STATE OF CALIFORNIA – THE RESOURCES AGENCY PETE WILSON, *Governor*

CALIFORNIA COASTAL COMMISSION

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W 12a

October 15, 1998

TO: COMMISSIONERS AND INTERESTED PERSONS

FROM: PETER M. DOUGLAS, Executive Director
Mark Delaplaine, Federal Consistency Supervisor
Larry Simon, Federal Consistency Staff

SUBJECT: Negative Determination ND-122-98 (International Boundary and Water Commission): Change in effluent quality for ocean discharges from the South Bay International Wastewater Treatment Plant, Tijuana River Valley, San Diego.

On September 18, 1998, the International Boundary and Water Commission (IBWC) submitted Negative Determination ND-122-98 (Exhibit 1) to account for changes in the effluent quality being discharged from the South Bay International Wastewater Treatment Plant (IWTP), located in the Tijuana River Valley north of the International Border with Mexico. In February 1994 (CD-2-94) the Commission concurred with a consistency determination for construction of the IWTP, a three-mile-long ocean outfall, and discharge of up to 25 million gallons per day of secondary treated wastewater into the Pacific Ocean. This initial concurrence was followed by numerous consistency determinations and negative determinations for project modifications, including CD-137-96 for interim operation of the IWTP at the advanced primary treatment level and effluent discharge to the Pacific Ocean through the City of San Diego's Point Loma Wastewater Treatment plant and ocean outfall. The IBWC expects to complete construction of the South Bay Ocean Outfall (SBOO) in November 1998 and then divert the IWTP's advanced primary treated effluent into the SBOO, as provided for by CD-137-96. However, the selection of the secondary treatment alternative to be used at the IWTP, and the schedule for its construction and operation, have yet to be finalized by the IBWC.

The IWTP has operated at the advanced primary treatment level since April 1997. As concurred with by the Commission, the effluent would have exceeded California Ocean Plan standards for polynuclear aromatic hydrocarbons (PAH); however, the Commission generally considered ocean discharges of treated wastewater preferable to discharges into

the Tijuana River. Recent monitoring of effluent from the IWTP indicates additional exceedances: (1) dioxin levels may exceed the standards set forth in the Ocean Plan; and (2) the effluent exceeds various acute toxicity standards in the Ocean Plan. Based on this new information concerning dioxin and acute toxicity, the IBWC has initiated consultation with the Council on Environmental Quality to explore its compliance options under the National Environmental Policy Act (NEPA). Release of an Addendum to the Interim Operation Supplemental EIS is currently scheduled for late October 1998. As was the case for other modifications to the IWTP project, the Commission staff has used the negative determination process as the Commission's review mechanism for any project changes. However, while this matter has been submitted as a negative determination, the issue before the Commission and staff is not whether or not the modifications affect the coastal zone, but rather, pursuant to the federal consistency regulations (15 CFR 930.44), whether the project continues to be undertaken in a manner consistent with the CCMP. Section 930.44 provides:

> *Section 930.44 Availability of mediation for previously reviewed activities.*
>
> *(a) Federal and State agencies shall cooperate in their efforts to monitor Federally approved activities in order to make certain that such activities continue to be undertaken in a manner consistent, to the maximum extent practicable, with the State's management program.*
>
> *(b) The State agency shall request that the Federal agency take appropriate remedial action following a serious disagreement resulting from a State agency's objection to a Federal activity which was: (1) Previously determined to be consistent to the maximum extent practicable with the State's management program, but which the State agency later maintains is being conducted or is having a coastal zone effect substantially different than originally proposed and, as a result, is no longer consistent to the maximum extent practicable with the State's management program, or (2) previously determined not to be a Federal activity directly affecting the coastal zone, but which the State agency later maintains is being conducted or is having a coastal zone effect substantially different than originally proposed and, as a result, the activity directly affects the coastal zone and is not consistent to the maximum extent practicable with the State's management program. The State agency's request must include supporting information and a proposal for recommended remedial action.* [Emphasis added]
>
> *(c) If, after a reasonable time following a request for remedial action, the State agency still maintains that a serious disagreement exists, either party may request the Secretarial mediation services provided for in Subpart G.*

Due to the changes in effluent characteristics at the IWTP, the IBWC conducted a new study of the potential impacts of dioxin in the advanced primary effluent discharge through the South Bay Ocean Outfall. The IBWC's submittal states in part that:

> *. . . the presence of the two above mentioned constituents [dioxin and acute toxicity] does not significantly change the findings of the original consistency determination. Despite the occurrence of these two constituents which exceeded regulatory standards, the SBIWTP project exhibits the previously described net*

benefits. . . For these reasons, it is requested that consideration of this new dioxin and acute toxicity information be handled administratively in a Negative Determination.

Based on the information contained in this letter and attachment, the USIBWC has determined that this project remains consistent to the maximum extent practicable with the California Coastal Management Program.

At this time the Commission staff does not have sufficient information to enable it to agree with IBWC's conclusion. The Commission staff has discussed this matter with staff from the IBWC and USEPA, and staff from all three agencies are scheduled to meet on October 23 to further discuss the change in effluent characteristics and the potential effects on coastal zone resources. As of the date of the mailing for this report, however, Commission staff is unable to concur that the change in effluent characteristics from the IWTP (in particular, the presence of dioxin at levels that may exceed Ocean Plan standards and compounds that cause the effluent to exceed Ocean Plan acute toxicity standards) allow a determination that the project remains consistent to the maximum extent practicable with the California Coastal Management Program (CCMP). Additional technical information and analysis from IBWC, USEPA, and the California Regional Water Quality Control Board (RWQCB) is necessary before Commission staff can make such a determination.

