOH has adopted hypothesis testing as the statistical method for analyzing WET test data. EPA has appropriately evaluated CCH's application based on the water quality standards adopted by HDOH.

Comment C32: The *Tripneustes gratilla* protocol includes techniques that are inherently sensitive. For example, the protocol specifies a 60-minute sperm exposure, which is three times longer than the 20-minute exposure required for West Coast urchin fertilization tests, as outlined in *Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms* (EPA, 1995). This inconsistency results in exaggerated sensitivity for *Tripneustes gratilla* relative to other West Coast urchin protocols.

Response: The *T. gratilla* method is not the only sea urchin WET method that calls for sperm to be exposed to the treatment (or control) for 60 minutes prior to introduction of the eggs. The sperm exposure period of 60 minutes is consistent with the *Arbacia punctulata* urchin fertilization toxicity test method which specifies a 60 minute exposure (USEPA, 2002a). A 60 minute exposure of urchin sperm compared to a 7-day exposure of *Ceriodaphnia dubia* is a reasonable exposure time to measure endpoints. The measure of whether or not the sperm exposure period is excessive is the fertilization success rate of the controls. Success in control fertilization of *T. gratilla* tests is evidence that exposure time is not excessive.

Comment C33: Corresponding WET test results performed by CCH on *Ceriodaphnia dubia*, an approved WET test species, consistently show no toxicity. Because *Ceriodaphnia dubia* has a reputation for being a sensitive test organism for NPDES compliance testing (particularly the reproduction endpoint), the long record of nontoxicity is important information regarding the overall low potential for aquatic impacts from HWWTP effluent discharge. To provide additional lines of evidence for low toxicity, additional WET test on other EPA-approved marine species were conducted in 2007. These tests were run using the mysid shrimp *Mysidopsis bahia* (a sensitive invertebrate) and the sheepshead minnow *Cyprinodon variegates* (a representative fish). The results of the testing with sheepshead minnow and mysid shrimp are consistent with the *Ceriodaphnia dubia* results; that is, they indicate a lack of unacceptable toxicity levels in the HWWTP effluent.

Response: EPA has long recognized that there are species sensitivity differences among different groups of organisms to different toxicants. This is why EPA recommends three-species testing. HDOH's *State Toxics Control Program: Derivation of Water Quality-Based Discharge Toxicity Limits for Biomonitoring and Specific Pollutants* (HDOH, 1989) states the following:

> A major concern about biomonitoring as a means to prevent toxicity is that the organisms used in the test may not be as sensitive as the most sensitive organism which either inhabits the receiving water, or would be present in the absence of pollution. The Technical Support Document contains an extensive discussion of the uncertainty associated with test species. Generally, testing with three diverse species (e.g., from different taxa) is likely to ensure protection of the most sensitive receiving water species. In certain critical cases, testing with additional species may be desirable.
>
> The probability of protecting sensitive species can also be increased, in cases where fewer than three test species are used, by increasing the stringency of the toxicity limit by a factor of 10 for two species, and by 100 for one species.

Test results indicate that *T. gratilla* is more sensitive to toxicants found in the Honouliuli effluents than other tested organisms. This is not the result of a deficiency with the *T. gratilla* test method, nor does it mean that the results with *T. gratilla* should somehow be discounted. Rather, it illustrates the reason for conducting WET tests with more than one species. Test results using *T. gratilla* are valid and indicate toxicity that is not detected by other species, such as *C. dubia*, or the two additional test species investigated by CCH, *Mysidopsis bahia* and *Cyprinodon variegatus*. For this reason, in the selection of test species, EPA recommends the use of species from ecologically diverse taxa (see USEPA, 1991, Section 1.3.4). By testing Hawaii effluents with multiple species, including a sea urchin found in tropical waters of the Pacific Ocean, the requirement at 40 CFR 122.44(d)(1)(ii) to consider species sensitivity when evaluating WET in NPDES effluents is satisfied.

Results from WET tests using *T. gratilla* clearly indicate that the Honouliuli effluent routinely exerts a toxic effect that is predicted under critical conditions to exceed water quality standards at the boundary of the zone of initial dilution. EPA continues to conclude that the proposed discharge will not attain water quality standards for WET and that the proposed discharge will contain substances at levels sufficient to be toxic to aquatic life, in violation of HAR 11-54-4(a)(4), and therefore is not protective of uses for Class A waters in Hawaii.

Comment C34: The EPA conclusion in its tentative decision that there is unacceptable toxicity in the HWWTP effluent, based solely on evaluation of *Tripneustes gratilla* WET test data through statistical hypothesis testing, is an inappropriate and unjustified basis for EPA's tentative denial of CCH's waiver application and should be reconsidered.

Response: EPA assessed WET test data for *T. gratilla* and *C. dubia*. In EPA's review of data from September 2005 through November 2006, 14 of the 15 daily maximum values exceeded the water quality standard of 118 TU_c in the toxicity tests conducted with *T. gratilla*. However, on one occasion, the water quality standard was met, indicating that there can be times when the effluent does not present unacceptable levels of toxicity. During the same time period, all tests using *C. dubia* met the water quality standard of 118 TU_c.

In response to these comments, EPA reviewed the results of toxicity tests using *T. gratilla* using effluent from other wastewater treatment plants in Hawaii, to confirm that the method itself does not lead to findings of toxicity with all effluents. EPA found that other permits in Hawaii contain the requirement to conduct toxicity testing with *T. gratilla*, and the permittees, including other CCH facilities, are able to meet the water quality standard as calculated based on the dilution for their facility. For example, tests conducted with effluent from the wastewater treatment plants for Kailua, Waianae, and Hilo consistently meet the State of Hawaii water quality standards for continuous discharges through submerged outfalls. Specifically, WET tests reported in DMRs from CCH's Kailua WWTP met the water quality standard of 186 TUc in 53 of the 59 WET tests conducted in the period from January 2003 through December 2007. Results reported in DMRs for CCH's Waianae WWTP indicate that the discharge met the water quality standard of 117.84 TUc in 57 of the 59 tests conducted in the period from January 2003 through December 2007. Results reported in DMRs for the Hilo WWTP indicated that the discharge met the water quality standard of 62.8 TUc in all 16 of the tests conducted quarterly in the period from March 2003 through September 2007 and reported in DMRs. These results indicate that the test method itself is not the cause of the consistent failure of the Honouliuli effluent to meet the WET criterion using *T. gratilla*.

See also response to comment C31 for a discussion of hypothesis testing.

Comment C35: Consistent with regulatory guidance and precedent, the statistical evaluation provided here indicates that the IC25 provides the most reliable estimation of whole effluent toxicity for the sea urchin. If the IC25 were used for evaluating the HWWTP WET test results, EPA would observe only infrequent toxicity, even in *Tripneustes gratilla*. Further, the weight of evidence provided from WET tests using the three EPA-approved organisms indicates that, to the extent that toxicity may be present in the HWTTP effluent, it is not present at unacceptable levels.

Response: EPA disagrees that the IC25 is an appropriate statistical endpoint for use with Honouliuli WWTP WET test results, as the Hawaii water quality standard for WET is expressed in terms of the NOEC, which is determined using hypothesis testing, not the IC25. Thus, results derived using the IC25 are not relevant. See also response to comment C30.

EPA disagrees that results using other species should offset the fact that WET testing with *Tripneustes gratilla* clearly show that the Honouliuli WWTP effluent often fails to attain the water quality standard for WET. Please see also response to comment C33; as discussed in that response, it is necessary to protect the most sensitive species..

One reason that WET tests show different levels of toxicity when different species are used is that some species are more sensitive to a particular pollutant than other species. However, a species that is not particularly sensitive to one pollutant may be very sensitive to another.

To assess why the Honouliuli effluent is more toxic to *T. gratilla* than to *C. dubia*, it would be helpful to know which pollutant or pollutants is causing the toxicity. If CCH had initiated and completed a comprehensive toxicity reduction evaluation (TRE), according to EPA guidelines, when repeated exceedances of the water quality standards were detected by *T. gratilla* tests, the pollutant or pollutants causing the toxicity could have been identified. As stated in the TDD, after exceedances in 2002 and 2003, the applicant submitted vague outlines for conducting a TRE. These TRE's were not approved by EPA, because they were incomplete. As a result of repeated exceedances of WET tests with *T. gratilla* in September 2005, the applicant submitted a plan for conducting a TRE to EPA on November 4, 2005. EPA reviewed the plan but withheld approval contingent upon the addition of more information and organizational structure. The applicant submitted another TRE plan as the result of two consecutive WET failures that occurred in May 2006. This plan is more thoroughly written than previously submitted plans, but it was still not approvable without additional revisions. EPA advised the applicant of the needed improvements on September 11, 2006. On April 25, 2008, CCH submitted an update to the TRE plan submitted in June 2006. This updated plan was reviewed by EPA. EPA's comments on the TRE plan were sent to CCH on November 12, 2008 with a requirement for a revised plan to be submitted to EPA by December 15, 2008. As of this date, CCH has still not completed a TRE to determine the source of toxicity and identify the steps needed to reduce toxicity.

See also response to comment C33.

Comment C36: It is recommended that the future permit for HWTTP use the IC25 as an endpoint for WET test data evaluation. This would overcome the deficiencies associated with hypothesis testing, would address issues related to biological relevance for *Tripneustes gratilla*, and would be in accordance with a great deal of published EPA guidance on toxicity test data evaluation. If hypothesis testing alone continues to be used to define toxicity, then *Tripneustes gratilla* appears to be statistically unstable and cannot provide a reliable measure of the potential for aquatic impacts. Other approved test species might be considered to substitute for the *Tripneustes gratilla* WET test.

Response: As EPA's decision is to deny CCH's request to renew the 301(h) variance, future permits for the Honouliuli WWTP will be written by HDOH, not EPA.

Furthermore, EPA disagrees that use of the IC25 would be an appropriate statistical endpoint for future permits, given that Hawaii's water quality standards for WET are expressed in terms of the NOEC, which is determined using hypothesis testing. See also response to comment C30.

Also, EPA disagrees that *Tripneustes gratilla* is statistically unstable and unreliable as a WET test species. See also response to comment C31.

Comment C37: It is important to note that these results do not question the quality of laboratory performance CCH conducted during its compliance WET test monitoring. Rather, they reflect only the deficiencies inherent within the methods themselves, relative to the biological variability inherent in this indigenous sea urchin. This issue can be addressed by switching to a more suitable statistical data evaluation method and/or species.

Response: EPA does not question the performance of the CCH laboratory, but EPA disagrees that CCH's failure to meet WET tests is due to deficiencies in the *T. gratilla* toxicity test. The data presented by the CCH Water Quality Laboratory demonstrate their ability to conduct the *T. gratilla* toxicity test well. The PMSDs for the CCH Water Quality Laboratory are consistently low, indicating excellent precision. Consistent results represented in the CCH reference toxicity control charts also indicate the reliability of the *T. gratilla* toxicity test. This consistency refutes any claims of unacceptable biological variability in the *T. gratilla* test.

Nutrients

Comment C38: The available nutrient database spans the period from March 1993 to October 2006, and includes a total of 1,914 analytical records. To provide recent data and to be consistent with the regulatory NPDES permitting cycle of 5 years, an evaluation was performed on the data within a 5-year period between February 20, 2002, and January 17, 2007.

Response: EPA has reviewed all of the relevant information submitted by the applicant, not just the more recent data. As described in the tentative decision, CCH provided EPA with a database of results from all nutrient monitoring conducted in the Honouliuli receiving water over the 16 years from 1991 through 2006. The data prior to 2002, which have not been reviewed previously for 301(h) purposes, are relevant because they represent the receiving water as it was affected by past treatment practices and the effluent quality resulting from those past practices. As described in Table 3 of the Honouliuli tentative decision and discussed on page 15 of the tentative decision, CCH has applied for a range of operating configurations, including those that have been employed at earlier times, and it is possible that future effluent quality could be more similar to earlier quality than to recent effluent quality. Thus, it is appropriate that EPA review all available receiving water data. Also, EPA has reviewed more recent data in the final decision document, and still concludes that the ammonia nitrogen standard has been exceeded.

Comment C39: The WQS found in the HDOH HAR, Chapter 11-54, August 31, 2004, require the calculation of geometric means for nutrients, including ammonia. Because ammonia is sampled on a quarterly basis (per the NPDES permit requirements), a true geometric mean cannot be calculated from four data values per sampling point per year.

Response: Hawaii's water quality standards for nutrient parameters are written as geometric means, thus EPA considers it necessary to assess attainment of the standard using the geometric mean. EPA does not agree that a geometric mean cannot be calculated from four data values. Mathematically, a geometric mean can be calculated when there are one or more data points. Hawaii's water quality standards for nutrient parameters do not describe the time period for determining a geometric mean, and the question in this case is what averaging period is most appropriate, given the frequency of sampling and the wording of Hawaii's standards.

For the 2007 Honouliuli tentative decision, EPA took the same approach as it did in the 1998 Sand Island tentative decision. The 1998 tentative decision for Sand Island, which became final when the Sand Island permit was issued, stated the following*: EPA calculated annual geometric means for the reported quarterly raw data at each station by averaging values obtained at all three depths.* In the 2007 Honouliuli tentative decision, EPA continued the practice of assessing data on an annual basis. As stated on page 63 of the Honouliuli tentative decision, EPA initially assessed the annual geometric mean for each nutrient at each monitoring station with all depths combined. When this initial and more general assessment indicated exceedances of the water quality standard -- as was the case for ammonia nitrogen -- EPA then further assessed attainment of the Hawaii water quality criterion for ammonia nitrogen by calculating a geometric mean for ammonia nitrogen data from each station at each depth on an annual basis. If more data had been available for a given year, these data would have been included in the geometric mean calculation.

