APPENDIX J

PRIORITY POLLUTANTS AND PESTICIDE DISCUSSION

INTRODUCTION

After the first year of the Honouliuli WWTP's 301(h) NPDES Permit the City and County of Honolulu is required to perform annual priority pollutant and pesticide scan on 24-hour composite samples on the wastewater treatment plant's influent and effluent wastewater samples. Annual sampling is rotated between the dry and wet seasons. Priority pollutant and pesticide monitoring is also required under Section 307(a) of the Clean Water Act. A list of pollutants to be monitored can be found in the back of the permit.

A secondary wastewater treatment plant was discharging secondary treated wastewater along with the continued discharge from the primary treatment plant to the outfall starting September 20, 1996. Additional streams, though intermittent were added to the outfall flows with the commencement in operations from a tertiary plant on September 18, 2000. The constituents of the discharge through the outfall are described in the process description in Part II of the technical questionnaire (Part I of this reapplication).

Sludge from the Honouliuli WWTP is subject to the priority pollutant and pesticide test. Sludge samples are collected twice a year from the last treatment process at the wastewater treatment plant prior to disposal at the municipal landfill or for composting at the Navy composting facility.

Priority pollutant scan on marine sediments in the vicinity of the Barbers Point Ocean Outfall are also conducted annually as required by the NPDES permit. The top 2 cm of the sediment sample core is used to determine the presence of pollutants and pesticides. Seven stations were established within the outfall's Zone of Dilution, nearfield and far field locations.

City personnel collected all samples. Samples are then analyzed locally at the Sand Island Water Quality Laboratory and a contract laboratory on the US mainland. All Quality Assurance and Control procedures for the sampling, handling, processing and analyzing of sampled media were followed.

The objective of this section is to review the historical Honouliuli WWTP pollutant and pesticide scans on influent/effluent wastewater, sludge, sediment samples and in fish. Generally, the review was limited on monitoring data from 1995 to present.

EFFLUENT WASTEWATER

A list of analytes to be identified on effluent wastewater samples is listed in Table J-1:

Table J-1 Priority Pollutant and Pesticides Monitored in Effluent

Target Analyte	Type	Type 2
Antimony	Metals, Total Recoverable	Priority Pollutant
Arsenic	Metals, Total Recoverable	Priority Pollutant
Beryllium	Metals, Total Recoverable	Priority Pollutant
Cadmium	Metals, Total Recoverable	Priority Pollutant
Chromium, Total	Metals, Total Recoverable	Priority Pollutant
Copper	Metals, Total Recoverable	Priority Pollutant
Lead	Metals, Total Recoverable	Priority Pollutant
Mercury	Metals, Total Recoverable	Priority Pollutant
Nickel	Metals, Total Recoverable	Priority Pollutant
Selenium	Metals, Total Recoverable	Priority Pollutant
Silver	Metals, Total Recoverable	Priority Pollutant
Thallium	Metals, Total Recoverable	Priority Pollutant
Zinc	Metals, Total Recoverable	Priority Pollutant
Acrolein	Volatiles	Priority Pollutant
Acrylonitrile	Volatiles	Priority Pollutant
Benzene	Volatiles	Priority Pollutant
Bromodichloromethane	Volatiles	Priority Pollutant
Bromoform	Volatiles	Priority Pollutant
Bromomethane	Volatiles	Priority Pollutant
Carbon Tetrachloride	Volatiles	Priority Pollutant
Chlorobenzene	Volatiles	Priority Pollutant
Chloroethane	Volatiles	Priority Pollutant
2-Chloroethyl vinyl ether	Volatiles	Priority Pollutant
Chloroform	Volatiles	Priority Pollutant
Chloromethane	Volatiles	Priority Pollutant
Dibromochloromethane	Volatiles	Priority Pollutant
1,2-Dichlorobenzene	Volatiles	Priority Pollutant
1,3-Dichlorobenzene	Volatiles	Priority Pollutant
1,4-Dichlorobenzene	Volatiles	Priority Pollutant
1,1-Dichloroethane	Volatiles	Priority Pollutant
1,2-Dichloroethane	Volatiles	Priority Pollutant
1,1-Dichloroethene	Volatiles	Priority Pollutant
trans-1,2-Dichloroethene	Volatiles	Priority Pollutant
1,2-Dichloropropane	Volatiles	Priority Pollutant
cis-1,3-Dichloropropene	Volatiles	Priority Pollutant
trans-1,3-Dichloropropene	Volatiles	Priority Pollutant
Ethylbenzene	Volatiles	Priority Pollutant
Methylene Chloride	Volatiles	Priority Pollutant
1,1,2,2-Tetrachloroethane	Volatiles	Priority Pollutant
Tetrachloroethene	Volatiles	Priority Pollutant
Toluene	Volatiles	Priority Pollutant
1,1,1-Trichloroethane	Volatiles	Priority Pollutant
1,1,2-Trichloroethane	Volatiles	Priority Pollutant
Trichloroethene	Volatiles	Priority Pollutant
Vinyl Chloride	Volatiles	Priority Pollutant
Acenaphthene	Semivolatiles	Priority Pollutant

Table J-1 Continued

Target Analyte	Type	Type 2
Acenaphthylene	Semivolatiles	Priority Pollutant
Anthracene	Semivolatiles	Priority Pollutant
Benzidine	Semivolatiles	Priority Pollutant
Benzo(a)anthracene	Semivolatiles	Priority Pollutant
Benzo(b)fluoranthene	Semivolatiles	Priority Pollutant
Benzo(k)fluoranthene	Semivolatiles	Priority Pollutant
Benzo(g,h,i)perylene	Semivolatiles	Priority Pollutant
Benzo(a)pyrene	Semivolatiles	Priority Pollutant
Bis(2-chloroethoxy)methane	Semivolatiles	Priority Pollutant
Bis(2-chloroethyl)ether	Semivolatiles	Priority Pollutant
Bis(2-chloroisopropyl)ether	Semivolatiles	Priority Pollutant
Bis(2-ethylhexyl)phthalate	Semivolatiles	Priority Pollutant
4-Bromophenyl Phenyl Ether	Semivolatiles	Priority Pollutant
Butyl Benzyl Phthalate	Semivolatiles	Priority Pollutant
2-Chloronaphthalene	Semivolatiles	Priority Pollutant
4-Chlorophenyl Phenyl Ether	Semivolatiles	Priority Pollutant
Chrysene	Semivolatiles	Priority Pollutant
Dibenzo(a,h)anthracene	Semivolatiles	Priority Pollutant
3,3-Dichlorobenzidine	Semivolatiles	Priority Pollutant
Diethyl Phthalate	Semivolatiles	Priority Pollutant
Dimethyl Phthalate	Semivolatiles	Priority Pollutant
2,4-Dinitrotoluene	Semivolatiles	Priority Pollutant
2,6-Dinitrotoluene	Semivolatiles	Priority Pollutant
Di-n-Butyl Phthalate	Semivolatiles	Priority Pollutant
Di-n-Octyl Phthalate	Semivolatiles	Priority Pollutant
1,2-Diphenylhydrazine	Semivolatiles	Priority Pollutant
Fluoranthene	Semivolatiles	Priority Pollutant
Fluorene	Semivolatiles	Priority Pollutant
Hexachlorobenzene	Semivolatiles	Priority Pollutant
Hexachlorobutadiene	Semivolatiles	Priority Pollutant
Hexachlorocyclopentadiene	Semivolatiles	Priority Pollutant
Hexachloroethane	Semivolatiles	Priority Pollutant
Indeno(1,2,3-cd)pyrene	Semivolatiles	Priority Pollutant
Isophorone	Semivolatiles	Priority Pollutant
Naphthalene	Semivolatiles	Priority Pollutant
Nitrobenzene	Semivolatiles	Priority Pollutant
N-Nitrosodimethylamine	Semivolatiles	Priority Pollutant
N-Nitrosodiphenylamine	Semivolatiles	Priority Pollutant
N-Nitrosodi-n-propylamine	Semivolatiles	Priority Pollutant
Phenanthrene	Semivolatiles	Priority Pollutant
Pyrene	Semivolatiles	Priority Pollutant
1,2,4-Trichlorobenzene	Semivolatiles	Priority Pollutant
2-Chlorophenol	Semivolatiles	Priority Pollutant
4-Chloro-3-methylphenol	Semivolatiles	Priority Pollutant
2,4-Dichlorophenol	Semivolatiles	Priority Pollutant
2,4-Dimethylphenol	Semivolatiles	Priority Pollutant

Table J-1 Continued

Target Analyte	Type	Type 2
2,4-Dinitrophenol	Semivolatiles	Priority Pollutant
2-Methyl-4,6-dinitrophenol	Semivolatiles	Priority Pollutant
2-Nitrophenol	Semivolatiles	Priority Pollutant
4-Nitrophenol	Semivolatiles	Priority Pollutant
Pentachlorophenol	Semivolatiles	Priority Pollutant
Phenol	Semivolatiles	Priority Pollutant
2,4,6-Trichlorophenol	Semivolatiles	Priority Pollutant
Aldrin	Organochlorine Pesticides and PCBs	Priority Pollutant
Alpha-BHC	Organochlorine Pesticides and PCBs	Priority Pollutant
Beta-BHC	Organochlorine Pesticides and PCBs	Priority Pollutant
Delta-BHC	Organochlorine Pesticides and PCBs	Priority Pollutant
Gamma-BHC	Organochlorine Pesticides and PCBs	Priority Pollutant
Chlordane	Organochlorine Pesticides and PCBs	Priority Pollutant
4,4'-DDD	Organochlorine Pesticides and PCBs	Priority Pollutant
4,4'-DDE	Organochlorine Pesticides and PCBs	Priority Pollutant
4,4'-DDT	Organochlorine Pesticides and PCBs	Priority Pollutant
Dieldrin	Organochlorine Pesticides and PCBs	Priority Pollutant
Endosulfan I	Organochlorine Pesticides and PCBs	Priority Pollutant
Endosulfan II	Organochlorine Pesticides and PCBs	Priority Pollutant
Endosulfan Sulfate	Organochlorine Pesticides and PCBs	Priority Pollutant
Endrin	Organochlorine Pesticides and PCBs	Priority Pollutant
Endrin Aldehyde	Organochlorine Pesticides and PCBs	Priority Pollutant
Heptachlor	Organochlorine Pesticides and PCBs	Priority Pollutant
Heptachlor Epoxide	Organochlorine Pesticides and PCBs	Priority Pollutant
Methoxychlor	Organochlorine Pesticides and PCBs	301(h) Pesticide
Mirex	Organochlorine Pesticides and PCBs	301(h) Pesticide
Toxaphene	Organochlorine Pesticides and PCBs	Priority Pollutant
PCB-1016	Organochlorine Pesticides and PCBs	Priority Pollutant
PCB-1221	Organochlorine Pesticides and PCBs	Priority Pollutant
PCB-1232	Organochlorine Pesticides and PCBs	Priority Pollutant
PCB-1242	Organochlorine Pesticides and PCBs	Priority Pollutant
PCB-1248	Organochlorine Pesticides and PCBs	Priority Pollutant
PCB-1254	Organochlorine Pesticides and PCBs	Priority Pollutant
PCB-1260	Organochlorine Pesticides and PCBs	Priority Pollutant
Guthion	Organophosphorus Pesticides	301(h) Pesticide
Demeton	Organophosphorus Pesticides	301(h) Pesticide
Malathion	Organophosphorus Pesticides	301(h) Pesticide
Parathion	Organophosphorus Pesticides	301(h) Pesticide
Cyanide, Total	Other	Priority Pollutant
2,3,7,8-Dioxin	Other	Priority Pollutant
Aluminum, Dissolved	Metals, Dissolved	State Water Quality Analyte
Antimony, Dissolved	Metals, Dissolved	State Water Quality Analyte
Arsenic, Dissolved	Metals, Dissolved	State Water Quality Analyte
Beryllium, Dissolved	Metals, Dissolved	State Water Quality Analyte
Cadmium, Dissolved	Metals, Dissolved	State Water Quality Analyte
Chromium, Hexavalent, Dissolve	Metals, Dissolved	State Water Quality Analyte

Table J-1 Continued

Target Analyte	Type	Type 2
Copper, Dissolved	Metals, Dissolved	State Water Quality Analyte
Lead, Dissolved	Metals, Dissolved	State Water Quality Analyte
Mercury, Dissolved	Metals, Dissolved	State Water Quality Analyte
Nickel, Dissolved	Metals, Dissolved	State Water Quality Analyte
Selenium, Dissolved	Metals, Dissolved	State Water Quality Analyte
Silver, Dissolved	Metals, Dissolved	State Water Quality Analyte
Thallium, Dissolved	Metals, Dissolved	State Water Quality Analyte
Zinc, Dissolved	Metals, Dissolved	State Water Quality Analyte
Pentachloroethane	Volatiles	State Water Quality Analyte
N-Nitrosodibutylamine	Semivolatiles	State Water Quality Analyte
N-Nitrosodiethylamine	Semivolatiles	State Water Quality Analyte
N-Nitrosopyrrolidine	Semivolatiles	State Water Quality Analyte
Pentachlorobenzene	Semivolatiles	State Water Quality Analyte
1,2,4,5-Tetrachlorobenzene	Semivolatiles	State Water Quality Analyte
2,3,5,6-Tetrachlorophenol	Semivolatiles	State Water Quality Analyte
Chlorpyrifos	Organophosphorus Pesticides	State Water Quality Analyte
Tributyltin	Other	State Water Quality Analyte
Asbestos	Other	"Priority Pollutant"

In addition to the analytes listed by the Clean Water Act, other parameters were included in the analyses. These included pollutants as listed by the State of Hawaii, Department of Health, Hawaii Administrative Rules, Chapter 11-54. Chapter 11-54 provides the local, state of Hawaii water quality standards.

PESTICIDES IN EFFLUENT

Pesticides have gotten attention especially for the analytes Dieldrin and Chlordane. Pesticide levels in effluent wastewater samples were compared with the Federal criterion, i.e., National Recommended Water Quality Criteria: 2002 (EPA-822-R-02-047) and the State of Hawaii Water Quality Standards. Before effluent pollutant concentrations could be compared with the standards, a dilution factor had to be applied, which is the case for an outfall discharge. Typically, compliance with the standards should occur with the discharge at the outfall Zone of Initial Dilution. An EPA dilution model, Plumes, third edition (April 14, 1994) was used to determine the initial dilution at the outfall diffusion ports. Plumes provides two sets of dilution output from the UM and RSB models, under two flow conditions. One is the maximum annual average flow for the year and the second is the Honouliuli WWTP's plant design flow of 38 MGD. Stratified conditions in the receiving waters were used in an attempt to model for the worst case scenario. At stratified conditions, the plume is observed to be trapped beneath the water surface, limiting the entrained discharge to mixing with the ambient receiving water.

As shown in the Table J-2 below, the models predicted dilutions from 21.97 to 983.5. The latter figure was reported in the 2003 HWWTP annual assessment report.

Table J-2 Dilutions reported from the HWWTP Annual Assessment Report

Date	Station	MDC Flow (MGD)	UM - ADC	UM - MDC	RSB - ADC	RSB - MDC				
11/3/1994	HM3	26.6	211.2	226.3						
10/26/1995	HM3	25.8	247.7	271						
7/10/1996	HB1	31.9	365.1	394.1						
10/9/1997	HM4	27.5	21.97	21.68						
7/6/1998	HB2	27.435			201	224.3				
7/1/1999	HM3	27.705			322.1	372.5				
10/11/2000	HB3	26.9981	65.39	69.6						
9/12/2001	HB3	26.45	94.41	89.97	158.4	164.9				
8/20/2002	ZM3	27.4	228.8	101.9	---	---				
10/8/2003	HM3	27.4	983.5	1,316	969.4	1,172.10				
	Stats									
	Average		176.3671	167.7929	227.1666667	253.9				
	Standard Deviation		131.2454	143.3075	133.0781819	154.069278				

Note: Date the most stratified conditions at the outfall for that year
Dilutions based on maximum monthly flows

ADC - receiving water stratified conditions at treatment plant design flows (38 MGD), constant
MDC - receiving water stratified conditions at maximum projected discharge flow (varies year to year, use maximum monthly average)

Surface hit
Note that the electronic source used for this info. did not have the dilution runs results incorporated.
Info. on to which model provided this figure were not noted.

It is believed that calculated low dilutions of October 9, 1997, October 11, 2000 and September 12, 2001 were outliers.

In the last 1995 permit reapplication, it was shown that the worst initial dilutions occurred during the winter months. The dilutions ranged from 210 to 236. These figures are presented Table J-3 below:

Table J-3 Dilutions at Trapping Depth as reported by the 1995 Honouliuli WWTP Reapplication

	Winter		Spring		Summer		Fall	
Year	Initial Dilution	Trapping Level (meters)	Initial Dilation	Trapping Level (meters)	Initial Dilution	Trapping Level (meters)	Initial Dilation	Trapping Level (meters)
1994	236	48	1100	Surfaced	353	34	462	20
2000	228	48	1026	Surfaced	338	34	440	20
2005	216	48	925	Surfaced	316	33	411	19
2010	210	48	881	Surfaced	307	33	397	19

1995 Honouliuli Wastewater Treatment Plant – 301(h) Waiver Reapplication. Harding Lawson Associates, K.P. Lindstrom Inc.

According to the City consultant who prepared the reapplication, the most stratified conditions occurred during the winter months. The 1995 Honouliuli 301(h) NPDES permit reapplication used critical dilution of 228. Because the method has not changed, the critical dilution of 228 will still be used in this permit reapplication. The table presented below shows that the effluent from the Honouliuli WWTP did not exceed the pesticide limits in either the Federal criterion or the State Water Quality Standards.