On October 14, 1998, (yesterday) the RWQCB authorized the discharges with the acute toxicity exceedances of the Ocean Plan. The RWQCB adopted conditions requiring submittal of a report with the current results of the toxicity evaluation by August 1, 1999, and requiring compliance with the Ocean Plan to be achieved by May 16, 2000. The Commission staff has not yet had an opportunity to evaluate the RWQCB's findings. The Commission staff also anticipates an addendum to the IBWC's submittal in the near future.

Normally, the Commission would not schedule such a matter before the Commission until the additional necessary information was submitted. However, in this situation the IBWC had hoped to obtain the Executive Director agreement that it could proceed with use of the new (SBOO) outfall, notwithstanding the changed circumstances in the effluent quality, prior to diversion of IWTP effluent from the City of San Diego's ocean outfall into the new SBOO outfall in November 1998. Due to the importance of this matter to the public, the Commission staff's inability at this time to agree with the IBWC's conclusion concerning the continued consistency of the project with the CCMP, and the need to minimize delays in reviewing the changed circumstances associated with the IWTP effluent, the Commission staff believed it was necessary to bring the matter before the Commission and the public before finalizing any decision on whether these changes affect the project's consistency with the CCMP. The Commission staff expects to publish an addendum to this report prior to the scheduled November 4, 1998, Commission hearing date for this matter.

INTERNATIONAL BOUNDARY AND WATER COMMISSION
UNITED STATES AND MEXICO
UNITED STATES SECTION

2225 Dairy Mart Road
San Diego, California 92173

September 18, 1998

Mr. Peter Douglas
Executive Director
California Coastal Commission
45 Fremont, Suite 2000
San Francisco, California 94105-2219

SUBJECT: Interim Operation of the South Bay International Wastewater Treatment Plant, San Diego, California

Dear Mr. Douglas:

In December 1996, the California Coastal Commission concurred with the consistency determination (CD-137-96), which concluded that the interim operation of the South Bay International Wastewater Treatment Plant (SBIWTP) was consistent to the maximum extent practicable with the California Coastal Management Program (CCMP). The interim operation, as described in the Supplemental Environmental Impact Statement (SEIS) completed in 1996 by the United States International Boundary and Water Commission (USIBWC) and Environmental Protection Agency, involved the use of advanced primary treatment facilities. The initial discharge of advanced primary effluent has been transported through the Emergency Connection and ultimately to the Pacific Ocean after treatment at the Point Loma Wastewater Treatment Plant. The final phase of the interim operation will utilize the South Bay Ocean Outfall, which is currently scheduled for completion in December 1998. Since the analysis undertaken in the SEIS, new data concerning the quality of the advanced primary effluent has been collected during the period of operation of the SBIWTP in 1997 and 1998.

The 1996 Interim Operation SEIS included an analysis of the environmental effects of the discharge of advanced primary effluent though the South Bay Ocean Outfall. The SEIS study predicted that the advanced primary effluent would meet California Ocean Plan standards, except for one group of constituents, polynuclear aromatic hydrocarbons. Despite, this potential exceedance of the Ocean Plan, the project was determined to be consistent with the CCMP since it would result in net benefits to coastal resources through the reduction of both dry weather sewage flows in the Tijuana River and raw sewage discharges to the surf zone in Mexico. The operation of the SBIWTP was also determined to result in improvements to habitat within the river, estuary, and near shore waters and also in improved recreational opportunities by the reduction of beach closures, odor, and mosquito populations.

Subsequent to the analysis in the Interim Operation SEIS, test results, conducted as part of the

Point Loma Wastewater Treatment Plant monthly monitoring program, suggested that another group of constituents, dioxin, may exceed the standards set forth in the Ocean Plan. A contract laboratory to the Metropolitan Wastewater Department (MWWD) was not able to detect dioxin in wastewater entering the Emergency Connection during the period of January 1995 through August 1996. However, due to a change in NPDES requirements, a new laboratory was contracted by MWWD to conduct higher resolution dioxin analyses. This laboratory was able to detect the presence of dioxin in the parts per quadrillion range.

Based on this new data, a new study of the impacts of dioxin in the advanced primary effluent discharge through the ocean outfall is enclosed for your review. This analysis also includes a discussion of the impacts for the various alternatives described in the Long Term SEIS. As part of the analysis of impacts, the fate of hazardous compounds in the Tijuana influent wastewater was studied to determine whether the compounds would be degraded, discharged in the effluent stream, or disposed of in the sludge. As part of the study, the effluent quality was evaluated based on the Ocean Plan and NPDES permit standards. Sludge quality was compared to hazardous waste disposal standards and also an ecological risk assesment was included in the study.

The enclosed analysis utilized an average and maximum dioxin influent concentration based on a dioxin data set from Emergency Connection wastewater samples collected during the period of September 1996 through April 1998. The removal of dioxin from the influent was estimated from removal efficiencies observed during the operation of the SBIWTP. The resultant effluent concentration of dioxin was then compared to the discharge limit established in the NPDES permit. The marine water concentration for dioxin after 100:1 dilution was evaluted according to the Ocean Plan limit. Based on average concentrations, the concentration of dioxin was not predicted to exceed the Ocean Plan or NPDES limits for any of the alternatives examined in the Long Term Treatment Options SEIS. However, based on maximum dioxin concentrations, the advanced primary effluent would exceed Ocean Plan limits. Based on fifteen months of data, the Ocean Plan limit would be exceeded thirty percent of the time. In addition, the dioxin effluent limit has been exceeded three times since the inception of testing in April 1997.

Dioxin concentrations in sludge were estimated for the average and maximum influent concentrations. It was determined that all Long Term Treatment options would not produce hazardous sludge. An ecological risk assessment was performed to evaluate the risk caused by dioxin in the marine water and in the sediment from settled solids which would contain dioxin. The risk assessment did not identify a risk with any of the alternatives including the advanced primary discharge option.