HDOH applied the same annual assessment practice when developing the NPDES permits for two other CCH facilities, the Kailua and Waianae WWTPs. While preparing the NPDES permits for these facilities, HDOH assessed the nutrient data as geometric means on an annual basis. For the Kailua permit, which was reissued in August 2006, an annual geometric mean was developed from twelve samples each year. Each sample site and each sample depth at the site was assessed individually (i.e. samples from three different depths at one station were not averaged). There were no objections from CCH or the public when permits for these other two CCH WWTPs were developed based on an annual assessment of nutrient data, including ammonia nitrogen. Similarly, there were no comments by HDOH on EPA's assessment of the nutrient data in the 1998 Sand Island tentative decision.

Overall, EPA believes that averaging on an annual basis is appropriate. Combining data from a longer period, such as a five-year period, overshadows data that could be influenced by short-term changes in treatment plant operation. EPA considered basing its assessment on a shorter period of time, such as monthly, but decided that annual was more appropriate, given the frequency of sampling. Overall, EPA still concludes that averaging on an annual basis strikes the best balance, given the variability of treatment plant operations, the frequency of sampling, and the past practice of EPA and HDOH.

Nevertheless, EPA has calculated the geometric mean of the last ten data points available to EPA to examine whether or not a longer averaging period would affect EPA's conclusion. The tables below list the most recent ten data points available to EPA for each offshore monitoring station. As shown in the tables, the results show that, even if the geometric mean is calculated using ten values, the water quality criterion is exceeded at the bottom depth. If the geometric mean is calculated using ten values from all three depths (i.e. a geometric mean developed from a total of 30 data points at each station), the water quality criterion is still exceeded at station HB5.

Ammonia nitrogen concentration (µg/L) at **surface** of each Honouliuli offshore monitoring station and geometric mean of ten samples. Geometric mean calculated using 1 µg/L for values reported as <1 µg/L.

	ZID Stations				ZOM Stations				Beyond ZOM	Reference Stations	
Sample Dates	HB2	HB3	HB4	HB5	HM1	HM2	HM3	HM4	HB6	HB1	HB7
3/23/06	1	3	3	2	< 1	< 1	< 1	1	2	1	2
5/31/06	2	2	< 1	1	2	2	1	1	2	< 1	1
7/18/06	2	5	5	4	1	1	2	2	3	1	3
10/10/06	1	2	2	2	2	2	2	2	2	2	2
5/2/07	2	< 1	< 1	3	4	4	1	< 1	< 1	< 1	< 1
7/25/07	1	2	2	1	2	1	4	4	2	2	1
10/17/07	3	5	5	3	9	2	7	7	8	1	6
2/26/08	1	1	1	1	2	1	1	1	1	1	1
4/2/08	1	1	2	2	1	1	1	1	4	1	3
7/31/08	1	1	1	1	5	1	1	1	3	1	3
Geometric mean	1.4	1.9	1.9	1.8	2.2	1.4	1.5	1.6	2.3	1.1	1.9

Ammonia nitrogen concentration (µg/L) at **middle depth** of each Honouliuli offshore monitoring station and geometric mean of ten samples. Geometric mean calculated using 1 µg/L for values reported as <1 µg/L.

	ZID Stations				ZOM Stations				Beyond ZOM	Reference Stations	
Sample Dates	HB2	HB3	HB4	HB5	HM1	HM2	HM3	HM4	HB6	HB1	HB7
3/23/06	4	6	6	4	3	4	2	5	4	4	8
5/31/06	1	1	1	2	1	1	1	1	2	< 1	1
7/18/06	2	7	20	3	1	1	5	9	8	2	4
10/10/06	3	2	3	5	2	2	4	2	3	2	3
5/2/07	2	< 1	< 1	1	3	3	< 1	< 1	< 1	< 1	< 1
7/25/07	1	9	1	1	3	2	5	6	2	1	1
10/17/07	4	1	1	4	3	2	1	8	10	1	5
2/26/08	3	4	1	1	1	3	12	1	1	1	2
4/2/08	1	1	2	1	1	1	1	1	2	1	2
7/31/08	1	1	1	4	1	1	1	1	3	1	3
Geometric mean	1.9	2.2	1.9	2.1	1.7	1.8	2.2	2.3	2.7	1.3	2.4

Ammonia nitrogen concentration (µg/L) at **bottom depth** of each Honouliuli offshore monitoring station and geometric mean of ten samples. Geometric mean values exceeding the State criterion (3.5 µg/L ammonia nitrogen) are highlighted. Geometric mean calculated using 1 µg/L for values reported as <1 µg/L.

	ZID Stations				ZOM Stations				Beyond ZOM	Reference Stations	
Sample Dates	HB2	HB3	HB4	HB5	HM1	HM2	HM3	HM4	HB6	HB1	HB7
3/23/06	16	5	6	76	24	8	< 1	5	8	2	3
5/31/06	30	14	12	31	6	12	1	7	4	< 1	1
7/18/06	4	8	7	33	7	2	7	6	7	2	5
10/10/06	7	41	47	13	7	6	7	4	6	2	4
5/2/07	2	4	< 1	6	3	2	< 1	< 1	< 1	< 1	< 1
7/25/07	5	2	6	43	9	26	1	24	3	1	2

10/17/07	6	4	53	19	19	4	5	8	8	3	10
2/26/08	85	29	17	101	3	14	1	3	2	1	1
4/2/08	16	66	2	2	1	5	1	1	6	1	5
7/31/08	1	1	1	60	29	1	1	2	4	1	4
Geometric mean	8.0	8.2	6.9	23.9	7.1	5.3	1.7	4.0	4.2	1.4	2.7

Geometric mean of ammonia nitrogen concentration (µg/L) at each Honouliuli offshore monitoring station (all depths from ten sample events for a total of 30 data points at each station). Geometric mean value exceeding the State criterion (3.5 µg/L ammonia nitrogen) highlighted. Geometric mean calculated using 1 µg/L for values reported as <1 µg/L.

	ZID Stations				**ZOM Stations**				**Beyond ZOM**	**Reference Stations**	
Sample Dates	HB2	HB3	HB4	HB5	HM1	HM2	HM3	HM4	HB6	HB1	HB7
Geometric mean	2.8	3.3	2.9	4.5	3.0	2.4	1.8	2.4	3.0	1.3	2.3

Comment C40: The EPA analysis assumes that any data point below the limit of detection is being reported as 1 µg/L. Using this assumption, the "geometric mean" calculated by EPA is biased on the high side.

Response: As described on page 63 of the tentative decision, EPA conducted its analysis using a database provided by CCH of results from all nutrient monitoring conducted in the receiving water over the 16 years from 1991 through 2006. This database did not clearly indicate whether data points were at the level of detection. Some values were reported as < 1 µg/L and EPA assumed that 1 µg/L was the level of detection and the values reported as < 1 µg/L were below the level of detection. The nutrient chapters of CCH's annual assessment reports do not indicate a special procedure for reporting data that are below the level of detection, nor do they address subsequent use of these data. For the tentative decision, EPA assumed that all values reported as < 1 µg/L were 1 µg/L, for purposes of calculating the geometric mean. In all cases, EPA conducted its analysis using the data as they were provided by CCH. Moreover, it is unlikely that use of a value at the detection level to identify a value under the detection level would change the results significantly. Use of the value at the detection point is a conservative practice that is appropriate and often applied in EPA's reviews when the parameter is detected but cannot be accurately and precisely quantified below the detection level. Nevertheless, in response to comments on this subject, EPA has recalculated the geometric means (calculated from ten samples, as discussed in response to comment C39) using half of the assumed detection level 0.5 µg/L for values reported as < 1 µg/L. The exceedance frequency using 0.5 µg/L was the same as that using 1 µg/L (as shown in the tables below).

Ammonia nitrogen concentration (µg/L) at **surface** of each Honouliuli offshore monitoring station and geometric mean of ten samples. Geometric mean calculated using 0.5 µg/L (in bold print) for values reported as <1 µg/L.

	ZID Stations				**ZOM Stations**				**Beyond ZOM**	**Reference Stations**	
Sample Dates	HB2	HB3	HB4	HB5	HM1	HM2	HM3	HM4	HB6	HB1	HB7
3/23/06	1	3	3	2	**0.5**	**0.5**	**0.5**	1	2	1	2
5/31/06	2	2	**0.5**	1	2	2	1	1	2	**0.5**	1
7/18/06	2	5	5	4	1	1	2	2	3	1	3
10/10/06	1	2	2	2	2	2	2	2	2	2	2
5/2/07	2	**0.5**	**0.5**	3	4	4	1	**0.5**	**0.5**	**0.5**	**0.5**
7/25/07	1	2	2	1	2	1	4	4	2	2	1
10/17/07	3	5	5	3	9	2	7	7	8	1	6
2/26/08	1	1	1	1	2	1	1	1	1	1	1
4/2/08	1	1	2	2	1	1	1	1	4	1	3
7/31/08	1	1	1	1	5	1	1	1	3	1	3
Geometric mean	1.4	1.8	1.7	1.8	2.1	1.3	1.4	1.5	2.2	1.0	1.8

Ammonia nitrogen concentration (µg/L) at **middle depth** of each Honouliuli offshore monitoring station and geometric mean of ten samples. Geometric mean calculated using 0.5 µg/L (in bold print) for values reported as <1 µg/L.

	ZID Stations				**ZOM Stations**				**Beyond ZOM**	**Reference Stations**	
Sample Dates	HB2	HB3	HB4	HB5	HM1	HM2	HM3	HM4	HB6	HB1	HB7
3/23/06	4	6	6	4	3	4	2	5	4	4	8
5/31/06	1	1	1	2	1	1	1	1	2	**0.5**	1
7/18/06	2	7	20	3	1	1	5	9	8	2	4
10/10/06	3	2	3	5	2	2	4	2	3	2	3
5/2/07	2	**0.5**	**0.5**	1	3	3	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**
7/25/07	1	9	1	1	3	2	5	6	2	1	1
10/17/07	4	1	1	4	3	2	1	8	10	1	5
2/26/08	3	4	1	1	1	3	12	1	1	1	2
4/2/08	1	1	2	1	1	1	1	1	2	1	2
7/31/08	1	1	1	4	1	1	1	1	3	1	3
Geometric mean	1.9	2.1	1.8	2.1	1.7	1.8	2.0	2.2	2.5	1.1	2.2

Ammonia nitrogen concentration (µg/L) at **bottom depth** of each Honouliuli offshore monitoring station and geometric mean of ten samples. Geometric mean values exceeding the State criterion (3.5 µg/L ammonia nitrogen) are highlighted. Geometric mean calculated using 0.5 µg/L (in bold print) for values reported as <1 µg/L.

	ZID Stations				**ZOM Stations**				**Beyond ZOM**	**Reference Stations**	
Sample Dates	HB2	HB3	HB4	HB5	HM1	HM2	HM3	HM4	HB6	HB1	HB7
3/23/06	16	5	6	76	24	8	**0.5**	5	8	2	3
5/31/06	30	14	12	31	6	12	1	7	4	**0.5**	1
7/18/06	4	8	7	33	7	2	7	6	7	2	5
10/10/06	7	41	47	13	7	6	7	4	6	2	4
5/2/07	2	4	**0.5**	6	3	2	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**
7/25/07	5	2	6	43	9	26	1	24	3	1	2

10/17/07	6	4	53	19	19	4	5	8	8	3	10
2/26/08	85	29	17	101	3	14	1	3	2	1	1
4/2/08	16	66	2	2	1	5	1	1	6	1	5
7/31/08	1	1	1	60	29	1	1	2	4	1	4
Geometric mean	8.0	8.2	6.5	23.9	7.1	5.3	1.5	3.7	3.9	1.2	2.6

Geometric mean of ammonia nitrogen concentration (µg/L) at each Honouliuli offshore monitoring station (all depths from ten sample events for a total of 30 data points at each station). Geometric mean value exceeding the State criterion (3.5 µg/L ammonia nitrogen) highlighted. Geometric mean calculated using 0.5 µg/L for values reported as <1 µg/L.

	ZID Stations				**ZOM Stations**				**Beyond ZOM**	**Reference Stations**	
Sample Dates	HB2	HB3	HB4	HB5	HM1	HM2	HM3	HM4	HB6	HB1	HB7
Geometric mean	2.8	3.1	2.7	4.5	2.9	2.3	1.6	2.3	2.8	1.1	2.2

Comment C41: Nutrients are introduced into Mamala Bay from both nonpoint and point sources, including wastewater effluent from the Honouliuli and Sand Island WWTPs. Comprehensive studies on the impact of nutrients to water quality in Mamala Bay were performed previously by Dr. Edward Laws, an expert in phytoplankton ecology. The studies clearly demonstrated that the effluent from the HWWTP outfall was having no statistically perceptible impact on the nutrient or chlorophyll *a* concentrations or water clarity in the vicinity of the outfall.

Response: The application contained little information about the impact of nutrients on water quality. In their comments, CCH presents Dr. Laws's nutrient and phytoplankton assessment from his 1993 testimony. EPA considered this information, as described on page 67 of the tentative decision. CCH's comments on the tentative decision also contain a 1998 assessment of coastal water quality in Hawaii. These studies are indicative of the past, but do not represent the current situation, which must also be known in order to determine the ongoing impact of the discharge on the receiving water. More recent studies since 1998 were not provided in the application or the comments. Moreover, the monitoring data submitted by CCH indicate that the water quality standard for ammonia nitrogen is exceeded in the receiving water. Moreover, nothing in the information submitted indicates that the exceedances are due entirely to other sources.

Comment C42: Effluent from the HWWTP is greatly diluted by exchange with the offshore ocean in a relatively short amount of time. Ammonia from the effluent plume is not available for a sufficient period of time to cause a measurable increase in algal production. This is supported by the fact that the 301(h) monitoring data do not show a significant correlation between ammonia levels and chlorophyll *a* levels.

In addition, there is no depletion in DO as might occur if there were excessive algal growth and die-off. Therefore, EPA's concern that the nutrient levels, as evidenced by ammonia concentrations in excess of the State standards, might cause algal blooms that would result in depleted oxygen concentrations to the point that "…aquatic life cannot be maintained" is clearly an unsupportable conclusion with respect to the HWWTP discharge. Further, any marine scientist familiar with coastal processes would not expect that such a problem could result, given the high initial dilution, the strong currents that further dilute and disperse the plume, and the lack of confining physical features that might concentrate the plume in a limited area.