Table J-4 Pesticide Compliance Determination with State Standard and Federal criteria

Detected Pesticide Comparison with Federal and State Limitations

	Influent (ug/L)				Effluent (ug/L)				After outfall dispersion of maximum concentration (ug/L)	Federal Criteria		State Std	
Target Analyte	Min.	Max	Min PQL Used	Max PQL Used	Min.	Max	Min. (PQL)	Max (PQL)		CMC	CCC	Acute	Chronic
Aldrin	0.071	0.071	0.009	0.054	0.086	0.086	0.009	0.054	0.000377193				
Alpha-BHC	ND	ND	0.009	0.1	ND	ND	0.009	0.1					
Beta-BHC	ND	ND	0.009	0.1	ND	ND	0.009	0.1					
Delta-BHC	0.59	0.59	0.009	0.1	0.082	0.082	0.009	0.3	0.000359649				
Gamma-BHC	0.007	0.017	0.009	0.1	0.011	0.011	0.009	0.1	0.0000482	0.016	ns	0.016	ns
4,4'-DDD	0.13	0.13	0.009	0.4	0.004	0.004	0.009	0.4	0.0000175				
4,4'-DDE	ND	ND	0.004	0.1	ND	ND	0.009	0.1					
4,4'-DDT	0.008	0.021	0.009	0.4	0.005	0.005	0.009	0.4	0.0000219	ns	ns	0.013	0.001
Chlordane	0.06	0.47	0.014	0.54	0.1	0.21	0.014	0.54	0.000921053	0.09	0.004	0.09	0.004
Dieldrin	0.012	0.058	0.009	0.2	0.007	0.035	0.009	0.2	0.000153509	0.71	0.0019	0.71	0.0019
Endosulfan I	ND	ND	0.009	1	ND	ND	0.009	1		ns	ns	0.034	0.0087
Endosulfan II	ND	ND	0.009	1	ND	ND	0.009	1		ns	ns	0.034	0.0087
Endosulfan Sulfate	ND	ND	0.009	2	ND	ND	0.009	2		ns	ns	0.034	0.0087
Endrin	ND	ND	0.009	0.2	ND	ND	0.009	0.1		0.037	0.0023	0.037	0.0023
Endrin Aldehyde	ND	ND	0.009	0.8	ND	ND	0.009	0.8					
Heptachlor	0.031	0.039	0.009	0.4	0.009	0.025	0.009	0.4	0.000109649	0.053	0.0036	0.053	0.0036
Heptachlor Epoxide	0.005	0.005	0.009	2	0.004	0.004	0.009	2	0.0000175				
Methoxychlor	ND	ND	0.009	3	ND	ND	0.009	3		ns	0.03	ns	0.03
Mirex	ND	ND	0.009	2	ND	ND	0.009	2		ns	0.001	ns	0.001
Toxaphene	ND	ND	0.25	5.4	ND	ND	0.25	5		0.21	0.0002	0.21	0.0002
Guthion	ND	ND	0.95	1.1	ND	ND	0.96	1.1		ns	0.01	ns	0.01
Demeton	1.2	2.7	0.1	10	ND	2.8	0.15	10	0.012280702	ns	0.1	ns	0.1
Malathion	1.5	1.5	0.15	10	1.6	1.6	0.15	10	0.007017544	ns	0.1	ns	0.1
Parathion	ND	ND	0.15	4	ND	ND	0.15	1.1		ns	ns	ns	ns
Chlorpyrifos	0.34	0.34	0.15	1.1	0.12	0.12	0.15	1.1	0.000526316	ns	ns	0.011	0.0056

Dilution used 228

Notes:

1) Blank entries under the Federal Criteria and State WQS columns indicate no listing of the pollutants in question
2) Demeton includes Demeton (Systox), Demeton-S and Demeton/Systox
3) The same min and max concentrations means that there was only one event in which the pollutant was detected
4) The critical dilution of 228 was used
5) The Federal and State acute toxicity figures were used as a cursory way of determining compliance

CMC: EPA Saltwater Criterion Maximum Concentration is an estimate of the highest concentration of a pollutant in saltwater, to which an aquatic community can be exposed briefly (acute limit) without resulting in an unacceptable effect.
CCC: EPA Saltwater Criterion Continuous Concentration is an estimate of the highest concentration of a pollutant in saltwater, to which an aquatic community can be exposed indefinitely (chronic limit) without resulting in an unacceptable effect.

A quick check was performed on the remaining detected priority pollutants after applying the dilution factor of 228. The concentration figures multiplied by the dilution factor were than compared with the salt water acute and chronic toxicity limitations in the State Water Quality Standards and the Federal water quality criteria. Below are the detected, i.e., above the PQL, effluent priority pollutant and pesticides concentrations and adjusted figures (apply dilution of 228). Given the dilution factor of 228, the concentrations of the various pollutant and pesticide concentrations did not exceed the State Water Quality Standards or the Federal water quality criteria (see Table J-5).

Table J-5 Effluent Pollutants and Pesticide Compliance Termination with State and Federal Water Quality Criteria

Analyte	Date	Result	Unit	PQL	w/ Dilution	State Acute Toxicity Limit	State Chronic Toxicity Limit	Federal Acute Toxicity Criteria	Federal Chronic Toxicity Criteria	Exceeds State Acute Toxicity?	Exceed State Chronic Toxicity?	Exceeds Federal Water Quality Criteria for Acute Toxicity?	Exceeds Federal Water Quality Criteria for Chronic Toxicity?
1,2-Dichlorobenzene	1/22/2001	0.4	ug/L	2	0.0018	660	---	---	---	no	---	---	---
1,3-Dichlorobenzene	1/22/2001	0.4	ug/L	2	0.0018	660	---	---	---	no	---	---	---
1,4-Dichlorobenzene	1/12/1994	2.1	ug/L	0.5	0.0092	660	---	---	---	no	---	---	---
	7/18/1994	2	ug/L	1	0.0088	660	---	---	---	no	---	---	---
	10/17/1995	3	ug/L	2	0.0132	660	---	---	---	no	---	---	---
	1/17/1996	3	ug/L	2	0.0132	660	---	---	---	no	---	---	---
	1/13/1997	2	ug/L	2	0.0088	660	---	---	---	no	---	---	---
	1/12/1998	2	ug/L	2	0.0088	660	---	---	---	no	---	---	---
	7/6/1998	2	ug/L	2	0.0088	660	---	---	---	no	---	---	---
	1/25/1999	3	ug/L	2	0.0132	660	---	---	---	no	---	---	---
	7/19/1999	2.6	ug/L	2	0.0114	660	---	---	---	no	---	---	---
	1/25/2000	3.2	ug/L	2	0.0140	660	---	---	---	no	---	---	---
	7/17/2000	4.3	ug/L	2	0.0189	660	---	---	---	no	---	---	---
	1/22/2001	2.8	ug/L	2	0.0123	660	---	---	---	no	---	---	---
	7/23/2001	1.9	ug/L	2	0.0083	660	---	---	---	no	---	---	---
	7/15/2002	2.3	ug/L	1	0.0101	660	---	---	---	no	---	---	---
	1/21/2003	2.8	ug/L	2	0.0123	660	---	---	---	no	---	---	---
	12/2/2003	2.1	ug/L	2	0.0092	660	---	---	---	no	---	---	---
4,4'-DDD	7/15/2002	0.004	ug/L	0.009	0.0000	---	---	---	---	---	---	---	---
4,4'-DDT	7/23/2001	0.005	ug/L	0.009	0.0000	0.013	0.001	0.13	0.001	no	no	no	no
Acrolein	1/22/2001	1.4	ug/L	1	0.0061	18	---	---	---	no	---	---	---
	1/21/2003	1.3	ug/L	1	0.0057	18	---	---	---	no	---	---	---
	12/2/2003	1.7	ug/L	1	0.0075	18	---	---	---	no	---	---	---
Aldrin	7/16/1995	0.086	ug/L	0.052	0.0004	1.3	---	1.3	---	no	---	no	---
Aluminum, Dissolved	7/18/1994	125	ug/L	5	0.5482	---	---	---	---	---	---	---	---
	1/16/1995	164	ug/L	5	0.7193	---	---	---	---	---	---	---	---
	7/15/1996	38	ug/L	10.3	0.1667	---	---	---	---	---	---	---	---
	1/13/1997	135	ug/L	50	0.5921	---	---	---	---	---	---	---	---
	1/12/1998	190	ug/L	50	0.8333	---	---	---	---	---	---	---	---
	7/6/1998	330	ug/L	50	1.4474	---	---	---	---	---	---	---	---
	1/25/1999	180	ug/L	50	0.7895	---	---	---	---	---	---	---	---
	7/19/1999	130	ug/L	100	0.5702	---	---	---	---	---	---	---	---
	1/25/2000	62	ug/L	2	0.2719	---	---	---	---	---	---	---	---
	7/17/2000	48	ug/L	2	0.2105	---	---	---	---	---	---	---	---
	1/22/2001	75	ug/L	50	0.3289	---	---	---	---	---	---	---	---
	7/23/2001	54	ug/L	2	0.2368	---	---	---	---	---	---	---	---
	7/15/2002	55	ug/L	2	0.2412	---	---	---	---	---	---	---	---
	1/21/2003	44	ug/L	2	0.1930	---	---	---	---	---	---	---	---
	12/2/2003	59	ug/L	2	0.2588	---	---	---	---	---	---	---	---

Table J-5 Continued

Analyte	Date	Result	Unit	PQL	w/ Dilution	State Acute Toxicity Limit	State Chronic Toxicity Limit	Federal Acute Toxicity Criteria	Federal Chronic Toxicity Criteria	Exceeds State Acute Toxicity?	Exceed State Chronic Toxicity?	Exceeds Federal Water Quality Criteria for Acute Toxicity?	Exceeds Federal Water Quality Criteria for Chronic Toxicity?
Antimony	1/25/2000	0.5	ug/L	0.2	0.0022	---	---	---	---	---	---	---	---
	7/17/2000	0.4	ug/L	2	0.0018	---	---	---	---	---	---	---	---
	7/23/2001	0.36	ug/L	2	0.0016	---	---	---	---	---	---	---	---
	7/15/2002	0.55	ug/L	2	0.0024	---	---	---	---	---	---	---	---
	1/21/2003	1.0	ug/L	2	0.0044	---	---	---	---	---	---	---	---
	12/2/2003	1.8	ug/L	2	0.0079	---	---	---	---	---	---	---	---
Antimony, Dissolved	1/25/2000	0.4	ug/L	0.2	0.0018	---	---	---	---	---	---	---	---
	7/17/2000	0.4	ug/L	2	0.0018	---	---	---	---	---	---	---	---
	7/23/2001	0.25	ug/L	2	0.0011	---	---	---	---	---	---	---	---
	7/15/2002	0.27	ug/L	2	0.0012	---	---	---	---	---	---	---	---
Arsenic	1/12/1994	12	ug/L	5	0.0526	69	36	69	36	no	no	no	no
	7/19/1999	2.5	ug/L	2	0.0110	69	36	69	36	no	no	no	no
	1/25/2000	1.2	ug/L	2	0.0053	69	36	69	36	no	no	no	no
	7/17/2000	0.9	ug/L	2	0.0039	69	36	69	36	no	no	no	no
	1/22/2001	1.2	ug/L	2	0.0053	69	36	69	36	no	no	no	no
	7/23/2001	1.3	ug/L	2	0.0057	69	36	69	36	no	no	no	no
	7/15/2002	1.5	ug/L	2	0.0066	69	36	69	36	no	no	no	no
Arsenic, Dissolved	7/19/1999	2.1	ug/L	2	0.0092	---	---	---	---	---	---	---	---
	1/25/2000	1.5	ug/L	2	0.0066	---	---	---	---	---	---	---	---
	7/17/2000	1.4	ug/L	2	0.0061	---	---	---	---	---	---	---	---
	1/22/2001	1.3	ug/L	2	0.0057	---	---	---	---	---	---	---	---
	7/23/2001	1.00	ug/L	2	0.0044	---	---	---	---	---	---	---	---
	7/15/2002	1.1	ug/L	2	0.0048	---	---	---	---	---	---	---	---
	1/21/2003	1.1	ug/L	2	0.0048	---	---	---	---	---	---	---	---
Asbestos	7/8/1991	49	MSL	19	0.2149	---	---	---	---	---	---	---	---
	1/28/1992	2	MFL	(blank)	0.0088	---	---	---	---	---	---	---	---
	7/13/1992	2	MFL	(blank)	0.0088	---	---	---	---	---	---	---	---
Benzene	12/2/2003	0.3	ug/L	2	0.0013	1700	---	---	---	no	---	---	---
Beryllium, Dissolved	1/25/2000	0.07	ug/L	0.2	0.0003	---	---	---	---	---	---	---	---
	7/17/2000	0.04	ug/L	2	0.0002	---	---	---	---	---	---	---	---
	1/21/2003	0.15	ug/L	0.2	0.0007	---	---	---	---	---	---	---	---
	12/2/2003	0.07	ug/L	0.1	0.0003	---	---	---	---	---	---	---	---

Table J-5 Continued

Analyte	Date	Result	Unit	PQL	w/ Dilution	State Acute Toxicity Limit	State Chronic Toxicity Limit	Federal Acute Toxicity Criteria	Federal Chronic Toxicity Criteria	Exceeds State Acute Toxicity?	Exceed State Chronic Toxicity?	Exceeds Federal Water Quality Criteria for Acute Toxicity?	Exceeds Federal Water Quality Criteria for Chronic Toxicity?
Bis(2-ethylhexyl)phthalate	7/16/1995	26	ug/L	17	0.1140	---	---	---	---	---	---	---	---
	1/17/1996	15	ug/L	11	0.0658	---	---	---	---	---	---	---	---
	7/15/1996	10	ug/L	10	0.0439	---	---	---	---	---	---	---	---
	1/13/1997	12	ug/L	10	0.0526	---	---	---	---	---	---	---	---
	1/25/1999	28	ug/L	10	0.1228	---	---	---	---	---	---	---	---
	7/19/1999	11	ug/L	5	0.0482	---	---	---	---	---	---	---	---
	1/25/2000	7	ug/L	10	0.0307	---	---	---	---	---	---	---	---
	7/17/2000	5	ug/L	10	0.0219	---	---	---	---	---	---	---	---
	1/22/2001	8	ug/L	10	0.0351	---	---	---	---	---	---	---	---
	7/23/2001	6	ug/L	10	0.0263	---	---	---	---	---	---	---	---
	7/15/2002	7	ug/L	10	0.0307	---	---	---	---	---	---	---	---
	12/2/2003	7	ug/L	10	0.0307	---	---	---	---	---	---	---	---
Cadmium	1/16/1995	3.6	ug/L	2	0.0158	---	---	---	---	---	---	---	---
	1/13/1997	1	ug/L	1	0.0044	---	---	---	---	---	---	---	---
	1/12/1998	2	ug/L	1	0.0088	---	---	---	---	---	---	---	---
	7/6/1998	0.8	ug/L	0.5	0.0035	---	---	---	---	---	---	---	---
	1/25/1999	0.6	ug/L	0.5	0.0026	---	---	---	---	---	---	---	---
	7/23/2001	0.12	ug/L	2	0.0005	---	---	---	---	---	---	---	---
	7/15/2002	0.15	ug/L	2	0.0007	---	---	---	---	---	---	---	---
	1/21/2003	0.16	ug/L	0.5	0.0007	---	---	---	---	---	---	---	---
	12/2/2003	0.23	ug/L	0.2	0.0010	---	---	---	---	---	---	---	---
Cadmium, Dissolved	1/13/1997	4	ug/L	1	0.0175	43	9.3	40	8.8	no	no	no	no
	1/12/1998	3.2	ug/L	1	0.0140	43	9.3	40	8.8	no	no	no	no
	7/6/1998	1.0	ug/L	0.5	0.0044	43	9.3	40	8.8	no	no	no	no
Chlordane	7/23/2001	0.19	ug/L	0.1	0.0008	0.09	0.004	0.09	0.004	no	no	no	no
	7/15/2002	0.21	ug/L	0.1	0.0009	0.09	0.004	0.09	0.004	no	no	no	no
	12/2/2003	0.10	ug/L	0.1	0.0004	0.09	0.004	0.09	0.004	no	no	no	no