In addition, the advanced primary effluent from the SBIWTP has been analyzed since the original testing period in April 1997 for all constituents in the NPDES permit, including the Table B compounds in the California Ocean Plan. Although test results have indicated general overall compliance with constituents in the Cease and Desist Order issued for the SBIWTP, the effluent exceeded various acute toxicity standards. Acute toxicity is a laboratory measure of the lethal effects to sensitive test organisms. This toxicity is caused by the presence of a compound

or group of compounds in the wastewater that act as toxic stressors to the test organisms.

Presently, the cause(s) of acute toxicity are being investigated through the implementation of a toxicity identification evaluation (TIE) which was initiated in March 1997. After the elucidation of the toxic stressors, coordination with Mexico will take place to implement a pre-treatment program to minimize the acute toxicity problem.

Based on this new infomation concerning dioxin and acute toxicity, consultation with the Council on Environmental Quality (CEQ) is being pursued to explore compliance options of the National Environmental Policy Act (NEPA). Release of an Addendum to the Interim Operation SEIS in early October is planned. This document will include discussion of the dioxin and acute toxicity issues. As part of this process, a Notice of Availability will be published in the Federal Register and a public hearing will be conducted to receive comments on the Addendum. After a 30-day public review period, the Addendum, along with public review comments, will be considered in reassessing the 1996 decision to operate the SBIWTP.

There is an ongoing public outreach process which has involved at a minimum, quarterly meetings with local stakeholders. The dioxin and acute toxicity issues were discussed at the last public meeting held in San Diego on August 10, 1998. Attendees at the meeting included various members of the public (Citizens Revolting Against Pollution, Tijuana Valley Equestrian Association, and Citizens Against Recreational Eviction), environmental advocate groups (Surfrider Association and Sierra Club), political representatives (Congressmen Filner and Bilbray and the Cities of San Diego and Imperial Beach) and public agencies (Tia Juana Valley County Water District, County of San Diego, Department of Environmental Health and MWWD). Another meeting which will include discussion of these issues is planned for September 22, 1998 in San Diego.

As mentioned previously, the California Coastal Commission approved the Intermim Operation project in 1996 (CD-137-96). The IBWC has determined that the presence of the two above mentioned constituents does not significantly change the findings of the original consistency determination. Despite, the occurrence of these two constituents which exceeded regulatory standards, the SBIWTP project exhibits the previously described net benefits. It should be noted that the anticipated period of operation of the advanced primary plant is approximately three and one half years until the secondary treatment alternative is constructed and operational. It is apparent that the benefits to the Tijuana River, estuarine and marine environments and recreational users from an ocean outfall discharge described in the previous consistency determination are vital. For these reasons, it is requested that consideration of this new dioxin and acute toxicity information be handled administratively in a Negative Determination.

Based on the information contained in this letter and attachment, the USIBWC has determined that the project remains consistent to the maximum extent practicable with the California Coastal Management Program. Your prompt consideration of this matter is appreciated. If you have any

additional questions concerning these issues, please contact Mr. Charles Fischer, environmental protection specialist at (619) 662-7600.

Sincerely,

Dion T. McMicheaux
Project Manager

Enclosure
as Stated

1. Dioxin Finding

1.1 Introduction

1.1.1 Background

In the Draft SEIS, each of the alternatives was evaluated for environmental effects. As part of that evaluation, the fate of hazardous compounds within Tijuana wastewater was predicted to determine whether the compounds would be decomposed, discharged in the effluent, or disposed in the sludge. In determining effects, sludge quality was compared to hazardous waste disposal standards and effluent quality was evaluated based on Ocean Plan and NPDES permit standards and on an ecological risk assessment. Only those compounds that were detected in the wastewater from Tijuana were considered in that evaluation.

A portion of Tijuana wastewater is sent through the Emergency Connection to the City of San Diego Point Loma wastewater treatment plant. When the South Bay International Wastewater Treatment Plant (SBIWTP) is operating, this is the same stream of wastewater that the SBIWTP treats. As long as this stream is routed to Point Loma, it is monitored as part of the Point Loma NPDES permit requirements. The sampling point for the monitoring is in the Emergency Connection and is downstream of the SBIWTP sampling location. The monitoring results reported in January through December 1995 and in January through August 1996 were used as the basis for the SEIS evaluation. This data set included monthly analyses of dioxin. For all compounds except dioxin, this data set appears representative and is considered adequate for the purpose of identifying impacts and selecting an environmentally preferred alternative. During the period from January 1995 through August 1996, there were no detections of dioxin in the wastewater.

A contracted laboratory conducted the analyses because of the special requirements that must be met to conduct these tests. In September 1996, a new laboratory was contracted to conduct dioxin analyses using a higher resolution instrument that could detect dioxin at lower concentrations. Use of the higher resolution instrument resulted in detections of dioxin. For that reason, the data used in the Draft SEIS to assess impacts by dioxin was no longer considered adequate. An additional evaluation was performed using laboratory analyses of Emergency Connection wastewater samples that were collected from September 1996 through April 1998. This period of time was selected because it coincides with the contract period of the laboratory that conducted the analyses.

It should be noted that there are inherent difficulties with detecting and accurately measuring dioxin concentrations in the range required to determine compliance with the regulatory standards. Dioxin is measured in picograms per liter (pg/L), which is parts per quadrillion (ppq) and is equivalent to 0.000000000001 grams per liter (g/L). Most analyses are conducted in milligrams/L (0.001 mg/L) or micrograms/L (0.000001 µg/L) with a few sensitive analyses conducted in nanogram/L (0.000000001 ng/L).