Response: Notwithstanding the points made by the commenter, 40 CFR 125.62(a) requires water quality standards to be met at the ZID boundary. CCH has not demonstrated that it can consistently attain State water quality standards for ammonia nitrogen at the ZID boundary.

Furthermore, infrequent monitoring in the vicinity of the outfall means that algae blooms could be occurring without being reported. CCH monitors nutrients in the offshore waters four times a year. It is appropriate for EPA to conclude that the proposed discharge could contribute to algae blooms, given the exceedances of water quality standards and the high percentage of the time that the receiving water is not monitored.

Comment C43: Data analyzed for the last 5 years show that WQS for chlorophyll *a* at all depths have not been exceeded. The chlorophyll *a* numbers are lower for the mid-depth and surface samples. The higher numbers for the bottom samples reflect the adaptation of phytoplankton to low light levels, not the impact of the effluent plume on chlorophyll *a*.

Response: EPA has reassessed the available data in view of comments received regarding chlorophyll *a*. As a result, EPA has determined that the discharge has generally attained the State of Hawaii's water quality standard for chlorophyll *a*. The final decision reflects this change from the Tentative Decision Document.

Comment C44: Dr. Edward Laws reviewed the same nutrient and chlorophyll *a* data evaluated by EPA. He reported in a letter to CCH: "…there is no difference in the chlorophyll concentrations at the bottom stations. The geometric means range between 0.15 and 0.22. The water quality standard is 0.3. The water quality standard says geometric mean. It does not say annual geometric mean. Since samples were taken quarterly, an annual mean implies an averaging of four numbers. It is obvious from the results that when the true geometric mean satisfies the standard, a random sampling of only four numbers will occasionally give a geometric mean greater than the standard. That is simple statistics."

"The chlorophyll numbers are lower for the mid and surface samples. The difference between the surface and bottom samples is very significant. This just reflects adaptation to low light levels in the case of the bottom samples. So because of adaptation to low light, the bottom samples are a worst case scenario, and in fact they satisfy the chlorophyll geometric mean criterion."

Response: As noted in the response to comment C43, EPA has revised its determination regarding chlorophyll *a*. Exceedances of this standard are not a basis for denying the application for a renewed variance.

Comment C45: With regard to ammonia, Laws reports the following:

"In the case of ammonia, once again there is no basis for calculating annual geometric means, particularly if there are only four numbers to be averaged. The bottom water geometric mean ammonia concentrations at the zone of mixing stations (HM1, HM2, HM3, and HM4) all satisfy the water quality standard of 3.5. However, three of the bottom water ZID stations (HB3, HB4, and HB5) violate the geometric mean standard. The highest geometric mean is 9.2 at HB5.

The whole rationale of using geometric mean concentrations is that the data are log-normal distributed. That means that a histogram of the logarithms of the values should look like a bell-shaped curve. Attached is such a histogram for the ammonia concentrations at the bottom of station HB5. Clearly this is not a bell-shaped curve.

The problem in part is that a significant fraction of the data are evidently below the limit of detection and are being reported as 1 microgram per liter (recall that the log of 1 is zero, so the problem shows up as a peak in the histogram between zero and 0.5). In this case there were 12 such samples. Other stations show an even larger spike at 1 microgram per liter.

Because low ammonia concentrations are evidently being reported as 1 microgram per liter, the geometric mean is biased on the high side. In other words, any numbers like 0.5, 0.1, or 0.7 are being reported as 1. The geometric mean is the nth root of the produce of n numbers. So if the true numbers are 0.5, 2, and 8, the true geometric mean is 2. However, if the value of 0.5 is reported as 1, the calculated geometric mean becomes 2.5.

The geometric mean calculated for the ammonia concentrations in Table 21 of EPA's TDD corresponds to a logarithm of 2.2, which seems reasonable from the figure. However,…if the low ammonia concentrations could be measured accurately, the histogram would have a tail to the left, i.e., below zero (n.b., the logarithm of any number less than 1 is negative). That would reduce the geometric mean. The water quality standard corresponds to a logarithm of 1.25.

As far as I know, there are two issues with ammonia. One is that it is an essential nutrient, and if other essential nutrients are also provided, the ammonia could trigger a phytoplankton bloom. Obviously this is not happening. The chlorophyll numbers tell us that.

The second concern is toxicity. The ammonia concentration in the raw sewage is certainly high enough to be toxic. However, by the time you reduce the concentration to less than 10 micrograms of ammonia nitrogen per liter, the ammonia is no longer an issue from the standpoint of toxicity. The EPA criterion continuous concentration for ammonia nitrogen at 25 degrees C in seawater at a pH of 8.2 is 500 micrograms per liter. The highest ammonia concentration measured at any of the bottom ZID stations was 82 micrograms per liter. Even if you believe the EPA's critical initial dilution factor of 118, the ammonia concentration is still down to 15,000/118 = 127 micrograms of ammonia N per liter. So there is absolutely no reason to believe that the ammonia is toxic at the boundary of the ZID, and there is certainly no evidence that it is triggering algal blooms."

Response: EPA has not stated that the ammonia nitrogen levels result in toxicity. Although whole effluent toxicity data indicate that the effluent is often highly toxic, CCH has not conducted an adequate toxicity identification evaluation to identify which pollutant (or pollutants) is causing the toxicity.

The water quality criterion for ammonia nitrogen is set at a level that protects against phytoplankton blooms. The comment implies that the water quality standard for ammonia nitrogen is redundant, because the water quality standard for chlorophyll *a* is sufficient to protect against phytoplankton blooms. HDOH, however, has adopted water quality standards for both ammonia nitrogen and chlorophyll *a*, and the section 301(h) regulations require that the discharge meet all water quality standards alone or in combination with other sources. The ammonia nitrogen data were assessed in the same manner used by EPA in the 1998 tentative decision for Sand Island and by HDOH when reissuing two NPDES permits. As discussed earlier, EPA continues to conclude that it is appropriate to calculate the geometric mean for nutrients and chlorophyll *a* on an annual basis. On this basis, EPA's review of the available data show that the Hawaii water quality criteria were not met for ammonia nitrogen.

Please also see response to comment C40 regarding use of data below detection limits and response to comment C39 regarding annual geometric means.

Comment C46: As Dr. Laws confirms, the HWWTP effluent is not exceeding WQS for chlorophyll *a* nor resulting in increased algal production, nor are ammonia levels exceeding toxicity criteria. The EPA conclusion in its TD that CCH failed to demonstrate that it can consistently attain WQS for nutrients is highly questionable. In particular, ammonia levels do not result in measurable biological responses with respect to either nutrient enrichment or toxicity. As a result, EPA's tentative decision to deny the waiver based on nutrient WQS is unjustified and should be reconsidered.

Response: As stated earlier, EPA's assessment of Honouliuli receiving water monitoring data indicates that the Hawaii waters quality standards are exceeded for ammonia nitrogen. EPA concludes that the receiving water of the Honouliuli outfall has not exceeded the Hawaii water quality criteria for total nitrogen, nitrate + nitrite, total phosphorus, and chlorophyll *a*, but the Hawaii water quality criterion for ammonia nitrogen was exceeded at all depths. The applicant has failed to demonstrate that it can consistently attain water quality standards. Water quality standards are designed to protect against adverse effects, and the lack of actual adverse effects would not necessarily mean that the standards are being met.

Comment C47: Data collected by CCH since 1993 have shown that there is a BIP of shellfish, fish, and wildlife surrounding the outfall with the existing effluent quality, a further indication that the HWWTP discharge is not creating eutrophic conditions.

Response: EPA has concluded that the applicant has failed to demonstrate that its discharge will not interfere, alone or in combination with pollutants from other sources, with the attainment or maintenance of that water quality which assures the protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife surrounding the outfall, primarily because the proposed discharge would not attain water quality standards for WET and ammonia nitrogen. The 301(h) requirements regarding the BIP require ensuring that water quality will be protected before the occurrence of adverse effects such as eutrophic conditions, not waiting until there are severe impacts. See also response to comment C50 and P46.

pH

Comment C48: EPA did not take exception to the pH of the HWWTP discharge, and CCH has not requested a variance for pH.

Response: EPA concluded it is likely that the projected discharge will not exceed the State water quality standard for pH in the receiving water. EPA continues to conclude that the proposed discharge will result in attainment of the Hawaii water quality standard for pH.

Public Water Supplies

Comment C49: 40 CFR 124.62(b), which implements CWA 301(h)(2), requires that the discharge must allow for the attainment and maintenance of water quality that ensures protection of public water supplies. EPA concludes that this criterion is satisfied.

Response: EPA continues to conclude this criterion is satisfied.

Shellfish, Fish, and Wildlife

Comment C50: In its TD, EPA notes the following: *"Although the results of EPA's analysis are mixed, EPA concludes that the applicant has failed to demonstrate to the satisfaction of EPA that a modified discharge would not interfere with the attainment or maintenance of that water quality which assures protection of a balanced, indigenous population of shellfish, fish, and wildlife."*

The EPA position is apparently based on its opinion that *"…the scope of the biological monitoring is limited; only portions of the marine community are sampled" and "the samples that were collected may not have been collected during critical conditions, for example when initial dilution was at critical levels."*

CCH disagrees with this finding, based on the results of years of in-field and in-laboratory biological and chemical monitoring that have been performed in accordance with the EPA-approved 301(h) monitoring plan. Further, EPA is fully aware that the critical conditions that are modeled with respect to plume dilution are both ephemeral and unrealistically conservative with respect to real-world conditions. Further still, when EPA suggested that a 1-year regional Mamala Bay monitoring program be performed to simultaneously take into account the potential environmental effects of both the HWWTP and the Sand Island WWTP discharges, CCH conducted such a program on a monthly basis for one year. The data and reports were submitted to EPA and were to have been used to determine whether that form of monitoring was superior to the monitoring required by the NPDES permits for each plant. However, CCH never received any response from EPA indicating that this program was better or worse than the ones contained in the NPDES permits, so CCH continued monitoring programs as required by the NPDES permits.

For all of the above reasons, it is at best disingenuous for EPA to now claim that the monitoring program is insufficient to answer the questions that are posed by the 301(h) criteria with respect to maintenance of a BIP and recreational activities at or beyond the edge of the ZID. An overview of the extensive biological monitoring conducted by CCH over 13 years since implementation of its current permit is provided. The weight of evidence that overwhelmingly supports the conclusion that the BIP is protected is discussed. These results indicate that, using methods that represent "state of the practice" for biological monitoring, *there is no evidence indicating that the BIP is adversely affected by the HWWTP effluent beyond the boundaries of the ZID*.

Response: The primary basis for EPA's conclusion that the applicant has failed to demonstrate that a modified discharge would not interfere with the attainment or maintenance of that water quality which assures protection of a balanced, indigenous population of shellfish, fish, and wildlife is not limitations of the monitoring program. EPA's *Technical Support Document for Water Quality-based Toxics Control* states that an integrated approach to water quality-based toxics control consists of whole effluent, chemical-specific, and biological assessments (EPA, 1991). Exclusive use of one approach alone cannot ensure required protection of aquatic life. EPA has considered the available information on WET, specific chemicals, and the biological data collected near the outfall and found that the proposed discharge would not attain water quality standards established to protect aquatic life, specifically WET and ammonia nitrogen. Thus, the primary basis for EPA's conclusion that the applicant has failed to demonstrate that a modified discharge would not interfere with the attainment or maintenance of that water quality which assures protection of a balanced, indigenous population of shellfish, fish, and wildlife is that the proposed discharge would not attain these water quality standards.

Regarding the weight-of-evidence approach proposed by the commenter, please see response to comment C60.

EPA disagrees with CCH's comment on use of the critical initial dilution value. As discussed in responses to comments C10 and C11, EPA followed the guidance presented in the ATSD, which indicates that the lowest (i.e. critical) initial dilution must be computed for each of the critical environmental seasons. It is appropriate for this value to be conservative in order to be protective of the most critical conditions that occur.

Although EPA has concluded that changes are needed in CCH's monitoring program (e.g., the frequency of testing the effluent for priority pollutants should be increased), EPA is not making these deficiencies a basis for denial of the 301(h) application (see response to comment C69).

Comment C51: The HWWTP NPDES permit requires the following biological and chemical monitoring to demonstrate compliance with the BIP requirements of the 301(h) waiver: (a) annual monitoring of benthic infaunal diversity and abundance near the outfall, (b) annual priority pollutant analyses of sediment near the outfall, (c) annual priority pollutant analyses of tissues (both muscle and liver) of three species of fish from near the outfall, (d) annual coral reef surveys near the outfall, (e) quarterly offshore monitoring of nutrients and chlorophyll near the outfall, (f) annual priority pollutant analyses of effluent, (g) annual video surveys of fish communities, and (h) monthly WET testing of effluent using three species for acute testing and two species for chronic testing. CCH also performs an annual evaluation of health metrics (that is, necropsy and histopathology) of fish from near the outfall, although this is not required by the permit.

The data resulting from these surveys and studies were evaluated to determine a cumulative weight of evidence regarding the potential for impacts on BIP. On the basis of this evaluation, it is clear that a BIP exists beyond the edge of the ZID, as supported by the following discussion.

Response: EPA agrees that the HWWTP NPDES permit contains these monitoring requirements. However, the BIP analysis is not limited to biological assessments. Here, the results of WET testing and the exceedance of the water quality standard for ammonia nitrogen lead to the conclusion that the applicant has not demonstrated that the discharge will not interfere with the attainment or maintenance of that water quality which assures protection of a BIP. See also response to comment C50 and P29.

Comment C52: Benthic Infaunal Abundance and Diversity

Benthic fauna have been sampled at seven offshore locations along the 61-meter diffuser isobath. One station is located within the ZID, three stations are located on the ZID boundary, and three stations are designated as reference stations (that is, unaffected by the discharge)—one at 0.5 kilometers (km) from the ZID and two at 3.5 km from the ZID. The benthic substrate is characterized as predominantly (> 94 percent) sand at all locations, with no reported difference in mean oil and grease measurements nor evidence of reducing conditions in surface sediments at any station. Total organic carbon (TOC) at all locations is ≤ 0.26 percent.