Table J-5 Continued

Analyte	Date	Result	Unit	PQL	w/ Dilution	State Acute Toxicity Limit	State Chronic Toxicity Limit	Federal Acute Toxicity Criteria	Federal Chronic Toxicity Criteria	Exceeds State Acute Toxicity?	Exceed State Chronic Toxicity?	Exceeds Federal Water Quality Criteria for Acute Toxicity?	Exceeds Federal Water Quality Criteria for Chronic Toxicity?
Chloroform	1/12/1994	0.9	ug/L	0.5	0.0039	---	---	---	---	---	---	---	---
	1/25/2000	0.6	ug/L	2	0.0026	---	---	---	---	---	---	---	---
	7/17/2000	1.3	ug/L	2	0.0057	---	---	---	---	---	---	---	---
	1/22/2001	0.5	ug/L	2	0.0022	---	---	---	---	---	---	---	---
	7/15/2002	0.5	ug/L	1	0.0022	---	---	---	---	---	---	---	---
	12/2/2003	0.6	ug/L	2	0.0026	---	---	---	---	---	---	---	---
Chlorpyrifos	1/21/2003	0.12	ug/L	0.15	0.0005	0.011	0.0056	---	---	no	no	---	---
Chromium, Hexavalent, Dissolved	1/16/1995	22	ug/L	10	0.0965	1,100	50	1,100	50	no	no	no	no
	7/17/2000	0.5	ug/L	5	0.0022	1,100	50	1,100	50	no	no	no	no
Chromium, Total	7/18/1994	5	ug/L	2	0.0219	---	---	---	---	---	---	---	---
	1/16/1995	3	ug/L	2	0.0132	---	---	---	---	---	---	---	---
	7/16/1995	3.2	ug/L	2	0.0140	---	---	---	---	---	---	---	---
	10/17/1995	3.5	ug/L	2	0.0154	---	---	---	---	---	---	---	---
	7/15/1996	3	ug/L	1	0.0132	---	---	---	---	---	---	---	---
	1/13/1997	4	ug/L	2	0.0175	---	---	---	---	---	---	---	---
	1/12/1998	3.6	ug/L	2	0.0158	---	---	---	---	---	---	---	---
	7/6/1998	3.3	ug/L	2	0.0145	---	---	---	---	---	---	---	---
	1/25/1999	3.7	ug/L	2	0.0162	---	---	---	---	---	---	---	---
	7/19/1999	4.5	ug/L	2	0.0197	---	---	---	---	---	---	---	---
	1/25/2000	3.8	ug/L	1	0.0167	---	---	---	---	---	---	---	---
	7/17/2000	2.8	ug/L	2	0.0123	---	---	---	---	---	---	---	---
	1/22/2001	6.7	ug/L	1	0.0294	---	---	---	---	---	---	---	---
	7/23/2001	3.7	ug/L	2	0.0162	---	---	---	---	---	---	---	---
	7/15/2002	4.3	ug/L	2	0.0189	---	---	---	---	---	---	---	---
	1/21/2003	4.5	ug/L	2	0.0197	---	---	---	---	---	---	---	---
	12/2/2003	4.7	ug/L	2	0.0206	---	---	---	---	---	---	---	---

Table J-5 Continued

Analyte	Date	Result	Unit	PQL	w/ Dilution	State Acute Toxicity Limit	State Chronic Toxicity Limit	Federal Acute Toxicity Criteria	Federal Chronic Toxicity Criteria	Exceeds State Acute Toxicity?	Exceed State Chronic Toxicity?	Exceeds Federal Water Quality Criteria for Acute Toxicity?	Exceeds Federal Water Quality Criteria for Chronic Toxicity?
Copper	7/18/1994	18	ug/L	5	0.0789	---	---	---	---	---	---	---	---
	1/16/1995	35	ug/L	5	0.1535	---	---	---	---	---	---	---	---
	7/16/1995	41	ug/L	5	0.1798	---	---	---	---	---	---	---	---
	10/17/1995	36	ug/L	5	0.1579	---	---	---	---	---	---	---	---
	1/17/1996	25	ug/L	5	0.1096	---	---	---	---	---	---	---	---
	9/7/1986	50	ug/L	20	0.2193	---	---	---	---	---	---	---	---
	8/29/1989	40	ug/L	20	0.1754	---	---	---	---	---	---	---	---
	7/8/1991	50	ug/L	10	0.2193	---	---	---	---	---	---	---	---
	1/28/1992	40	ug/L	20	0.1754	---	---	---	---	---	---	---	---
	7/13/1992	35	ug/L	20	0.1535	---	---	---	---	---	---	---	---
	1/23/1993	26	ug/L	20	0.1140	---	---	---	---	---	---	---	---
	7/8/1993	37	ug/L	20	0.1623	---	---	---	---	---	---	---	---
	7/15/1996	35	ug/L	1.2	0.1535	---	---	---	---	---	---	---	---
	1/13/1997	20	ug/L	5	0.0877	---	---	---	---	---	---	---	---
	1/12/1998	28	ug/L	5	0.1228	---	---	---	---	---	---	---	---
	7/6/1998	26	ug/L	5	0.1140	---	---	---	---	---	---	---	---
	1/25/1999	38	ug/L	5	0.1667	---	---	---	---	---	---	---	---
	7/19/1999	30	ug/L	5	0.1316	---	---	---	---	---	---	---	---
	1/25/2000	29	ug/L	1	0.1272	---	---	---	---	---	---	---	---
	7/17/2000	30	ug/L	2	0.1316	---	---	---	---	---	---	---	---
	1/22/2001	38	ug/L	2	0.1667	---	---	---	---	---	---	---	---
	7/23/2001	23	ug/L	2	0.1009	---	---	---	---	---	---	---	---
	7/15/2002	41	ug/L	2	0.1798	---	---	---	---	---	---	---	---
	1/21/2003	39	ug/L	2	0.1711	---	---	---	---	---	---	---	---
	12/2/2003	42	ug/L	2	0.1842	---	---	---	---	---	---	---	---

Table J-5 Continued

Analyte	Date	Result	Unit	PQL	w/ Dilution	State Acute Toxicity Limit	State Chronic Toxicity Limit	Federal Acute Toxicity Criteria	Federal Chronic Toxicity Criteria	Exceeds State Acute Toxicity?	Exceed State Chronic Toxicity?	Exceeds Federal Water Quality Criteria for Acute Toxicity?	Exceeds Federal Water Quality Criteria for Chronic Toxicity?
Copper, Dissolved	7/18/1994	7	ug/L	5	0.0307	2.9	2.9	4.8	3.1	no	no	no	no
	1/16/1995	16.5	ug/L	5	0.0724	2.9	2.9	4.8	3.1	no	no	no	no
	7/15/1996	6.7	ug/L	1.2	0.0294	2.9	2.9	4.8	3.1	no	no	no	no
	1/13/1997	11	ug/L	5	0.0482	2.9	2.9	4.8	3.1	no	no	no	no
	1/12/1998	14	ug/L	5	0.0614	2.9	2.9	4.8	3.1	no	no	no	no
	7/6/1998	14	ug/L	5	0.0614	2.9	2.9	4.8	3.1	no	no	no	no
	1/25/1999	16	ug/L	5	0.0702	2.9	2.9	4.8	3.1	no	no	no	no
	7/19/1999	13	ug/L	5	0.0570	2.9	2.9	4.8	3.1	no	no	no	no
	1/25/2000	4.3	ug/L	1	0.0189	2.9	2.9	4.8	3.1	no	no	no	no
	7/17/2000	5.4	ug/L	2	0.0237	2.9	2.9	4.8	3.1	no	no	no	no
	1/22/2001	3.3	ug/L	2	0.0145	2.9	2.9	4.8	3.1	no	no	no	no
	7/23/2001	3.9	ug/L	2	0.0171	2.9	2.9	4.8	3.1	no	no	no	no
	7/15/2002	4.3	ug/L	2	0.0189	2.9	2.9	4.8	3.1	no	no	no	no
	1/21/2003	1.5	ug/L	2	0.0066	2.9	2.9	4.8	3.1	no	no	no	no
	12/2/2003	3.8	ug/L	2	0.0167	2.9	2.9	4.8	3.1	no	no	no	no
Cyanide, Total	1/13/1997	16	ug/L	10	0.0702	1	1	---	---	no	no	---	---
	7/15/2002	19	ug/L	5	0.0833	1	1	---	---	no	no	---	---
Delta-BHC	7/16/1995	0.082	ug/L	0.052	0.0004	---	---	---	---	---	---	---	---
Demeton-O	7/16/1995	2.8	ug/L	0.3	0.0123	---	0.1	---	0.1	---	no	---	no
Dieldrin	1/22/2001	0.007	ug/L	0.009	0.0000	0.71	0.0019	0.71	0.0019	no	no	no	no
	7/15/2002	0.014	ug/L	0.009	0.0001	0.71	0.0019	0.71	0.0019	no	no	no	no
	1/21/2003	0.007	ug/L	0.009	0.0000	0.71	0.0019	0.71	0.0019	no	no	no	no
	12/2/2003	0.035	ug/L	0.009	0.0002	0.71	0.0019	0.71	0.0019	no	no	no	no

Table J-5 Continued

Analyte	Date	Result	Unit	PQL	w/ Dilution	State Acute Toxicity Limit	State Chronic Toxicity Limit	Federal Acute Toxicity Criteria	Federal Chronic Toxicity Criteria	Exceeds State Acute Toxicity?	Exceed State Chronic Toxicity?	Exceeds Federal Water Quality Criteria for Acute Toxicity?	Exceeds Federal Water Quality Criteria for Chronic Toxicity?
Diethyl Phthalate	7/13/1992	86	ug/L	10	0.3772	---	---	---	---	---	---	---	---
	1/23/1993	86	ug/L	10	0.3772	---	---	---	---	---	---	---	---
	1/25/1999	11	ug/L	10	0.0482	---	---	---	---	---	---	---	---
	7/19/1999	6	ug/L	5	0.0263	---	---	---	---	---	---	---	---
	1/25/2000	5	ug/L	10	0.0219	---	---	---	---	---	---	---	---
	7/17/2000	6	ug/L	10	0.0263	---	---	---	---	---	---	---	---
	1/22/2001	6	ug/L	10	0.0263	---	---	---	---	---	---	---	---
	7/23/2001	5	ug/L	10	0.0219	---	---	---	---	---	---	---	---
	7/15/2002	6	ug/L	10	0.0263	---	---	---	---	---	---	---	---
	12/2/2003	4	ug/L	10	0.0175	---	---	---	---	---	---	---	---
Di-n-Butyl Phthalate	7/19/1999	1	ug/L	5	0.0044	---	---	---	---	---	---	---	---
Di-n-Octyl Phthalate	7/19/1999	1	ug/L	5	0.0044	---	---	---	---	---	---	---	---
Ethylbenzene	7/18/1994	4	ug/L	2	0.0175	140	---	---	---	no	---	---	---
	7/8/1993	4	ug/L	4	0.0175	140	---	---	---	no	---	---	---
	7/17/2000	1.2	ug/L	2	0.0053	140	---	---	---	no	---	---	---
	12/2/2003	0.5	ug/L	2	0.0022	140	---	---	---	no	---	---	---
Gamma-BHC	7/23/2001	0.011	ug/L	0.009	0.0000	0.16	---	0.16	---	no	---	no	---
Heptachlor	1/16/1995	0.025	ug/L	0.02	0.0001	0.053	0.0036	0.053	0.0036	no	no	no	no
	7/23/2001	0.009	ug/L	0.009	0.0000	0.053	0.0036	0.053	0.0036	no	no	no	no
Heptachlor Epoxide	12/2/2003	0.004	ug/L	0.009	0.0000	---	---	0.053	0.0036	---	---	no	no
Lead	10/17/1995	10	ug/L	5	0.0439	---	---	---	---	---	---	---	---
	7/15/1996	1.8	ug/L	1.7	0.0079	---	---	---	---	---	---	---	---
	1/12/1998	7.0	ug/L	5	0.0307	---	---	---	---	---	---	---	---
	7/19/1999	7.6	ug/L	5	0.0333	---	---	---	---	---	---	---	---
	1/25/2000	3.3	ug/L	2	0.0145	---	---	---	---	---	---	---	---
	7/17/2000	1.4	ug/L	2	0.0061	---	---	---	---	---	---	---	---
	1/22/2001	2.6	ug/L	2	0.0114	---	---	---	---	---	---	---	---
	7/23/2001	0.85	ug/L	2	0.0037	---	---	---	---	---	---	---	---
	7/15/2002	1.5	ug/L	2	0.0066	---	---	---	---	---	---	---	---
	1/21/2003	2.2	ug/L	1	0.0096	---	---	---	---	---	---	---	---
	12/2/2003	2.4	ug/L	1	0.0105	---	---	---	---	---	---	---	---

Table J-5 Continued

Analyte	Date	Result	Unit	PQL	w/ Dilution	State Acute Toxicity Limit	State Chronic Toxicity Limit	Federal Acute Toxicity Criteria	Federal Chronic Toxicity Criteria	Exceeds State Acute Toxicity?	Exceed State Chronic Toxicity?	Exceeds Federal Water Quality Criteria for Acute Toxicity?	Exceeds Federal Water Quality Criteria for Chronic Toxicity?
Malathion	7/16/1995	1.6	ug/L	1	0.0070	---	0.1	---	0.1	---	no	---	no
Mercury	7/15/1996	0.16	ug/L	0.1	0.0007	---	---	1.8	0.94	---	---	no	no
(note Fed. Applies to total mercury)	7/15/2002	0.12	ug/L	0.2	0.0005	---	---	1.8	0.94	---	---	no	no
	1/21/2003	0.04	ug/L	0.2	0.0002	---	---	1.8	0.94	---	---	no	no
	12/2/2003	0.11	ug/L	0.2	0.0005	---	---	1.8	0.94	---	---	no	no
Mercury, Dissolved	7/15/1996	0.16	ug/L	0.1	0.0007	2.1	0.025	---	---	no	no	---	---
	1/25/1999	0.5	ug/L	0.5	0.0022	2.1	0.025	---	---	no	no	---	---
Methylene Chloride	7/13/1992	11	ug/L	4	0.0482	---	---	---	---	---	---	---	---
	1/25/1999	6	ug/L	2	0.0263	---	---	---	---	---	---	---	---
	1/25/2000	1.0	ug/L	2	0.0044	---	---	---	---	---	---	---	---
	7/17/2000	17	ug/L	2	0.0746	---	---	---	---	---	---	---	---
	1/22/2001	0.8	ug/L	2	0.0035	---	---	---	---	---	---	---	---
	7/23/2001	1.1	ug/L	2	0.0048	---	---	---	---	---	---	---	---
	12/2/2003	0.7	ug/L	2	0.0031	---	---	---	---	---	---	---	---
Nickel	7/15/1996	2.5	ug/L	1.6	0.0110	---	---	---	---	---	---	---	---
	1/13/1997	6	ug/L	5	0.0263	---	---	---	---	---	---	---	---
	7/6/1998	6.2	ug/L	5	0.0272	---	---	---	---	---	---	---	---
	7/19/1999	6.0	ug/L	5	0.0263	---	---	---	---	---	---	---	---
	1/25/2000	4.2	ug/L	2	0.0184	---	---	---	---	---	---	---	---
	7/17/2000	3.8	ug/L	2	0.0167	---	---	---	---	---	---	---	---
	1/22/2001	8.8	ug/L	2	0.0386	---	---	---	---	---	---	---	---
	7/23/2001	3.8	ug/L	2	0.0167	---	---	---	---	---	---	---	---
	7/15/2002	4.6	ug/L	2	0.0202	---	---	---	---	---	---	---	---
	1/21/2003	5.1	ug/L	1	0.0224	---	---	---	---	---	---	---	---
	12/2/2003	4.5	ug/L	2	0.0197	---	---	---	---	---	---	---	---

Table J-5 Continued

Analyte	Date	Result	Unit	PQL	w/ Dilution	State Acute Toxicity Limit	State Chronic Toxicity Limit	Federal Acute Toxicity Criteria	Federal Chronic Toxicity Criteria	Exceeds State Acute Toxicity?	Exceed State Chronic Toxicity?	Exceeds Federal Water Quality Criteria for Acute Toxicity?	Exceeds Federal Water Quality Criteria for Chronic Toxicity?
Nickel, Dissolved	7/15/1996	4	ug/L	1.6	0.0175	75	8.3	74	8.2	no	no	no	no
	1/13/1997	9	ug/L	5	0.0395	75	8.3	74	8.2	no	no	no	no
	7/19/1999	6.1	ug/L	5	0.0268	75	8.3	74	8.2	no	no	no	no
	1/25/2000	2.6	ug/L	2	0.0114	75	8.3	74	8.2	no	no	no	no
	7/17/2000	3.4	ug/L	2	0.0149	75	8.3	74	8.2	no	no	no	no
	1/22/2001	5.4	ug/L	2	0.0237	75	8.3	74	8.2	no	no	no	no
	7/23/2001	3.1	ug/L	2	0.0136	75	8.3	74	8.2	no	no	no	no
	7/15/2002	3.5	ug/L	2	0.0154	75	8.3	74	8.2	no	no	no	no
	1/21/2003	3.8	ug/L	1	0.0167	75	8.3	74	8.2	no	no	no	no
	12/2/2003	3.5	ug/L	2	0.0154	75	8.3	74	8.2	no	no	no	no
Phenol	1/12/1994	6	ug/L	5	0.0263	170	---	---	---	no	---	---	---
	7/19/1999	3	ug/L	5	0.0132	170	---	---	---	no	---	---	---
	7/17/2000	4	ug/L	10	0.0175	170	---	---	---	no	---	---	---
	1/22/2001	3	ug/L	10	0.0132	170	---	---	---	no	---	---	---
	7/15/2002	7	ug/L	10	0.0307	170	---	---	---	no	---	---	---
	2/25/2003	21	ug/L	11	0.0921	170	---	---	---	no	---	---	---
	12/2/2003	4	ug/L	5	0.0175	170	---	---	---	no	---	---	---
Selenium	7/15/1996	3.8	ug/L	2.4	0.0167	---	---	---	---	---	---	---	---
	1/13/1997	4	ug/L	4	0.0175	---	---	---	---	---	---	---	---
	1/12/1998	7.0	ug/L	4	0.0307	---	---	---	---	---	---	---	---
	1/25/1999	2.8	ug/L	2	0.0123	---	---	---	---	---	---	---	---
	1/25/2000	3.4	ug/L	2	0.0149	---	---	---	---	---	---	---	---
	7/17/2000	1.6	ug/L	2	0.0070	---	---	---	---	---	---	---	---
	1/22/2001	1.6	ug/L	2	0.0070	---	---	---	---	---	---	---	---
	7/23/2001	1.3	ug/L	2	0.0057	---	---	---	---	---	---	---	---
	7/15/2002	1.5	ug/L	2	0.0066	---	---	---	---	---	---	---	---
	12/2/2003	1.3	ug/L	2	0.0057	---	---	---	---	---	---	---	---