1.1.2 Terminology and Toxicity Equivalents

This section explains some of the terminology used when referring to dioxin. The information is provided because of the sometimes confusing terminology associated with the words "dioxin", "TCDD", and "TCDD equivalents", which are defined as follows. Dioxin refers to a group of

compounds, or cogeners, that have similar characteristics. These compounds are chlorinated dioxin and furan compounds ranging from tetrachlorodibenzo-p- to octachlorodibenzo-p-dioxin or –furan. A convention is to group these dioxin and furan compounds together as one group parameter which, for simplicity, is referred to as "dioxin". Any reference to dioxin in this document refers to the group parameter dioxin, not to an individual compound.

Since not all of these compounds have the same level of toxicity, a concentration of one of the compounds could be significantly more toxic than the same concentration of another. If the concentrations of each of the individual dioxins and furans were summed together, the total concentration would be meaningless in terms of toxicity. To correct this, a toxicity equivalency (TEQ) factor has been assigned to each of the individual compounds to normalize their concentrations relative to 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD), which is recognized as the most toxic (EPA, 1989). The TEQ factors range from 1.0 for 2,3,7,8-TCDD down to 0.00001 for other cogeners (see Table 1). Thus, the normalized concentrations of the cogeners are TCDD-equivalent concentrations. TCDD equivalents are factored laboratory results of analyses for chlorinated dioxins and furans. The Ocean Plan limit for TCDD equivalents is defined as the maximum allowable sum of all TCDD equivalent concentrations of dioxin cogeners that were detected.

TABLE 1
Dioxin Compound and Assigned Toxicity Equivalent
Listed in the California Ocean Plan

Compound	TEQ
2,3,7,8 - tetra CDD	1.000
1,2,3,7,8 - penta CDD	0.500
1,2,3,4,7,8 – hexa CDD	0.100
1,2,3,6,7,8 – hexa CDD	0.100
1,2,3,7,8,9 – hexa CDD	0.100
1,2,3,4,6,7,8 – hepta CDD	0.010
octa CDD	0.001
2,3,7,8, - tetra CDF	0.100
1,2,3,7,8,- penta CDF	0.050
2,3,4,7,8 - penta CDF	0.500
1,2,3,4,7,8 – hexa CDF	0.100
1,2,3,6,7,8 – hexa CDF	0.100
1,2,3,7,8,9 – hexa CDF	0.100
2,3,4,6,7,8 – hexa CDF	0.100
1,2,3,4,6,7,8 – hepta CDF	0.010
1,2,3,4,7,8,9 – hepta CDF	0.010
octa CDF	0.001

If a cogener is not detected above its detection limit, then the TCDD equivalent concentration for the congener is zero (0). If the cogener is detected, the concentration is multiplied by the appropriate TEQ factor to produce a TCDD equivalent. Thus the concentration for dioxin cogeners is reported in terms of TCDD equivalents and the total for dioxin is the sum of TCDD equivalents. In the NPDES permits for the SBIWTP and the Point Loma wastewater treatment plant, the RWQCB specifies dioxin reporting according to this methodology.

1.2 Development of Influent Concentration

A representative influent concentration of dioxin was developed and used to estimate dioxin concentrations in treatment plant sludge and effluent, marine water and sediment quality, and the effect on marine biological resources. The data set of Emergency Connection monitoring reports from September 1996 through April 1998 were screened prior to acceptance and use in the estimation. The laboratory analyses were reviewed to determine whether the reported quality control and quality assurance (QA/QC) was adequate in terms of conforming with EPA method 1613B that was used to conduct the analyses. The QA/QC on 14 of the 19 analyses was acceptable. These reports comprise the data set that was used to develop a representative influent concentration to the SBIWTP (see Table 2).

The average and maximum concentrations from this data set were used to develop representative influent conditions for the SBIWTP. Table 3 shows the monthly, maximum, minimum, and average TCDD equivalents used to model the fate of dioxin and the impacts from each of the alternatives. The standard deviation is also shown. The average influent concentration used for this study was 1.614 picograms per liter (pg/L). The maximum concentration during this period (6.485 pg/L) was selected as the representative maximum influent concentration for the SEIS alternatives.

1.3 Removal Efficiencies

The fate of dioxin through each of the alternative treatment options was modeled to identify where the dioxin would go, i.e. into the sludge or out with the effluent, and whether the concentration detected in the sludge and effluent could be hazardous. It is generally believed that when dioxin is in a solution of liquids and solids and the very large majority of dioxin is strongly adsorbed to the solids (EPA, 1989; Jonsson, *et al.*, 1993; and Chernysh, *et al.*, 1992). For wastewater, this means that dioxin will be mostly found in the sludge or the solids that are discharged in the effluent, which are either transported away or settle as nearby sediment. Removal efficiencies for activated sludge and the pond treatment processes were based on removal efficiencies reported for full-size activated sludge and anaerobic-aerobic pond treatment plants. For both processes, the reported removal efficiency is 98% (Amendola, *et al.*, 1989 and Lee *et al.*, 1993) For the advanced primary process, the actual performance of the SBIWTP was used to generate a removal efficiency. The plant operated for seven of the months between April 1997 and March 1998. The average removal efficiency of dioxin during this period was 80% based on influent and effluent concentrations reported to the RWQCB.

1.4 Sludge Concentrations

Dioxin concentrations in sludge were estimated for the average and maximum influent concentrations for each of the unit processes that is used (i.e. conventional primary, advanced primary, activated sludge, and anaerobic-aerobic pond series). See Table 4 and Table 5 for the projected dioxin concentrations in sludge generated by each of the unit processes.