During the 2006 sampling period (the most current available data), samplers collected 5,929 nonmollusk organisms from 199 taxa. Species abundance and richness were compared among sample locations and among years over the previous 15 years. Dominant taxa of the nonmollusk fauna were similar to those of previous sampling years. Specifically, representation of polychaetes, nematodes, crustaceans, and oligochaetes as a percentage of total abundance was of similar magnitude to that of previous sampling years. Limited variation in abundance and richness was observed, but there was no indication that it was related to environmental contamination. This conclusion is supported by the observed presence of pollution-sensitive taxa like amphipods (especially the phoxocephalids) at ZID-area stations, both in 2006 and in previous years.

Mollusk abundance in 2006 was in the middle of the range for all survey years. Neither the temporal nor the spatial pattern of differences among stations indicates a negative effect of the diffuser effluent discharge on mollusk abundance.

On the basis of these results, Swartz et. al. (2006) concluded the following:

"…there is little evidence of adverse effects of the Barbers Point Ocean Outfall on the macrobenthic community in 2006. The primary indication of an effect lies in the crustacean component: there were quantitatively, but not significantly, fewer individuals and taxa at ZID-area station HB4 than at all of the reference stations. In contrast, mean crustacean abundance and taxa richness at ZID-boundary stations HB2 and HB3 often exceeded that at the reference stations. The presence of 19 amphipod taxa at the ZID-area stations indicates that alterations in the crustacean component may be related to a noncontaminant factor. The analyses of the noncrustacean fauna clearly demonstrate the presence of a diverse and abundant macrobenthos within and near the ZID of the Barbers Point Ocean Outfall."

Response: EPA does not disagree with the data collected in these benthic studies. These results, however, must be considered in conjunction with the available data on WET and specific chemicals in the discharge. See also response to comment C50.

Comment 53: Sediment Monitoring
CCH has collected and analyzed offshore sediment samples each year since 1993 under its monitoring program. The current HWWTP NPDES permit specifies monitoring once per year at each of seven offshore stations. One station is located within the ZID, and three stations are located on the ZID boundary. One station is located at 0.5 km from the ZID (designated as near-field). Two stations are located at 3.5 km from the ZID (designated as reference stations). In total, more than 300 sediment samples have been taken over the 13-year period. Each of these sample analyses includes more than 140 target analytes on the EPA priority pollutant list. The available database of priority pollutants contains a total of 14,028 analytical records.

This evaluation of sediment data is limited to a 5-year period between February 7, 2002, and March 7, 2007, to provide recent data and to be consistent with the regulatory NPDES permitting cycle. To provide a perspective on the potential for risk to benthic infauna, constituents detected in sediment over this period were compared with the following screening-level sediment quality benchmarks, available from the National Oceanic and Atmospheric Administration (NOAA) Screening Quick Reference Tables (SquiRTs) (NOAA, 2006):

- The NOAA Effects-Range-Median (ERM). This benchmark represents the chemical concentration above which adverse effects would be expected to occur (Long et al., 1995).

- The State of Washington Apparent Effects Threshold (AET). This benchmark is considered by the State of Washington to be predictive of toxicity.

The results of the sediment screening evaluation indicate that, over the last 5 years, none of the detected constituents (metals or organics) exceed these risk-based screening benchmarks at the ZID edge or beyond. In the most recent sampling in 2007, no detected constituents exceeded screening benchmarks at any station (even within the ZID). Most important, neither dieldrin nor chlordane (which EPA cited in its TD as exceeding WQS in the HWWTP effluent) has ever (1993–2007) been found in sediment at levels above the NOAA-sponsored toxicity benchmarks that would indicate a possibility of adverse effects to invertebrates near the outfall. Thus, there is no reason for EPA to postulate the probability of adverse effects on a BIP from these compounds.

Response: EPA has not found specifically that concentrations of toxic pollutants in the sediments surrounding the outfall have adversely affected benthic infauna. EPA finds that the proposed discharge could result in bioaccumulation in fish at levels that would pose a significant threat to persons who consume fish caught near the outfall, based on levels of chlordane and dieldrin observed in the effluent. EPA has also found that the proposed discharge would exceed water quality standards for WET and ammonia nitrogen, and concluded that this could result in adverse impacts to marine life surrounding the outfall (see also response to comment C50).

Comment C54: Fish Health Metrics

The discharge of wastewater into the ocean gives rise to a concern that fish species that live in the area around the outfall are at an increased risk of contracting pollution-related diseases. One approach to assess whether an impact has occurred is to periodically collect fish in the immediate vicinity of the ocean outfall and to evaluate them for skin or liver neoplasms (tumors) and pre-neoplastic changes. In addition, it is important to collect similar species of fish from a reference area distant from the ocean outfall and examine them for similar changes. The latter group can also serve as a control for histopathological changes that may be induced by factors unrelated to substances present in wastewater effluent.

Researchers at the University of Hawaii's Water Resources Research Center (WRRC) continue to monitor the marine fauna around the ocean sewage outfall at Barbers Point. In the most recent available results from 2006 (Work, 2006), necropsy and liver histopathology were conducted on three different fish species, collected live, to assess potential exposure to pollutants in waters near the terminus of the HWWTP outfall. Gross necropsy and liver histopathology were performed on bluestripe seaperch (*Lutjanus kasmira*), blotcheye soldierfish (*Myripristis berndti*), and bigeye scad (*Selar crumenophthalmus*). Findings were compared with parallel tests performed on the same species collected live at reference station RF2 in Maunalua Bay.

Results of the analysis of a total of 30 fish residing in the vicinity of the HWWTP outfall and in the vicinity of reference station FR2 indicated that no tumors or tumor-like lesions were seen in any internal or external organs of any of the fish collected at either the reference station or the outfall station. Therefore, there is no reason to hypothesize adverse effects on fish health as a result of the outfall discharge.

Response: EPA does not disagree with the findings of the 2006 investigation. These results, however, must be considered in conjunction with the available data on WET and specific chemicals in the discharge. See also response to comment C50.

Comment C55: Fish Tissue Residue Effects
To provide an additional line of evidence regarding potential influences of HWWTP effluent on BIP, fish tissue levels were evaluated to determine whether any constituents have accumulated at levels reported in the scientific literature to be potentially toxic to fish (as opposed to their potential effects on people consuming fish, as evaluated in Section IIC). Available databases on fish tissue residues versus effects relationships were obtained from the following readily available federal agency sources:

- U.S. EPA, MED-Duluth Toxicity/Tissue Residue Database (derived from Jarvinen and Ankley, 1999) http://www.epa.gov/med/Prods_Pubs/tox_residue.htm

- Army Environmental Residue Effects Database (ERED, 2007) http://el.erdc.usace.army.mil/ered/Index.cfm

The tissue residue versus effects data, summarized in Table IIC-1, were obtained for chemicals detected in tissue within the last 5 years (2002–2007) at higher levels in fish caught at the outfall than those caught at the control station. The literature search included data from both marine and freshwater fish, and included tissue residues in both whole fish and fish muscle (fillets). The literature sources of these studies (as cited in the databases listed above) are summarized in Table IIC-2 (of the comments).

Of the constituents evaluated, none are present in fish caught from the outfall area at concentrations exceeding tissue-residue effects benchmarks derived from studies where adverse effects were actually observed. These results support the conclusion that outfall constituents are not accumulating at concentrations that pose risks to marine fish populations.

Response: With respect to fish tissue results, the final decision concludes that based on available data, EPA does not believe that fish tissue data, in and of itself, point to adverse impacts from the discharge. However, EPA has found that the applicant has not demonstrated that its discharge will not interfere with the attainment or maintenance of that water quality which assures protection of a balanced, indigenous population of shellfish, fish, and wildlife, because the proposed discharge would not attain water quality standards established to protect aquatic life, specifically WET and ammonia nitrogen. See also response to comment C50.

Comment C56: Coral Reef Surveys
In accordance with the HWWTP NPDES permit, surveys of coral communities within the area of the HWWTP outfall are conducted in January/February of each year. Four permanent stations,

with two transects per station, are sampled. A comparison of the data from the 14 annual surveys performed to date indicates that no statistically significant change has occurred that would suggest an impact from the HWWTP discharge. The stability of the data is impressive, given the imposition of a major hurricane (Hurricane Iniki) on these marine communities in September 1992. Coral coverage at Transect BP-4-B, which is located directly adjacent to the outfall pipe, has shown a steady and significant increase from the first survey after Hurricane Iniki (1993 mean = 0.1 percent) to the most recent survey (2005 mean = 12.6 percent). Thus, the data collected support the contention that operation of the HWWTP deep-ocean outfall is not having a negative impact on the coral reef resources situated inshore of the outfall terminus.

Response: EPA does not disagree with this comment and did not disagree with this point in the tentative decision.

Comment C57: Nutrient-Related Impacts
As discussed in the Nutrients subsection of Section IIB, there is no reason to believe that discharge of nutrients from the HWWTP outfall is causing any deleterious effects on the marine environment with respect to water quality or marine organisms. Although ammonia levels are above State criteria at some stations, they are well below toxic concentrations at the edge of the ZID and there is no indication that they are in any way resulting in algal blooms or other eutrophic conditions, even in the direct vicinity of the discharge. The State should reconsider its ammonia criterion and/or set site-specific criteria for this parameter for the HWWTP outfall.

Response: EPA agrees with CCH that ammonia nitrogen levels near the outfall have exceeded state water quality standards. In fact, Hawaii water quality criteria for ammonia nitrogen were exceeded at all ZID and ZOM stations at some point during the 16 year period reviewed by EPA. EPA agrees with CCH that ammonia nitrogen concentrations are below toxic concentrations. EPA has not stated that the ammonia nitrogen levels result in toxicity. Although whole effluent toxicity data indicate that the effluent is often highly toxic, EPA has not stated that the concentration of ammonia nitrogen is the reason for the toxicity. The existing 301(h) permit does not require any definitive plankton studies and it appears that none have been conducted since 1993. Although there are no data to indicate that algal blooms occur, there is no regular procedure for detecting increases in algal concentration, aside from field observations made in conjunction with quarterly offshore monitoring to collect CTD profiles along with bacteria and nutrient samples.

CCH’s comment states that HDOH should reconsider its ammonia nitrogen criterion and/or set site-specific criteria for ammonia nitrogen at the HWWTP outfall. HDOH has specifically adopted ammonia nitrogen standards in order to protect aquatic life that could be harmed by the stimulation of algal growth that could reduce the amount of oxygen in the water or reduce the clarity of the water. Unless HDOH formally amends the water quality standards contained in Chapter 11-54, EPA’s review must apply the water quality standards as they are.

Comment 58: Water Quality Monitoring Data
As discussed in the Toxics subsection of Section IIB (of the comments) comparison of the effluent priority pollutant data with chronic WQS protective of marine aquatic organisms indicates that, over the entire course of the analytical record, there has been only a single exceedance of WQS, for 4,4'-DDT by only 1.7-fold, in January 2007. It is believed that this anomalous exceedance may be a false positive due to the analytical method used.

Response: EPA agrees that the single exceedance for DDT may be an anomaly, but disagrees that it is likely a false positive due to the analytical method used. See responses to comments C24 and C25.

Comment C59: Whole Effluent Toxicity
The Whole Effluent Toxicity subsection of Section IIB summarizes the results of the evaluation of alternative statistical methods for identifying toxicity in the HWWTP effluent. Consistent with regulatory guidance and precedent, the statistical evaluation provided indicates that the IC25 provides the most reliable (and EPA-recommended) estimation of whole effluent toxicity for the sea urchin *Tripneustes gratilla*. If the IC25 were used for evaluating the HWWTP WET test results, EPA would observe infrequent toxicity rather than the toxicity referenced in its TD.

As noted in the Whole Effluent Toxicity subsection of Section IIB, CCH believes that continued use of hypothesis testing with *Tripneustes gratilla*, a species not on the list of EPA-approved WET test species, is inappropriate for the next permit cycle. In addition, WET test results for chronic toxicity for other sensitive EPA-approved species (the water flea *Ceriodaphnia dubia*, mysid shrimp *Mysidopsis bahia*, and the sheepshead minnow *Cyprinodon variegatus*) that are considered representative of the types of organisms residing near the HWWTP outfall indicate that there should be no toxicity at effluent concentrations found at the ZID edge.

Response: This comment is repetitive of comments C27, C30, and C33. See responses to these comments.

Comment C60: Weight of Evidence Evaluation
The purpose of this evaluation is to determine whether there is any evidence linking discharges of HWWTP effluent with potential adverse ecological effects at or outside the ZID. This determination is made on the basis of both quantitative and qualitative evaluations. To provide confidence in any decision making for marine resources near the outfall, potential effects to aquatic or benthic communities are assessed using an approach that considers multiple lines of evidence collectively, in accordance with EPA guidance in *Guidelines for Ecological Risk Assessment* (EPA, 1998). On the basis of the available biological monitoring data, as summarized above, all lines of evidence corroborate to lead to a conclusion that there has been no measurable impact to a BIP of fish, shellfish, and wildlife at and beyond the edge of the ZID. The weight of evidence includes the following:

1. No changes have been observed in benthic infaunal abundance and diversity that are attributable to the outfall.

2. Sediment monitoring indicates that detected concentrations are below risk-based screening levels.

3. Fish health metrics results show no correlation between histopathological changes and the discharge from the outfall.

4. Effluent constituents are not accumulating in fish tissue at concentrations that pose risks to fish resources.

5. Coral reef surveys indicate that the outfall is not having a quantifiable impact on the coral reef resources situated inshore of the outfall terminus. In fact, coral coverage is increasing in the discharge area.

6. Ammonia concentrations are not causing excessive phytoplankton growth or eutrophic conditions.

7. Effluent monitoring indicates that, over the entire course of the analytical record, there has been only one minimal exceedance of WQS for protection of marine aquatic life (that was likely a false positive due to the analytical method used).