Table J-5 Continued

Analyte	Date	Result	Unit	PQL	w/ Dilution	State Acute Toxicity Limit	State Chronic Toxicity Limit	Federal Acute Toxicity Criteria	Federal Chronic Toxicity Criteria	Exceeds State Acute Toxicity?	Exceed State Chronic Toxicity?	Exceeds Federal Water Quality Criteria for Acute Toxicity?	Exceeds Federal Water Quality Criteria for Chronic Toxicity?
Selenium, Dissolved	7/15/1996	4	ug/L	2.4	0.0175	300	71	290	71	no	no	no	no
	1/13/1997	4	ug/L	4	0.0175	300	71	290	71	no	no	no	no
	1/12/1998	3.1	ug/L	4	0.0136	300	71	290	71	no	no	no	no
	1/25/2000	4.5	ug/L	2	0.0197	300	71	290	71	no	no	no	no
	1/22/2001	1.0	ug/L	2	0.0044	300	71	290	71	no	no	no	no
	7/23/2001	1.1	ug/L	2	0.0048	300	71	290	71	no	no	no	no
	7/15/2002	2.2	ug/L	2	0.0096	300	71	290	71	no	no	no	no
	1/21/2003	0.8	ug/L	2	0.0035	300	71	290	71	no	no	no	no
	12/2/2003	0.9	ug/L	2	0.0039	300	71	290	71	no	no	no	no
Silver	1/12/1994	8	ug/L	5	0.0351	---	---	---	---	---	---	---	---
	7/18/1994	1.9	ug/L	0.5	0.0083	---	---	---	---	---	---	---	---
	1/16/1995	2.7	ug/L	0.5	0.0118	---	---	---	---	---	---	---	---
	1/17/1996	1	ug/L	1	0.0044	---	---	---	---	---	---	---	---
	7/15/1996	2.2	ug/L	1.3	0.0096	---	---	---	---	---	---	---	---
	1/13/1997	4	ug/L	1	0.0175	---	---	---	---	---	---	---	---
	1/12/1998	5.4	ug/L	1	0.0237	---	---	---	---	---	---	---	---
	7/6/1998	1.8	ug/L	0.5	0.0079	---	---	---	---	---	---	---	---
	1/25/1999	2.0	ug/L	0.5	0.0088	---	---	---	---	---	---	---	---
	1/25/2000	1.6	ug/L	0.2	0.0070	---	---	---	---	---	---	---	---
	7/17/2000	1.4	ug/L	2	0.0061	---	---	---	---	---	---	---	---
	1/22/2001	3.0	ug/L	0.5	0.0132	---	---	---	---	---	---	---	---
	7/23/2001	2.2	ug/L	2	0.0096	---	---	---	---	---	---	---	---
	7/15/2002	2.4	ug/L	2	0.0105	---	---	---	---	---	---	---	---
	1/21/2003	2.8	ug/L	0.5	0.0123	---	---	---	---	---	---	---	---
	12/2/2003	2.3	ug/L	0.4	0.0101	---	---	---	---	---	---	---	---

Table J-5 Continued

Analyte	Date	Result	Unit	PQL	w/ Dilution	State Acute Toxicity Limit	State Chronic Toxicity Limit	Federal Acute Toxicity Criteria	Federal Chronic Toxicity Criteria	Exceeds State Acute Toxicity?	Exceed State Chronic Toxicity?	Exceeds Federal Water Quality Criteria for Acute Toxicity?	Exceeds Federal Water Quality Criteria for Chronic Toxicity?
Silver, Dissolved	1/13/1997	3	ug/L	1	0.0132	2.3	---	1.9	---	no	---	no	---
	1/12/1998	1.3	ug/L	1	0.0057	2.3	---	1.9	---	no	---	no	---
	7/6/1998	1.2	ug/L	0.5	0.0053	2.3	---	1.9	---	no	---	no	---
	1/25/1999	2.2	ug/L	0.5	0.0096	2.3	---	1.9	---	no	---	no	---
	7/17/2000	0.1	ug/L	2	0.0004	2.3	---	1.9	---	no	---	no	---
	7/15/2002	0.12	ug/L	2	0.0005	2.3	---	1.9	---	no	---	no	---
Tetrachloroethene	1/25/2000	0.7	ug/L	2	0.0031	---	---	---	---	---	---	---	---
	7/17/2000	0.6	ug/L	2	0.0026	---	---	---	---	---	---	---	---
	1/22/2001	0.6	ug/L	2	0.0026	---	---	---	---	---	---	---	---
Thallium	7/15/2002	0.02	ug/L	2	0.0001	---	---	---	---	---	---	---	---
Thallium, Dissolved	10/17/1995	3	ug/L	2	0.0132	710	---	---	---	no	---	---	---
	7/17/2000	0.03	ug/L	2	0.0001	710	---	---	---	no	---	---	---
	7/23/2001	0.10	ug/L	2	0.0004	710	---	---	---	no	---	---	---
Toluene	7/8/1993	5	ug/L	4	0.0219	2,100	---	---	---	no	---	---	---
	1/12/1994	1.1	ug/L	0.5	0.0048	2,100	---	---	---	no	---	---	---
	7/18/1994	3	ug/L	1	0.0132	2,100	---	---	---	no	---	---	---
	10/17/1995	3	ug/L	2	0.0132	2,100	---	---	---	no	---	---	---
	7/19/1999	2.1	ug/L	2	0.0092	2,100	---	---	---	no	---	---	---
	1/25/2000	2.3	ug/L	2	0.0101	2,100	---	---	---	no	---	---	---
	7/17/2000	3.0	ug/L	2	0.0132	2,100	---	---	---	no	---	---	---
	1/22/2001	1.2	ug/L	2	0.0053	2,100	---	---	---	no	---	---	---
	7/23/2001	1.1	ug/L	2	0.0048	2,100	---	---	---	no	---	---	---
	7/15/2002	2.3	ug/L	1	0.0101	2,100	---	---	---	no	---	---	---
	1/21/2003	1.5	ug/L	2	0.0066	2,100	---	---	---	no	---	---	---
	12/2/2003	2.0	ug/L	2	0.0088	2,100	---	---	---	no	---	---	---
Tributyltin	1/16/1995	0.55	ug/L	0.1	0.0024	---	0.01	0.37	0.01	---	no	no	no
	7/15/1996	0.058	ug/L	0.055	0.0003	---	0.01	0.37	0.01	---	no	no	no

Table J-5 Continued

Analyte	Date	Result	Unit	PQL	w/ Dilution	State Acute Toxicity Limit	State Chronic Toxicity Limit	Federal Acute Toxicity Criteria	Federal Chronic Toxicity Criteria	Exceeds State Acute Toxicity?	Exceed State Chronic Toxicity?	Exceeds Federal Water Quality Criteria for Acute Toxicity?	Exceeds Federal Water Quality Criteria for Chronic Toxicity?
Zinc	9/7/1986	180	ug/L	20	0.7895	---	---	---	---	---	---	---	---
	8/29/1989	130	ug/L	20	0.5702	---	---	---	---	---	---	---	---
	7/8/1991	60	ug/L	20	0.2632	---	---	---	---	---	---	---	---
	1/28/1992	70	ug/L	20	0.3070	---	---	---	---	---	---	---	---
	7/13/1992	140	ug/L	20	0.6140	---	---	---	---	---	---	---	---
	1/23/1993	70	ug/L	20	0.3070	---	---	---	---	---	---	---	---
	7/8/1993	57	ug/L	20	0.2500	---	---	---	---	---	---	---	---
	1/12/1994	70	ug/L	50	0.3070	---	---	---	---	---	---	---	---
	7/18/1994	85.3	ug/L	10	0.3741	---	---	---	---	---	---	---	---
	1/16/1995	50	ug/L	10	0.2193	---	---	---	---	---	---	---	---
	7/16/1995	62	ug/L	20	0.2719	---	---	---	---	---	---	---	---
	10/17/1995	44	ug/L	20	0.1930	---	---	---	---	---	---	---	---
	7/15/1996	47	ug/L	0.5	0.2061	---	---	---	---	---	---	---	---
	1/13/1997	44	ug/L	20	0.1930	---	---	---	---	---	---	---	---
	1/12/1998	57	ug/L	20	0.2500	---	---	---	---	---	---	---	---
	7/6/1998	92	ug/L	20	0.4035	---	---	---	---	---	---	---	---
	1/25/1999	55	ug/L	20	0.2412	---	---	---	---	---	---	---	---
	7/19/1999	80	ug/L	20	0.3509	---	---	---	---	---	---	---	---
	1/25/2000	43	ug/L	2	0.1886	---	---	---	---	---	---	---	---
	7/17/2000	52	ug/L	2	0.2281	---	---	---	---	---	---	---	---
	1/22/2001	91	ug/L	10	0.3991	---	---	---	---	---	---	---	---
	7/23/2001	39	ug/L	2	0.1711	---	---	---	---	---	---	---	---
	7/15/2002	77	ug/L	2	0.3377	---	---	---	---	---	---	---	---
	1/21/2003	90	ug/L	10	0.3947	---	---	---	---	---	---	---	---
	12/2/2003	100	ug/L	10	0.4386	---	---	---	---	---	---	---	---
Zinc, Dissolved	7/18/1994	15.3	ug/L	10	0.0671	95	86	90	81	no	no	no	no
	7/15/1996	8.4	ug/L	0.5	0.0368	95	86	90	81	no	no	no	no
	1/13/1997	30	ug/L	20	0.1316	95	86	90	81	no	no	no	no
	1/12/1998	37	ug/L	20	0.1623	95	86	90	81	no	no	no	no
	7/6/1998	47	ug/L	20	0.2061	95	86	90	81	no	no	no	no
	1/25/1999	35	ug/L	20	0.1535	95	86	90	81	no	no	no	no
	7/19/1999	34	ug/L	20	0.1491	95	86	90	81	no	no	no	no
	1/25/2000	76	ug/L	2	0.3333	95	86	90	81	no	no	no	no
	7/17/2000	13	ug/L	2	0.0570	95	86	90	81	no	no	no	no
	1/22/2001	15	ug/L	10	0.0658	95	86	90	81	no	no	no	no
	7/23/2001	7.7	ug/L	2	0.0338	95	86	90	81	no	no	no	no
	7/15/2002	21	ug/L	2	0.0921	95	86	90	81	no	no	no	no
	1/21/2003	18	ug/L	10	0.0789	95	86	90	81	no	no	no	no
	12/2/2003	12	ug/L	10	0.0526	95	86	90	81	no	no	no	no

It should be noted that for many years, the City was unable to report daily effluent flow measurements either due to the lack of a flow meter or an effluent flow meter was unable to provide measurements with acceptable accuracy.

Because a 24-composite sample is used to analyze various parameters, e.g., BOD5, TSS and priority pollutants, it is flow-weighted. Given this, a flow meter is integrated with the composite sampler. For many years, the influent flow meter was used to "drive" the effluent sampler.

In November 2003, the effluent sampler was hooked to an effluent flow meter that provided acceptable accuracy. Thus, effluent flow readings, including the priority pollutant and pesticides results, are now being reported on Discharge Monitoring Reports.

Before November 2003, effluent priority pollutant and pesticides were reported on a separate sheet to provide an approximation of the pollutant concentrations.

Due to the lack of accurate flow readings, the priority pollutant concentrations prior to November 2003 were mainly approximate values.

SLUDGE

In 2003, approximately 96% of the primary and secondary sludge from the Honouliuli WWTP were trucked to the Navy composting facility at Barbers Point. At the composting facility, the sludge was combined with green waste. The remaining sludge material was hauled by truck to the City Waimanalo Gulch Sanitary Landfill for disposal.

The current HWWTP 301(h) NPDES permit requires the semi-annual priority pollutant and pesticide scan on sludge generated from the treatment plant. Monitoring data review was limited to the period between May 15, 1993 and March 8, 2004, i.e., 23 sampling events. Pollutant concentrations were on a dry weight basis.

The feasibility of primary and secondary sludge for biosolids applications and disposal methods were evaluated by the City. A key factor in the reuse of biosolids is their compliance with the limitations listed in 40 CFR 503, the Federal regulations governing the use and disposal of sewage sludge. 40 CFR 503 provides limitations for various applications and distribution, i.e., whether biosolids is being sold or given away in bulk or bagged. The table below compares the highest concentration measured in combined primary/secondary sludge from the Honouliuli WWTP to the ceiling concentration of Table 1 in Section 503.13 of the regulations. All biosolids that are land applied must meet these ceiling concentrations.

Table J-6 Comparison of the HWWTP Sludge with Federal Standards for Reuse

Pollutant	Ceiling concentration (mg/Kg)	Highest measured concentration mg/Kg

Pollutant	Ceiling concentration (mg/Kg)	Highest measured concentration mg/Kg
Arsenic	75	1.20
Cadmium	85	1.7
Chromium	3,000	38.6
Copper	4,300	386
Lead	840	25.9
Mercury	57	3.0
Molybdenum	75	3.2
Nickel	420	27.8
Selenium	100	2
Zinc	7,500	615

Notes: All are in the dry weight basis. The table above applies to all biosolids that are land applied. The limitations can be found in 40 CFR 503.13, Table 1.

The pollutant profile for all years sampled on sludge from the Honouliuli WWTP is well below the ceiling concentrations. Below Table J-7 provides the detected priority pollutant and pesticide concentrations in sludge.

Table J-7 Detected Priority Pollutant and Pesticide in Sludge from the HWWTP

Analyte	Date	Result	PQL	Unit
Arsenic	3/4/1996	1200	218	ug/Kg dry
Cadmium	1/19/1994	4	2	mg/Kg dry
	7/12/1994	4	2	mg/Kg dry
	3/4/1996	1700	16	ug/Kg dry
Cadmium				
Chromium, Total	1/19/1994	22	4	mg/Kg dry
	7/12/1994	23	2	mg/Kg dry
	1/2/1995	18	2	mg/Kg dry
	3/4/1996	38600	38	ug/Kg dry
	9/10/1996	33400	32	ug/Kg dry
	3/17/1997	38100	63	ug/Kg dry
	9/8/1997	24800	40	ug/Kg dry
	3/16/1998	25200	46	ug/Kg dry
	9/8/1998	25000	68	ug/Kg dry
	3/8/1999	20400	39	ug/Kg dry
	9/7/1999	33.0	0.07	mg/Kg dry
	3/20/2000	31.8	0.11	mg/Kg dry
	9/6/2000	31.4	0.06	mg/Kg dry
	3/12/2001	30.6	0.074	mg/Kg dry
	9/10/2001	27.4	0.037	mg/Kg dry
	3/11/2002	33.9	0.054	mg/Kg dry
	9/9/2002	33.8	0.102	mg/Kg dry
	3/10/2003	27.9	0.04	mg/Kg dry
	9/8/2003	28.7	0.05	mg/Kg dry
	3/8/2004	37.7	0.08	mg/Kg dry
Copper	1/19/1994	247	3	mg/Kg dry
	7/12/1994	229	4	mg/Kg dry
	1/2/1995	200	4	mg/Kg dry
	3/4/1996	279000	54	ug/Kg dry
Copper	9/10/1996	289000	58	ug/Kg dry
	3/17/1997	386000	63	ug/Kg dry
	9/8/1997	262000	60	ug/Kg dry
	3/16/1998	282000	61	ug/Kg dry
	9/8/1998	283000	130	ug/Kg dry
	3/8/1999	207000	44	ug/Kg dry
	9/7/1999	289	0.11	mg/Kg dry
	3/20/2000	335	0.11	mg/Kg dry
	9/6/2000	335	0.1	mg/Kg dry
	3/12/2001	310	0.132	mg/Kg dry
	9/10/2001	291	0.053	mg/Kg dry
	3/11/2002	296	0.128	mg/Kg dry
	9/9/2002	302	0.092	mg/Kg dry
	3/10/2003	308	0.11	mg/Kg dry
	9/8/2003	316	0.11	mg/Kg dry
	3/8/2004	324	0.16	mg/Kg dry
Lead	1/19/1994	27	3	mg/Kg dry
	7/12/1994	36	2	mg/Kg dry
	1/2/1995	22	2	mg/Kg dry
	3/4/1996	32900	103	ug/Kg dry

