Biological Assessment

Impacts of Section 301(h) Permit Modifications for the Sanitation Districts of Los Angeles County, Orange County, and the City of Los Angeles, on the Endangered California Brown Pelican

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ACRONYMS and ABBREVIATIONS

BOD	Biochemical Oxygen Demand
CBP	California brown pelican
CLA	City of Los Angeles
CSDOC	County Sanitation Districts of Orange County
CWA	Clean Water Act, or FWPCA
DDT	1,1,1-trichloro-2,2-bis(p-chlorophenyl) ethane
DFG	California Department of Fish and Game
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FWPCA	Federal Water Pollution Control Act, or CWA
HERS	Hyperion Energy Recovery System
JOS	Joint Outfall System (LACSD)
JWPCP	Joint Water Pollution Control Plant (LACSD)
LACSD	County Sanitation Districts of Los Angeles County
MER	Mass Emission Rate
MGD	Million Gallons Per Day
NPDES	National Pollutant Discharge Elimination System
PCB	Polychlorinated Biphenyl
RWQCB	California Regional Water Quality Control Board
SCB	Southern California Bight
SWRCB	California State Water Resources Control Board
TICH	Total Identifiable Chlorinated Hydrocarbons
301(h)	Section 301(h) of the Clean Water Act
TSCA	Toxic Substances Control Act
TSS	Total Suspended Solids
USFWS	United States Fish and Wildlife Service
WRP	Water Renovation and Reclamation Plants

SUMMARY

This report assesses the potential impacts of three separate permit actions by the Environmental Protection Agency. The County Sanitation Districts of Los Angeles County (LACSD), the City of Los Angeles Hyperion Treatment Plant (CLA), and the County Sanitation Districts of Orange County (CSDOC) have each applied for a modification to their NPDES wastewater discharge permits, pursuant to Section 301(h) of the Clean Water Act. The permits place limits on the wastewater discharges to the ocean which contain trace amounts of toxic residues - DDT and PCBs in particular - which affect the productivity of the endangered California brown pelican.

The discharge limitations that would be required under a 301(h) modified NPDES permit are, in the case of these three municipal wastewater dischargers, proposed to be at least as stringent as discharge levels currently being achieved, and certain facilities have planned improvements which will further improve the quality of their wastewater discharge. A 301(h) modification will officially alter, for a period of 5 years, the requirement that all dischargers attain a secondary level of wastewater treatment. At the end of the 5 year period the permittee would either apply for another 301(h) modified permit or be required to construct the additional facility improvements necessary to provide secondary treatment

of wastewater. The results of the monitoring program conducted pursuant to the conditions of the initial 301(h) modified permit would form one of the bases for determining whether the issuance of a second 301(h) modified permit is justified.

Limits on the discharge of toxic compounds are derived from the Federally approved water quality standards contained in the California Ocean Plan, scheduled for revision this year. These limits are independent of the level of treatment required under the Federal Clean Water Act. All three facilities in question are currently meeting the Ocean Plan limits on chlorinated hydrocarbon emissions; nevertheless, the construction of secondary treatment facilities would result to some degree in a further reduction of toxic pollutants emitted to the ocean.

Significant improvements have been made in the quality of wastewater discharges since the 1960s, when DDT discharged to the ocean had a critical impact on the reproduction of brown pelicans breeding off the coast of Southern California. Although some of the reduction of DDT and PCB emissions is attributable to improvements in the treatment facilities, the bulk of it is due to control of the sources of these toxic substances, and to Federal and State bans on their use.

Since 1970, brown pelican productivity has improved dramatically but not sufficiently to merit its removal from the U.S. Fish and Wildlife Service's endangered species list. Current PCB concentrations do not appear to be responsible for the continued low reproduction rates.

While chronic DDT problems persist, there are several other environmental factors affecting pelican productivity which have increased in relative importance. The major block to full recovery of the species now appears to be inadequate food abundance.

The diversity and complexity of factors affecting both pelican productivity and the distribution and persistence of chlorinated hydrocarbons throughout the aquatic ecosystem make it impossible to determine a definitive wastewater effluent concentration that would correspond to a maximum allowable body burden of DDT in brown pelicans. The persistence of DDT and PCB contamination in pelicans appears to be caused chiefly by the general persistence of these substances in ocean sediments, on land, and in the atmosphere, since wastewater inputs have decreased substantially without a corresponding decrease in the concentration of these substances in aquatic organisms and secondary consumers such as the pelican.

The incremental improvement in toxics removal that would be realized under full secondary wastewater treatment is likely to have neither a noticeable effect on levels of contamination in brown pelicans, nor a significant impact on their viability. The issuance of Section 301(h) modified permits for the three dischargers would therefore be unlikely to affect the productivity and continued existence of the California brown pelican. Recommendations for improving our understanding of the influences of wastewater discharges on the brown pelican are proposed in the final section of this report.

1. INTRODUCTION

1.1 Requirements of the Endangered Species Act

The Endangered Species Act was enacted to provide a means whereby the ecosystems upon which endangered species depend may be conserved, to provide a program for the conservation of such endangered species, and to take appropriate steps to achieve the goals of several international treaties and conventions. In furtherance of the purposes of the Act, Federal departments and agencies are required to use their authorities to conserve endangered and threatened species.

Section 7 of the Act states:

> Each Federal Agency shall, in consultation and with the assistance of the secretary, insure that any action authorized, funded, or carried out by such agency ... is not likely to jeopardize the continued existence of any endangered species or threatened species.

The procedures for interagency consultation on endangered species are set forth in 50 CFR Part 402. These regulations limit the requirement of preparing a biological assessment to construction projects, defined as, "Any major Federal action authorized, funded, or carried out by a Federal agency which.... is designed primarily to result in the building or erection of man-made structures such as dams, buildings, roads, pipelines, channels, and the like" (50 CFR 402.02). Notwithstanding this limitation, Federal agencies still have an obligation to review all their actions for effects on endangered and threatened species, and may use the biological assessment to assist in determining the need for formal consultation pursuant to Section 7(a) of the ESA, whether or not the action is a construction project.

1.2 Relationship to Issuance of 301(h) Modified NPDES Permits

In September 1979, the City of Los Angeles, the County Sanitation Districts of Los Angeles County, and the County Sanitation Districts of Orange County applied for 301(h) modifications to their NPDES permits for the discharge of pollutants from their municipal sewage treatment plants (a description of this permit action is provided in Section 2 of this report).

In 1980 the National Marine Fisheries Service and the U.S. Fish and Wildlife Service provided EPA lists of endangered species present in the areas affected by the proposed 301(h) actions. Through subsequent informal consultation, NMFS concluded that issuance of the 301(h) modified NPDES permits would not adversely affect any of the endangered species for which they are responsible. USFWS came to a similar conclusion for one of the species they listed, the light-footed clapper rail (Rallus longirostris levipes); however, they could not conclude that there would be no adverse effect on the California brown pelican (Pelecanus occidentalis californicus) from the issuance of the 301(h) modified NPDES permits, due to insufficient data on the effects of sewage discharge on pelican reproduction (letter from William Sweeney, USFWS to Ron DeCesare, EPA, May 14, 1982).

USFWS cited two issues for which they have insufficient data to assess the impact of the 301(h) actions on the California brown pelican:

1. Is the current problem of chronic eggshell thinning a manifestation of past DDT accumulations in the marine ecosystem or a manifestation of current emmissions (or both)?

2. If there is a correlation between current pesticide loads and eggshell thinning, what is the maximum pesticide effluent concentration that will provide for the minimum acceptable levels of pelican productivity?

In addition to these two issues, USFWS questioned the effectiveness of existing water quality standards in protecting the needs of the California brown pelican.

1.3 Objectives

As a result of the outstanding concerns of the USFWS, the EPA decided to perform a biological assessment of the impacts of issuing 301(h) modified NPDES permits to CLA, LACSD and CSDOC on the California brown pelican. This report summarizes the information gathered in the assessment and provides information on the probable impacts of the referenced actions, both individually and cumulatively.

In order to meet the objectives of the assessment, the following methods were employed:

1. Scientific literature pertaining to pesticide and PCB contamination of the marine ecosystem and, in particular, the brown pelican was reviewed.

2. Scientists currently working in the field were contacted to obtain unpublished data and professional opinions on the subject.

3. Information on the quality of past, present, and projected wastewater discharges from the three municipal treatment plants was compiled and analyzed.

4. Possible mitigation measures and specific biological monitoring requirements were investigated.

2. FEDERAL ACTIONS

2.1 National Pollutant Discharge Elimination System (NPDES)

The NPDES program was created by Section 402 of the Federal Water Pollution Control Act (FWPCA, later the Clean Water Act or CWA) Amendments of 1972. The Act makes it illegal to discharge a pollutant from a point source to the Nation's waters without an NPDES permit. The permit includes effluent limitations and, if applicable, compliance measures, schedules, and monitoring or reporting requirements legally binding on the permittee. NPDES permits are issued by EPA or a state delegated permitting authority by EPA. Under the provisions of the 1972 Act, publicly owned treatment works (POTWs) were to achieve effluent quality reflective of a secondary level of sewage treatment by (§301(b)(1)(B)).[1]

In 1977, Congress made several changes to the FWPCA, the most significant change for the purposes of this assessment being the addition of Section 301(h).

[1]Federal Regulations at 40 CFR 133.102 define secondary treatment according to the following criteria (measured as a 30-day average): no more than 30 mg/l B.O.D., no more than 30 mg/l suspended solids, pH between 6 and 9, and a removal efficiency of 85%.

2.2 Section 301(h) of the Clean Water Act

The requirement of secondary treatment for POTWs was one of the areas of greatest controversy regarding the 1972 amendments. The Act mandated uniform minimum requirements on all POTW discharges whether the discharges were into a lake, estuary, river, or ocean. The 1972 amendments included a requirement that a national commission study the impacts associated with carrying out the amendments. The commission's report included the following finding:

> If reasonable precautions are followed, large volumes of municipal wastewaters can be discharged into some open coastal waters without undue damage to man's interest or to the ecological balance and productivity of coastal waters. The public is misinformed about the extent of ocean pollution and the damage to marine life by municipal wastewaters, generally believing the situation to be much worse than scientific studies show.