8. WET test results using an IC25 endpoint indicate infrequent toxicity to sea urchins, and nontoxicity to other species of invertebrates and fish representative of those near the outfall.

When considering the collective weight of evidence using these eight lines of evaluation for potential risk to fish and invertebrates, there is more than ample evidence to conclude that the effluent is not resulting in ecologically significant impacts to these communities in the vicinity of the HWWTP outfall.

Further, a review of historical information indicates that the conditions observed at the edge of the ZID today are consistent with the data used by EPA in its 1988 decision to approve the 301(h) waiver.

Based on the foregoing discussion, EPA's denial of CCH's waiver application on the basis of alleged interference with sustaining a BIP of fish, shellfish, and wildlife at the edge of the ZID cannot be supported by the data and should be reconsidered.

Response: The commenter's basic argument here appears to be that, because current data do not show that actual adverse effects on aquatic organisms have already occurred, and because, in the commenter's opinion, whole effluent toxicity should be evaluated differently, CCH has demonstrated that its discharge would not interfere with the attainment or maintenance of that water quality which assures protection of a balanced indigenous population of fish, shellfish, and wildlife. EPA has addressed the comments regarding whole effluent toxicity in responses to comments C27 through C37. Those test results cannot be ignored, nor can the data related to ammonia nitrogen.

The weight of evidence approach proposed in this comment is not appropriate for evaluating whether CCH has met the 301(h) criterion related to maintaining water quality which assures protection of a BIP. Rather, as discussed in the tentative decision, EPA has issued guidance that addresses the integration of various types of available data. Specifically, EPA's *Technical Support Document for Water Quality-based Toxics Control* states the following with respect to the integration of chemical specific, whole effluent toxicity, and bioassessment data:

> It is EPA's position that the concept of "independent application" be applied to water quality-based situations. Since each method 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.

In the case of Honouliuli, this approach leads to a conclusion that the proposed discharge could adversely affect aquatic life. EPA remains concerned that the proposed discharge could adversely affect aquatic life, notwithstanding the current biological data, given the available information on WET and ammonia nitrogen.

See also response to comment C50.

<u>Recreational activities</u>

Comment C61: EPA notes the following:

"EPA concludes that both fishing (fish consumption) and water contact recreation are adversely affected by the applicant's discharges, and that the applicant has not demonstrated that its modified discharge will not interfere with the attainment or maintenance of water quality which allows for recreational activities in and on the water at and beyond the ZID."

EPA further states that the HWWTP discharge

"…could cause bioaccumulation at levels that would pose a significant threat to persons who consumed fish near the outfall" and "would contain levels of pathogens that would not allow recreational activities."

CCH disagrees with these conclusions and believes that the long-term monitoring program of fish tissue, fish catchment data, and the results of bacteria sampling at surface stations (summarized below) support the conclusion that recreational activities remain protected by discharge of primary treated wastewater at a depth of 200 feet approximately 1.7 miles offshore. The weight of evidence is clear that recreational activities have been and remain protected. EPA has chosen to ignore this large body of monitoring data to reach a conclusion that is not supported by the evidence.

The discussion below addresses the EPA TD with respect to the potential for impacts to the attainment or maintenance of water quality that allows for recreational activities at and beyond the ZID, including (without limitation) swimming, diving, boating, fishing, picnicking, and sports activities along shorelines and beaches. An overview is provided of the extensive monitoring of fish tissue, effluent, sediment, and fish catchment surveys conducted by CCH since implementation of its current permit. The weight of evidence that supports the conclusion that recreational activities are currently protected is discussed.

Using actual data from near the outfall, these results indicate that there is no evidence that recreational activities are adversely affected by the HWWTP effluent.

Response: EPA must evaluate the specific criteria set forth in section 301(h) of the CWA and its implementing regulations, and cannot grant a variance unless all of the statutory and regulatory requirements are satisfied. Regarding the commenter's proposed weight of evidence approach, please see response to comment C60.

EPA's evidence of fish consumption and water contact recreation being adversely affected by the Honouliuli WWTP discharge is that the water quality standards are not being met. Water quality criteria for bacteria, to protect recreational activities involving water contact, are exceeded beyond the ZID, and the discharge contains concentrations of the pesticides chlordane and dieldrin that exceed water quality standards established to protect human health from ingestion of carcinogens through fish consumption. CCH has not demonstrated that the Honouliuli discharge will not interfere with the attainment or maintenance of water quality which allows for recreational activities in and on the water at and beyond the ZID.

Comment C62: Notwithstanding the evidence provided with respect to the protection of recreational activities in and on the water, the area around the HWWTP outfall, as set forth in 33 CFR 334.1360—Danger Zone and Restricted Area Regulations, is an area where recreational activities are restricted. It is closed to all surface craft, swimmers, divers and fishermen except to craft and personnel authorized by the enforcing agency, which in this case, is the Commanding Officer, Naval Air Station, Barbers Point, Hawaii 96862.

EPA does not note this restriction in the TD.

Response: The significance of the restriction mentioned in the comment is not clear to EPA. The application does not discuss the Danger Zone and Restricted Area Regulations from 33 CFR 334.1360, nor its application to waters near the outfall. No restrictions based on this regulation were mentioned in CCH's annual assessment reports for the Honouliuli WWTP, nor in the 2003 survey conducted for CCH to determine recreational uses on the south shore of Oahu. No such restriction is mentioned in Hawaii's water quality standards. Figure IIB-3 from CCH's comments indicates that the danger zone is located to one side of the outfall, leaving the area on the other side of the outfall open for unrestricted recreational activities. Review of Figure IIB-3 indicates that White Plains

Beach is located within the danger zone. HDOH conducts bacteriological monitoring of this designated beach two to three times a week, indicating that frequent recreation occurs at this beach. EPA concludes that this restriction does not exempt CCH from the requirement to attain water quality standards to protect recreation, because areas within the zone are currently used for recreation and because the areas affected by the proposed discharge would not be limited to the restricted zone.

Comment C63: Fish Consumption and Fish Tissue Data: The HWWTP NPDES permit requires annual monitoring of tissue concentrations from fish harvested near the outfall, and at a control (or reference) station. Because detected constituents in fish tissue can be contributed by natural (such as minerals) or anthropogenic (such as urban runoff) background sources unrelated to the outfall, the degree of bioaccumulation attributable to the effluent can be evaluated by comparing the tissue results from fish caught in the outfall area with those from fish caught in the control area.

CCH has collected and analyzed offshore fish tissue samples each year since 1993. The annual monitoring includes analysis of tissue residues (both muscle and liver) in three species of common epibenthic fish of edible size, including Akule (bigeye scad; *Selar crumenophthalamus*), Menpachi (blotcheye soldierfish or u'u; *Myripristis berndti*), and Ta'ape (bluestripe seaperch; *Lutjanus kasmira*). These species of fish are, in general, representative of those caught by commercial and sport fishermen in the area. To ensure representativeness, each fish sample consists of a composite of 10 individual fish.

In total, about 180 composite fish and liver tissue samples have been collected, representing a total of about 900 individual fish. Each of the sample analyses includes more than 130 target analytes on the EPA priority pollutant list. The available database of priority pollutants over the period of August 17, 1993, to February 9, 2007, contains more than 22,000 analytical records for muscle and liver tissue. This large database provides insight into whether there is a long-term potential for bioaccumulation in fish from near the outfall. To provide a perspective on the potential for fish consumption risk, constituents detected in the edible fish muscle were compared with the risk-based screening concentrations (RBCs) obtained from EPA Region III in its *Risk Based Concentration Table* (EPA, 2007). These RBCs equate to an excess cancer risk of one in one million for constituents suspected of being carcinogenic. They conservatively assume consumption of an average of 54 grams of fish per day, every day for 30 years. It should be noted that the consumption rate of 54 grams per day is approximately three times the current "national average" of 17.5 grams per day used for derivation of Human Health Ambient Water Criteria (EPA, 2000), providing added conservatism to this screening evaluation.

The results of the fish tissue screening evaluation are summarized in Table IIC-3, which lists those detected constituents that exceeded the RBC in fish collected near the outfall and corresponding control stations. Constituents detected in fish from the outfall station at levels that were above the screening-level RBCs, and corresponding results from the control (or reference) station, include the following:

- Mercury (the highest levels were seen at the control station)
- Polychlorinated biphenyl (PCB) 1260 (equal levels were seen at the outfall and control stations)
- 2,6-Dinitrotoluene (an anomalous chemical seen once in one of the three fish species collected in 2006; exceedance factor was only 1.2-fold)
- Thallium (comparable levels were seen at the outfall and control stations)

Because tissue levels of mercury, PCBs, and thallium have been comparable in fish from the outfall vicinity and the control station, they cannot be attributed to the effluent. The unexplained detection of 2,6-dinitrotoluene in one of the three fish species in 2006 is anomalous; further, this chemical has never been detected in effluent. These results indicate that, over the entire period of monitoring, none of the detected constituents (metals or organics) has been present at levels that exceed risk-based screening benchmarks and that can be attributable to the effluent.

An important finding from this screening evaluation is that neither dieldrin nor chlordane, cited by EPA in its TD as exceeding fish consumption WQS in the HWWTP effluent, has *ever* (1993–2007) been found in edible fish tissue at levels above EPA-sponsored RBCs that would indicate a probability of fish consumption risk. These actual fish tissue results suggest that the conservative assumptions inherent in the derivation of the fish consumption WQS for chlordane and dieldrin (for example, use of laboratory-derived bioaccumulation factors that assume long-term equilibrium conditions) are not occurring in the real world near the HWWTP outfall.

Response: Hawaii has established numeric criteria for toxic pollutants in water to ensure that the fish caught by anglers in Hawaii's waters will be safe to eat. EPA's conclusion that the proposed discharge would not protect recreational fishing (fish consumption) is based on the expected failure of the proposed discharge to meet water quality standards specifically adopted by the state of Hawaii for two pesticides, dieldrin and chlordane, to protect against carcinogenic effects. Based on the exceedances of Hawaii's water quality standards, EPA continues to conclude that pollutants discharged from the Honouliuli outfall could contribute to bioaccumulation in fish in the vicinity of the Honouliuli outfall. As a result of these exceedances, the applicant has not demonstrated that the discharge allows recreational activities, specifically fishing. Although available fish tissue data do not, in and of themselves, point to current adverse impacts from the discharge, the absence of detections of these pesticides in fish tissue sampling does not change the fact that water quality standards have been exceeded. Water quality standards are set at protective levels that prevent unacceptable levels of bioaccumulation. The degree of protection built into the water quality standards is designed to ensure that adverse results will not exist in the receiving water. The objective of the Clean Water Act is to restore *and maintain* the chemical, physical, and biological integrity of the Nation's waters. CWA section 101(a). Under section 301(h), the applicant's burden is to show that its 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.

Comment 64: Fish consumption and effluent quality data: A review of effluent quality data was described in Section IIB (of the comments). Concentrations of chlordane and dieldrin reported in the effluent, which were noted by EPA as exceeding fish consumption WQS, have been reinterpreted in light of new testing information obtained using more suitable, sensitive, and definitive analytical methods than those used in the past. These new results indicate that the previously reported pesticide exceedances are likely false positives, resulting in EPA's misconstrued conclusion of noncompliance. During this new testing, dieldrin and DDT appeared to be absent from the effluent, and chlordane was detected using the GC/MS analytical technique at substantially lower levels than were reported using the GC/ECD technique. In fact, the levels detected through the GC/MS analyses were all lower than the fish consumption-based WQS.

Response: In this 301(h) analysis, protection of fish consumption must be analyzed in terms of the particular water quality standards applicable in the state of Hawaii to protect persons consuming fish caught in Hawaii waters. Please also see response to comment C63. EPA's conclusion that the proposed discharge would not protect fishing (fish consumption) is based on the expected failure of the proposed discharge to meet water quality standards for dieldrin and chlordane. It is not appropriate for EPA to substitute national Ambient Water Quality Criteria for the standards promulgated by the State of Hawaii. EPA disagrees with the commenter's assertions regarding analytical methods, including the description of measured chlordane and dieldrin levels as "false positives." Please see response to comment C25 for a comprehensive discussion of alternative analytical methods.

Comment C65: Fish consumption and sediment quality data: A review of sediment quality data was described in Section IIC (of the comments). Based on evaluation of the offshore sediment samples that CCH collects for priority pollutant analysis on an annual basis, it is important to note that dieldrin and chlordane, cited by EPA in its TD as exceeding fish consumption WQS in HWWTP effluent, have been detected very infrequently and at very low concentrations over the entire period of monitoring (1993–2007). Over the 15-year period, dieldrin has been detected only once, at a concentration of 0.0029 milligrams per kilogram (mg/kg) in one of three triplicate samples (the others were nondetects), and chlordane has been detected three times at a maximum of 0.0028 mg/kg. These levels found in sediment are not anticipated to be indicative of a source for bioaccumulation, as verified from the fish tissue results previously described.

Response: EPA's conclusion that the proposed discharge would not protect fishing (fish consumption) is based on the expected failure of the proposed discharge to meet water quality standards for dieldrin and chlordane. Hawaii's water quality standards for dieldrin and chlordane apply to water samples, not sediment samples. Water quality standards are set at protective levels that prevent unacceptable levels of bioaccumulation. The degree of protection built into the water quality standards, in addition to the requirements set forth in section 301(h) of the CWA, are designed to ensure that adverse results will not exist in the receiving water. Additionally, as stated in page 74 of the tentative decision, the pesticides chlordane and dieldrin were detected in several sediment samples. Because both pesticides consistently occur in the effluent at levels which exceed Hawaii water quality standards, the fact that they are detected in marine sediments in the vicinity of the outfall suggests that the outfall is a source for potential bioaccumulation of these toxics in local fish. Although the concentrations were below screening benchmarks, it is appropriate for EPA to consider these detections, even at low levels, as significant information when assessing the impact of the outfall on recreation.