Table J-7 Continued

Analyte	Date	Result	PQL	Unit
Lead	9/10/1996	24000	48	ug/Kg dry
	3/17/1997	25900	99	ug/Kg dry
	9/8/1997	18600	80	ug/Kg dry
	3/16/1998	19900	91	ug/Kg dry
	9/8/1998	20500	146	ug/Kg dry
	3/8/1999	12700	48	ug/Kg dry
	9/7/1999	18.4	0.04	mg/Kg dry
	3/20/2000	22.2	0.12	mg/Kg dry
	9/6/2000	18	0.09	mg/Kg dry
	3/12/2001	19.9	0.069	mg/Kg dry
	9/10/2001	13.1	0.032	mg/Kg dry
	3/11/2002	18.2	0.044	mg/Kg dry
	9/9/2002	37.3	0.073	mg/Kg dry
	3/10/2003	15.2	0.06	mg/Kg dry
	9/8/2003	14.0	0.07	mg/Kg dry
	3/8/2004	16.6	0.08	mg/Kg dry
Mercury	3/4/1996	2500	73	ug/Kg dry
	9/10/1996	1700	80	ug/Kg dry
	3/17/1997	1500	55	ug/Kg dry
	9/8/1997	2800	40	ug/Kg dry
	3/16/1998	2200	42	ug/Kg dry
	9/8/1998	1600	43	ug/Kg dry
	3/8/1999	3000	42	ug/Kg dry
	9/7/1999	1.6	0.04	mg/Kg dry
	3/20/2000	2.8	0.04	mg/Kg dry
	9/6/2000	1.1	0.04	mg/Kg dry
	3/12/2001	2.4	0.048	mg/Kg dry
	9/10/2001	1.50	0.042	mg/Kg dry
	3/11/2002	2.0	0.043	mg/Kg dry
	9/9/2002	1.5	0.043	mg/Kg dry
	3/10/2003	2.0	0.04	mg/Kg dry
	9/8/2003	1.5	0.04	mg/Kg dry
	3/8/2004	1.2	0.03	mg/Kg dry
Mercury	1/19/1994	0.2	0.01	mg/Kg dry
	7/12/1994	0.21	0.01	mg/Kg dry
	1/2/1995	0.79	0.02	mg/Kg dry
Molybdenum	7/12/1994	2	2	mg/Kg dry
	1/2/1995	2	2	mg/Kg dry
	3/4/1996	3200	93	ug/Kg dry
	3/8/1999	2200	68	ug/Kg dry
	9/7/1999	3.3	0.07	mg/Kg dry
	3/20/2000	3.7	0.08	mg/Kg dry
	9/6/2000	4.2	0.15	mg/Kg dry
	3/12/2001	4.8	0.063	mg/Kg dry
	9/10/2001	5.70	0.048	mg/Kg dry
	3/11/2002	5.1	0.083	mg/Kg dry
	9/9/2002	4.6	0.039	mg/Kg dry
	3/10/2003	4.4	0.07	mg/Kg dry
	9/8/2003	5.3	0.05	mg/Kg dry
	3/8/2004	4.5	0.12	mg/Kg dry

Table J-7 Continued

Analyte	Date	Result	PQL	Unit
Nickel	1/19/1994	14	10	mg/Kg dry
	7/12/1994	14	10	mg/Kg dry
	1/2/1995	11	10	mg/Kg dry
	3/4/1996	27800	87	ug/Kg dry
Nickel	9/10/1996	21700	83	ug/Kg dry
	3/17/1997	24900	110	ug/Kg dry
	9/8/1997	13900	40	ug/Kg dry
	3/16/1998	10700	66	ug/Kg dry
	9/8/1998	12200	172	ug/Kg dry
	3/8/1999	9600	92	ug/Kg dry
	9/7/1999	14.0	0.12	mg/Kg dry
	3/20/2000	16.4	0.15	mg/Kg dry
	9/6/2000	16.1	0.11	mg/Kg dry
	3/12/2001	18.5	0.069	mg/Kg dry
	9/10/2001	12.4	0.112	mg/Kg dry
	3/11/2002	20.3	0.123	mg/Kg dry
	9/9/2002	14.5	0.14	mg/Kg dry
	3/10/2003	15.6	0.12	mg/Kg dry
	9/8/2003	14.4	0.12	mg/Kg dry
	3/8/2004	23.2	0.12	mg/Kg dry
Selenium	1/19/1994	2	1	mg/Kg dry
	1/2/1995	2	2	mg/Kg dry
	3/4/1996	3500	185	ug/Kg dry
Selenium	9/10/1996	3700	99	ug/Kg dry
	3/17/1997	5400	136	ug/Kg dry
	9/8/1997	3800	200	ug/Kg dry
	3/16/1998	3100	158	ug/Kg dry
	9/8/1998	4000	255	ug/Kg dry
	3/8/1999	2800	175	ug/Kg dry
	9/7/1999	3.8	0.15	mg/Kg dry
	3/20/2000	4.7	0.21	mg/Kg dry
	9/6/2000	4.5	0.14	mg/Kg dry
	3/12/2001	3.7	0.206	mg/Kg dry
	9/10/2001	3.00	0.064	mg/Kg dry
	3/11/2002	4.1	0.098	mg/Kg dry
	9/9/2002	4.8	0.14	mg/Kg dry
	3/10/2003	5.3	0.18	mg/Kg dry
	9/8/2003	3.7	0.18	mg/Kg dry
	3/8/2004	5.1	0.2	mg/Kg dry

Table J-7 Continued

Analyte	Date	Result	PQL	Unit
Zinc	3/4/1996	579000	16	ug/Kg dry
Zinc	1/19/1994	554	3	mg/Kg dry
	7/12/1994	497	8	mg/Kg dry
	1/2/1995	400	5	mg/Kg dry
	9/10/1996	571000	74	ug/Kg dry
	3/17/1997	615000	68	ug/Kg dry
	9/8/1997	500000	90	ug/Kg dry
	3/16/1998	489000	81	ug/Kg dry
	9/8/1998	498000	109	ug/Kg dry
	3/8/1999	341000	102	ug/Kg dry
	9/7/1999	434	0.05	mg/Kg dry
	3/20/2000	709	0.08	mg/Kg dry
	9/6/2000	573	0.07	mg/Kg dry
	3/12/2001	490	0.253	mg/Kg dry
	9/10/2001	496	0.08	mg/Kg dry
	3/11/2002	445	0.132	mg/Kg dry
	9/9/2002	459	0.116	mg/Kg dry
	3/10/2003	634	1.15	mg/Kg dry
	9/8/2003	447	0.11	mg/Kg dry
	3/8/2004	447	0.21	mg/Kg dry

For sludge disposal at the landfill, the Honouliuli WWTP sludge must pass the Paint Filter Test as required by 40 CFR 264.314 and 265.314; and the Toxicity Characteristic Leachate Procedure (TCLP) test. A comparison of the TCLP results will be compared with the limitations in 40 CFR Section 261.24. When completed, the City will be submitting the determination for compliance under a separate cover letter.

EPA has published a risk assessment document on biosolids use (# EPA/832/R-93/003). The first column of Table J-8 identifies the inorganic and organic pollutants levels that are considered a risk to human health.

Table J-8 Sludge Priority Pollutant and Pesticide Concentrations Compared with Risk Limits

	Pollutant Limit (RSC) (ug/pollutants/g-biosolids dry weight basis)	Highest concentration measured in the HWWTP Sludge (ug/g dry weight basis)
Inorganic Pollutant		
Arsenic	41	1.20
Cadmium	39	1.7
Chromium	3,000	38.6
Copper	1,500	386
Lead	300	25.9
Mercury	17	3.0
Molybdenum	18	3.2
Nickel	420	27.8
Selenium	100	2
Zinc	2,800	615
Organic Pollutant		
Aldrin/Dieldrin	2.7	0.003/0.170
Benzo(a)pyrene	15	ND[1]
Chlordane	86	0.620
DDT/DDD/DDE	120	0.028/0.021/0.034
Heptachlor	7.4	0.081
Hexachlorobenzene	29	ND[2]
Hexachlorobutadiene	600	ND[3]
Lindane	84	0.0071
n-Nitroso-dimethyl-amine	2,1	ND[4]
PCBs	4.6	ND[5]
Toxaphene	10	ND[6]
Trichloroethylene	10,000	ND[7]

1, 2, 3, – From 1993 to March 2004, the PQL ranged from 4.5 to 40 ug/g
4- PQL ranged from 5.3 to 40 ug/g
5 – Assessed the cogeners PCB-1016, -1221, -1232, -1242, -1248, -1254, -1260. PQL ranged from 0.002 to 0.02 ug/g
6 – PQL ranged from 0.005 to .54 ug/g
7 – PQL ranged from .008 to 0.081 ug/g

The last column in the table contained the highest pollutant concentration measured in the Honouliuli sludge. All concentrations were below the risk levels.

Tables J-6 and J-9 provide the concentrations in sludge for the various analytes listed in the Table J-8 above.

Table J-9 Detected Organic Compounds in Sludge

Analyte	Date	Result	PQL	Unit
4,4`-DDE	7/12/1994	34	1	ug/Kg dry
4,4'-DDD	3/4/1996	16	11	ug/Kg dry
	9/9/2002	0.021	0.01	mg/Kg dry
4,4'-DDE	3/4/1996	20	11	ug/Kg dry
	3/17/1997	20	11	ug/Kg dry
	9/9/2002	0.031	0.01	mg/Kg dry
	11/18/2002	0.016	0.01	mg/Kg dry
	3/10/2003	0.010	0.009	mg/Kg dry
	3/8/2004	0.013	0.011	mg/Kg dry
4,4'-DDT	3/16/1998	14	10	ug/Kg dry
	3/12/2001	0.028	0.011	mg/Kg dry
	9/9/2002	0.014	0.01	mg/Kg dry
	11/18/2002	0.016	0.01	mg/Kg dry
Aldrin	11/18/2002	0.009	0.0053	mg/Kg dry
Chlordane	3/4/1996	330	57	ug/Kg dry
	9/10/1996	420	100	ug/Kg dry
	3/17/1997	460	56	ug/Kg dry
	9/8/1997	510	50	ug/Kg dry
	9/8/1998	180	53	ug/Kg dry
	9/7/1999	0.29	0.053	mg/Kg dry
	3/20/2000	0.3100	0.053	mg/Kg dry
	9/6/2000	0.310	0.053	mg/Kg dry
	9/10/2001	0.12	0.052	mg/Kg dry
	3/10/2003	0.230	0.047	mg/Kg dry
	3/8/2004	0.620	0.054	mg/Kg dry
Chlordane, Alpha	7/12/1994	7.4	5	ug/Kg dry
Chlordane, Gamma	7/12/1994	13	5	ug/Kg dry
Dieldrin	7/12/1994	8.1	1	ug/Kg dry
	3/4/1996	66	11	ug/Kg dry
	9/10/1996	170	20	ug/Kg dry
	3/17/1997	77	11	ug/Kg dry
	9/8/1997	24	10	ug/Kg dry
	3/16/1998	33	10	ug/Kg dry
	9/8/1998	20	10	ug/Kg dry
	3/8/1999	24	10	ug/Kg dry
	9/7/1999	0.037	0.01	mg/Kg dry
	3/20/2000	0.0230	0.01	mg/Kg dry
	9/6/2000	0.023	0.01	mg/Kg dry
	3/12/2001	0.031	0.011	mg/Kg dry
	9/10/2001	0.021	0.01	mg/Kg dry
	3/11/2002	0.040	0.01	mg/Kg dry
	9/9/2002	0.037	0.01	mg/Kg dry
	11/18/2002	0.054	0.01	mg/Kg dry
	3/10/2003	0.038	0.009	mg/Kg dry
	9/8/2003	0.016	0.01	mg/Kg dry
	3/8/2004	0.071	0.011	mg/Kg dry

Table J-9 Continued

Analyte	Date	Result	PQL	Unit
Gamma-BHC	3/16/1998	6.0	5.3	ug/Kg dry
	3/20/2000	0.0071	0.0053	mg/Kg dry
	9/9/2002	0.012	0.0052	mg/Kg dry
	11/18/2002	0.0083	0.0053	mg/Kg dry
Heptachlor	7/12/1994	33	1	ug/Kg dry
	3/4/1996	9.2	5.7	ug/Kg dry
	3/8/1999	8.5	5	ug/Kg dry
	9/7/1999	0.065	0.0053	mg/Kg dry
	3/20/2000	0.0700	0.0053	mg/Kg dry
	9/6/2000	0.025	0.0053	mg/Kg dry
	3/12/2001	0.083	0.0054	mg/Kg dry
	3/11/2002	0.081	0.005	mg/Kg dry
	9/9/2002	0.014	0.0052	mg/Kg dry
	11/18/2002	0.016	0.0053	mg/Kg dry
	3/10/2003	0.016	0.005	mg/Kg dry
	3/8/2004	0.020	0.005	mg/Kg dry
PCB-1260	3/17/1997	120	56	ug/Kg dry
	3/8/1999	58	50	ug/Kg dry
	9/7/1999	0.058	0.053	mg/Kg dry

SEDIMENT

As required by the Honouliuli WWTP NPDES Permit, priority pollutants and pesticides in marine sediments samples were measured in the laboratory and reported to US EPA and State of Hawaii Department of Health. The list of pollutants (analytes) monitored by the City originated from Section 307 of the Federal Water Pollution Control Act. This list is attached in the Honouliuli WWTP's 301(h) NPDES permit. There are currently 126 priority toxic pollutants listed under Section 307. Table J-10 lists all of the priority pollutants and pesticides presently analyzed by the City.

Table J-10 Priority Pollutant and Pesticides Parameters for Marine Sediment

Target Analyte	Type	Type 2
Antimony	Total Recoverable Metal	Priority Pollutant
Arsenic	Total Recoverable Metal	Priority Pollutant
Beryllium	Total Recoverable Metal	Priority Pollutant
Cadmium	Total Recoverable Metal	Priority Pollutant
Chromium, Total	Total Recoverable Metal	Priority Pollutant
Copper	Total Recoverable Metal	Priority Pollutant
Lead	Total Recoverable Metal	Priority Pollutant
Mercury	Total Recoverable Metal	Priority Pollutant
Nickel	Total Recoverable Metal	Priority Pollutant
Selenium	Total Recoverable Metal	Priority Pollutant
Silver	Total Recoverable Metal	Priority Pollutant
Thallium	Total Recoverable Metal	Priority Pollutant
Zinc	Total Recoverable Metal	Priority Pollutant
Acrolein	Volatile Organic	Priority Pollutant
Acrylonitrile	Volatile Organic	Priority Pollutant
Benzene	Volatile Organic	Priority Pollutant
Bromodichloromethane	Volatile Organic	Priority Pollutant
Bromoform	Volatile Organic	Priority Pollutant
Bromomethane	Volatile Organic	Priority Pollutant
Carbon Tetrachloride	Volatile Organic	Priority Pollutant
Chlorobenzene	Volatile Organic	Priority Pollutant
Chloroethane	Volatile Organic	Priority Pollutant
2-Chloroethyl vinyl ether	Volatile Organic	Priority Pollutant
Chloroform	Volatile Organic	Priority Pollutant
Chloromethane	Volatile Organic	Priority Pollutant
Dibromochloromethane	Volatile Organic	Priority Pollutant
1,2-Dichlorobenzene	Volatile Organic	Priority Pollutant
1,3-Dichlorobenzene	Volatile Organic	Priority Pollutant
1,4-Dichlorobenzene	Volatile Organic	Priority Pollutant
1,1-Dichloroethane	Volatile Organic	Priority Pollutant
1,2-Dichloroethane	Volatile Organic	Priority Pollutant
1,1-Dichloroethene	Volatile Organic	Priority Pollutant
trans-1,2-Dichloroethene	Volatile Organic	Priority Pollutant
1,2-Dichloropropane	Volatile Organic	Priority Pollutant
cis-1,3-Dichloropropene	Volatile Organic	Priority Pollutant
trans-1,3-Dichloropropene	Volatile Organic	Priority Pollutant
Ethylbenzene	Volatile Organic	Priority Pollutant
Methylene Chloride	Volatile Organic	Priority Pollutant
1,1,2,2-Tetrachloroethane	Volatile Organic	Priority Pollutant
Tetrachloroethene	Volatile Organic	Priority Pollutant
Toluene	Volatile Organic	Priority Pollutant
1,1,1-Trichloroethane	Volatile Organic	Priority Pollutant
1,1,2-Trichloroethane	Volatile Organic	Priority Pollutant
Trichloroethene	Volatile Organic	Priority Pollutant
Vinyl Chloride	Volatile Organic	Priority Pollutant
Acenaphthene	Semivolatile Organic	Priority Pollutant

Table J-10 Continued

Target Analyte	Type	Type 2
Acenaphthylene	Semivolatile Organic	Priority Pollutant
Anthracene	Semivolatile Organic	Priority Pollutant
Benzidine	Semivolatile Organic	Priority Pollutant
Benzo(a)anthracene	Semivolatile Organic	Priority Pollutant
Benzo(b)fluoranthene	Semivolatile Organic	Priority Pollutant
Benzo(k)fluoranthene	Semivolatile Organic	Priority Pollutant
Benzo(g,h,i)perylene	Semivolatile Organic	Priority Pollutant
Benzo(a)pyrene	Semivolatile Organic	Priority Pollutant
Bis(2-chloroethoxy)methane	Semivolatile Organic	Priority Pollutant
Bis(2-chloroethyl)ether	Semivolatile Organic	Priority Pollutant
Bis(2-chloroisopropyl)ether	Semivolatile Organic	Priority Pollutant
Bis(2-ethylhexyl)phthalate	Semivolatile Organic	Priority Pollutant
4-Bromophenyl Phenyl Ether	Semivolatile Organic	Priority Pollutant
Butyl Benzyl Phthalate	Semivolatile Organic	Priority Pollutant
2-Chloronaphthalene	Semivolatile Organic	Priority Pollutant
4-Chlorophenyl Phenyl Ether	Semivolatile Organic	Priority Pollutant
Chrysene	Semivolatile Organic	Priority Pollutant
Dibenzo(a,h)anthracene	Semivolatile Organic	Priority Pollutant
3,3-Dichlorobenzidine	Semivolatile Organic	Priority Pollutant
Diethyl Phthalate	Semivolatile Organic	Priority Pollutant
Dimethyl Phthalate	Semivolatile Organic	Priority Pollutant
2,4-Dinitrotoluene	Semivolatile Organic	Priority Pollutant
2,6-Dinitrotoluene	Semivolatile Organic	Priority Pollutant
Di-n-Butyl Phthalate	Semivolatile Organic	Priority Pollutant
Di-n-Octyl Phthalate	Semivolatile Organic	Priority Pollutant
1,2-Diphenylhydrazine	Semivolatile Organic	Priority Pollutant
Fluoranthene	Semivolatile Organic	Priority Pollutant
Fluorene	Semivolatile Organic	Priority Pollutant
Hexachlorobenzene	Semivolatile Organic	Priority Pollutant
Hexachlorobutadiene	Semivolatile Organic	Priority Pollutant
Hexachlorocyclopentadiene	Semivolatile Organic	Priority Pollutant
Hexachloroethane	Semivolatile Organic	Priority Pollutant
Indeno(1,2,3-cd)pyrene	Semivolatile Organic	Priority Pollutant
Isophorone	Semivolatile Organic	Priority Pollutant
Naphthalene	Semivolatile Organic	Priority Pollutant
Nitrobenzene	Semivolatile Organic	Priority Pollutant
N-Nitrosodimethylamine	Semivolatile Organic	Priority Pollutant
N-Nitrosodiphenylamine	Semivolatile Organic	Priority Pollutant
N-Nitrosodi-n-propylamine	Semivolatile Organic	Priority Pollutant
Phenanthrene	Semivolatile Organic	Priority Pollutant
Pyrene	Semivolatile Organic	Priority Pollutant
1,2,4-Trichlorobenzene	Semivolatile Organic	Priority Pollutant
2-Chlorophenol	Semivolatile Organic	Priority Pollutant
4-Chloro-3-methylphenol	Semivolatile Organic	Priority Pollutant
2,4-Dichlorophenol	Semivolatile Organic	Priority Pollutant
2,4-Dimethylphenol	Semivolatile Organic	Priority Pollutant