TABLE 2
TCDD Equivalents per Dioxin Cogener in Emergency Connection Samples (pg/L)

Compound	Sep-96	Nov-96	Dec-96	Feb-97	Mar-97	Apr-97	May-97	Jun-97	Aug-97	Sep-97	Jan-98	Feb-98	Mar-98	Apr-98
2,3,7,8 – tetra CDD	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2,3,7,8 – penta CDD	-	-	-	-	-	1.210	-	-	-	-	-	-	-	-
1,2,3,4,7,8 – hexa CDD	-	-	-	-	-	0.181	-	-	-	-	-	-	-	-
1,2,3,6,7,8 – hexa CDD	-	-	-	-	-	-	-	-	0.662	-	-	-	-	-
1,2,3,7,8,9 – hexa CDD	-	0.360	-	0.312	-	-	-	-	-	-	-	-	-	-
1,2,3,4,6,7,8 - hepta CDD	-	1.052	0.271	0.381	-	0.589	1.251	0.901	1.900	0.236	0.229	0.109	0.166	-
octa CDD	0.165	0.893	0.164	0.250	0.134	0.403	0.812	0.636	2.450	0.188	0.209	0.107	0.163	0.110
2,3,7,8, - tetra CDF	0.180	0.560	-	-	-	-	-	-	0.395	-	-	-	-	-
1,2,3,7,8,- penta CDF	-	-	-	-	-	0.153	-	-	-	-	-	-	-	-
2,3,4,7,8 – penta CDF	-	-	-	1.140	-	-	-	-	-	-	-	-	-	-
1,2,3,4,7,8 – hexa CDF	-	0.693	-	-	-	-	-	-	0.356	-	-	-	-	-
1,2,3,6,7,8 – hexa CDF	-	-	-	-	-	-	0.118	-	-	-	-	-	-	-
1,2,3,7,8,9 – hexa CDF	-	-	-	-	-	0.199	-	-	-	-	-	-	-	-
2,3,4,6,7,8 – hexa CDF	0.410	-	-	-	-	-	-	-	0.257	-	-	-	-	-
1,2,3,4,6,7,8 - hepta CDF	-	0.282	-	0.115	-	0.133	0.482	-	0.407	-	-	-	-	-
1,2,3,4,7,8,9 - hepta CDF	-	-	-	-	-	-	-	-	-	-	-	-	-	-
octa CDF	0.021	0.050	0.010	0.024	-	-	0.052	-	0.058	-	-	-	-	-
Total	0.776	3.890	0.445	2.222	0.134	2.868	2.715	1.537	6.485	0.424	0.438	0.216	0.329	0.110

Note: Does not include data from October 1996 and January, July, October, and December 1997 that were rejected on the basis of QA/QC level. November 1997 test was not conducted because the sample froze and burst the sample jar.

TABLE 3
Total TCDD Equivalents per Sample (pg/L)

Month	TCDD Equivalents
September-96	0.776
November-96	3.890
December-96	0.445
February-97	2.222
March-97	0.134
April-97	2.868
May-97	2.715
June-97	1.537
August-97	6.485
September-97	0.424
January-98	0.438
February-98	0.216
March-98	0.329
April-98	0.110
Maximum	6.485
Minimum	0.110
Average	1.614
Standard Deviation	1.860

As shown in Table 4 and Table 5, none of the unit processes that comprise the SEIS alternatives are predicted to produce hazardous sludge. Since hazardous sludge would not be produced by any unit process, then none of the proposed treatment alternatives would produce hazardous sludge. This is true for all alternatives under average and maximum dioxin influent conditions. For the CMA at Hofer and AIPS at Spooner's Mesa alternatives, predictions using maximum dioxin influent conditions are not applicable to the sludge generated in the pond sections of the alternatives. Maximum conditions appear over short-term periods, such as a day. Since the sludge in the ponds is produced over a very long period of (time measured in years), the effective influent concentration under these conditions is the average concentration. All the other unit processes produce sludge that is removed on a daily basis. Therefore, predictions using maximum influent conditions are applicable and were considered. These predictions included the primary settling process for the pond alternatives and included all other alternatives.

TABLE 4
Projected Sludge Concentration for Advanced Primary and Activated Sludge Processes

Removal Model	Predicted Influent, pg/L	Removed in Advanced Primary, pg/L	Concentration in Advanced Primary Sludge after processing, mg/kg	Does Concentration in Sludge from Activated Sludge Exceed Title 22 Limits?	Concentration in Sludge removed in Activated Sludge Process, pg/L	Concentration in Final Sludge from Activated Sludge, mg/kg	Does Concentration in sludge from Activated Sludge Exceed Title 22 Limits?
Average Influent Conditions							
80% removal in advanced primary, total of 98% removal in activated sludge	1.614	1.29	0.00000101	NO	0.00000029	0.0000002	NO
Maximum Influent Conditions							
80% removal in advanced primary, total of 98% removal in activated sludge	6.485	5.19	0.00000404	NO	0.00000117	0.0000007	NO

Note: The California Title 22 Total Threshold Limit Concentration (TTLC) is 0.01 mg/kg and the Soluble Threshold Limit Concentration (STLC) is 0.001 mg/L. Refer to Appendix B3 of the Draft SEIS for an explanation of how STLC is used. The Mexican standard for disposal of hazardous waste, NOM-052-ECOL/1993, does not include a limit for dioxin or TCDD equivalents.