Comment C66: Fish catchment surveys: In accordance with the HWWTP NPDES permit, fish catch statistics from the State of Hawaii Division of Fish and Game are reviewed annually in January/February to detect changes in fish abundance and distribution in the vicinity of the outfall. Although normal year-to-year changes are expected, the presence of long-term trends might be indicative of potential influences from wastewater discharge. Representative fish species of various trophic levels and habitat (pelagic, benthic, coastal/pelagic, and reef communities) are evaluated. The Barbers Point ocean outfall is located within inshore catchment Area 401. The Sand Island outfall is located within inshore catchment Area 400. Adjacent inshore catchment Area 402 is a control site used to compare fish takes of species naturally plentiful in Oahu waters.

Fish abundance in Area 401 (which includes the HWWTP outfall) is compared annually with that in Areas 400 and 402. Fish abundance is determined by totaling commercial fishing questionnaire data (in total pounds) in each fish category for each catchment area.

In 2005, the majority of the coastal/pelagic (for example, snapper) and reef (for example, scad) fish catch was in Area 401. In 2006, the majority of the catch was located within control site Area 402, followed by Area 401. For reef and benthic communities (for example, goatfish), more fish were caught in Area 401 in 2005 and 2006 than in the other two catchment areas.

Area 401, which spans the western half of Mamala Bay, has frequent boat traffic. Being relatively close to major marinas and harbors, it is often fished by sport and commercial fishermen. EPA has not cited in its TD any catchment statistics that show long-term trends that might be associated with negative impacts from the discharge and has not disputed that Area 401 continues to provide a good fishing ground for all types of fish communities.

Response: As stated on page 19 of the tentative decision, CCH indicated in their application that over 68,000 pounds of fishes were landed from statistical area 401 in 1994. EPA did not assert in the TDD that catchment statistics show long-term trends that might be associated with negative impacts from the discharge. No changes to EPA's decision are needed in response to this comment.

Comment C67: Water contact recreation: Bacterial standards (currently implemented based on *Enterococcus* concentrations) are risk-based standards and assume direct contact with affected waters by activities such as swimming, snorkeling, and diving. The outfall is approximately 1.7 miles offshore (which precludes swimming and snorkeling) and discharges at a depth of 200 feet (which precludes recreational diving). The effluent plume undergoes rapid initial dilution and then the prevailing currents further dilute it and carry it away from the nearest recreational areas, which are primarily the beaches and shallow waters less than 1,000 feet offshore. This makes it implausible that the public will be exposed to the plume at all, and less likely still that bacterial concentrations would be problematic if exposure occurred. Finally, evidencing EPA's inconsistent approaches, Mr. Frick in 1993 testified on behalf of EPA that

"It is clear that the combination of environmental factors necessary to cause elevated levels of Enterococci *in nearshore waters will not occur frequently enough to cause a violation of Hawaii's water quality standard for* Enterococci*."*

Because (a) there are no geometric mean exceedances in the entire data set for the past 2 years of record (since the Beach Act went into effect in Hawaii in December 2004) at the shoreline or nearshore stations (the "nearshore" stations are all > 1,500 feet offshore), (b) the offshore stations near the outfall are at a distance and depth that put them well beyond all direct contact recreational use, and (c) the most appropriate single sample criterion (501 cfu/100 mL) to apply to these offshore waters was exceeded on only five occasions at the surface between 1991 and 2006 there is no reason for concern for bacterial concentrations interfering with water contact recreation.

Moreover, recreational use in the area around the outfall is currently restricted by federal law, as noted above. Even if it were to be opened to public use in the future, there would still be no recreational swimming, snorkeling, or diving at the middle and bottom depths in the area of the ZID.

Response: EPA's conclusion in the TDD that the proposed discharge would not protect water contact recreation was based primarily on the expected failure of the proposed discharge to meet water quality standards for bacteria beyond the ZID in areas designated as recreational waters. High concentrations of bacteria detected occasionally in surface samples indicate that the plume does not always stayed trapped at the depth of the outfall. The assessment discussed on pages 48 through 54 of the tentative decision indicates that water quality criteria for bacteria are routinely exceeded in the offshore waters at and beyond the ZID around the outfall. Dr. Frick's 1993 testimony was made prior to EPA's 2004 promulgation of bacteria criteria for coastal recreational waters. Regarding the appropriate single sample maximum, please see the responses to comments C17 and C20. In 2004, EPA promulgated a range of single sample maximum values (104 to 501 cfu/100 mL) based on use frequency. One commenter on the Honouliuli tentative decision stated that the more protective value of 104 cfu/100 mL is the appropriate single sample value for farshore waters (see response to comment P92).

For response to the comment as it pertains to restrictions on recreation near the outfall, see responses to comments C21 and C62.

Comment C68: Weight of evidence evaluation: The purpose of this evaluation is to determine whether there is any evidence linking discharges of HWWTP effluent with potential impacts to the attainment or maintenance of recreational activities at and beyond the ZID. This determination is made on the basis of both quantitative and qualitative evaluations. To provide confidence in any decision making regarding recreational activities, multiple lines of evidence are considered collectively. On the basis of the available monitoring data, as summarized above, these lines of evidence include the following:

1. None of the detected constituents (metals or organics) in fish tissue over the entire period of monitoring has been detected at concentrations that exceed risk-based screening benchmarks or that can be attributed to the HWWTP effluent. Neither of the pesticides (dieldrin and chlordane) cited by EPA in its TD as exceeding fish consumption WQS in the HWWTP effluent has ever (1993–2007) been found in edible fish tissue at levels above EPA-sponsored RBCs that would indicate a probability of fish consumption risk.

2. Effluent monitoring indicates that historical exceedances of WQS for pesticides are likely false positives resulting from unsuitable and insensitive analytical procedures, leading to a misinterpretation on the part of EPA of noncompliance with WQS.

3. A review of sediment quality data indicates that dieldrin and chlordane have been detected very infrequently and at very low concentrations over the entire period of monitoring (1993–2007). The levels found in sediment are not indicative of the HWWTP outfall as a source for bioaccumulation.

4. Statistical evaluation of the catch in various fish communities located within the vicinity of the HWWTP outfall shows no negative impact from the effluent and indicates that this area continues to provide a good fishing ground for all communities.

5. A review of available bacterial data indicates that, due to the very low potential for recreational contact with *Enterococcus* concentrations that exceed applicable standards, there is no reason to conclude that there are negative effects on human health or recreational use. Further, if there were cause for concern in the future, the concern could be readily alleviated simply by disinfecting the effluent.

When considering the collective weight of evidence (using these five lines of evidence) for potential risk to recreational activities, there is no evidence that the HWWTP outfall is interfering with recreational activities at and beyond the ZID.

In addition to disregarding the lack of evidence, EPA also ignores its own language in the permit. EPA included explicit language in the HWWTP NPDES permit that requires fish tissue analyses in order to determine the threat to public health. The following are excerpts from the HWWTP NPDES permit:

"Pollutant body burdens in fish consumed by humans will be measured, ***in order to determine whether or not the effects of the waste discharge may constitute a threat to public health****" (emphasis added), and "The fish shall be representative of those caught by recreational and commercial fishermen in the area and shall be analyzed annually for all Priority Pollutants and other Pesticides."*

Implicit in this language is the expectation that the annual fish tissue surveys would provide a real-world measure of whether fish caught near the outfall could pose unacceptable risk or "threat" to the fish consumers. However, in its TD, EPA has chosen to ignore this powerful line of evidence in favor of relying heavily (or perhaps solely) on occasional exceedances of WQS for two pesticides found in the HWWTP effluent. As previously noted, there is strong evidence that these pesticides are either absent (in the case of dieldrin) or present at much lower concentrations (in the case of chlordane) than previously thought. The other lines of evidence corroborate this conclusion.

Despite the explicit language in the HWWTP NPDES permit quoted above, in its TD, EPA took a different, unsupported approach and concluded that it cannot rule out that bioaccumulation of organic compounds and metals in fish is a result of the HWWTP discharge and that, therefore, the discharge does not protect recreational activities (such as recreational fishing). At best, this is false logic, as it is impossible to prove a negative. It appears, therefore, that EPA is reaching for a technically indefensible conclusion in the face of all the evidence collected under the 301(h) monitoring program that it approved.

CCH comes to the opposite conclusion. Monitoring of fish tissue since 1993 provides clear evidence that the constituents of concern to EPA are not resulting in unacceptable bioaccumulation in fish near the outfall and that reported levels of dieldrin and chlordane in effluent are likely false positive exceedances of WQS. The weight of evidence precluding unacceptable bioaccumulation is clear. With respect to the organic chemicals of concern to EPA, fish tissue analyses since 1993 show that no chlordane or dieldrin is detectable in fish tissue. Moreover, metals accumulation in fish tissue collected from the vicinity of the outfall is equal to or less than levels found naturally in fish from control stations. Yet, EPA ignores this information in order to conclude that the modified discharge will not protect recreational activities. These data should instead lead EPA to conclude that the discharge is not contributing to adverse bioaccumulation and that there is no interference with recreational activities. Therefore, alleged impacts to recreational activities do not justify EPA's arbitrary and unsupported denial of CCH's waiver application, and EPA should reconsider its TD in light of the foregoing discussion.

Response: This comment reiterates several points that have been made elsewhere in these comments. Comment number 1 here was made previously as comment C63. Comment number 2 here was made previously as part of comment C25. Comment number 3 here was made in comment C65. Comment number 4 here was made in comment C54. Comment 5 here, and the commenter's following point about disinfection were both made in comment C21. Please see the responses to those comments.

The weight-of-evidence approach proposed in this comment is not appropriate for evaluating whether CCH has met the 301(h) criterion related to maintaining water quality which allows recreation. Rather, as discussed in the tentative decision, EPA has issued guidance that addresses the integration of various types of available data. Specifically, EPA's *Technical Support Document for Water Quality-based Toxics Control* states the following with respect to the integration of chemical specific, whole effluent toxicity, and bioassessment data:

> It is EPA's position that the concept of "independent application" be applied to water quality-based situations. Since each method 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.

The primary basis for EPA's conclusion that the applicant has failed to satisfy the recreation criterion is that EPA does not expect that the proposed discharge would attain water quality standards for bacteria, chlordane, and dieldrin. The bacteria standards establish a maximum permissible level of bacteria in water to protect recreational users from gastrointestinal diseases, while the chlordane and dieldrin standards establish numeric criteria for toxic pollutants in water to ensure that fish caught by anglers in Hawaii's waters are safe to eat. Because these standards are not being met, EPA cannot conclude that the discharge will not interfere with the attainment or maintenance of that water quality which assures protection of water contact recreation and fishing.

<u>Monitoring Program</u>

Comment C69: EPA concludes in its TD:
"The applicant did not propose a new monitoring program and the existing monitoring program is not sufficient."

EPA's conclusion regarding CCH's monitoring program should not be a basis for denial and should be reconsidered. In 1988, and with issuance of the NPDES permit incorporating a 301(h) waiver in 1993-1994, EPA recognized that monitoring would be required to ensure that its 301(h) decision was sound and to ensure protection of public health. Monitoring of fecal coliform bacteria is a case in point. EPA concluded that it is highly unlikely that bacteria from the outfall would reach nearshore areas and interfere with recreation. Nonetheless, EPA required a monitoring program to ensure this to be the case and noted that disinfection would be required if bacteria were found at levels to interfere with the protection of recreation in and on the water.

In 1988, EPA stated the following:

"The proposed 301(h) biological monitoring program is designed to verify EPA's conclusions. If at any time during the permit term, these conclusions are found to be incorrect, EPA and the DOH may revise the 301(h) monitoring program, and may include an increase in the number of monitoring parameters or frequencies, or the number and size of samples collected."

On the basis of its conclusions in 1988, EPA developed permit conditions that require a comprehensive monitoring program, as specified on page 6 of 63 of the permit:

"The monitoring program is designed to provide data to demonstrate compliance with applicable water quality standards and 301(h) criteria, to evaluate the impact of the Honouliuli discharge on the marine biota, and to measure toxic substances in the discharge.

Under 40 CFR 125.62, the monitoring program for a discharger receiving a 301(h) modified NPDES permit must:

- *Document short- and long-term effects of the discharge on receiving waters, sediments, biota, and on beneficial uses of the receiving water.*
- *Determine compliance with NPDES permit terms and conditions, and state and federal water quality standards/criteria.*
- *Assess the effectiveness of toxic control programs. Once an adequate background data base is established and predictable relationships among the biological, water quality, and effluent monitoring variables are demonstrated, it may be appropriate to revise the monitoring program.*

Revisions may be made under the direction of EPA Region IX and the Hawaii Department of Health at any time during the five-year permit term, and may include a reduction or increase in the number of parameters to be monitored, the frequency of monitoring, or the number and size of samples collected.

The monitoring data will be used by EPA Region IX and the Hawaii Department of Health to assess whether the 301(h) modified permit should be terminated or renewed and to determine compliance with Federal and Hawaii water quality standards."

Since the permit went into effect in December 1993, CCH has worked cooperatively with HDOH and EPA in conducting its EPA-approved monitoring program and defining the monitoring required to ensure compliance with its NPDES permit and 301(h) waiver. Table IID-1 is a summary of the monitoring requirements included as part of the permit. EPA's tentative denial on this basis is unjustified for a number of reasons and should be reconsidered.

Response: The TDD acknowledges that the monitoring program specified in the existing permit was developed jointly by CCH, EPA, and DOH, but it also concludes that the existing monitoring program is no longer sufficient. For example, more frequent monitoring of the effluent for toxic pollutant, especially for chlordane and dieldrin, as these pollutants often exceed water quality standards. Although there are deficiencies in the monitoring program proposed by the applicant, EPA is not making these deficiencies a basis for denial of the application, and the findings section of the final decision will be clarified accordingly. If EPA's concerns with the application were limited to the monitoring program, EPA would work with CCH on improvements to the monitoring program. See 40 CFR 125.63(a)(2), specifying that EPA may require revision of the proposed monitoring program before issuing a modified permit. EPA has concluded, however, that the application fails to satisfy several of the 301(h) criteria, and, therefore, EPA is denying the application and will no longer be the permitting authority for the discharge. DOH will now be responsible for preparing and issuing an NPDES permit incorporating secondary treatment requirements and appropriate monitoring requirements. EPA encourages CCH to work cooperatively with DOH on the development of the monitoring program. EPA also intends to work with DOH and CCH in this process.