Municipalities on the West Coast argued that secondary treatment is unnecessary to protect marine waters. They alleged that less-than-secondary discharges will not cause ecological perturbations.

Thus, Section 301(h) was enacted as part of the 1977 Amendments to the CWA. This action authorizes EPA to issue NPDES permits modifying Federal secondary treatment requirements (Section 301(b)(1)(B)) for municipal discharges to marine waters if the discharge complies with the 301(h) criteria specified in the Act. The Construction Grant Regulations (40 CFR 35.2005) were amended on May 12, 1982 such that wastewater treatment at levels commensurate with 301(h) ocean discharge waivers may qualify as Best Practicable Waste Treatment Technology (BPWTT). BPWTT is defined as the most cost effective technology that can treat wastewater in publicly owned or individual wastewater treatment works.

The applicant must show that their proposal will comply with the seven criteria of Section 301(h) regarding: 1) applicable water quality standards; 2) impact on public water supplies, balanced indigenous population, and recreation; 3) monitoring discharge impacts on marine biota; 4) impacts on requirements applicable to other point and non-point sources, 5) pretreatment; 6) nonindustrial toxics source control; and 7) increase in discharge.

The State of California administers an approved NPDES permit program for discharges to waters within State jurisdiction. NPDES permits are issued by the State through the Regional Water Quality Control Boards (RWQCB). Authority to grant a waiver and issue a modified NPDES permit under Section 301(h) of the Act is, however, limited to the EPA. Concurrence by the State on the issuance of a modified permit is required by Section 301(h). The EPA Region 9 Water Management Division Director and the California State Water Resources Control

Board Executive Director have entered into an agreement (Memorandum of Agreement, 9/22/82) in order to most efficiently coordinate efforts. Thus, to the extent possible, NPDES permits and State Waste Discharge Requirements which include 301(h) modified limitations will be issued jointly by the EPA and the appropriate RWQCB.

The processing of a Section 301(h) waiver application consists of the following actions:

1. Filing of a complete application;

2. Comparison of the application with criteria set forth in regulations, from which a technical evaluation report is prepared;

3. Preparation of a recommendation and tentative decision document for the Administrator by an EPA Task Force consisting of representation by the Office of Water and Waste Management, Office of Research and Development, and the appropriate Regional Office;

4. Announcement of the tentative decision by the Administrator;

5. Issuance of a notice of a draft NPDES permit and Waste Discharge Requirements with modifications or notice to deny the application, by the EPA Regional Administrator and RWQCB Executive Officer;

6. Conduct of public hearings where necessary to address public interest;

7. Issuance of a Section 301(h) modified NPDES permit and Waste Discharge Requirements or issuance of a denial of the application by the appropriate Regional Administrator (EPA) and Executive Officer (RWQCB);

8. Processing of appeals, in accordance with procedures defined in EPA regulations (40 CFR Part 124, Subpart E).

2.3 Section 301(h) Actions to Date

The history and status of the 301(h) applications for LACSD, CSDOC, and CLA are summarized below.

	LACSD	CSDOC	CLA
Application	9/13/79	9/13/79	9/13/79
Draft Technical Evaluation Report	3/81	3/81	2/81
Tentative Decision Document	11/30/81	11/30/81	11/30/81
Public Notice of Draft Permit and Fact Sheet	- - -	8/3/82	- - -
Public Hearing	- - -	9/10/82	- - -
Letter of Intent to Revise Application	1/10/83	1/10/83	1/10/83
Revision Due	11/25/83	11/25/83	11/25/83

After concluding consultation with the U.S. Fish and Wildlife Service and public hearings on these 301(h) actions the next step would be for EPA and the appropriate RWQCB to issue a draft NPDES modified permit and Waste Discharge Requirements, provided that the final decision is to grant the 301(h) modified permit. If the intent is to deny a variance, a public notice of that proposed action would precede the final decision.

3. ENDANGERED SPECIES

Within the brown pelican species (Pelecanus occidentalis) there are six recognized subspecies (Wetmore 1945) one of which, the California brown pelican (P.o. californicus), is the subject of this report. The breeding habitat of the California brown pelican generally ranges from the Channel Islands off Southern California as far southward as Isla Tres Marias off Nayrit, Mexico. The subspecies is distributed in five breeding units which are geographically separate but not isolated. One such unit is known as the Southern California Bight (SCB) population and inhabits the Channel Islands and the islands along the northwest coast of Baja California south to Isla San Martin (Figure 1). This breeding unit currently represents about 6 percent of the total P.o. californicus population. Other breeding units of the California brown pelican have not suffered the colony-wide reproductive failures experienced by the SCB population (Gress and Anderson, in preparation).

The largest brown pelican colonies in the SCB are those found on the Anacapa and Los Coronados Island groups (each consisting of three small islands). Breeding colonies also occur less regularly on other islands in the SCB. The number of pairs breeding in the SCB from 1969 through 1981 ranged from 339 to 3510 (ibid.).

In order to breed successfully, the California brown pelican requires nesting grounds that are free from predators and human disturbance and an adequate supply of food within its normal 30 to 50 kilometer foraging range. The duration of the pelican breeding season is about 18 weeks, and during this period pelicans feed almost exclusively on northern anchovies (Engraulis mordax) (Anderson et al. 1980). Thus, a constant availability of anchovies during the breeding season is crucial to the maintenance of a sustainable pelican population.

The brown pelican was classified as endangered by USFWS in 1970 in response to widespread pollution related reproductive failures in the 1950's and 1960's. The subspecies P.o. californicus received further protection in 1971 when it was designated as endangered by the State of California. Since then, levels of chlorinated pesticides and PCBs in the near shore marine environment have been significantly reduced, with a corresponding improvement in brown pelican reproductive success. In spite of the improvement, the pelican reproductive rate in the SCB is still below normal. According to the California Brown Pelican Recovery Plan (Gress and Anderson, 1982), a mean reproductive rate of 0.9 to 1.1 young fledged per nesting attempt, typical of rates observed in Florida and the Gulf of California, would be indicative of a stable, self-sustaining population. Since 1974, CBP productivity has generally ranged from 0.6 to 0.9 young per nest attempt (Table 1). It is possible, but highly unlikely, that the historical productivity of the SCB colonies was typically low.

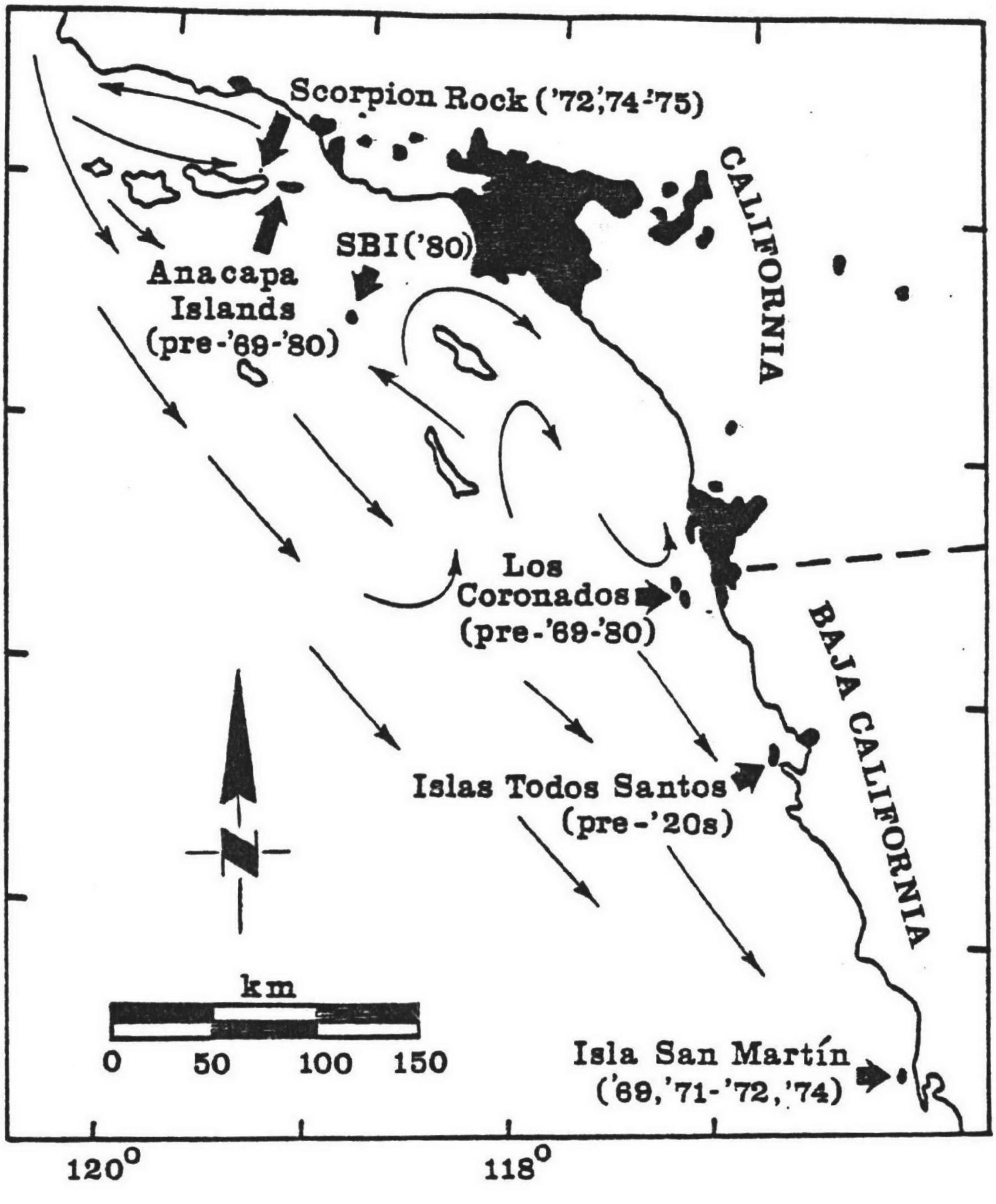

Figure 1. Map of the Southern California Bight area showing the locations of present and past brown pelican nesting colonies. Dates in parentheses below each location are the years when these colonies have been active. Santa Barbara Island is abbreviated as "SBI." Narrow arrows indicate major water circulation patterns in the Southern California Bight. Taken from Anderson and Gress (1982a).