TABLE 5
Predicted Influent Concentration, Removal Efficiencies, and Sludge Loading for Conventional Primary and Pond Treatment Processes

Removal Model	Predicted Influent, pg/L	Removal in Conventional Primary, pg/L	Concentration in Daily Conventional Primary Sludge, mg/kg	Does Concentration in Sludge from Conventional Primary Exceed Title 22 Limits?	Aerated Zone Sludge Settling, pg/L	Anaerobic Zone Sludge Concentration after Air Drying, mg/kg	Aeration Zone Sludge Concentration after Air Drying, mg/kg	Does Concentration in Sludge from Pond System Exceed Title 22 Limits?
64% removal in conventional primary, total of 98% removal in pond system	1.614	1.03	0.00000105	NO	.50	0.0000027	0.0000074	NO
64% removal in conventional primary, total of 98% removal in pond system	6.485	4.15	0.00000420	NO	2.01	see Note 1	see Note 1	NO

Note:
1. Using a maximum concentration is not applicable to long-term sludge accumulation conditions.
2. The California Title 22 Total Threshold Limit Concentration (TTLC) is 0.01 mg/kg and the Soluble Threshold Limit Concentration (STLC) is 0.001 mg/L. Refer to Appendix B3 of the Draft SEIS for an explanation of how STLC is used. The Mexican standard for disposal of hazardous waste, NOM-052-ECOL/199, does not include a limit for dioxin or TCDD equivalents.

1.5 Effluent Concentrations

The effluent concentrations were estimated using the identified removal efficiencies for each of the unit processes. Effluent concentrations were calculated for each of the alternatives using the estimated average influent concentration. These concentrations were compared to the discharge limit of 0.39 pg/L, which is defined as the allowable 30-day average effluent concentration. As seen in Table 6, none of the alternatives are projected to exceed the NPDES limit when they are evaluated using the average influent concentration. Because the monitoring requirements only require one sample to be collected per month, the monthly averages shown in the left-hand column of the table actually comprise only one sample each. For this reason, the NPDES limit was also compared to the maximum effluent concentration and to the effluent concentrations that would have occurred if an alternative had been in operation during the monitoring period when the samples were collected. Predicted effluent concentrations shown in bold in Table 6 indicate when the discharge limit would have been exceeded. The Partial Secondary and Advanced Primary alternatives show exceedances.

1.6 Marine Water Concentrations

Examination of Table 7 indicates that California Ocean Plan requirements are met by the alternatives with a few qualifications. All alternatives result in concentrations below the average value of the samples considered. However, the California Ocean Plan and the NPDES Permit require compliance with a monthly average. If only one sample is analyzed in a given month then the average consists of a single measurement. On that basis, the Advanced Primary alternative would not have met the requirement or permit limit for a total of five months out of the 14 months reviewed. On the same basis, the Partial Secondary alternative would not meet the requirement for two of the 14 months. All other alternatives meet the requirements of the California Ocean Plan for all samples considered under average and maximum conditions.

1.7 Eco-Rick Assessment

1.7.1 Introduction and Problem Formulation

An ecological risk assessment (ERA) was performed using the average predicted effluent concentration for dioxin for each of the alternatives. The ecosystems at risk, stressor characteristics, receptors, endpoint selection, and conceptual models of exposure in this ERA do not vary from those originally presented in Appendix D of the Draft SEIS. The only change is that the compound dioxin (as TCDD equivalents) was added to the list of identified contaminants. The assessment endpoints for dioxin are similar to those for other compounds as previously defined in Section 2.4 of Appendix D. This ERA is an addendum to the ERA found in Appendix D.

1.7.2 Exposure Characterization

Dioxin exposure is characterized for three scenarios: for the predicted average effluent concentration in the ocean following the permitted 100:1 dilution, for the discharged solids that settle near the diffuser, and for the final settling pond water quality in the AIPS at Spooner's Mesa Alternative (see Appendix D, Draft SEIS for why the latter is included).

The estimated dioxin concentration in the settling and sedimenting solids was calculated using the formula presented in Appendix D, Section 3.1. The adsorption of dioxin onto the solids was estimated to be 99.999% (EPA, 1993).

TABLE 6
Influent and Effluent TCDD-Equivalent Concentrations (pg/L)

Date of Sample	NPDES Permit Effluent Limitation (30-day Avg.)	Influent Concentration (TEQ[1])	Effluent Concentration for Treatment Alternatives[2]						
			Act. Sludge/No Action	Partial Secondary	Act. Sludge with FEB	CMA at Hofer	AIPS at Spooner's Mesa	Advanced Primary	Activated Sludge w/ Exp. Capacity
September-96		0.776	0.0155	0.0854	0.0155	0.0155	0.0155	0.1552	0.0155
November-96		3.890	0.0778	**0.4279**	0.0778	0.0778	0.0778	**0.7780**	0.0778
December-96		0.445	0.0089	0.0490	0.0089	0.0089	0.0089	0.0890	0.0089
February-97		2.222	0.0444	0.2444	0.0444	0.0444	0.0444	**0.4444**	0.0444
March-97		0.134	0.0027	0.0147	0.0027	0.0027	0.0027	0.0268	0.0027
April-97		2.868	0.0574	0.3155	0.0574	0.0574	0.0574	**0.5736**	0.0574
May-97		2.715	0.0543	0.2987	0.0543	0.0543	0.0543	**0.5430**	0.0543
June-97		1.537	0.0307	0.1691	0.0307	0.0307	0.0307	0.3074	0.0307
August-97		6.485	0.1297	**0.7134**	0.1297	0.1297	0.1297	**1.2970**	0.1297
September-97		0.424	0.0085	0.0466	0.0085	0.0085	0.0085	0.0848	0.0085
January-98		0.438	0.0088	0.0482	0.0088	0.0088	0.0088	0.0876	0.0088
February-98		0.216	0.0043	0.0238	0.0043	0.0043	0.0043	0.0432	0.0043
March-98		0.329	0.0066	0.0362	0.0066	0.0066	0.0066	0.0658	0.0066
April-98		0.110	0.0022	0.0121	0.0022	0.0022	0.0022	0.0220	0.0022
Maximum[2]		6.485	0.1297	**0.7134**	0.1297	0.1297	0.1297	**1.2970**	0.1297
Minimum[2]		0.110	0.0022	0.0121	0.0022	0.0022	0.0022	0.0220	0.0022
Average[2]	0.39	1.614	0.0323	0.1775	0.0323	0.0323	0.0323	0.3227	0.0323
Standard Deviation[2]		1.860	0.0372	0.2046	0.0372	0.0372	0.0372	0.3721	0.0372

[1] TCDD Toxicity Equivalents

[2]Predicted effluent concentrations shown in bold indicate when the discharge limit would be exceeded.