Comment C70: First, CCH recognized in its application that the monitoring program might need to be adjusted over time; for example, CCH recognized that modifications might prove necessary in response to resolution of toxicity testing requirements and the outcome of the Mamala Bay Study. CCH's cooperative and flexible relationship with EPA regarding its monitoring programs can be seen from the Sand Island NPDES permit (at Part E, page 29 of 30) that requires CCH to engage in Regional Monitoring Activities, which incorporate a random monitoring site selection process. This program also evaluates the effects of the HWWTP discharge, as defined as follows.

*"The Permittee shall participate in a regional monitoring effort in Mamala Bay to evaluate the effects of wastewater discharged from the Sand Island WWTP and the Honouliuli WWTP, and their effects relative to other sources of contaminants flowing into Mamala Bay. The primary objective of the regional monitoring program is to assess the spatial extent and magnitude of ecological disturbances within the Mamala Bay, and to describe the relative conditions among different regions within the Bay. Monitoring stations shall be selected randomly to ensure they are representative of conditions in the study area. The concept of the regional monitoring program for the Permittee is to use a comparable level of effort, as required under the core monitoring program, to sample more broadly in Mamala Bay. Some activities required under the core monitoring program will be replaced with activities of comparable value under the regional monitoring program. The regional monitoring plan will be designed to investigate Mamala Bay between Diamond Head on the east and Barber's Point on the west. The Permittee shall design a detailed plan for regional monitoring in Mamala Bay in conjunction with the EPA and as much as possible other participating agencies, various levels of government and private entities. The Permittee, the EPA and other participating monitoring agencies and entities shall constitute the coordinating committee for the Mamala Bay Regional Monitoring Program. In the event that such a committee is non-functional, the Permittee shall work cooperatively on the regional monitoring plan with the EPA. The Permittee with the EPA shall determine its portion of the regional plan. The final monitoring plan must be approved by the EPA prior to its implementation. The exact shoreline, recreational water, nearshore and offshore station locations required under regional monitoring and to be completed under the Sand Island WWTP permit, will be designated by either a coordinating committee or, if no committee is functional, the EPA in coordination with the Permittee. The regional monitoring plan will also be included and supported in a similar manner in the Honouliuli WWTP's NPDES permit."*5

CCH worked cooperatively with EPA to define these requirements and fulfilled the regional monitoring activity, understanding this effort was part of a western regional effort. CCH suggested to EPA that these Regional Monitoring Activities could be included in the HWWTP 301(h) monitoring program if the Regional approach proved to be a better monitoring activity. EPA has never responded to the efficacy of the Regional Monitoring approach, despite its obligation under the permit to evaluate the adequacy of the monitoring program.

Response: EPA acknowledges that CCH has worked cooperatively on the regional monitoring effort. See also the response to comment C69.

Comment C71: Second, EPA's conclusion in its TD is so vague as to be meaningless and does not provide CCH with any information about the basis for the denial, contrary to EPA's obligations under its regulations. EPA stated:

"EPA's review has determined that the current monitoring program is not sufficient. As EPA is tentatively denying the variance application, EPA is not identifying the specific changes that would be necessary to the monitoring program."

This conclusion is illogical, unfair, and inconsistent with EPA's 1988 approval of the waiver and oversight of the NPDES permit since 1993. This conclusion is also contrary to EPA's obligation under 40 CFR 124.7 and 124.8, which require EPA to state the bases for its denial.

Response: See response to comment C69.

Comment C72: Third, the CCH monitoring program has produced voluminous and sufficient data supporting continuation of the waiver. EPA has provided no evidence demonstrating otherwise.

EPA's conclusion regarding the sufficiency of CCH's monitoring program is unjustified and should be reconsidered.

Response: See response to comment C69.

Comment C73: Further, CCH has hosted several training venues on Data Quality Objective (DQO) and Statistical Sampling. The training was attended by CCH, EPA , HDOH, and several private-sector organizations. CCH understands the DQO process is supported by EPA (e.g., U.S. EPA Contract 68-D4-0091; Work Assignment 99-17; RTI Task 91U-7249-417; August 24, 1999) as a new approach for recreational water monitoring. Further, CCH and DOH are investigating a new sampling approach (Multi-increment sampling, also known as Gy Sampling Theory). Unlike the random sampling approach incorporated in the Regional Monitoring Activity of the Sand Island WWTP NPDES permit, the multi-increment sampling appears to better represent the water quality of a region. The approach obtains several subsamples in a designated region and analyzes the "composite" sample for the parameter(s) of interest. This approach removes the "hot spots" issue, addresses outliers, reduces the variability of the data, and can easily incorporate statistical evaluations, without the random aspect of the Regional Monitoring approach. Multi-increment sampling appears to be a significant improvement over the current grab sample approach.

Response: This comment does not request any changes in EPA's decision. EPA will consider CCH's views on monitoring approaches when we engage in future monitoring efforts.

Impact of Modified Discharge on Other Point and Nonpoint Sources

Comment C74: CCH submitted a certification from the State dated January 20, 1998 (included in the Appendix) that the proposed discharge will not result in any additional pollution control, or other requirements on any other point or nonpoint source. The discharge has not resulted in any additional pollution control on any other point or nonpoint source since the State certification.

Response: As noted in the TDD, EPA is not aware of any additional treatment requirements that have been imposed on any other point or nonpoint source. However, under 40 CFR 125.64, it is necessary to have a determination to that effect from the State. The January 20, 1998, statement from HDOH submitted by CCH is not based on current data or the current operating configuration at the HWWTP. Therefore, the statements made in HDOH's letter are no longer valid. CCH did not request an updated letter when the updated application was submitted in August 2004. As EPA is denying the application, however, an updated certification from HDOH is not required at this time.

Toxics Control and Pretreatment

Comment C75: CCH does not believe that EPA's tentative denial of the waiver application based on CWA criterion 7, toxics control, and 40 CFR 125.66(b) is justified. Table IIF-1 (attached to the comments) indicates and categorizes the potential sources of the priority pollutants. CCH continues to implement several programs to control the introduction of priority pollutants and pesticides into CCH's sewer system.

Response: The comment addresses EPA's tentative conclusion that CCH had not satisfied the requirements of 40 CFR 125.66(b), which requires that applicants analyze the known or suspected sources of toxic pollutants or pesticides and categorize the sources according to industrial and non-industrial types.

In its comments, CCH provided Table IIF-1, which lists detected toxic pollutants and pesticides, categorizing the sources of these substances according to industrial and non-industrial types. The comments also describe programs used to control toxics in CCH's wastewater system. In consideration of the information submitted by CCH, EPA has concluded that CCH has met the requirements of 40 CFR 125.66(b).

Additionally, EPA notes that section 301(h)(7) and 40 CFR 125.66(d) require a schedule for additional nonindustrial source control programs. As part of its responsibilities under the current permit, on April 25, 2008, CCH submitted a toxicity reduction evaluation plan, which includes a schedule of activities designed to address toxic pollutants. CCH has stated that they have begun implementing the investigations under this plan. While EPA still has concerns with portions of the TRE plan (see response to comment C36), we have concluded that the April 25, 2008, submission satisfies the requirements of section 301(h)(7) and 40 CFR 125.66(d) related to a schedule of activities for nonindustrial source control programs.

Based on the analysis discussed in this response, EPA concludes that CCH has met the requirements of section 301(h)(7). The final variance decision will reflect this conclusion.

Comment C76: Urban area pretreatment program: Although EPA found that CCH is complying with the industrial pretreatment requirements of 40 CFR 125.66(c), the tentative decision stated that "improved management of FOG (fats, oil and grease) is necessary to reduce the number of collection system spills due to FOG blockage." This statement is inaccurate and without basis, and is inconsistent with statements in EPA's letter of May 16, 2005, which provided the results of its review of CCH's urban area pretreatment program. CCH's FOG program has been and continues to be effective. CCH addressed this concern in its August 16, 2007 letter (attached to comments) in response to EPA's May 16, 2005 letter.

Response: As noted in CCH's comment, the TDD concluded that CCH is meeting the requirements regarding industrial pretreatment in 40 CFR 125.66(c). Nonetheless, CCH has provided comments on the TDD regarding this criterion.

EPA disagrees with the assertion that the TDD language is inconsistent with EPA's May 16, 2005, comments on CCH's pretreatment program. Comment #1 in EPA's May 16, 2005 letter notes the following:

> "It is EPA's position that CCH's Pretreatment Program must have clear, documented procedures for following up on Fats, Oil, and Grease (FOG) blockage. Given the high frequency of CCH's collection system spills due to FOG, it is especially critical for the Pretreatment program to closely coordinate with those discovering FOG problems, including CCH's Collection System Maintenance (CSM) program."

This language is consistent with the TDD text cited in CCH's comment.

Additionally, while CCH provided a reply to EPA on August 16, 2007, this reply committed to incorporate new procedures for addressing FOG into an updated Urban Area Pretreatment Program Local Limits Development Report and submit this revised report to EPA and HDOH. EPA has not received this revised report. Until the new procedures required by EPA are incorporated in CCH's program, it is erroneous for CCH to assert that it has "addressed" EPA's May 16, 2005, comments on FOG management.

Nevertheless, EPA continues to consider the specific requirements of 40 CFR 122.66(c) to have been met. While CCH still needs to address EPA's concerns on FOG management (presumably through submission of the revised report), EPA does not consider that to be a ground for denial of the 301(h) variance request.

Comment C77: Industrial user pretreatment program: EPA noted in its TD that it cannot conclude at this time that CCH has demonstrated that industrial sources are in compliance with all applicable pretreatment requirements, and that CCH will enforce those requirements, as required by 40 CFR 125.65(b)(2). EPA's tentative decision to deny the waiver based on this criterion is unjustified and should be reconsidered.

The TD's statement that CCH has still not come to a conclusion as to the status of The Honolulu Advertiser (THA) as an SIU is an incorrect evaluation of CCH's pretreatment activities with respect to THA. After THA informed CCH that it was moving its printing, packing, and distribution function to a new location, CCH issued THA an SIU IWDP. SIU permit conditions were pending completion of the project and the establishment of baseline monitoring, and tentative monitoring conditions were established. In 2004, a compliance evaluation was conducted at the new facility, indicating that THA's SIU status was in question. Later in 2004 when THA completed all transfer of its operations to the new facility, THA was instructed to conduct baseline monitoring to determine whether its SIU status should be continued. Subsequent monitoring indicated that the new facility did not meet the criteria for SIU status; however, THA was kept on SIU status because of violations of oil, grease and silver discharges at the previous location. CCH has continued to monitor operations, and has confirmed that no changes in operations have occurred that would affect HWWTP operations; pending final evaluation in 2007, SIU status will be discontinued.

EPA's evaluation of CCH's actions regarding Pepsi Cola Bottling Group is incorrect. CCH has been diligent in having Pepsi come into compliance with applicable pretreatment requirements and has pursued enforcement against Pepsi. Enforcement actions include a letter of warning in February 2005, verbal warnings in August and September 2005, a letter of warning in September 2005, a verbal warning in June 2006, a letter of warning in August 2006, and a notice and findings of violation in November 2006.

Response: The relevant statutory criteria are in CWA Section 301(h)(5) and (6), both of which require enforcement of pretreatment requirements. Regulations in 40 CFR 125.65(b)(2) require that applicants for variances demonstrate that industrial sources are in compliance with all applicable pretreatment requirements, and that the applicant will enforce pretreatment requirements.

CCH's comments provide timelines of actions taken to enforce pretreatment requirements with respect to the two users discussed in the TDD. EPA believes that the information in the comments indicates that CCH has utilized enforcement tools in ensuring pretreatment requirements are complied with, and that industrial users are in compliance. Based on the information provided in CCH's comments, EPA concludes that the applicable pretreatment requirements have been met. The final variance decision will reflect this conclusion.

Miscellaneous comments

Comment C78: After review of the current BOD and TSS loadings and operational characteristics of the HWWTP, and the stipulations of Section 301(h) that *"No modified discharge may result in any new or substantially increased discharges of the pollutant to which the modification applies above the discharge specified in the section 301(h) modified permit,"* CCH has concluded that it will, and herein does, withdraw its request for further relaxation of the technology-based standard for BOD. Specifically, CCH withdraws its request for a BOD limit of 200 mg/L and instead requests that the current NPDES permit limit for BOD (160 mg/L) be maintained as a condition of the renewed 301(h) waiver application.

Response: See response to altered discharge in comment C7.

Comment 79: The TD is incorrect to the extent it suggests that CCH has not provided documentation of compliance with other laws. The November 26, 1997, letter from U.S. Fish and Wildlife Service indicates that the requirements of the ESA have been met. The December 24, 1997, letter from the State Office of Planning indicates that the discharge is consistent with the Hawaii Coastal Zone Management program. The January 13, 1998, letter from NMFS indicates that the discharge is not likely to affect the green turtle, hawksbill turtle, or humpback whale. In an abundance of caution, CCH has sent another letter to NMFS to confirm that no threatened or endangered species are affected by the discharge.

Response: As discussed in the tentative decision, the letter from the State Office of Planning is over ten years old, was conditioned on the discharge meeting water quality standards, and did not take into consideration the updated (2004) application. In order to comply with 40 CFR 125.59(b)(3) as to the CZMA, the applicant would have to provide a new certification. Similarly, the letters from NMFS and USFWS are over 10 years old and did not take into consideration the 2004 application. Updated information would be necessary to demonstrate compliance with 40 CFR 125.59(b)(3) as to the ESA. Finally, the commenter did not include any information as to the concerns raised in the tentative decision regarding the Marine Protection, Research and Sanctuaries Act. However, as the final decision is to deny the renewed variance, determinations or concurrences from these agencies are not necessary at this time. The decision will be changed to indicate that these determinations or concurrences are not necessary at this time because the decision is that a modified permit not be issued.