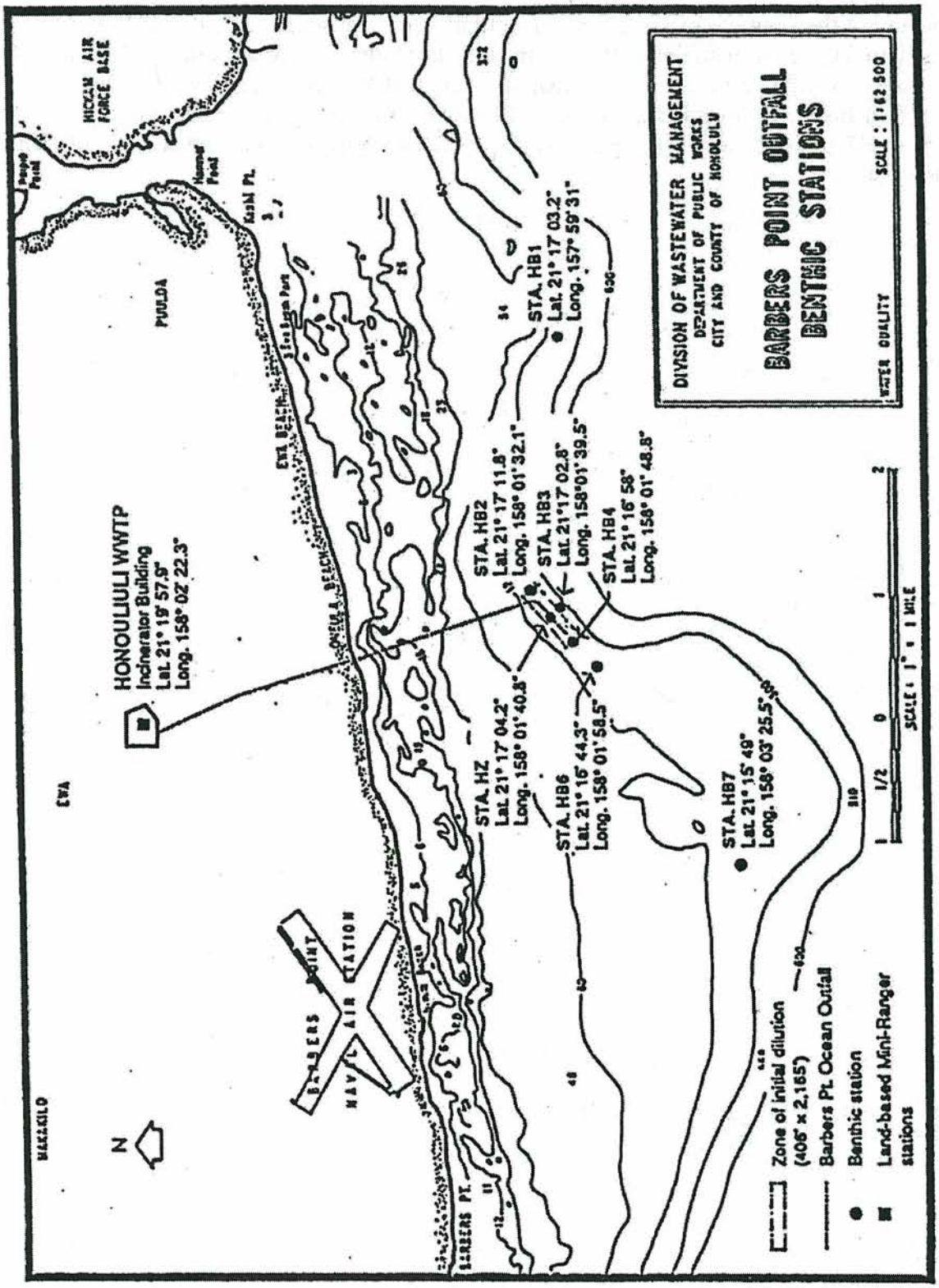
Table J-10 Continued

Target Analyte	Type	Type 2
2,4-Dinitrophenol	Semivolatile Organic	Priority Pollutant
2-Methyl-4,6-dinitrophenol	Semivolatile Organic	Priority Pollutant
2-Nitrophenol	Semivolatile Organic	Priority Pollutant
4-Nitrophenol	Semivolatile Organic	Priority Pollutant
Pentachlorophenol	Semivolatile Organic	Priority Pollutant
Phenol	Semivolatile Organic	Priority Pollutant
2,4,6-Trichlorophenol	Semivolatile Organic	Priority Pollutant
Aldrin	Chlorinated Pesticides and PCBs	Priority Pollutant
Alpha-BHC	Chlorinated Pesticides and PCBs	Priority Pollutant
Beta-BHC	Chlorinated Pesticides and PCBs	Priority Pollutant
Delta-BHC	Chlorinated Pesticides and PCBs	Priority Pollutant
Gamma-BHC	Chlorinated Pesticides and PCBs	Priority Pollutant
Chlordane	Chlorinated Pesticides and PCBs	Priority Pollutant
4,4'-DDD	Chlorinated Pesticides and PCBs	Priority Pollutant
4,4'-DDE	Chlorinated Pesticides and PCBs	Priority Pollutant
4,4'-DDT	Chlorinated Pesticides and PCBs	Priority Pollutant
Dieldrin	Chlorinated Pesticides and PCBs	Priority Pollutant
Endosulfan I	Chlorinated Pesticides and PCBs	Priority Pollutant
Endosulfan II	Chlorinated Pesticides and PCBs	Priority Pollutant
Endosulfan Sulfate	Chlorinated Pesticides and PCBs	Priority Pollutant
Endrin	Chlorinated Pesticides and PCBs	Priority Pollutant
Endrin Aldehyde	Chlorinated Pesticides and PCBs	Priority Pollutant
Heptachlor	Chlorinated Pesticides and PCBs	Priority Pollutant
Heptachlor Epoxide	Chlorinated Pesticides and PCBs	Priority Pollutant
Methoxychlor	Chlorinated Pesticides and PCBs	301(h) Pesticide
Mirex	Chlorinated Pesticides and PCBs	301(h) Pesticide
Toxaphene	Chlorinated Pesticides and PCBs	Priority Pollutant
PCB-1016	Chlorinated Pesticides and PCBs	Priority Pollutant
PCB-1221	Chlorinated Pesticides and PCBs	Priority Pollutant
PCB-1232	Chlorinated Pesticides and PCBs	Priority Pollutant
PCB-1242	Chlorinated Pesticides and PCBs	Priority Pollutant
PCB-1248	Chlorinated Pesticides and PCBs	Priority Pollutant
PCB-1254	Chlorinated Pesticides and PCBs	Priority Pollutant
PCB-1260	Chlorinated Pesticides and PCBs	Priority Pollutant
Guthion	Organophosphorus Pesticides	301(h) Pesticide
Demeton	Organophosphorus Pesticides	301(h) Pesticide
Malathion	Organophosphorus Pesticides	301(h) Pesticide
Parathion	Organophosphorus Pesticides	301(h) Pesticide
Cyanide, Total	Inorganic	Priority Pollutant
2,3,7,8-Dioxin	Organic	Priority Pollutant
Molybdenum	Total Recoverable Metal	

Detected analytes from the June 1993 to January 2004 sediment sampling period are summarized in the table below. An analyte is detected when the concentration (measured in ug/kg of dry weight) is above the Practical Quantitation Limit (PQL). Typically, three replicate samples were collected.

Because of their remote location from the outfall, sediment stations HB1 and HB7 are considered the control stations. It is assumed that because of their very distant location, they are unaffected by the outfall discharge. Station HB6 is at the southwest of the outfall diffuser. Stations HB2, HB3 and HB4 are located along the ZID boundary. Station HZ is along the diffuser pipe. A map of the stations is provided below along with coordinates.

Figure J-1 Sediment Monitoring Stations



From Nelson et al. (1991)

To compare the detected pollutant and pesticides concentrations among the sediment monitoring stations with respect to the control stations (HB1 and HB7), a table was created (see below). In the table, the control station and the nearfield station (HB6) results were group together.

Table J-11 Sediment Priority Pollutant and Pesticide Comparison

Sediment Pollutant Analyte	TABLE HB1	HB7	HB6	HB2	HB3	HB4	HZ
1,1,1-Trichloroethane	ND	ND	ND	ND	ND	22	ND
4,4'-DDE	ND	ND	0.1	ND	ND	ND	ND
Alpha-BHC	ND	ND	0.33	0.6	ND	0.8	ND
Antimony	380	200	290	340	310	340	280
Arsenic	2,900	1,000	1,800	3,300	2,400	2,500	2,600
Benzene	ND	ND	ND	ND	6.5	6.7	ND
Benzo(a)anthracene	ND	ND	ND	ND	ND	41	ND
Benzo(a)pyrene	ND	ND	ND	ND	ND	45	ND
Benzo(g,h,i)perylene	ND	ND	40	ND	ND	ND	ND
Beryllium	130	130	130	120	130	130	130
Beta-BHC	ND	ND	1.4	0.25	0.18	ND	ND
Bis(2-ethylhexyl)phthalate	68	50	46	230	540	1000	61
Cadmium	110	60	70	110	110	90	ND
Chlordane	ND	ND	ND	ND	ND	2.8	ND
Chromium, Total	12,500	10,900	13,000	16,900	16,800	14,800	13,200
Chrysene	ND	ND	ND	ND	ND	48	ND
Copper	1,500	920	27,900	3,500	2,300	5,000	2,200
Cyanide, Total	0.4	ND	ND	ND	ND	0.49	ND
Delta-BHC	ND	2.4	ND	ND	8.7	ND	5.6
Dibenzo(a,h)anthracene	34	ND	ND	ND	ND	ND	ND
Dieldrin	ND	ND	ND	ND	ND	0.3	ND
Diethyl Phthalate	ND	ND	ND	ND	ND	ND	500
Di-n-Butyl Phthalate	40	ND	ND	ND	ND	ND	230
Di-n-Octyl Phthalate	ND	ND	ND	ND	ND	41	ND
Fluoranthene	ND	ND	ND	ND	ND	35	ND
Heptachlor Epoxide	ND	ND	ND	ND	0.28	ND	ND
Indeno(1,2,3-cd)pyrene	32	ND	ND	ND	ND	ND	ND
Isophorone	ND	ND	ND	ND	ND	ND	ND
Lead	1,300	1,400	1,600	2,300	1,400	1,400	1,300
Mercury	0.4	0.03	40	50	0.05	50	30
Methoxychlor	ND	ND	ND	1.5	ND	ND	ND
Molybdenum	190	220	180	250	190	310	210
Nickel	9,500	1,000	1,400	2,800	1,800	2,300	1,700
PCB-1260	ND	ND	ND	ND	ND	1.9	ND
Phenol	300	500	700	270	900	1,000	440
Pyrene	ND	ND	ND	ND	ND	50	ND
Selenium	510	460	530	460	470	540	440
Silver	130	120	140	120	140	280	240
Thallium	150	ND	160	190	ND	210	180
Toluene	ND	ND	ND	ND	23	22	ND
Total Organic Carbon	0.50%	0.52%	0.56%	0.53%	0.44%	0.55%	0.60%
Total Solids	69.50%	64.30%	70.10%	72.90%	68.80%	68%	71.60%
Zinc	3,800	1,900	5,600	4,100	4,000	10,300	5,100

Notes:
1. Did not include results that were flagged with a blank contamination
2. Included those estimated pollutant concentrations (flagged with a "J"). This included Methoxychlor.

Analytes detected only at the ZID stations were 1,1,1 – Trichloroethane, Benzene, Benzo(a)anthracene, Benzo(a)pyrene, Chlordane, Chrysene, Dieldrin, Diethyl Phthalate, Di-n-Octyl Phthalate, Fluoranthene, Heptachlor Epoxide, Methoxychlor, PCB-1260, Pyrene and Toluene. Chlordane, Dieldrin, Heptachlor Expoxide and Methoxychlor are all pesticides.

Dibenzo(a,h)anthracene, Di-n-Butyl Phthalate and Indeno(1,2,3-cd) pyrene were detected only at the control stations.

Many metals appear to exist in the environment away from the diffuser discharge. By noting the concentration levels of the metals at the control stations within the same magnitude as the stations in proximity of the diffuser, the following analytes is deduced to be found in sediments in waters affected by treated wastewater discharge:

- Antimony
- Arsenic
- Beyllium
- Cadmium
- Chromium (Total)
- Lead
- Molybdenum
- Nickel
- Selenium
- Silver
- Zinc

Many of these metals constitute volcanic material and thus not surprisingly found in the marine sediments.

FISH (BIOACCUMULATION)

Toxics pollutants such as metals and chlorinated pesticides may enter the flesh and liver of fish from the surrounding sediment and water. They are a concern to many because certain toxics are accumulated within the tissues with increasing concentrations as long as the pollutant continues to exist in the environment. Three locally popular, fish species for the bioaccumulation studies were caught near the outfall with line and hook. The menpachi, akule and ta'ape fish species are eaten by many local people. The bioaccumulation study is being conducted annually by the City as required by the NPDES Permit. Below is a table which compares the detected pollutants and pesticides in the muscle tissues of akule, menpachi and ta'ape with the screening values for carcinogenic and non-carcinogenic effects. The methodology is identical to the one use in the Sand Island and Honouliuli WWTP's Annual Assessment Reports.

Table J-12 Comparison of bioaccumulation results with risk associated with carcinogenic and non-carcinogenic effects