Table 1. Yearly mean population data for brown pelicans nesting in the Anacapa Island area (West Anacapa Island, Scorpion Rock, and Santa Barbara Island) and on Isla Coronado Norte from 1969 through 1981. (taken from Gress and Anderson, 1982).

	Anacapa Area			Los Coronados		
Year	Est. No. Pairs[1]	No. Yng. Fledged	Productivity[2]	Est. No. pairs[1]	No. Yng. fledged	Productivity[2]
1969	750	4	0.005	375	0	0
1970	552	1	0.002	175	4	0.02
1971	540	7	0.013	110	35	0.32
1972[3]	261	57	0.22	250	150	0.60
1973	247	34	0.14	350	100	0.29
1974[3]	416	305	0.73	870	880	1.01
1975[3]	292	256	0.88	339	407	1.20
1976	417	279	0.67	473	487	1.01
1977	76	39	0.51	263	216	0.82
1978	210	37	0.18	265	62	0.23
1979	1258	980	0.78	960	920	0.96
1980[3]	2244	1515	0.68	758	350	0.46
1981	2946	1805	0.61	564	310	0.55

[1] Estimates represent a compromise between maximum numbers present, numbers of nests constructed, reproductive behavior, and appearances of secondary sexual characteristics.

[2] Expressed as number of young fledged per pair. Data for years 1969-1974 are from Anderson et al. (1975), for 1975-1980 from Anderson and Gress (1982a) and Gress and Anderson (1982).

[3] Nesting occurred on Scorpion Rock in 1972 (112 nests; 31 young), 1974 (105 nests; 75 young), and 1975 (80 nests; 74 young) and on Santa Barbara Island in 1980 (97 nests; 77 young).

Several reasons for the inability of the population to stabilize are discussed in the Recovery Plan, including fluctuations in anchovy biomass within foraging range of Anacapa Island, the persistence of chlorinated pesticides in the SCB, and human disturbance during the breeding season. Determining the extent to which continued poor pelican productivity is attributable to wastewater discharges from the three major Southern California municipal sewage treatment plants is the objective of this assessment.

4. ENVIRONMENTAL FACTORS AFFECTING CALIFORNIA BROWN PELICAN REPRODUCTION

4.1 Chlorinated Hydrocarbons

4.1.1 Regulatory Background on DDT and PCBs

DDT

Agricultural and commercial usage of DDT became widespread in the U.S. after 1945. During the years prior to its cancellation almost 1.4 billion pounds of DDT were used domestically. After 1959 DDT usage in the U.S. declined significantly, as a result of increased insect resistance, the development of more effective alternative pesticides, growing concern over adverse environmental effects, and increasing government restrictions on DDT use. Several government committee reports issued in the 1960s recommended a phasing out of the pesticide. Various environmental organizations such as the Environmental Defense Fund became increasingly active in initiating lawsuits leading to the restriction of DDT use at both local and Federal levels.

In 1957, the USDA prohibited the spraying of DDT in specified strips around aquatic areas on lands under its jurisdiction, and began to phase out all use of the pesticide in 1958. In 1964 the Secretary of the Interior issued a directive restricting DDT use on Interior lands. USDA cancelled DDT registrations for certain uses nonessential to human health in the late 1960s.

Soon after the transfer of responsibility for Federal regulation of pesticides to the Environmental Protection Agency in December of 1971, and under court order following a suit by the Environmental Defense Fund, EPA issued cancellation notices for all registrations of products containing DDT, pending a public hearing and final resolution. Final cancellation of all remaining crop uses of DDT was announced by the EPA Administrator on July 7, 1972. DDT use in California had already been banned by the State in 1971. Since the Federal ban, emergency use of the pesticide has been possible on a case by case basis.

The Montrose Chemical Corporation in Torrance, California was the sole remaining domestic manufacturer of DDT after 1971 (domestic production of the pesticide for foreign export was unaffected by DDT domestic use bans). Montrose has continued to manufacture DDT through 1982, but plans to discontinue production by the Spring of 1983 (Montrose personnel, pers. comm.).

Coincidentally, the DDT ambient water quality criteria for protecting freshwater and marine aquatic life, developed in 1980 by EPA using the lowest maximum permissible tissue concentration of DDT and its metabolites, are based on studies of DDT's effects on the brown pelican.[1] The Federal criterion for DDT is 0.001 ug/l. Presently,

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[1]The Federal water quality criteria are not enforceable standards, *per se*; rather, they present data and guidance on the environmental effects of pollutants, which may be used to derive regulatory requirements. At present there are no Federal water quality standards for DDT or PCBs.

there is no State standard in the California Ocean Plan specific for DDT; rather a fixed, undiluted effluent limit of 0.002 mg/l was established in 1972 for the total concentration of identifiable chlorinated hydrocarbons (TICH).[1] This level was developed by the State on the basis of small residues typically found in treated domestic wastewater (Klapow, et al, 1979).

In 1978 the Ocean Plan was revised, and the TICH parameter was replaced by the Total Concentration of Chlorinated Pesticides and PCBs, consisting of a more strictly defined list of constituents.[2] DDT and PCBs typically account for the bulk of the chlorinated hydrocarbons measured in the effluents from the three facilities discussed in this report. More recently proposed revisions to the Ocean Plan call for the compounds listed in the current plan to receive individual limits (State Water Resources Control Board, 1983). Under this proposal, the individual limit for the 6-month median of total DDT <u>diluted</u> effluent concentration would be set at

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[1]Total Identifiable Chlorinated Hydrocarbons are measured by summing the individual concentrations of DDT, DDD, DDE, aldrin, BHC, chlordane, endrin, heptachlor, lindane, dieldrin, polychlorinated biphenyls, and other identifiable chlorinated hydrocarbons.

[2]Total chlorinated pesticides and PCBs are measured by summing the individual concentrations of DDT, DDD, DDE, aldrin, BHC, chlordane, endrin, heptachlor, lindane, dieldrin, and polychlorinated biphenyls.

0.001 ug/l. A draft EIR on the proposed changes to the Ocean Plan has been circulated and a public hearing was held on April 21, 1983. Final adoption of a new Ocean Plan is still several months away.

PCBs

Between 1929 and 1977, about 1.4 billion pounds of PCBs were produced in the United States. Of this total, an estimated 150 million pounds are thought to be present in the environment, and another 750 million pounds still in service in electrical equipment. Not until the late 1960s did it become evident that PCBs were an ubiquitous pollutant in the global environment.

The Food and Drug Administration promulgated regulations in 1972 prohibiting the use of certain PCB-containing materials and equipment in animal feed, human food, and food packaging materials. That same year Monsanto, the major U.S. manufacturer of PCBs, limited sales to manufacturers of transistors and capacitors (i.e., closed systems). Monsanto ceased manufacturing PCBs in 1977. Small quantities of PCBs may still be produced currently as unintentional byproducts of other chemical processes.

The enactment of the Toxic Substances Control Act of 1976 placed additional specific restrictions on the use of PCBs. Section 6(e)(2)(A) of TSCA prohibits the manufacture, processing, distribution in commerce, and use of PCBs after January 1, 1978, in other than a totally enclosed manner. Prior to the enactment of the TSCA, the EPA's regulatory authority over PCBs had been limited to contamination of water from point sources under the Clean Water Act of 1972. EPA promulgated a rule under Section 307(a) of the CWA on February 2, 1977 (42 FR 6532-6556) banning the discharge of PCBs into navigable waters by electrical transformer and capacitor manufacturers.

For PCBs the EPA ambient water quality criterion to protect salt water aquatic life is 0.003 ug/l as a 6-month average. PCB emissions are presently limited by the State of California under the Total Chlorinated Pesticides. The undiluted effluent concentration of 0.002 mg/l mentioned in the preceding DDT discussion is the limit which applies. Under the proposed revisions to the Ocean Plan, the individual limit for the 6-month median of PCB diluted effluent concentration would be set at 0.003 ug/l.

4.1.2 Effects of Chlorinated Hydrocarbons on the California brown pelican

DDT

Research on probable causes of reproductive problems in brown pelicans was initiated in 1969 in response to surveys which indicated that the SCB population was declining. High levels of chlorinated pesticide had previously been linked to reproduction failures in predatory birds (Stickel, et al, 1966) and seabirds (Hickey and Anderson, 1968). Eggshell thinning in peregrines was first noted in the early 1960's by Derek Ratcliffe of the British Nature Conservancy, and similar observations were made subsequently in the United States. Pesticides were a suspected cause, and experiments performed at the Patuxent Wildlife Research Center confirmed a relationship between abnormal decreases in eggshell thickness and doses of DDT fed to kestrels.

Pelican eggshells are thinned as a result of DDE[1] inhibition of calcium ATPase, an enzyme which promotes the active transport of calcium ions across the avian shell gland from the blood to the developing shell (Miller, et al, 1975). In addition to eggshell thinning there may be other toxicological effects of DDE inhibiting normal pelican reproduction. Chlorinated hydrocarbons are thought to depress the estrogen level in birds through the induction of liver enzymes, resulting in late breeding or an inability to lay more eggs after early clutches are destroyed (Peakall, 1970).

Studies indicate a non-linear relationship between DDE levels and eggshell thickness (ibid.). Thus, a given decrease in DDT input into the environment may not result in a proportional improvement in the eggshell thickness and reproductive rate of birds, all other considerations being equal. Nor does there appear to be a definitive threshold level of DDE in birds below which no eggshell thinning has been observed; however, levels below which reproduction is unimpaired have been determined in studies on the eastern brown pelican, P.o. carolinensis (Blus, 1982).