TABLE 7
Influent and Effluent TCDD-Equivalent Concentrations after 100:1 Dilution (pg/L)

Date of Sample	Ocean Plan Requirement (30 Day Average)	Influent Concentration (TEQ[1])	Effluent Concentration for Treatment Alternative[2]						
			Act. Sludge/No Action	Partial Secondary	Act. Sludge with FEB	CMA at Hofer	AIPS at Spooner's Mesa	Adv. Primary	Activated Sludge w/ Exp. Capacity
September-96		0.776	0.0002	0.0009	0.0002	0.0002	0.0002	0.0016	0.0002
November-96		3.890	0.0008	**0.0043**	0.0008	0.0008	0.0008	**0.0078**	0.0008
December-96		0.445	0.0001	0.0005	0.0001	0.0001	0.0001	0.0009	0.0001
February-97		2.222	0.0004	0.0024	0.0004	0.0004	0.0004	**0.0044**	0.0004
March-97		0.134	0.0000	0.0001	0.0000	0.0000	0.0000	0.0003	0.0000
April-97		2.868	0.0006	0.0032	0.0006	0.0006	0.0006	**0.0057**	0.0006
May-97		2.715	0.0005	0.0030	0.0005	0.0005	0.0005	**0.0054**	0.0005
June-97		1.537	0.0003	0.0017	0.0003	0.0003	0.0003	0.0031	0.0003
August-97		6.485	0.0013	**0.0071**	0.0013	0.0013	0.0013	**0.0130**	0.0013
September-97		0.424	0.0001	0.0005	0.0001	0.0001	0.0001	0.0008	0.0001
January-98		0.438	0.0001	0.0005	0.0001	0.0001	0.0001	0.0009	0.0001
February-98		0.216	0.0000	0.0002	0.0000	0.0000	0.0000	0.0004	0.0000
March-98		0.329	0.0001	0.0004	0.0001	0.0001	0.0001	0.0007	0.0001
April-98		0.110	0.0000	0.0001	0.0000	0.0000	0.0000	0.0002	0.0000
Maximum		6.485	0.0013	**0.0071**	0.0013	0.0013	0.0013	**0.0130**	0.0013
Minimum		0.110	0.0000	0.0001	0.0000	0.0000	0.0000	0.0002	0.0000
Average	0.0039	1.614	0.0003	0.0018	0.0003	0.0003	0.0003	0.0032	0.0003
Standard Deviation		1.860	0.0004	0.0020	0.0004	0.0004	0.0004	0.0037	0.0004

[1] TCDD Toxicity Equivalents

[2] Concentrations in bold indicate where the limit would be exceeded.

The estimated dioxin concentrations for water and sediment are shown in Tables 8 and 9.

TABLE 8
Marine and Freshwater Exposure Concentrations for Dioxin as TCDD Equivalents

Alternative	Maximum Concentration (pg/L)	Average Concentration (pg/L)
Marine Exposure (after 100:1 dilution)		
No Action/Activated Sludge	0.0013	0.0003
Partial Secondary	0.0071	0.0018
Activated Sludge with FEB	0.0013	0.0003
CMA at Hofer	0.0013	0.0003
AIPS at Spooner's Mesa	0.0013	0.0003
Advanced Primary	0.0130	0.0032
Activated Sludge with Expanded Capacity	0.0013	0.0003
Freshwater Exposure in Pond		
AIPS at Spooner's Mesa	0.1297	0.0323

TABLE 9

Marine Sediment Exposure Concentrations for Dioxins as TCDD Equivalents

Alternative	Estimated Sediment Concentration (pg/gram dry weight)
No Action/Activated Sludge	0.000398
Partial Secondary	0.001158
Activated Sludge with FEB	0.000398
CMA at Hofer	0.000398
AIPS at Spooner's Mesa	0.000488
Advanced Primary	0.000961
Activated Sludge with Expanded Capacity	0.000398

1.7.3 Criteria for Characterizing Effects

There are no established regulatory criteria for the protection of marine or freshwater aquatic life from dioxin. The existing California Ocean Plan and EPA criteria were developed solely as protection for human health. Nevertheless, the existing literature on water and sediment-caused toxicity has been summarized in the EPA guidance manual on the assessment of dioxin risks to aquatic life and associated wildlife (EPA, 1993). Toxicity values are presented by the EPA as "Low Risk Concentrations" (no effects thresholds) and "High Risk Concentrations" (expected to cause 50% to 100% mortality of young life stages). These guidance levels are presented along with the Lowest Observed Effect Levels (LOELs), which are provided instead of criteria in the EPA Quality Criteria for Water (EPA, 1994). The lowest concentrations (most stringent) from all three guidelines were chosen as the selected criteria for this assessment (see Table 10).

No guidelines have been developed for aquatic invertebrates because these organisms are much less susceptible to the toxic effects of TCDD. Invertebrates lack the receptor which binds to dioxin, producing toxicity in vertebrates (EPA 1993). Therefore, the sediment and water effect criteria that were listed for fish in Table 8 were used as the protective criteria for aquatic invertebrates.