Bioaccumulation of Fish Caught in the Vicinity of the Barbers Point Ocean Outfall											Screening Values (SV_c) for Carcinogen					
Analyte	Fish name	Tissue	Sample Date	Result	Unit	PQL	Fish Consumption Rate (kg/day)	Body Weight (kg)	Oral Reference Dose	Cancer Slope	1E-04 (ug/Kg)	1E-05 (ug/Kg)	1E-06 (ug/Kg)	1E-07 (ug/Kg)	Non-carcinogen screening value (SV_n)	Exceed screening value?
Antimony	Akule	Muscle	1/10/1997	170	ug/Kg	100	0.165	70	4.00E-04	N/A					170	yes
			1/27/1998	180	ug/Kg	137	0.165	70	4.00E-04	N/A					170	yes
			1/17/1999	590	ug/Kg	248	0.165	70	4.00E-04	N/A					170	yes
			2/5/2000	50	ug/Kg	39	0.165	70	4.00E-04	N/A					170	no
			1/21/2001	130	ug/Kg	56	0.165	70	4.00E-04	N/A					170	no
			1/13/2002	100	ug/Kg	62	0.165	70	4.00E-04	N/A					170	no
			1/5/2003	200	ug/Kg	128	0.165	70	4.00E-04	N/A					170	yes
			2/19/2004	57	ug/Kg	57	0.165	70	4.00E-04	N/A					170	no
	Menpachi	Muscle	1/17/1999	820	ug/Kg	301	0.165	70	4.00E-04	N/A					170	yes
			2/5/2000	50	ug/Kg	43	0.165	70	4.00E-04	N/A					170	no
			1/21/2001	130	ug/Kg	57	0.165	70	4.00E-04	N/A					170	no
			1/12/2002	80	ug/Kg	61	0.165	70	4.00E-04	N/A					170	no
			1/3/2003	170	ug/Kg	128	0.165	70	4.00E-04	N/A					170	yes
			2/19/2004	69	ug/Kg	57	0.165	70	4.00E-04	N/A					170	no
	Taape	Muscle	1/27/1998	150	ug/Kg	139	0.165	70	4.00E-04	N/A					170	no
			1/17/1999	640	ug/Kg	265	0.165	70	4.00E-04	N/A					170	yes
			1/21/2001	110	ug/Kg	57	0.165	70	4.00E-04	N/A					170	no
			1/12/2002	90	ug/Kg	62	0.165	70	4.00E-04	N/A					170	no
			1/3/2003	200	ug/Kg	136	0.165	70	4.00E-04	N/A					170	yes
			2/19/2004	68	ug/Kg	55	0.165	70	4.00E-04	N/A					170	no
Arsenic (apply inorganic)	Akule	Muscle	9/17/1993	1,100	ug/Kg	(blank)	0.165	70	3.00E-04	1.5	28.28282828	2.828283	0.282828	0.02828283	127	yes
			2/14/1994	3,740	ug/Kg	100	0.165	70	3.00E-04	1.5	28.28282828	2.828283	0.282828	0.02828283	127	yes
			2/25/1995	400	ug/Kg	100	0.165	70	3.00E-04	1.5	28.28282828	2.828283	0.282828	0.02828283	127	yes
			2/19/1996	5,700	ug/Kg	50	0.165	70	3.00E-04	1.5	28.28282828	2.828283	0.282828	0.02828283	127	yes
			1/10/1997	2,800	ug/Kg	80	0.165	70	3.00E-04	1.5	28.28282828	2.828283	0.282828	0.02828283	127	yes
			1/27/1998	1,800	ug/Kg	141	0.165	70	3.00E-04	1.5	28.28282828	2.828283	0.282828	0.02828283	127	yes
			1/17/1999	2,500	ug/Kg	184	0.165	70	3.00E-04	1.5	28.28282828	2.828283	0.282828	0.02828283	127	yes
			2/5/2000	3,200	ug/Kg	45	0.165	70	3.00E-04	1.5	28.28282828	2.828283	0.282828	0.02828283	127	yes
			1/21/2001	4,400	ug/Kg	75	0.165	70	3.00E-04	1.5	28.28282828	2.828283	0.282828	0.02828283	127	yes
			1/13/2002	2,800	ug/Kg	83	0.165	70	3.00E-04	1.5	28.28282828	2.828283	0.282828	0.02828283	127	yes
			1/5/2003	4,300	ug/Kg	106	0.165	70	3.00E-04	1.5	28.28282828	2.828283	0.282828	0.02828283	127	yes
			2/19/2004	3,400	ug/Kg	55	0.165	70	3.00E-04	1.5	28.28282828	2.828283	0.282828	0.02828283	127	yes
	Menpachi	Muscle	9/17/1993	8,100	ug/Kg	(blank)	0.165	70	3.00E-04	1.5	28.28282828	2.828283	0.282828	0.02828283	127	yes
			2/14/1994	8,740	ug/Kg	100	0.165	70	3.00E-04	1.5	28.28282828	2.828283	0.282828	0.02828283	127	yes
			2/25/1995	15,500	ug/Kg	100	0.165	70	3.00E-04	1.5	28.28282828	2.828283	0.282828	0.02828283	127	yes
			1/26/1996	21,700	ug/Kg	50	0.165	70	3.00E-04	1.5	28.28282828	2.828283	0.282828	0.02828283	127	yes
			1/10/1997	9,500	ug/Kg	70	0.165	70	3.00E-04	1.5	28.28282828	2.828283	0.282828	0.02828283	127	yes
			1/27/1998	10,400	ug/Kg	139	0.165	70	3.00E-04	1.5	28.28282828	2.828283	0.282828	0.02828283	127	yes
			1/17/1999	7,800	ug/Kg	223	0.165	70	3.00E-04	1.5	28.28282828	2.828283	0.282828	0.02828283	127	yes
			2/5/2000	15,200	ug/Kg	49	0.165	70	3.00E-04	1.5	28.28282828	2.828283	0.282828	0.02828283	127	yes
			1/21/2001	20,600	ug/Kg	75	0.165	70	3.00E-04	1.5	28.28282828	2.828283	0.282828	0.02828283	127	yes
			1/12/2002	11,500	ug/Kg	82	0.165	70	3.00E-04	1.5	28.28282828	2.828283	0.282828	0.02828283	127	yes
			1/3/2003	9,500	ug/Kg	105	0.165	70	3.00E-04	1.5	28.28282828	2.828283	0.282828	0.02828283	127	yes
			2/19/2004	12,100	ug/Kg	55	0.165	70	3.00E-04	1.5	28.28282828	2.828283	0.282828	0.02828283	127	yes
	Taape	Muscle	9/17/1993	1,100	ug/Kg	(blank)	0.165	70	3.00E-04	1.5	28.28282828	2.828283	0.282828	0.02828283	127	yes
			2/14/1994	5,960	ug/Kg	100	0.165	70	3.00E-04	1.5	28.28282828	2.828283	0.282828	0.02828283	127	yes
			2/21/1995	6,100	ug/Kg	100	0.165	70	3.00E-04	1.5	28.28282828	2.828283	0.282828	0.02828283	127	yes

Table J-12 Continued

Bioaccumulation of Fish Caught in the Vicinity of the Barbers Point Ocean Outfall											Screening Values (SV_c) for Carcinogen					
Analyte	Fish name	Tissue	Sample Date	Result	Unit	PQL	Fish Consumption Rate (kg/day)	Body Weight (kg)	Oral Reference Dose	Cancer Slope	1E-04 (ug/Kg)	1E-05 (ug/Kg)	1E-06 (ug/Kg)	1E-07 (ug/Kg)	Non-carcinogen screening value (SV_n)	Exceed screening value?
			1/26/1996	5,800	ug/Kg	50	0.165	70	3.00E-04	1.5	28.28282828	2.828283	0.282828	0.02828283	127	yes
			1/10/1997	6,800	ug/Kg	70	0.165	70	3.00E-04	1.5	28.28282828	2.828283	0.282828	0.02828283	127	yes
			1/27/1998	4,500	ug/Kg	143	0.165	70	3.00E-04	1.5	28.28282828	2.828283	0.282828	0.02828283	127	yes
			1/17/1999	3,300	ug/Kg	197	0.165	70	3.00E-04	1.5	28.28282828	2.828283	0.282828	0.02828283	127	yes
			2/5/2000	5,400	ug/Kg	49	0.165	70	3.00E-04	1.5	28.28282828	2.828283	0.282828	0.02828283	127	yes
			1/21/2001	7,100	ug/Kg	76	0.165	70	3.00E-04	1.5	28.28282828	2.828283	0.282828	0.02828283	127	yes
			1/12/2002	3,700	ug/Kg	84	0.165	70	3.00E-04	1.5	28.28282828	2.828283	0.282828	0.02828283	127	yes
			1/3/2003	3,700	ug/Kg	112	0.165	70	3.00E-04	1.5	28.28282828	2.828283	0.282828	0.02828283	127	yes
			2/19/2004	7,800	ug/Kg	53	0.165	70	3.00E-04	1.5	28.28282828	2.828283	0.282828	0.02828283	127	yes
Beryllium	Akule	Muscle	1/10/1997	10	ug/Kg	4	0.165	70	2.00E-03	N/A					848	no
			1/27/1998	5	ug/Kg	4	0.165	70	2.00E-03	N/A					848	no
			1/21/2001	3	ug/Kg	2	0.165	70	2.00E-03	N/A					848	no
			1/13/2002	5	ug/Kg	4	0.165	70	2.00E-03	N/A					848	no
	Menpachi	Muscle	1/27/1998	10	ug/Kg	4	0.165	70	2.00E-03	N/A					848	no
			1/21/2001	2	ug/Kg	2	0.165	70	2.00E-03	N/A					848	no
	Taape	Muscle	1/27/1998	4	ug/Kg	4	0.165	70	2.00E-03	N/A					848	no
			1/21/2001	3	ug/Kg	2	0.165	70	2.00E-03	N/A					848	no
Cadmium	Akule	Muscle	1/10/1997	40	ug/Kg	6	0.165	70	1.00E-03	N/A					424	no
			1/27/1998	20	ug/Kg	12	0.165	70	1.00E-03	N/A					424	no
			1/17/1999	25	ug/Kg	16	0.165	70	1.00E-03	N/A					424	no
			2/5/2000	10	ug/Kg	4	0.165	70	1.00E-03	N/A					424	no
			1/21/2001	10	ug/Kg	4	0.165	70	1.00E-03	N/A					424	no
			1/13/2002	9	ug/Kg	8	0.165	70	1.00E-03	N/A					424	no
	Menpachi	Muscle	1/10/1997	20	ug/Kg	5	0.165	70	1.00E-03	N/A					424	no
			2/5/2000	10	ug/Kg	4	0.165	70	1.00E-03	N/A					424	no
			1/21/2001	10	ug/Kg	4	0.165	70	1.00E-03	N/A					424	no
			1/12/2002	10	ug/Kg	8	0.165	70	1.00E-03	N/A					424	no
	Taape	Muscle	1/10/1997	10	ug/Kg	5	0.165	70	1.00E-03	N/A					424	no
			2/5/2000	10	ug/Kg	4	0.165	70	1.00E-03	N/A					424	no
			1/21/2001	10	ug/Kg	4	0.165	70	1.00E-03	N/A					424	no
			1/12/2002	10	ug/Kg	8	0.165	70	1.00E-03	N/A					424	no
Chromium, Total	Akule	Muscle	9/17/1993	90	ug/Kg	(blank)	0.165	70	3.00E-03	N/A					1,273	no
			2/25/1995	100	ug/Kg	50	0.165	70	3.00E-03	N/A					1,273	no
			2/19/1996	80	ug/Kg	10	0.165	70	3.00E-03	N/A					1,273	no
			1/10/1997	120	ug/Kg	20	0.165	70	3.00E-03	N/A					1,273	no
			1/27/1998	130	ug/Kg	43	0.165	70	3.00E-03	N/A					1,273	no
			1/17/1999	140	ug/Kg	64	0.165	70	3.00E-03	N/A					1,273	no
			2/5/2000	70	ug/Kg	18	0.165	70	3.00E-03	N/A					1,273	no
			1/21/2001	100	ug/Kg	26	0.165	70	3.00E-03	N/A					1,273	no
			1/13/2002	40	ug/Kg	22	0.165	70	3.00E-03	N/A					1,273	no
	Menpachi	Muscle	9/17/1993	70	ug/Kg	(blank)	0.165	70	3.00E-03	N/A					1,273	no
			2/25/1995	100	ug/Kg	50	0.165	70	3.00E-03	N/A					1,273	no
			1/26/1996	100	ug/Kg	10	0.165	70	3.00E-03	N/A					1,273	no
			1/10/1997	60	ug/Kg	20	0.165	70	3.00E-03	N/A					1,273	no
			1/27/1998	100	ug/Kg	42	0.165	70	3.00E-03	N/A					1,273	no
			1/17/1999	90	ug/Kg	78	0.165	70	3.00E-03	N/A					1,273	no
			2/5/2000	60	ug/Kg	20	0.165	70	3.00E-03	N/A					1,273	no

Table J-12 Continued

Bioaccumulation of Fish Caught in the Vicinity of the Barbers Point Ocean Outfall											Screening Values (SV_c) for Carcinogen					
Analyte	Fish name	Tissue	Sample Date	Result	Unit	PQL	Fish Consumption Rate (kg/day)	Body Weight (kg)	Oral Reference Dose	Cancer Slope	1E-04 (ug/Kg)	1E-05 (ug/Kg)	1E-06 (ug/Kg)	1E-07 (ug/Kg)	Non-carcinogen screening value (SV_n)	Exceed screening value?
			1/21/2001	70	ug/Kg	26	0.165	70	3.00E-03	N/A					1,273	no
			1/12/2002	50	ug/Kg	22	0.165	70	3.00E-03	N/A					1,273	no
	Taape	Muscle	9/17/1993	90	ug/Kg	(blank)	0.165	70	3.00E-03	N/A					1,273	no
			2/21/1995	100	ug/Kg	50	0.165	70	3.00E-03	N/A					1,273	no
			1/26/1996	100	ug/Kg	10	0.165	70	3.00E-03	N/A					1,273	no
			1/10/1997	60	ug/Kg	20	0.165	70	3.00E-03	N/A					1,273	no
			1/17/1999	110	ug/Kg	68	0.165	70	3.00E-03	N/A					1,273	no
			2/5/2000	60	ug/Kg	20	0.165	70	3.00E-03	N/A					1,273	no
			1/21/2001	80	ug/Kg	26	0.165	70	3.00E-03	N/A					1,273	no
			1/12/2002	50	ug/Kg	22	0.165	70	3.00E-03	N/A					1,273	no
Copper	Akule	Muscle	1/10/1997	2,700	ug/Kg	20	0.165	70	3.70E-02	N/A					15,697	no
			1/27/1998	960	ug/Kg	90	0.165	70	3.70E-02	N/A					15,697	no
			1/17/1999	920	ug/Kg	72	0.165	70	3.70E-02	N/A					15,697	no
			2/5/2000	760	ug/Kg	34	0.165	70	3.70E-02	N/A					15,697	no
			1/21/2001	1,200	ug/Kg	46	0.165	70	3.70E-02	N/A					15,697	no
			1/13/2002	1,200	ug/Kg	52	0.165	70	3.70E-02	N/A					15,697	no
			1/5/2003	970	ug/Kg	78	0.165	70	3.70E-02	N/A					15,697	no
			2/19/2004	1,600	ug/Kg	59	0.165	70	3.70E-02	N/A					15,697	no
	Menpachi	Muscle	1/10/1997	210	ug/Kg	20	0.165	70	3.70E-02	N/A					15,697	no
			1/27/1998	220	ug/Kg	89	0.165	70	3.70E-02	N/A					15,697	no
			1/17/1999	110	ug/Kg	87	0.165	70	3.70E-02	N/A					15,697	no
			2/5/2000	130	ug/Kg	37	0.165	70	3.70E-02	N/A					15,697	no
			1/21/2001	180	ug/Kg	46	0.165	70	3.70E-02	N/A					15,697	no
			1/12/2002	170	ug/Kg	51	0.165	70	3.70E-02	N/A					15,697	no
			1/3/2003	210	ug/Kg	78	0.165	70	3.70E-02	N/A					15,697	no
			2/19/2004	170	ug/Kg	59	0.165	70	3.70E-02	N/A					15,697	no
	Taape	Muscle	1/10/1997	210	ug/Kg	20	0.165	70	3.70E-02	N/A					15,697	no
			1/27/1998	230	ug/Kg	91	0.165	70	3.70E-02	N/A					15,697	no
			1/17/1999	170	ug/Kg	77	0.165	70	3.70E-02	N/A					15,697	no
			2/5/2000	220	ug/Kg	37	0.165	70	3.70E-02	N/A					15,697	no
			1/21/2001	200	ug/Kg	46	0.165	70	3.70E-02	N/A					15,697	no
			1/12/2002	200	ug/Kg	52	0.165	70	3.70E-02	N/A					15,697	no
			1/3/2003	390	ug/Kg	83	0.165	70	3.70E-02	N/A					15,697	no
			2/19/2004	240	ug/Kg	57	0.165	70	3.70E-02	N/A					15,697	no
Lead	Akule	Muscle	1/10/1997	50	ug/Kg	40	0.165	70	3.00E-04	N/A					127	no
			1/27/1998	120	ug/Kg	70	0.165	70	3.00E-04	N/A					127	no
			1/17/1999	240	ug/Kg	80	0.165	70	3.00E-04	N/A					127	yes
			1/21/2001	120	ug/Kg	24	0.165	70	3.00E-04	N/A					127	no
			1/13/2002	20	ug/Kg	18	0.165	70	3.00E-04	N/A					127	no
			1/5/2003	100	ug/Kg	78	0.165	70	3.00E-04	N/A					127	no
	Menpachi	Muscle	1/10/1997	60	ug/Kg	40	0.165	70	3.00E-04	N/A					127	no
			1/27/1998	100	ug/Kg	69	0.165	70	3.00E-04	N/A					127	no
			1/17/1999	250	ug/Kg	97	0.165	70	3.00E-04	N/A					127	yes
			2/5/2000	30	ug/Kg	26	0.165	70	3.00E-04	N/A					127	no
			1/21/2001	60	ug/Kg	24	0.165	70	3.00E-04	N/A					127	no
			1/12/2002	220	ug/Kg	18	0.165	70	3.00E-04	N/A					127	yes
			1/3/2003	140	ug/Kg	78	0.165	70	3.00E-04	N/A					127	yes