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[1]DDE is one of the predominant metabolites of DDT, produced through the reductive dehydrochlorination of the DDT molecule.

The eastern brown pelican was the victim of severe pesticide contamination and decreased productivity not unlike that experienced by the California brown pelican in the late 1960s and early 1970s. An intensive study was conducted in South Carolina from 1971 to 1975 during which sample eggs collected from marked nests of brown pelicans were analyzed for organochlorine residues, and those residues correlated to the success of individual nests (ibid.). A nest was classified as successful if at least one downy young survived long enough to leave the nest.

Statistical analyses demonstrated a significant relationship between DDE residues and reproductive success of the eastern brown pelican. The critical level of DDE associated with substantial impairment of reproduction was calculated to be 3 ppm (expressed on a fresh wet weight basis), although the calculation was complicated by the intercorrelation of DDE effects with the effects of other organochlorines present. One method of analysis performed indicated that there are only slight effects of DDE on reproduction when residues are below the critical level, but nest success decreased decidedly where residues exceeded the critical level. This quasi threshold level for DDE effects on reproduction may appear to contradict an earlier statement that even minute DDE residues thin eggshells; however, there are several other modes of action through which DDE may affect reproduction. In fact, improved eastern brown pelican productivity did not temporally coincide with increased eggshell thickness (Blus, pers. comm.). Eggshell thickness did increase subsequently as DDE residues continued to decline.

Nevertheless, eggshell thinning was the primary cause of reproductive failure in the Anacapa Island brown pelican colony in the late 1960s and early 1970s. In 1969, nearly 300 nests on West Anacapa Island were examined and only 12 contained intact eggs (Risebrough, et al 1971). Shells sampled that year had a mean thickness 50% less than normal. DDE residues in pelican eggs from 1969 averaged 853 ppm lipid basis, which corresponds roughly to a wet weight value of 43 ppm - an order of magnitude greater than residue levels found in P.o. carolinensis in the early 1970s (Table 2).

Concurrent with a decrease of DDT discharges to the ocean waters off Southern California in the early 1970s, a dramatic decline in pelican egg contamination and eggshell thinning was observed (Anderson, et al, 1977). Reproductive success subsequently improved, and then stablized around 1974 at a level still below what is believed to be a normal level of productivity. Present DDE contamination has been characterized as a chronic problem as opposed to the acute situation of 1969 (Gress and Anderson, in preparation). Residue levels appear to have stablized around 5 ppm, still higher than the critical level of 3 ppm derived by Lawrence Blus in the studies on eastern brown pelicans.

PCB

PCBs do not appear to induce eggshell thinning in wild birds (Blus, et al, 1971), but PCBs and dieldrin were linked to abnormally late breeding in ringdoves, and a failure to lay eggs after early clutches had been lost (Peakall, 1970). Parental behavioral changes, such as reduced nest attentiveness, have been among suspected effects of PCB residues (Anderson et al, 1975); however, more recent studies at the Patuxent Wildlife Research Center conducted on mallards and screech owls have failed to link PCB dietary dosages of 25 ppm and 3 ppm, respectively, to interference with reproductive success (U.S. Fish and Wildlife Service, Fisheries and Wildlife Research, 1978).

The studies described in the previous section pertaining to the eastern brown pelican provide perhaps the best model for evaluating the effects of PCB contamination on brown pelican reproduction. Although PCB residues as high as 18.6 ppm were found in the eastern brown pelican, no statistically significant correlation between PCB residues and reproductive success was found.

PCB residues in California brown pelican eggs have declined since 1969, though not as dramatically as DDT residues (Table 2). Current PCB levels found in eggs are well below the maximum levels (as high as 18.6 ppm) found in eastern brown pelican eggs collected from successful nests in South Carolina (Blus, 1982).

Biomagnification

DDT and PCBs are water insoluble and adhere readily to sediments and organic particulates. Phytoplankton assimilate the organochlorines through direct uptake and, due to the lipophilic nature

TABLE 2. Mean annual organochlorine residues in brown pelican eggs from Anacapa Island, in ppm wet weight (sources: Anderson et al, 1977; Harry M. Ohlendorf, USFWS, personal communication).

Year[1]	Sample Size	DDE	Total DDT	PCB[2]
1969	28	42.65	45.35	10.0
1973	4	8.75	9.1	2.15[3]
1974	39	4.85	4.85	7.3
1975	4	5.65	5.65	6.0
1979	—	7.4	7.6	3.6
1980	—	3.6	3.7	1.2
1981	--	5.1	5.2	1.2

1. Residue values for the years 1969-75 are converted from ppm lipid-basis values presented in Anderson et al, 1977, assuming a 5% egg lipid content. Values for the years 1979-1981 are preliminary estimates based on data for which analysis is still incomplete, and may not be representative of actual residues. Therefore, these residues are not rigorously comparable to earlier years. Final data will be presented in a report by USFWS that is currently in preparation.

2. 1969 PCB residues are from Risebrough (1972) and were quantified on the basis of Arochlor 1254. The 1973-1975 PCBs were quantified on the basis of Arochlor 1260. Therefore, these residues are not rigorously comparable. A correction factor of 2.15 (Risebrough and deLappe, 1972) was applied to the data, but no statistical test was made.

3. Without one value of 0.03 ppm, this mean would be 4.3 ppm.

of these compounds, they accumulate and are biomagnified at higher trophic levels. The brown pelican is a secondary consumer, its chief prey being the planktotrophic and lipid rich northern anchovy. Biomagnification factors for organochlorine residues from fish to brown pelican eggs are believed to be within the range estimated for similar species, on the order of 50 to 100 fold (Blus, 1982), although lower factors have been observed (Blus et al, 1977).

Table 3 lists mean residues of DDT and DDE in anchovies from various studies conducted in Southern California coastal and harbor waters. The migration of anchovies complicates the interpretation of biomagnification from fish to pelican eggs, and residues vary substantially depending on the sample location. The mean residues for the 1980-81 sample are still much higher than the 0.014 ppm mean value measured in Atlantic menhaden (Brevoortia tyrannus) regurgitated by eastern brown pelicans in 1975 (Blus et al, 1979). A more systematic approach to monitoring pesticide residues in anchovies around the SCB would provide information useful in improving our understanding of the sources of pelican contamination.

4.2 Other Factors Affecting Pelican Productivity

Pollutants no longer appear to be the major factor limiting CBP productivity. Since about 1974, the variability of food supplies during the breeding season has become the most important limiting

Table 3. Mean residues of DDT and DDE in Anchovies off the Southern California Coast (concentrations in ppm wet weight).

Year[1]	Total DDT	DDE
1969	4.27	3.24
1970	1.40	0.84
1971	1.34	0.87
1972a	1.12	0.74
1972b	2.18[2]	----
1973	0.29	0.18
1974	0.15	0.12
1975-77	0.30	----
1979	0.12[2]	----
1980-81	0.047	----

1. Data for the years 1969, 1970, 1971, 1972a, 1973, and 1974 are taken from Anderson et al, 1975; The 1972b data are from Stout and Beezhold, 1981; data for the years 1975-77 are from USEPA, 1980c, Appendix B; the 1979 data are from Mearns and Young, in Coastal Water Research Project Biennial Report, 1979-1980 (Bascom, 1980); the 1980-81 data are from Shaffer in Coastal Water Research Project Biennial Report, 1981-82 (Bascom, 1982).