Table 10
Selection of Effects Criteria for Dioxin in Water and Sediment

Medium and Receptor for Risk Assessment	TCDD Guidance Manual Concentrations (EPA 1993)		EPA Water Quality Guidelines (EPA 1994)		Selected Criteria
	Low Risk	High Risk	Chronic Exposure	Acute Exposure	
Sediment (pg/g DW)					
Fish	60	100	n/a	n/a	60
Birds	21	210	n/a	n/a	21
Water (pg/L)					
Fish	3.1	5	<10,000	<10	3.1
Birds	0.35	3.5	n/a	n/a	0.35

Note: n/a = not available

1.7.4 Risk Characterization

Risk characterization is expressed numerically in terms of the hazard quotient. Projected ambient concentrations are divided by toxicity-guideline values to produce the hazard quotients. Hazard quotients exceeding 1.0 indicate a potential risk of toxicity.

Ocean Water After 100:1 Dilution

Table 11 identifies the hazard quotient for fish from the maximum dioxin concentrations predicted. None of the maximum TCDD equivalent concentrations in the discharge following the permitted 100:1 dilution would exceed the chosen toxicity criteria (Table 11). There does not appear to be a risk of exposure from waterborne dioxin to the marine environment through the implementation of any of the alternatives.

Ocean Sediment

The estimated sediment concentration of TCDD equivalents from each of the alternatives is far below the risk level criteria (see Table 11). There is no expected toxicity to, or significant bio-accumulation in, marine organisms from dioxin concentrations in the sediment formed from effluent solids.

TABLE 11
Hazard Quotients for the Estimate of Risk from Exposure to TCDD

Exposure Medium and Alternative	Projected Ambient Concentrations	Selected Criteria	Hazard Quotient
Marine Water	**Maximum (pg/L)**	**(pg/L) (fish/invertebrates)**	
No Action/Activated Sludge	0.0013	3.1	0.00042
Partial Secondary	0.0071	3.1	0.00229
Activated Sludge with FEB	0.0013	3.1	0.00042
CMA at Hofer	0.0013	3.1	0.00042
AIPS at Spooner's Mesa	0.0013	3.1	0.00042
Advanced Primary	0.0130	3.1	0.00420
Activated Sludge with Expanded Capacity	0.0013	3.1	0.00042
Marine Sediment	**(pg/g DW)**	**(pg/g DW) (fish/invertebrates)**	
No Action/Activated Sludge	0.000027	60	0.00000044
Partial Secondary	0.000077	60	0.00000129
Activated Sludge with FEB	0.000027	60	0.0000004466
CMA at Hofer	0.000027	60	0.00000044
AIPS at Spooner's Mesa	0.000033	60	0.00000054
Advanced Primary	0.000064	60	0.000001707
Activated Sludge with Expanded Capacity	0.000027	60	0.00000044
Water in Spooner's Mesa Settling	**(pg/L)**	**(pg/L)**	
AIPS at Spooner's Mesa	0.0013	3.1 (invertebrates)	0.00042
AIPS at Spooner's Mesa	0.0013	0.35 (birds)	0.0037

Settling Pond Water

The settling pond water quality for the AIPS at Spooner's Mesa alternative will not exceed the selected aquatic toxicity criteria for TCDD equivalents (see Table 11). Fish would not be present in the settling pond, but aquatic invertebrates could be present. The exposure may be gauged against the fish guidelines as a conservative measure of risk. The ponds are also expected to be an area of some bird use and the birds could feasibly feed on the invertebrates. Bio-accumulation of dioxins by this invertebrate prey in the ponds is predicted to be insignificant because the invertebrates lack receptor sites and thus do not accumulate dioxin.

1.7.5 Risk Assessment Conclusions and Limitations

Dioxin does not present additional risk in the settling ponds or in the marine environment for any of the alternative because the hazard quotients would add such an incrementally small additional risk to these environments. In addition, the hazard quotients were so low for dioxin that it should not be used as the basis for selecting an environmentally preferred alternative in order to minimize ecological risk. The original ranking of alternatives in Appendix D of the Draft SEIS showed the lowest ecological risk was likely to occur from either of the pond alternatives (CMA at Hofer or AIPS at Spooner's Mesa) with greatest risks associated with the Advanced Primary and Partial Secondary alternatives.

Estimates of ecological risk from dioxin are hindered by the lack of criteria developed for the protection of aquatic life (EPA, 1993). Nevertheless, the comprehensive literature review presented (EPA, 1993) has provided adequate guidance for estimating risk in this particular case.

1.8 Conclusions

This analysis considered the impact by dioxin from each of the alternatives. An average influent concentration was developed based on a data set of reliable dioxin analysis performed on Emergency Connection wastewater samples collected from September 1996 through April 1998. It should be noted that there are inherent difficulties with detecting and accurately measuring dioxin concentrations in the concentration range required to determine compliance with the regulatory standards. Dioxin is measured in picograms per liter (pg/L), which is in parts per quadrillion (ppq) and is equivalent to 0.000000000001 grams per liter (g/L). Most analyses are conducted in milligrams/L (0.001 mg/L) or micrograms/L (0.000001 µg/L) with a few sensitive analyses conducted in nanogram/L (0.000000001 ng/L).

The removal of dioxin from the wastewater was estimated for each of the unit processes that comprise the alternatives. The resultant sludge concentrations are predicted to be non-hazardous, falling below hazardous waste regulatory limits. The effluent concentration from each alternative was compared to the discharge limit. The marine water concentration of dioxin after 100:1 dilution was compared to the Ocean Plan limit. Under average discharge conditions, dioxin would not exceed the Ocean Plan of NPDES limits for any of the alternatives. Under maximum conditions, these limits would be exceeded for the Advanced Primary and Partial Secondary alternatives. An ecological risk assessment was performed and evaluated the risk caused by dioxin in the marine water and in the sediment from settled solids containing dioxin. The risk assessment did not identify a risk with any of the alternatives.

1.9 References

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