Comment C80: On January 20, 1998, HDOH provided a certification finding that "there is a reasonable assurance that the discharge will comply with applicable provisions of State law including water quality standards." CCH is complying with the WQS and is confident that it could obtain State certification to this effect.

Response: EPA disagrees that WQS are being met, as discussed in the tentative and final decisions. HDOH's letter from January 1998 is ten years old, and does not take into consideration more recent data. HDOH did not submit any comments on the TDD as to whether the proposed discharge would meet state water quality standards. However, as the final decision is to deny the renewed variance, State concurrence is not necessary at this time.

Comment C81: Congress enacted 301(h) in order to avoid the unnecessary cost of constructing secondary treatment facilities by municipalities that can discharge to an active ocean environment. In a 1981 decision in the case of the *Natural Resources Defense Council v. U.S. EPA*, the District of Columbia Court of Appeals stated: "The purpose of section [301(h)] is to permit some coastal municipal sewage treatment plants to avoid costs associated with secondary treatment as long as environmental standards can be maintained. If a treatment plant can discharge a pollutant and meet the criteria of section [301(h)] unnecessary expenditures may be avoided." To proceed with a denial of the 301(h) application would be in direct contradiction to the stated intent and purpose of Section 301(h) to avoid unnecessary costs where other projects with greater environmental benefit can be achieved

Response: Financial considerations are not included in the statutory criteria listed in section 301(h) of the CWA, and EPA cannot make secondary treatment variance decisions based on cost considerations. In the case of the Honouliuli facility, water quality standards are not being maintained, and the statutory criteria in section 301(h) of the CWA are not being met. The statute is clear that unless the specified criteria -- which do not include cost considerations -- are met, a variance from secondary treatment may not be granted by EPA.

Neither the court decision cited by the commenter nor the legislative history of section 301(h) suggests in any way that a 301(h) variance can be granted because of cost considerations, when the applicant fails to satisfy the specific statutory criteria. The preamble to EPA's implementing regulations discusses the history of section 301(h): "…[A] number of municipalities … argued to both Congress and EPA that secondary treatment of municipal ocean discharges is not necessary to protect the marine environment or to assure the attainment and maintenance of water quality in ocean waters. … [T]hese municipalities have maintained that they should be exempted from the Act's secondary treatment requirement, and the associated capital, maintenance, and operating costs. These municipalities also claimed that they had accumulated sufficient evidence to demonstrate the scientific basis for exemptions from the secondary treatment requirements. As a result of their testimony, Congress … added section 301(h), which allows a municipal marine discharger to present its case to EPA." See EPA 1979 Final Rule, 44 Federal Register page 34784 (June 15, 1979). Thus, while EPA agrees that Congress favored elimination of unnecessary expenditures in general, this was not the overriding concern as to a specific facility; rather, the key to obtaining a variance was presenting sufficient evidence to demonstrate the scientific basis for an exemption for the specific facility. See also statement by Sen. Muskie, p. 447 of Conference Report No. 95-830 accompanying H.R. 3199 (Dec.6, 1977).

Similarly, the Court of Appeals decision cited by the commenter clearly notes that the statutory criteria in section 301(h) must be met in order for a variance to be granted (see quotation above in comment). Additionally, elsewhere in the same case, the Court of Appeals describes the purpose of section 301(h) as follows: "The purpose of section [301(h)] is to allow treatment plants that can discharge into marine waters and meet certain environmental standards to demonstrate those facts to the Agency and receive a permit [citations omitted]. Although fiscal concerns are not paramount under section 301(h), Congress has determined to allow some savings in sewage treatment through harmless marine discharges. The overriding purpose of the Act is still the prevention of water pollution." *NRDC v. EPA*, 656 F. 2d 768 at 780.

Thus, while we do not disagree with the commenter that a motivation for enacting section 301(h) was to avoid unnecessary costs, this does not mean that a particular facility must be granted a variance because conversion to full secondary treatment would be expensive, nor that costs can even be considered in EPA's decisions on whether or not to grant specific variances. Rather, the Act is clear that a variance cannot be granted unless all the statutory criteria – which do not include consideration of cost – are met.

Comment C82: The CWA involves a balancing of economic and environmental impacts, as evidenced by EPA's 1997 guidance document "Combined Sewer Overflows – Guidance for Financial Capability Assessment and Schedule Development."

Response: The guidance document cited by the commenter does not address 301(h). Rather, it addresses Combined Sewer Systems (CSS), which are present in the United States primarily in the Northeast and Great Lakes region. (There are two cities with CSS in EPA Region 9, San Francisco and Sacramento.) Unlike the Separate Sewer Systems used in Honolulu and most U.S. cities, in CSS both storm water and sewage travel together in single pipes to wastewater treatment plants. When heavy storm flows exceed the capacity of either the collection system or treatment plant, CSS are designed to overflow to surface water. These events are known as Combined Sewer Overflows (CSOs). In order to minimize the impacts of CSOs, in 1994, EPA developed a national CSO Control Policy. This Policy includes provisions which allow for the phasing in of CSO controls in consideration of the financial condition of municipalities operating the CSS. To assist with implementation of this Policy, EPA developed the 1997 guidance cited by CCH. The cited guidance is beneficial for establishing schedules for how cities control CSOs.

This guidance does not consider whether or not it is appropriate to grant a variance from secondary treatment under section 301(h) and is not relevant to the variance decisions for the Honouliuli treatment plant. However, EPA does believe that the financial model in the guidance could be a relevant tool in determining the <u>schedule</u> under which CCH makes wastewater infrastructure improvements to both its collection system and its treatment plants.

Comment C83: In analyzing financial impact on CCH, such impacts must be considered holistically. Individual enforcement actions have a cumulative impact on ratepayers' and communities' financial resources. One must consider the potential costs of secondary treatment in the context of CCH's other environmental investments, e.g. additional EPA-mandated stormwater management measures and recommended asset management initiatives. These costs will impose significant financial, economic and social risks. These risks are generally treated as "additional considerations" in EPA guidance, but they represent important potential impacts on Oahu residents and businesses.

Response: See response to comment C81. Secondary treatment variance decisions may not be based on financial considerations, as such considerations are not included in the statutory criteria listed in section 301(h) of the CWA. The statute is clear that unless the specified criteria -- which do not include cost considerations – are met, a variance from secondary treatment may not be granted by EPA. However, EPA considers it appropriate to take into consideration information such as that presented in this comment in determining the schedule under which CCH makes wastewater infrastructure improvements to both its collection system and its treatment plants.

Comment C84: Fixed schedules for water quality investments should be assigned only to the highest priority, immediate projects, because later investments are subject to market dynamics, such as increasing construction costs. CCH's total water quality investments will impose significant rate increases, could lower demand and thus total revenues, and could impact CCH's credit rating.

Response: See responses to comments C81 and C83. The factors discussed in this comment do not go to the statutory criteria for granting a 301(h) variance. However, EPA considers it appropriate to consider information of the type included in this comment in determining the schedule under which CCH makes wastewater infrastructure improvements to both its collection system and its treatment plants.

Comment C85: Imposing unnecessary secondary treatment on utility rates may have a dampening effect on local economic vitality. Projected rate increases portend to compromise individual residents' financial capabilities. Requiring extraordinary amounts of construction work to be executed within a limited time frame will distort Oahu's resident engineering and contractor market.

Response: See responses to comments C81 and C83. The factors discussed in this comment do not go to the statutory criteria for granting a 301(h) variance. However, EPA considers it appropriate to consider information of the type included in this comment in determining the schedule under which CCH makes wastewater infrastructure improvements to both its collection system and its treatment plants.

Comment C86: Rate increases will disproportionately affect low-income residents. Upgrading to secondary treatment will exacerbate CCH's financing challenges, and the resulting impacts on low-income residents should be recognized. These risks are not addressed in EPA's Financial Capability Assessment methodology.

Response: As a fundamental matter, discussed in response to comment C81, secondary treatment variance decisions may not be based on cost considerations. The statute is clear that unless the specified criteria, which do not include cost considerations, are met, a variance from secondary treatment may not be granted by EPA.

EPA is aware that sewage fee increases may potentially have a disproportionate effect on Honolulu's low income residents. Other municipalities have developed fee structures addressing this potential inequity. For example, the City of Atlanta faces huge expenses repairing its drinking water and wastewater infrastructure. Recognizing the impacts rate increases would have on portions of its population, Atlanta established discount programs for low income senior citizens, and financial assistance to those having difficulty paying their bills. EPA urges CCH to follow up on it stated intent to consider options to address low-income affordability issues, and offers to facilitate communications with other municipalities that are successfully addressing this challenge.

The comment makes reference to EPA's Financial Capability Assessment Guidance, implying that this guidance is relevant to this 301(h) variance, and that it should take into account impacts on low income residents. As noted in response to comment C82, the referenced EPA guidance is a tool for considering the financial condition of a municipality when sewer system upgrades are needed. The financial condition assessed is that of the municipality as a whole, not the financial status of individual residents. This guidance does not consider whether or not it is appropriate to grant a variance from secondary treatment under section 301(h), and is not relevant to the variance decision for the Honouliuli treatment plant. However, EPA does believe that the Cost and Financial Capability guidance could be a relevant tool in determining the schedule under which CCH makes wastewater infrastructure improvements to both its collection system and its treatment plants.

Comment C87: Secondary treatment cannot be a priority among CCH's water quality investment objectives as other major components of CCH's water quality investment program have substantially higher water quality benefits. Full secondary treatment is infeasible through the 301(h) waiver renewal period. Other options such as chemical addition may represent a higher return water quality investment. Although investment in secondary treatment is of dubious merit under any circumstances, it may make more sense in the future, reinforcing the argument that revocation of CCH's waiver is untimely.

Response: See responses to comments C82 and C83. The factors discussed in this comment do not go to the statutory criteria for granting a 301(h) variance. However, although these points are not relevant to the decisions made pursuant to section 301(h) of the CWA, they do provide information that is relevant for determining schedules for future treatment plant upgrades. During the development of schedules for system upgrades, it is EPA's intention to consider the financial capability of CCH, and the relative priorities for the various wastewater infrastructure challenges CCH faces.

Comment C88: Full secondary treatment represents an untenable water quality investment, both because it will yield limited (if any) environmental benefit and because of other claims on CCH resources. Honolulu's current administration under the leadership of Mayor Hannemann has demonstrated an extraordinary financial commitment to improved water quality, including approving a 4-year rate increase plan, which does not contemplate financing of secondary treatment. This will result in monthly residential bills that will exceed EPA's 2 percent of median household income threshold by 2014, and will place Honolulu's wastewater rates among the highest in the US.

Response: EPA does not disagree that the Hannemann administration has taken valuable steps forward towards addressing CCH's wastewater management challenges. However, the demonstration of a commitment to address other priorities cannot be used to justify a variance under section 301(h). As noted above (comment C87) it is EPA's intention to consider all wastewater management priorities in determining schedules future treatment plant upgrades.

Regarding the contention that full secondary treatment will yield limited environmental benefit, EPA expects that secondary treatment would improve water quality in a variety of ways. Although CCH has not completed an adequate toxicity reduction evaluation to identify the source or sources causing the effluent to be toxic, secondary treatment removes many toxic pollutants and it may well help reduce whole effluent toxicity, thus reducing adverse impacts to aquatic life. Secondary treatment also generally makes disinfecting wastewater more effective and energy-efficient and it is likely to reduce levels of chlordane and dieldrin in the effluent, thus reducing adverse impacts to recreation.

Comment C89: The fundamental challenge to CCH, EPA and community stakeholders is to determine the appropriate selection and pace of investments that maximize environmental benefits within the financial capabilities and logistical constraints that prevail in Honolulu. CCH does not have unlimited financial capacity to fund improvements; choices are required. A holistic perspective is required for determining the priorities and schedule for water quality improvements. While individual enforcement actions may have technical merit in relation to individual provisions of the CWA, there are important financial and project delivery realities that must be considered in defining requirements collectively. Honouliuli's primary discharge does not harm the marine environment and meets all 301(h) criteria. To proceed with a denial of the 301(h) application would be in direct contradiction to the stated intent and purpose of Section 301(h) to avoid unnecessary costs where other projects with greater environmental benefit can be achieved.

The enormous cost to design, build and operate a secondary treatment facility at Honouliuli is untimely and unjustified. It would cost between \$280 million - \$400 million. Secondary treatment has a large energy demand. The carbon emissions resulting from the additional energy requirements would be equivalent to adding 4,000 automobiles per day.

Response: Regarding cost considerations in general, please see responses to comments C81 and C83. EPA disagrees that the Honouliuli discharge meets all 301(h) criteria, as discussed in responses to specific comments regarding the specific criteria. Regarding the comment that Honouliuli's primary discharge does not harm the marine environment, EPA has found that the discharge exceeds water quality standards established to protect aquatic life (specifically the criteria for whole effluent toxicity and ammonia nitrogen) and water quality standards established to protect recreation (specifically bacteria, chlordane, and dieldrin). With regard to carbon emissions and energy demands, see response to comment P27.

As discussed in the referenced responses, considerations such as costs for constructing and operating secondary treatment facilities, the energy demands associated with secondary treatment, and carbon emissions resulting from this estimated energy production are not relevant to the determination of whether a variance may be granted. Nevertheless, it is important to note that EPA does not necessarily agree with the cost or emission estimates cited in CCH's comments. These are matters which must be reviewed in detail during the design of treatment plant upgrades. To date, CCH has not provided EPA with the underlying assumptions for design, construction and operation of an upgraded treatment plant to enable EPA to evaluate CCH's conclusions. As an example of a point that needs further evaluation, many modern wastewater treatment plants utilize gases created during secondary treatment to general electricity, thus reducing operating costs and energy demand at wastewater treatment plants. It is unclear whether efficiencies such as this have been factored into CCH's estimates. EPA looks forward to working with CCH to ensure that treatment plant upgrades are made in a manner that takes advantage of state-of-the-art cost and energy efficiencies used throughout the U.S.

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