2. These values are derived from anchovies sampled in Los Angeles Harbor.

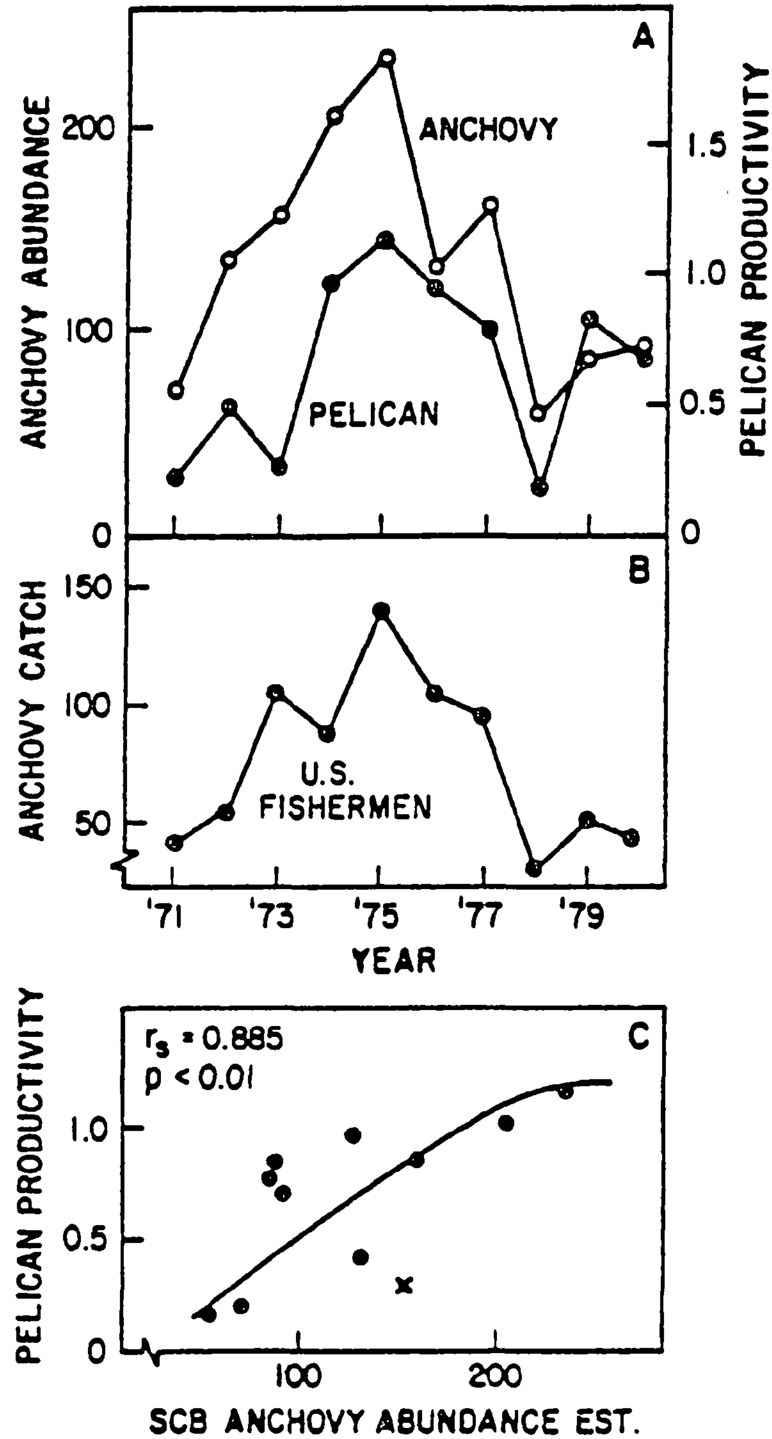


Figure 2. A. Changes in anchovy biomass estimates (abundance) from 1971-1980 (km^2 of school surface area) as related to changes in brown pelican productivity (fledging rates) in the Southern California Bight (Anacapa and Los Coronados).
B. Reduction fishery harvest of anchovies by U.S. fishermen from 1971-1980 expressed in metric tons x 10^3.
C. Correlation of Southern California Bight overall estimates of anchovy abundance using same units as above) and brown pelican productivity; The curve was fitted by eye. The "x" represents an anomalous year (1972-1973).
Source: Anderson and Gress. 1982. Brown Pelicans and the Anchovy Fishery Off Southern California. Canadian Wild. Serv. Occas. Papers.

factor influencing pelican breeding success (Gress and Anderson, 1982). Inadequate anchovy abundance at critical periods during the breeding season has been blamed for nest abandonment and chick mortality. In 1979 through 1981, there was a general pattern of good food availability early in the breeding season followed by food shortages in mid-season coinciding with widespread nest abandonment and starvation of young (Gress, 1981). Nest abandonment rates in 1980 and 1981 for the Anacapa Island colony were 50% and 53%, respectively.

Fluctuations in pelican productivity in recent years appear to correlate well with variations in anchovy abundance (Figure 2). Shortage of food supplies is believed to be caused by variable oceanographic conditions and the cyclic nature of the pelagic anchovy population (Godfrey an Fondahl, 1982). There is experimental verification of synergistic adverse effects of food shortage and DDE on avian reproduction (Keith, 1978), thus suggesting that critical DDE residues may be lowered during periods of food shortage (Blus, 1982).

Human disturbance to breeding colonies and foraging pelicans, though not considered a primary cause of endangerment at present, has the potential to more seriously impact population stability. The recent mutilation of several birds has gained media attention (L.A. Times, October 16, 1982), as has the accidental hooking of pelicans by recreational and commercial fishermen. Breeding colonies are disrupted by photographers and educational groups visiting the island, and by loud noises from low flying aircraft and boats. These interferences can result in nest desertion and even complete colony abandonment (Gress and Anderson, 1982). Nevertheless, mortality caused by direct interactions with humans does not presently account for a significant depression in the CBP productivity.

Offshore oil development could potentially have a serious impact on pelican breeding. Although the 1969 Santa Barbara oil spill had little impact on brown pelicans breeding on Anacapa Island, new leases, exploration, and development near Anacapa Island could seriously affect the birds should there be a major spill. Natural seeps in the Santa Barbara Channel are also capable of polluting foraging habitat near the nesting colonies.

In summary, CBP productivity is affected by several environmental factors ranging from pollution to variations in food availability. This makes it difficult to develop a direct correlation between the minimum acceptable pelican productivity and concentrations of chlorinated hydrocarbons in municipal wastewaters discharged to the ocean, as requested by USFWS.[1] Given a relationship between municipal sewage input and levels of chlorinated hydrocarbons in the benthic environment surrounding the ocean outfalls, there is still a need to

[1]Actually, past observations suggest that the overall mass emission rates of pollutants are better indicators of the degree of environmental impact than are concentrations of pollutants in wastewater (Mearns and Young, 1978).

accurately represent the biomagnification of these substances through the food chain and factor in other constraints (e.g., food availability) on pelican productivity. The synergism between pollution effects and malnutrition would further complicate this model.

Attempts have been made to correlate effluent DDT emissions required to reduce the scale of contamination below a specified level, using biomonitoring techniques (Mearns, 1982). Using data from the California mussel watch program and the LACSD effluent monitoring program, one observes an apparent first order relation between the mass emissions of DDT and the length of coastline which has been impacted thereby (figures 3, 4, and 5). The use of mussels to provide feedback on the suitability of discharge limitations is discussed further in the last section of this report.

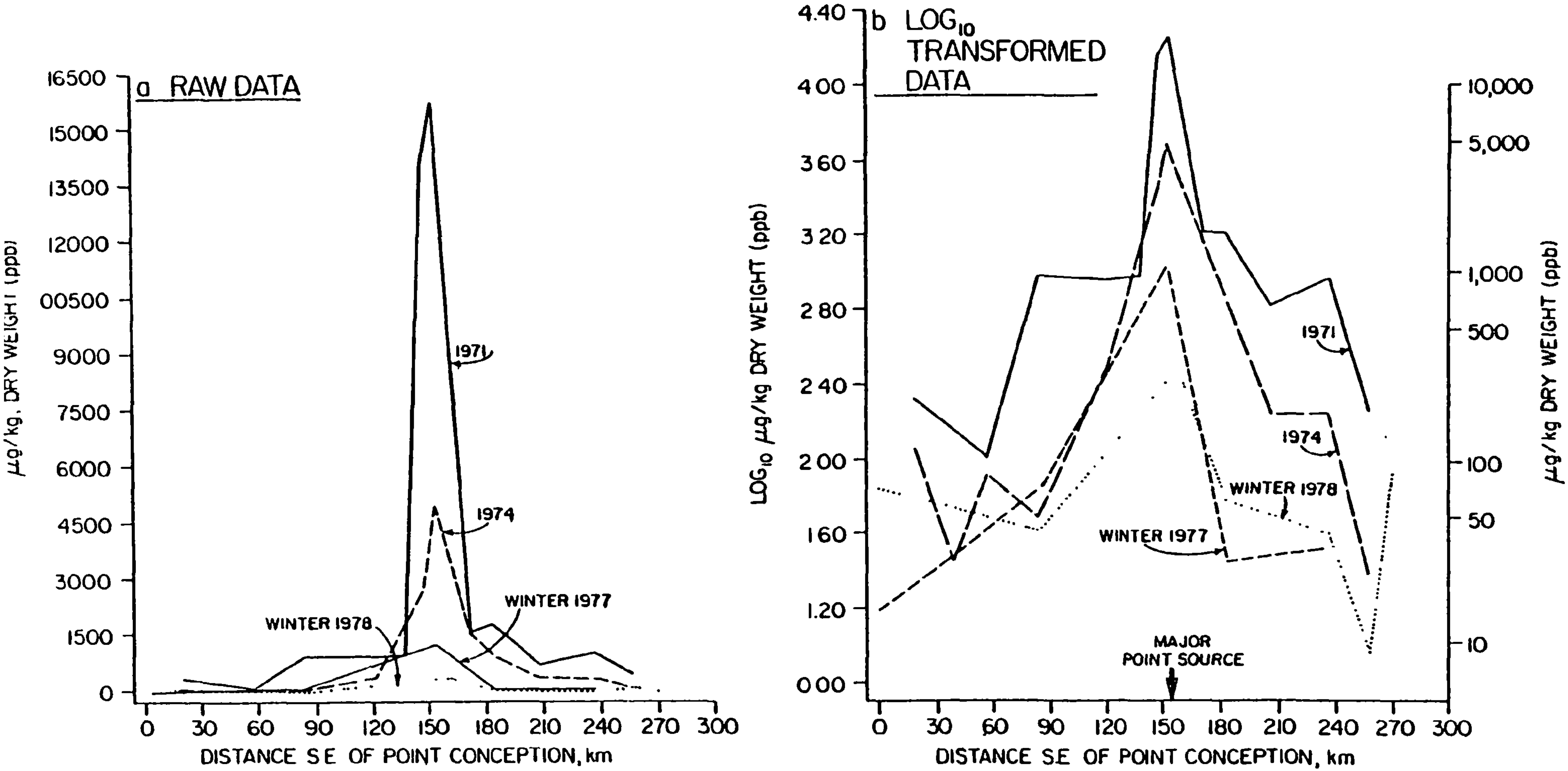


Figure 3. Decline of DDE contamination in intertidal mussels (Mytilus spp.) along 300 km of the Southern California coast, 1971 through 1978. The LACSD joint outfall system is located approximately 150 km southeast of Point Conception. Taken from Mearns, 1982.