Table J-12 Continued

Bioaccumulation of Fish Caught in the Vicinity of the Barbers Point Ocean Outfall											Screening Values (SV_c) for Carcinogen					
Analyte	Fish name	Tissue	Sample Date	Result	Unit	PQL	Fish Consumption Rate (kg/day)	Body Weight (kg)	Oral Reference Dose	Cancer Slope	1E-04 (ug/Kg)	1E-05 (ug/Kg)	1E-06 (ug/Kg)	1E-07 (ug/Kg)	Non-carcinogen screening value (SV_n)	Exceed screening value?
	Taape	Muscle	1/27/1998	80	ug/Kg	71	0.165	70	3.00E-04	N/A					127	no
			1/17/1999	270	ug/Kg	85	0.165	70	3.00E-04	N/A					127	yes
			1/21/2001	90	ug/Kg	24	0.165	70	3.00E-04	N/A					127	no
Mercury	Akule	Muscle	9/17/1993	34	ug/Kg	(blank)	0.165	70	3.00E-04	N/A					127	no
			2/14/1994	128	ug/Kg	20	0.165	70	3.00E-04	N/A					127	yes
			2/25/1995	50	ug/Kg	10	0.165	70	3.00E-04	N/A					127	no
			2/19/1996	30	ug/Kg	10	0.165	70	3.00E-04	N/A					127	no
	Menpachi	Muscle	9/17/1993	26	ug/Kg	(blank)	0.165	70	3.00E-04	N/A					127	no
			2/14/1994	59	ug/Kg	20	0.165	70	3.00E-04	N/A					127	no
			2/25/1995	110	ug/Kg	10	0.165	70	3.00E-04	N/A					127	no
			1/26/1996	150	ug/Kg	10	0.165	70	3.00E-04	N/A					127	yes
	Taape	Muscle	9/17/1993	8	ug/Kg	(blank)	0.165	70	3.00E-04	N/A					127	no
			2/14/1994	78	ug/Kg	20	0.165	70	3.00E-04	N/A					127	no
			2/21/1995	160	ug/Kg	10	0.165	70	3.00E-04	N/A					127	yes
			1/26/1996	130	ug/Kg	10	0.165	70	3.00E-04	N/A					127	yes
Selenium	Akule	Muscle	1/10/1997	1,000	ug/Kg	50	0.165	70	5.00E-03	N/A					2,121	no
			1/27/1998	1,100	ug/Kg	184	0.165	70	5.00E-03	N/A					2,121	no
			1/17/1999	1,200	ug/Kg	288	0.165	70	5.00E-03	N/A					2,121	no
			2/5/2000	860	ug/Kg	45	0.165	70	5.00E-03	N/A					2,121	no
			1/21/2001	850	ug/Kg	71	0.165	70	5.00E-03	N/A					2,121	no
			1/13/2002	600	ug/Kg	40	0.165	70	5.00E-03	N/A					2,121	no
			1/5/2003	1,100	ug/Kg	128	0.165	70	5.00E-03	N/A					2,121	no
			2/19/2004	1,100	ug/Kg	75	0.165	70	5.00E-03	N/A					2,121	no
	Menpachi	Muscle	1/10/1997	880	ug/Kg	40	0.165	70	5.00E-03	N/A					2,121	no
			1/27/1998	880	ug/Kg	181	0.165	70	5.00E-03	N/A					2,121	no
			1/17/1999	1,100	ug/Kg	350	0.165	70	5.00E-03	N/A					2,121	no
			2/5/2000	700	ug/Kg	49	0.165	70	5.00E-03	N/A					2,121	no
			1/21/2001	730	ug/Kg	72	0.165	70	5.00E-03	N/A					2,121	no
			1/12/2002	420	ug/Kg	39	0.165	70	5.00E-03	N/A					2,121	no
			1/3/2003	1,100	ug/Kg	128	0.165	70	5.00E-03	N/A					2,121	no
			2/19/2004	950	ug/Kg	75	0.165	70	5.00E-03	N/A					2,121	no
	Taape	Muscle	1/10/1997	670	ug/Kg	40	0.165	70	5.00E-03	N/A					2,121	no
			1/27/1998	780	ug/Kg	187	0.165	70	5.00E-03	N/A					2,121	no
			1/17/1999	720	ug/Kg	308	0.165	70	5.00E-03	N/A					2,121	no
			2/5/2000	620	ug/Kg	49	0.165	70	5.00E-03	N/A					2,121	no
			1/21/2001	590	ug/Kg	72	0.165	70	5.00E-03	N/A					2,121	no
			1/12/2002	340	ug/Kg	40	0.165	70	5.00E-03	N/A					2,121	no
			1/3/2003	740	ug/Kg	136	0.165	70	5.00E-03	N/A					2,121	no
			2/19/2004	810	ug/Kg	72	0.165	70	5.00E-03	N/A					2,121	no
Silver	Akule	Muscle	9/17/1993	40	ug/Kg	(blank)	0.165	70	5.00E-03	N/A					2,121	no
			1/10/1997	30	ug/Kg	20	0.165	70	5.00E-03	N/A					2,121	no
	Menpachi	Muscle	9/17/1993	50	ug/Kg	(blank)	0.165	70	5.00E-03	N/A					2,121	no
			2/14/1994	34	ug/Kg	30	0.165	70	5.00E-03	N/A					2,121	no
			1/10/1997	20	ug/Kg	20	0.165	70	5.00E-03	N/A					2,121	no
	Taape	Muscle	9/17/1993	40	ug/Kg	(blank)	0.165	70	5.00E-03	N/A					2,121	no
			2/14/1994	42	ug/Kg	30	0.165	70	5.00E-03	N/A					2,121	no
			1/26/1996	30	ug/Kg	10	0.165	70	5.00E-03	N/A					2,121	no

Table J-12 Continued

Bioaccumulation of Fish Caught in the Vicinity of the Barbers Point Ocean Outfall											Screening Values (SV_c) for Carcinogen					
Analyte	Fish name	Tissue	Sample Date	Result	Unit	PQL	Fish Consumption Rate (kg/day)	Body Weight (kg)	Oral Reference Dose	Cancer Slope	1E-04 (ug/Kg)	1E-05 (ug/Kg)	1E-06 (ug/Kg)	1E-07 (ug/Kg)	Non-carcinogen screening value (SV_n)	Exceed screening value?
Thallium	Akule	Muscle	2/19/2004	110	ug/Kg	83	0.165	70	9.00E-05	N/A					38	yes
	Menpachi	Muscle	1/10/1997	60	ug/Kg	60	0.165	70	9.00E-05	N/A					38	yes
	Taape	Muscle	2/19/2004	91	ug/Kg	80	0.165	70	9.00E-05	N/A					38	yes
Zinc	Akule	Muscle	9/17/1993	5,800	ug/Kg	(blank)	0.165	70	3.00E-03	N/A					1,273	yes
			2/14/1994	1,700	ug/Kg	200	0.165	70	3.00E-03	N/A					1,273	yes
			2/25/1995	5,000	ug/Kg	100	0.165	70	3.00E-03	N/A					1,273	yes
			2/19/1996	8,400	ug/Kg	10	0.165	70	3.00E-03	N/A					1,273	yes
			1/10/1997	6,100	ug/Kg	40	0.165	70	3.00E-03	N/A					1,273	yes
			1/27/1998	7,500	ug/Kg	121	0.165	70	3.00E-03	N/A					1,273	yes
			1/17/1999	7,200	ug/Kg	64	0.165	70	3.00E-03	N/A					1,273	yes
			2/5/2000	5,500	ug/Kg	34	0.165	70	3.00E-03	N/A					1,273	yes
			1/21/2001	8,100	ug/Kg	87	0.165	70	3.00E-03	N/A					1,273	yes
			1/13/2002	10,300	ug/Kg	54	0.165	70	3.00E-03	N/A					1,273	yes
			1/5/2003	8,300	ug/Kg	179	0.165	70	3.00E-03	N/A					1,273	yes
			2/19/2004	8,400	ug/Kg	79	0.165	70	3.00E-03	N/A					1,273	yes
	Menpachi	Muscle	9/17/1993	2,100	ug/Kg	(blank)	0.165	70	3.00E-03	N/A					1,273	yes
			2/14/1994	3,200	ug/Kg	200	0.165	70	3.00E-03	N/A					1,273	yes
			2/25/1995	2,800	ug/Kg	100	0.165	70	3.00E-03	N/A					1,273	yes
			1/26/1996	4,800	ug/Kg	10	0.165	70	3.00E-03	N/A					1,273	yes
			1/10/1997	2,800	ug/Kg	40	0.165	70	3.00E-03	N/A					1,273	yes
			1/27/1998	3,200	ug/Kg	120	0.165	70	3.00E-03	N/A					1,273	yes
			1/17/1999	3,200	ug/Kg	78	0.165	70	3.00E-03	N/A					1,273	yes
			2/5/2000	3,500	ug/Kg	37	0.165	70	3.00E-03	N/A					1,273	yes
			1/21/2001	2,900	ug/Kg	88	0.165	70	3.00E-03	N/A					1,273	yes
			1/12/2002	2,700	ug/Kg	53	0.165	70	3.00E-03	N/A					1,273	yes
			1/3/2003	3,100	ug/Kg	178	0.165	70	3.00E-03	N/A					1,273	yes
			2/19/2004	2,700	ug/Kg	79	0.165	70	3.00E-03	N/A					1,273	yes
	Taape	Muscle	9/17/1993	2,300	ug/Kg	(blank)	0.165	70	3.00E-03	N/A					1,273	yes
			2/14/1994	2,400	ug/Kg	200	0.165	70	3.00E-03	N/A					1,273	yes
			2/21/1995	3,400	ug/Kg	100	0.165	70	3.00E-03	N/A					1,273	yes
			1/26/1996	3,800	ug/Kg	10	0.165	70	3.00E-03	N/A					1,273	yes
			1/10/1997	2,900	ug/Kg	40	0.165	70	3.00E-03	N/A					1,273	yes
			1/27/1998	3,500	ug/Kg	123	0.165	70	3.00E-03	N/A					1,273	yes
			1/17/1999	2,700	ug/Kg	68	0.165	70	3.00E-03	N/A					1,273	yes
			2/5/2000	3,100	ug/Kg	37	0.165	70	3.00E-03	N/A					1,273	yes
			1/21/2001	3,100	ug/Kg	89	0.165	70	3.00E-03	N/A					1,273	yes
			1/12/2002	2,900	ug/Kg	54	0.165	70	3.00E-03	N/A					1,273	yes
			1/3/2003	3,200	ug/Kg	189	0.165	70	3.00E-03	N/A					1,273	yes
			2/19/2004	3,100	ug/Kg	76	0.165	70	3.00E-03	N/A					1,273	yes

Notes
1. Chromium VI risk factor was used for Total Chromium
2. There was no Oral reference does or cancer slope factor for nickel. In leiu of this, the soluble salt form was used
3. No listing for elemental Thallium. Look up for Thallium acetate in IRIS website
4. Dectables where they were blank contaminations were not included

Screening values for non-carcinogenic effects were exceeded for detected concentrations of Antimony, Arsenic, Lead, Mercury, Thallium and Zinc. Arsenic was the only analyte in which screening values for carcinogenic effects could be determined for various risk levels. As reported in the annual reports of the Sand Island WWTP, DOH has stated the majority of the Arsenic is in the less chemically active pentavalent form. The screening values utilize the oral risk factors and cancer slope factors for inorganic Arsenic. Antimony, Lead, Mercury, Thallium and Zinc are naturally occurring as they are found in the earth's crust.

DIELDRIN/CHLORDANE ISSUE

Pesticide concentrations in the Honouliuli WWTP's influent and effluent samples were compared directly with the State of Hawaii Water Quality Standard and Federal Water Quality criterion for salt water (see previous table on pesticide comparison). No exceedences were observed.

EPA has been concerned with the presence of Dieldrin and Chlordane in the Honouliuli WWTP effluent. Using the Honouliuli WWTP average effluent flow rate of 16.4256 MGD (based on the average monthly flow for June 2004) and a maximum concentration that was ever observed in the wastewater effluent, i.e, 0.19 ug/L of Chlordane and 0.035 ug/L of Dieldrin, respectively (see table below), approximately 1.51 teaspoons and 0.28 teaspoons of Chlordane and Dieldrin, respectively are being discharged per day through the Barbers Point Ocean Outfall. 16.4256 million gallons is about the size of 16 Olympic pools. The constituents of these two pesticides in the wastewater are considerably small.

In sludge, Chlordane was detected above the detection limits in all annual sampling events from 1996 to 2004 except for March 1998, March 1999, March 2001, March 2002, September 2002, November 2002 and September 2003. Concentration ranged from 0.12 to 460 ug/kg of sludge (based on the dry weight basis). Similarly, Dieldrin was not detected in the May 15 and July 12, 1993, January 19, 1994, January 12, 1995 and October 9, 1995 samples. The analyte concentration ranged from 0.16 to 170 ug/Kg. The lower levels were measured in later years when the detection limits for the tests were much lower.

In sediments, Chlordane was detected only in samples collected at station HB4 on January 31, 1997 (2.1 ug/Kg), January 14, 2001 (1.6 ug/Kg) and January 9, 2004 (2.8 and 2.5 ug/Kg at Station HB4). Station HB4 is on the Barbers Point Ocean Outfall ZID boundary.

Dieldrin was detected at 0.30 ug/kg in sediment samples collected on January 9, 2004, again at station HB4.

Table J-13 Dieldrin and Chlordane Results

Table C-2: Chlordane and Dieldrin in HWWTP influent and effluent samples

Analyte	Chlordane													Dieldrin											
Site	Influent			Effluent			Primary Effluent			Secondary Effluent			Total	Influent			Effluent			Primary Effluent			Secondary Effluent		
Date	Result	Unit	PQL	Result	Unit	PQL	Result	Unit	PQL	Result	Unit	PQL	No Totals	Result	Unit	PQL	Result	Unit	PQL	Result	Unit	PQL	Result	Unit	PQL
9/7/1986				ND	ug/L	0.4											ND	ug/L	0.2						
8/29/1989				ND	ug/L	0.4											ND	ug/L	0.2						
7/8/1991	ND	ug/L	0.4	ND	ug/L	0.4								ND	ug/L	0.2	ND	ug/L	0.2						
1/28/1992	ND	ug/L	0.4	ND	ug/L	0.4								ND	ug/L	0.2	ND	ug/L	0.2						
7/13/1992	ND	ug/L	0.4	ND	ug/L	0.4								ND	ug/L	0.2	ND	ug/L	0.2						
1/23/1993	ND	ug/L	0.4	ND	ug/L	0.4								ND	ug/L	0.2	ND	ug/L	0.2						
7/8/1993	ND	ug/L	0.014	ND	ug/L	0.014								ND	ug/L	0.002	ND	ug/L	0.002						
1/12/1994														ND	ug/L	0.1	ND	ug/L	0.1						
7/18/1994	ND	ug/L	0.1	ND	ug/L	0.1								ND	ug/L	0.01	ND	ug/L	0.01						
1/16/1995	ND	ug/L	0.14	ND	ug/L	0.14								ND	ug/L	0.02	ND	ug/L	0.02						
7/16/1995	ND	ug/L	0.52	ND	ug/L	0.52								ND	ug/L	0.1	ND	ug/L	0.1						
10/17/1995	ND	ug/L	0.54	ND	ug/L	0.54								ND	ug/L	0.11	ND	ug/L	0.11						
1/17/1996	ND	ug/L	0.07	ND	ug/L	0.07								ND	ug/L	0.02	ND	ug/L	0.02						
7/15/1996	ND	ug/L	0.5	ND	ug/L	0.5								ND	ug/L	0.1	ND	ug/L	0.1						
1/13/1997	ND	ug/L	0.07	ND	ug/L	0.07								ND	ug/L	0.02	ND	ug/L	0.02						
1/12/1998	ND	ug/L	0.07	ND	ug/L	0.07								0.04	ug/L	0.02	ND	ug/L	0.02						
7/6/1998	ND	ug/L	0.2	ND	ug/L	0.2								ND	ug/L	0.02	ND	ug/L	0.02						
1/25/1999	ND	ug/L	0.2	ND	ug/L	0.2								ND	ug/L	0.02	ND	ug/L	0.02						
7/19/1999	ND	ug/L	0.2	ND	ug/L	0.2								ND	ug/L	0.02	ND	ug/L	0.02						
1/25/2000	ND	ug/L	0.1	ND	ug/L	0.1								ND	ug/L	0.009	ND	ug/L	0.009						
7/17/2000	0.06	ug/L	0.1	ND	ug/L	0.1								ND	ug/L	0.009	ND	ug/L	0.009						
1/22/2001	ND	ug/L	0.1	ND	ug/L	0.1								0.012	ug/L	0.009	0.007	ug/L	0.009						
7/23/2001	0.47	ug/L	0.1	0.19	ug/L	0.1								ND	ug/L	0.009	ND	ug/L	0.009						
7/15/2002	0.30	ug/L	0.1	0.21	ug/L	0.1								0.019	ug/L	0.009	0.014	ug/L	0.009						
1/21/2003	ND	ug/L	0.1	ND	ug/L	0.1								0.012	ug/L	0.009	0.007	ug/L	0.009						
12/2/2003	0.11	ug/L	0.1	0.10	ug/L	0.1	0.09	ug/L	0.1	ND	ug/L	0.1		0.058	ug/L	0.009	0.035	ug/L	0.009	0.086	ug/L	0.009	ND	ug/L	0.009

Note: density of chlordane: 1.59 g/cm^3 (range from 1.59 to 1.63 g/cm^3) see http://www.atsdr.cdc.gov/toxprofiles/tp31-c3.pdf
density of dieldrin: 1.62 g/cm^3

Calculated approximately 1.51 teaspoon of chlordane and 0.28 teaspoon of dieldrin is beign discharged per day from HWWTP at a flow of 16.43 MGD

In fish, neither Chlordane nor Deidrin was detected in all three fish species sampled near the Barbers Point Outfall. The samples consisted of liver and muscle tissues. Chlordane was not tested in the liver samples.

Dieldrin and Chlordane were used as pesticides in Hawaii, mainly to control termites but was banned by EPA. Usage ended in the 1980s. However, these pesticides have long persistence in soils and have shown up in storm water discharges. They enter into treatment plant waste stream, most likely by infiltration at the collection system, especially during rain storm events.

SUMMARY

Assessment of priority pollutants and pesticides on sampled influent/effluent wastewater, sludge, marine sediment and fish does not indicate that the Honouliuli WWTP is a major contributor of these pollutants into the environment. Many of the metals detected in the marine sediment and fish are found commonly elsewhere in the waters, probably of volcanic origin.

The sludge produced from the Honouliuli WWTP contains organic and inorganic pollutant levels below figures that are considered health risks. Currently, a large portion of the produced sludge is being composted at a local facility.

Some of the State of Hawaii Water Quality Standards for pollutants and pesticides is more stringent than the Federal criteria. Despite of this and given the application of an average dilution of 228, the pollutants discharge from the Honouliuli WWTP does not exceed the State Standards and Federal criteria, including pesticides.

Dieldrin and Chlordane in the Honouliuli WWTP discharge has been a concern with many stakeholders. These insecticides/pesticides are very difficult to control as their persistence in the environment is dominant given its huge use predating the 1980s. It is found in storm water discharges into the receiving waters via storm drains and coastal discharges. Based on the analytical data, Dieldrin and Chlordane were not detected in the sampled fish tissues. In sediments, they were only been detected near the outfall diffuser at Station HB4.