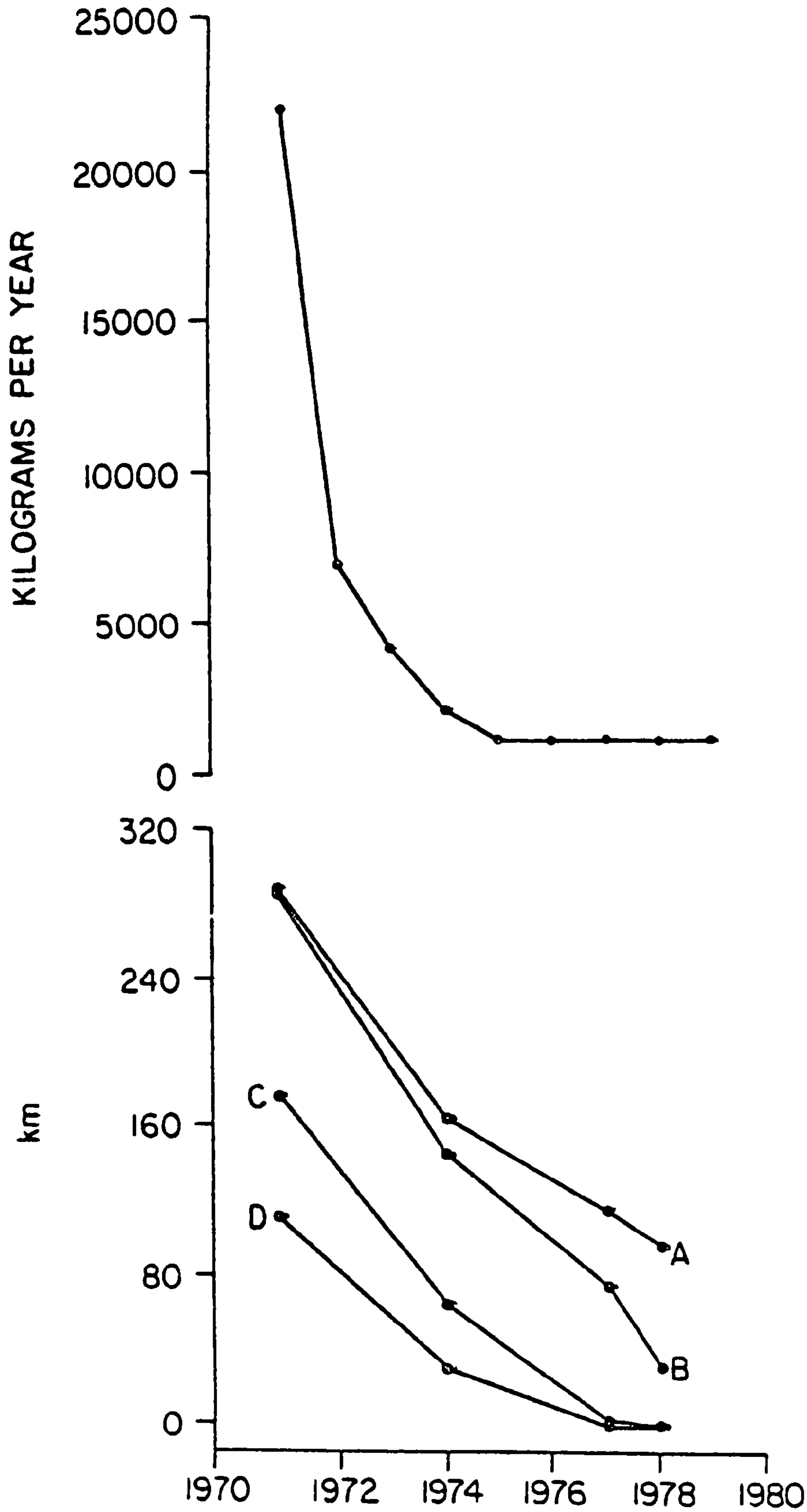


Figure 4. (a) Annual change in total DDT mass emission rates from major Southern California ocean outfalls, 1971 through 1979. (b) Changes in length of coastline bearing mussels contaminated by DDE, 1971 through 1978. Four levels of contamination, in ppb dry weight, are: (A) ≥50, (B) ≥100, (C) ≥500, and (D) ≥1000. From Mearns, 1932.

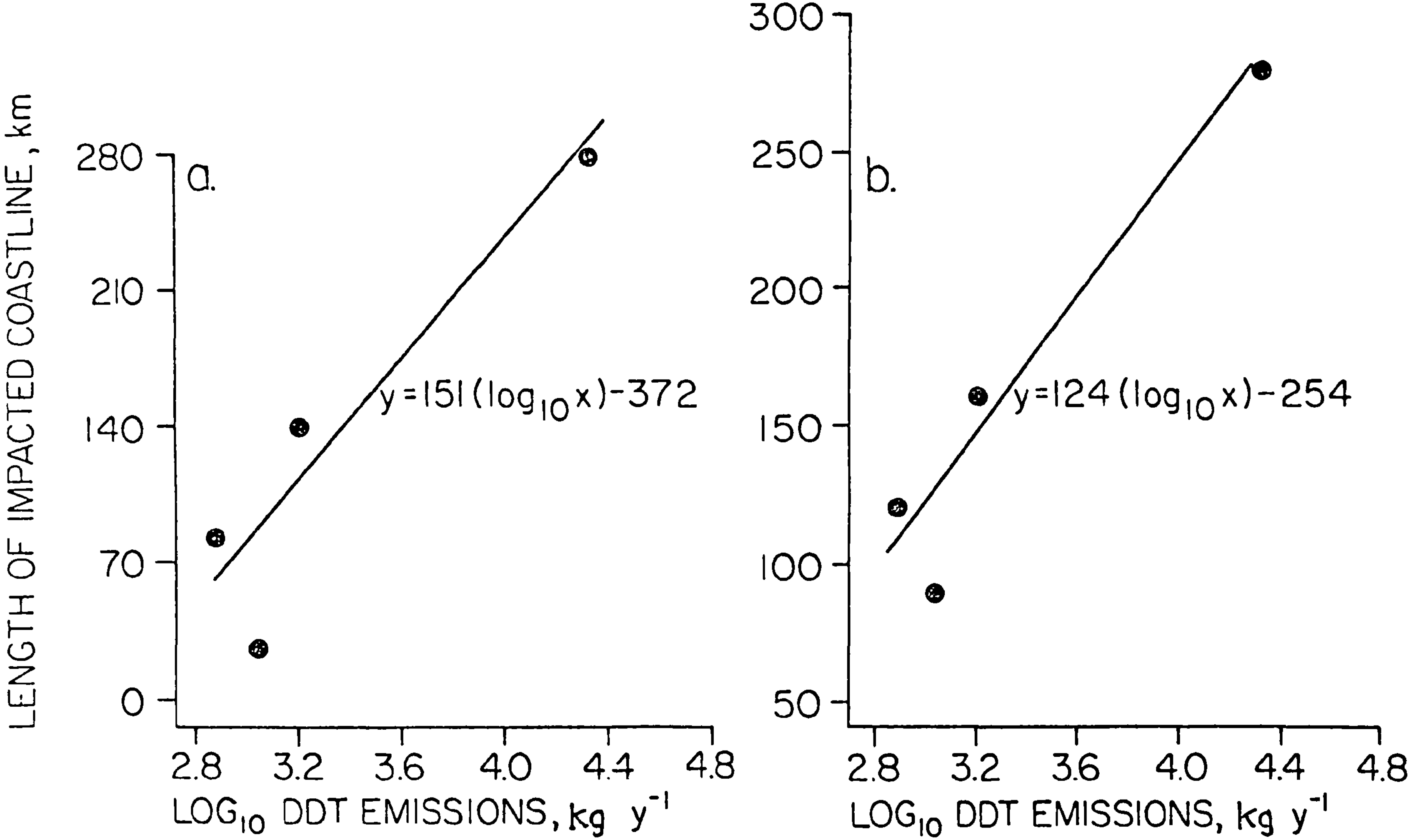


Figure 5. Relation between lengths of Southern California coastline bearing mussels contaminated by DDE and corresponding $\log_{10}$-transformed sewage-borne mass emission rates for the same year. The two concentrations, in ppb dry weight, are: (a) ≥ 100, and (b) ≥ 50. Taken from Mearns, 1982.

5. WASTEWATER DISCHARGE CHARACTERISTICS

5.1 County Sanitation Districts of Los Angeles County

The Los Angeles County Sanitation Districts Joint Water Pollution Control Plant (JWPCP) is located in Carson, California near San Pedro Bay and the Palos Verdes Peninsula. The service area for this treatment plant consists of twenty-four sanitation districts in the urbanized Los Angeles Basin. The districts extend south and west from the San Gabriel - mountain foothills to the Palos Verdes Peninsula, bounded to the east by San Bernardino and Orange Counties, to the west by the cities of Glendale and Los Angeles and to the south by San Pedro Bay. These districts form the network called the Joint Outfall System (JOS) which includes six treatment plants and four submarine outfalls. The location and service area are described in Figure 6.

There are two treatment subsystems in the JOS: A coastal facility known as the Joint Water Pollution Control Plant and five inland water renovation and reclamation plants (WRP's). The five WRP's provide advanced secondary treatment for approximately 23% of the total JOS flow. The treated effluent from the WRP's is either reused or reclaimed. The JWPCP serves as a terminus for this trunk sewer system and provides advanced primary treatment for 77% of the total system flow.

The five WRP's consist of the Pomona Water Reclamation Plant, the Whittier Narrows Water Reclamation Plant, the San Jose Creek Water Reclamation Plant, the Los Coyotes Water Reclamation Plant and the Long Beach Water Reclamation Plant. The treatment processes for the JOS plants and their 1979 design capacities are described in Table 4.

The undigested solids removed in these treatment processes are discharged back to the trunk sewers and transported to the JWPCP for treatment and disposal. It is estimated that 3,210 lbs/day of solids are contributed to the JWPCP for each million gallons per day of upstream treatment.

The JWPCP was constructed in 1927 and began operation as an activated sludge secondary plant in 1928. The plant was converted to a primary plant and has operated as a primary or advanced primary treatment facility since 1947.

In 1970 the system was upgraded to an advanced primary plant by adding the following to the primary treatment system: a system for adding polymer to the primary sedimentation tanks, a system for treating flows generated during digester cleaning operations, an upgraded and expanded solids dewatering facility and a primary effluent screening system. All of the above improvements were operating by 1977. A summary of the current NPDES limitations for the JWPCP is given in Table 5.

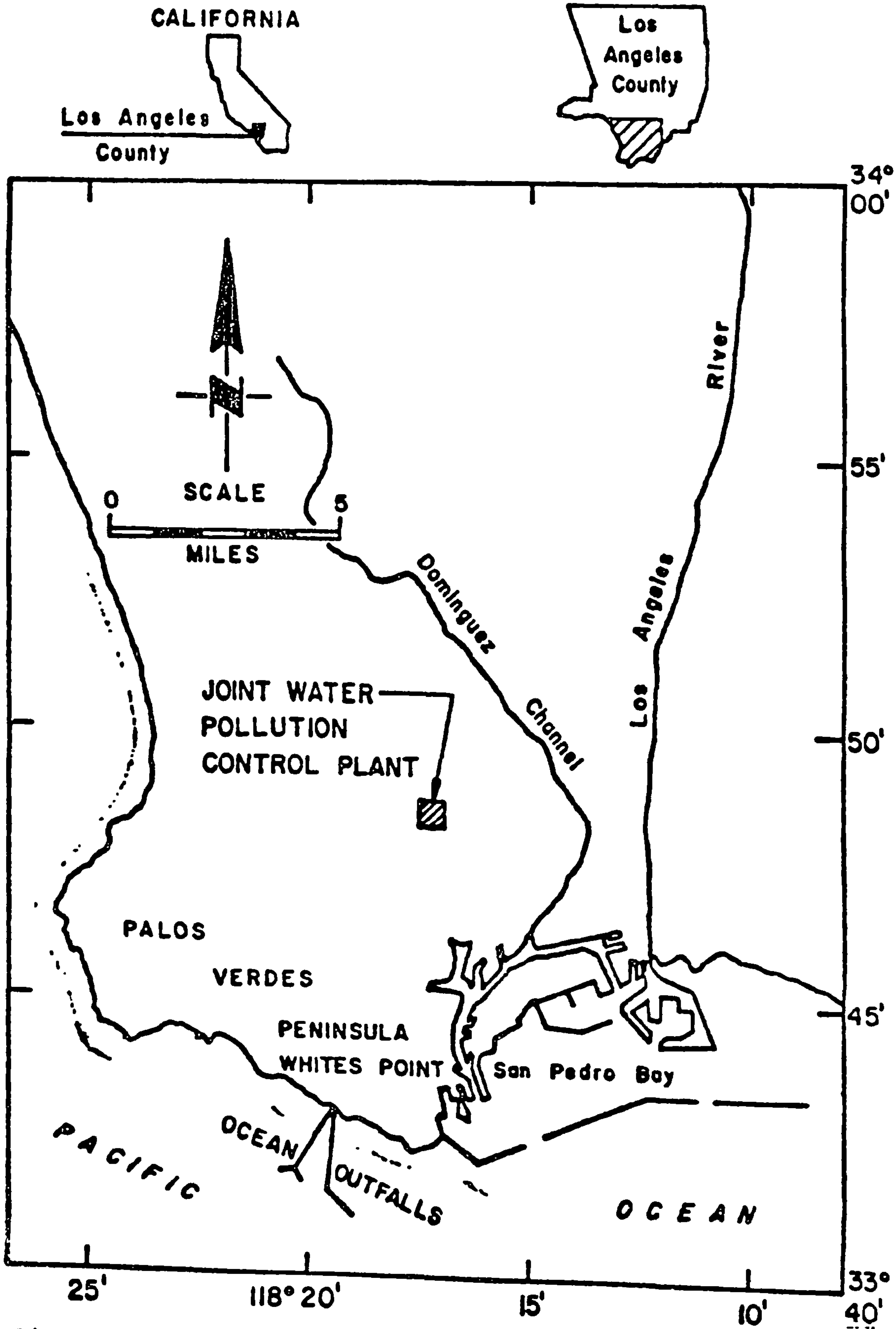


Figure 6 Location of the joint water pollution control plant and county sanitation districts ocean outfalls. Taken from LACSD 1979 301(h) Application.

TABLE 4. Treatment Processes for the LACSD Joint Outfall System Plants

Plant	Type of Treatment System	Flow, MGD Design Capacity
Pomona Water Reclamation Plant	Activated Carbon	10
Whittier Narrows Water Reclamation Plant	Dual-Media or Activated Carbon Tertiary	15
San Jose Creek Water Reclamation Plant	Dual-Media or Activated Carbon Tertiary	62.5
Los Coyotes Water Reclamation Plant	Dual-Media Tertiary	37.5
Long Beach Water Reclamation Plant	Dual-Media or Advanced Filtration Method, to Enhance Reuse	25
JWPCP	Advanced Primary	385

TABLE 5

DISCHARGE REQUIREMENTS NPDES PERMIT CA0053813 - COUNTY SANITATION DISTRICTS OF LOS ANGELES COUNTY (JOINT WATER POLLUTION CONTROL PLANT)

NPDES EFFECTIVE DATE - 6/27/77
EXPIRATION DATE - 6/10/82

Based on a design flow of 385 MGD Effluent Limits for discharge serial Nos: 001, 002, 003, 004, and 015.

DISCHARGE LIMITATIONS

COMPLIANCE DATE	CONSTITUENT	UNITS	30-DAY AVE	7-DAY AVE	DAILY MAXIMUM
July 1, 1977*	BOD_5 20°C	mg/1	30	45	—
		Kg/day	43,700	65,540	87,400
		lbs/day	96,300	144,500	192,600
	Suspended Solids	mg/1	30	45	—
		Kg/day	43,700	65,540	87,400
		lbs/day	96,300	144,500	192,600

* The date for compliance has been extended by Regional Board Order #77-116. Full compliance is to be achieved by January 31, 1985 and a report of compliance is due February 15, 1985.

COMPLIANCE DATE	CONSTITUENT	UNITS	30-DAY AVE	not to be exceeded more than 10% of the time.	DAILY MAXIMUM
July 1, 1978	Total identifiable chlorinated hydrocarbons	mg/1	.002	.004	.006
		Kg/day	2.91		5.83
		lbs/day	6.42		12.8

July 1, 1978 — B-15 - The concentration in marine sediments of substances listed in 'item A-3 (includes TICH) shall not be significantly increased above that present under natural conditions.

July 1, 1977 — The final receiving water toxicity concentrations shall not exceed .05 toxicity units.

The current JWPCP is an advanced primary treatment system and has a design flow of 385 MGD. It consists of the following treatment processes: bar screening, aerated grit removal, primary sedimentation with polymer addition and anaerobic digestion of primary sludge and digested sludge dewatering via centrifugation. The sludge from the treatment plant is composted or hauled to a landfill for disposal. Because of the lack of sludge dewatering facilities and disposal options some of the sludge is dewatered with very inefficient equipment and a high solids centrate is also mixed with the effluent and discharged to the ocean. The disposal of LACSDs sludge was the subject of the Los Angeles/Orange County Metropolitan Area (LA/OMA) Sludge Management Program EIS/EIR (U.S.E.P.A., 1980c). As a result of the EIS/EIR, LACSD is currently designing facilities to dehydrate and thermally process a portion of their sludge, with the remainder being composted and landfilled.

The effluent from the JWPCP is pumped through two tunnels under the Palos Verdes Hills to be discharged to the coast near Whites Point for ocean disposal. The outfall consists of four different outfall pipes, one 60 inches in diameter, one 72 inch diameter pipe, one 90 inches in diameter and one 120 inch diameter pipe.

The 60 inch diameter outfall pipe was constructed in 1937. It is 5,000 feet long and discharges at a depth of 110 feet. The diffuser consists of 42 outlet ports drilled into the pipe for 384 feet of the length. This outfall is used for emergency purposes only.

The 72 inch diameter outfall was constructed in 1947. The diffuser is located 6800 feet offshore at a depth of 165 feet. In 1953 a 648 foot wye shaped diffuser was added to this outfall. It is currently used only during peak flow periods at the plant.

The 90 inch pipe was added in 1956 and is located at 33°42'82"N latitude and 118°29'14"W longitude. The diffuser is a 2,400 foot wye shaped structure with 100 ports. Each port is 6.5 to 7.5 inches in diameter. It currently discharges 8,000 feet offshore at a 210 foot depth. This outfall has been used continuously since 1956.

The 120 inch outfall pipe was constructed in 1965 and is located 33°41'52" N latitude and 118°19'27"W longitude. This diffuser is a 4,400 foot ellshaped diffuser with one leg parallel to shore. There are 740 discharge ports on the diffuser, each one is 2-3 inches in diameter. The discharge takes place 12,000 feet offshore at a depth of 190 feet.

Full secondary treatment at the Joint Water Pollution Control plant would be necessary to meet the current NPDES permit requirements described in Table 5. The LACSD had originally planned to reach full secondary treatment at the JWPCP via a series of three 100 MGD modules called stages I, II and III. Full secondary treatment at the JWPCP would be provided with the completion of stage III. Stage III has a design capacity flow of 300 MGD with an additional 150 MGD of wastewater treated and reclaimed at the upstream reuse and reclamation treatment plants. Stage III would provide secondary levels of treatment via the activated sludge process followed by secondary clarification. The waste activated sludge would be treated via dissolved air floatation, anaerobic digestion, dewatering and final disposal.

The LACSD is currently requesting a variance from the secondary treatment requirements of the Clean Water Act pursuant to section 301(h). The treatment facilities proposed in the 301(h) permit application would essentially be those facilities planned for stages I and II. This proposal would provide secondary treatment for 200 MGD and advanced primary treatment for 100 MGD. Thus, the total design discharge would be 300 MGD rather than the current limit of 385 MGD. The remaining wastewater flow would be treated and reclaimed upstream of the JWPCP.

Stages I and II have been under construction at the JWPCP since 1977 and are scheduled to be completed this year. Secondary treatment would consist of activated sludge followed by secondary clarification. Waste activated sludge will be treated via dissolved air floatation and anaerobic digestion. The facilities needed for handling the sludge generated by the operation of these two stages are not complete. Centrifuges for dewatering waste activated sludge and primary digested sludge are planned to be operational in 1985. The LACSD will be unable to provide ultimate sludge disposal until 1987 when the sludge handling alternative is scheduled to be on line.

The proposed 301(h) discharge limits for the JWPCP are summarized in Table 6. Table 7 summarizes the influent and effluent characteristics at the JWPCP since 1971.

There have been two approaches used by the LACSD to reduce the total pollutant mass discharged from the JWPCP: improved treatment efficiency and the control of pollutant volumes at their sources. With respect to the latter, the County Sanitation Districts adopted a Wastewater Ordinance on April 1, 1972 and amended it July 1, 1975 and July 1, 1980 in order to regulate sewer construction, sewer use and industrial wastewater discharges, pursuant to the responsibilities and authorities delegated to the Districts under Section 4766 of the California Health and Safety Code.

Section 102 of the Districts Wastewater Ordinance regulates among other things the quantity and quality of discharged wastes and the degree of waste pretreatment required. Section 103 states that wastes that will cause certain detrimental effects in the sewerage system will be prohibited. Section 406 of the ordinance lists the specific wastes which are prohibited due to their detrimental effects on the sewerage system. No specific numerical limits are given for these wastes in the ordinance; however, specific numerical limits are given in the Districts' Phase I Source Control Document, adopted in 1975. Industrial users of the sewerage system are required to comply with these Phase I standards through Industrial Wastewater Discharge Permit requirements. The first compliance date was set for January 1, 1977 for all Phase I limits. The Phase I limit on industrial users for total identifiable chlorinated hydrocarbons is "essentially none."

TABLE 6

County Sanitation Districts of Los Angeles County - JWPCP discharge limits (from the Tentative Decision Document for the LACSD 301(h) waiver, November 30, 1981).

Based on a flow rate of 300 million gallons per day

Effluent Characteristics	Units	Discharge Limitations
BOD	mg/l	90
	kg/day	102,000
	lbs/day	225,000
SS	mg/l	90
	kg/day	102,000
	lbs/day	225,000
pH		6-9

TABLE 7
JWPCP - Influent And Effluent Characteristics

Year	Flow Rate MGD [1]	Suspended Solids mg/l [2] Influent	Suspended Solids mg/l [2] Effluent	BOD [2] mg/l Influent	BOD [2] mg/l Effluent	Total DDT [5,11] ug/l Influent	Total DDT [5,11] ug/l Effluent	PCB [5,6] ug/l Influent	PCB [5,6] ug/l Effluent	TICH [5,6] ug/l Influent	TICH [5,6] ug/l Effluent
1970	371	---	---	---	---	----	----	----	----	--	--
1971	372	397[3]	325	384[3]	328	33.7	43.9	19.0	10.1	54	54
1972	351	416	293	319	307	14.8	13.4	9.28	7.6	25	22
1973	359	518	289	357	244	7.30	7.52[11]	4.82	2.67	12	10
1974	347	460	276	314	213	3.95	3.05	21.9	12.5	20	15
1975	342	484	278	302	209	1.67	2.17	3.94	2.73	5	5
1976	353	424	282	306	229	2.03	1.79	2.37	2.34	4	4
1977	330	463	220	334	220	2.12	1.58	2.70	1.81	4	3
1978	345	448	219	324	204	<2.80[7]	<2.06[7]	1.70[7]	<1.09[7]	<4.67[7]	<3.28
1979	367	435	195	322	204	2.14[7]	<1.38[7]	0.91[7]	0.69[7]	2.89[7]	<2.19
1980	374	442	176	335	208	1.66[7]	1.05[7]	0.83[7]	0.65[7]	3.03[7]	1.91
1981	364	442	167	322	202	1.54[8]	0.83[7]	0.96[7]	0.54[7]	4.09[8]	2
1982	363	444[4]	160[4]	323[4]	205	0.89[9]	0.52[9]	0.52[9]	0.33[9]	1.53[9]	2

1 Annual mean of the average daily flows.
2 Annual mean.
3 Average of 6 mo. worth of data.
4 Average of 8 mos. worth of data.
5 From Concentrations of Mass Flow Rates of Trace Constituents in the Joint Outfall System 1971-1976 Norman Ackerman Project Engineer Monitoring Section - County Sanitation Districts of Los Angeles Annual Mean Value.
6 PCB data for JWPCP prior to January 1975 are of questionable accuracy and probably should be disregarded, as should the PCB fraction of the TICH data. Prior to 1975, questionable chromatographic peak were reported as either interference or PCBs, based on technician judgement. An improved analytical procedure was adopted in 1975 which resolved the problem of interference. For further dicussion, see the LACSD report entitled, Control of Plychlorinated Bihpenyls in the Sanitation Districts of Los Angeles County by Choog-Hee Rhee.
7 Water Quality Characteristics - Statistical Summary of 1980 Joint Water Pollution Control Plant - CSDLA Report No. WQCB02.
8 1981 Monitoring Results - JWPCP - Chlorinated Hydeocarbons - Chlorinated Hydrocarbon Monitoring Program - Annual Mean Values.
9 JWPCP Chlorinated Hydrocarbon Monitoring Program - Raw Influent and Final Effluent August 3, 1982 - Annual mean values.
10 Effluent samples are taken 100 yards downstream from the effluent pump station. Effluent has had two minutes of sampling.
11 Analytical error is resposible where values for effluent concentration exceed influent concentration.

During the past a number of improvements were made to the JWPCP to reduce the mass emissions of suspended solids. TICH emissions have, however declined to a greater extent than the suspended solids. This is likely due to a combination of factors including source control, a gradual flushing of residues from the sewer trunk lines, and restrictions on the use of DDT and PCBs. Improved removal efficiency with respect to BOD and suspended solids is anticipated with the planned treatment facilities and further removal of DDT and PCBs can be expected as this improved treatment efficiency is provided.

It is anticipated that increased removal of PCBs will take place in the upgraded facilities because PCB removal efficiency through a wastewater treatment system is reported to be comparable but slightly less than the corresponding removal efficiencies for susupended solids and BOD (U.S.E.P.A., 1977c). DDT behaves similarly in the aquatic environment and therefore is also expected to be comparable (U.S.E.P.A., 1979). Table 8 summarizes the present and estimated removal efficiencies for the JWPCP under existing conditions, under partial secondary treatment as proposed in the 301(h) application, and under full secondary treatment.

Using these estimated removal efficiencies, the mass emission rates are predicted in Table 9. It is important to note, however, that the projected removal efficiences given in Table 9 would not be achieved until alternatives to the ocean disposal of sludge are implemented.

TABLE 8. Existing and Estimated Overall Removal Efficiencies
LACSD Joint Water Pollution Control Plant

Parameter	Existing Advanced Primary Treatment[1] %	301(h) Partial Secondary Treatment %	Full Secondary Treatment %
BOD	40	76[3]	94[3]
SS	55	84[3]	96[3]
DDT	33	65[4]	81.5 ± 4.5[2]
PCB	33	65[4]	81.5 ± 4.5[2]
TICH	33	65[4]	81.5 ± 4.5[2]

1. Estimated from 1977-1982 data obtained from Table 7.

2. U.S. Environmental Protection Agency. 1977. PCB Removal in Publicly-Owned Treatment Works. Criteria and Standards Division, Office of Water Planning and Strategy, EPA Report No. EPA-440/5-7-77.

3. County Sanitation Districts of Los Angeles County. 1979. Joint Water Pollution Control Plant Application for Modification of Secondary Treatment Requirements for Publicly Owned Treatment Works Which Discharge into Marine Waters; Volume 3, Part F, pg. Axx-1.

4. Assumes 200 MGD at 81.5% removal (see #2 above) and 100 MGD at 33% removal (see #1 above).

TABLE 9 - JWPCP Current and Projected Mass Emission Rates
lbs/day (kg/day)

Parameter	Current NPDES Effluent Limits	Existing Treatment [1] (advanced primary)	301(h) Partial 2° (200 MGD 2°)	Full 2° (300 MGD 2° treatment)
Flow MGD	385	363	300	300
BOD-30 day Avg.	96,300 (43,681)	620,621 (281,513)	217,373[2] (98,600)	48,488[4] (21,994)
TSS-30 day Avg.	96,300 (43,681)	484,387 (219,717)	224,179[2] (101,687)	36,228[4] (16,433)
TICH	6.42 (2.91)	6.05 (2.74)	1.34[3] (0.61)	0.69[3] (0.31)
Total DDT	N/A	1.57 (0.71)	0.78[3] (0.35)	0.40[3] (0.18)
Total PCB	N/A	0.9 (0.41)	0.46[3] (0.21)	0.23[3] (0.11)

1 See table 7 for concentrations and flow rates.

2 The mass emissions were developed using LACSD projections based on influent BOD concentrations of approximately 375 mg/l and an influent suspended solids concentraion of approximately 560 mg/l.

3 The mass emissions for TICH, DDT and PCB were obtained by using the current influent concentration and projected flow rate of 300 MGD.

4 The mass emissions have been calculated using the existing influent BOD and TSS concentrations and the projected flow rate.

5.2 The City of Los Angeles Hyperion Treatment Plant

The City of Los Angeles sewerage service area encompasses approximately 600 square miles which includes most of the City of Los Angeles (Figure 7). The major wastewater treatment facility is the Hyperion Treatment Plant. The City also operates the Los Angeles-Glendale Water Reclamation Plant located in Griffith Park and the Terminal Island Treatment Plant located on Terminal Island. The CLA is currently constructing the Tillman Water Reclamation Plant in the San Fernando Valley. The solids handling facilities for the Glendale and Tillman Water Reclamation Plants will be provided for at the Hyperion Treatment Plant.

The City first started discharging wastewaters into Santa Monica Bay at Hyperion in 1894. In 1925 a new submarine outfall was extended into the ocean for one mile and a screening plant was built at Hyperion. The plant was first upgraded to a secondary treatment facility in 1950. A twelve foot diameter one mile outfall was also constructed at this time. In 1955 the existing plant was expanded to a capacity of 420 MGD. A five mile effluent outfall and a seven mile digested sludge outfall were also constructed but not placed into operation until 1961.

The existing Hyperion sewage treatment facility (HTP) basically consists of pretreatment, primary and secondary treatment, sludge treatment and then discharge to Santa Monica Bay. Primary treatment consists of bar

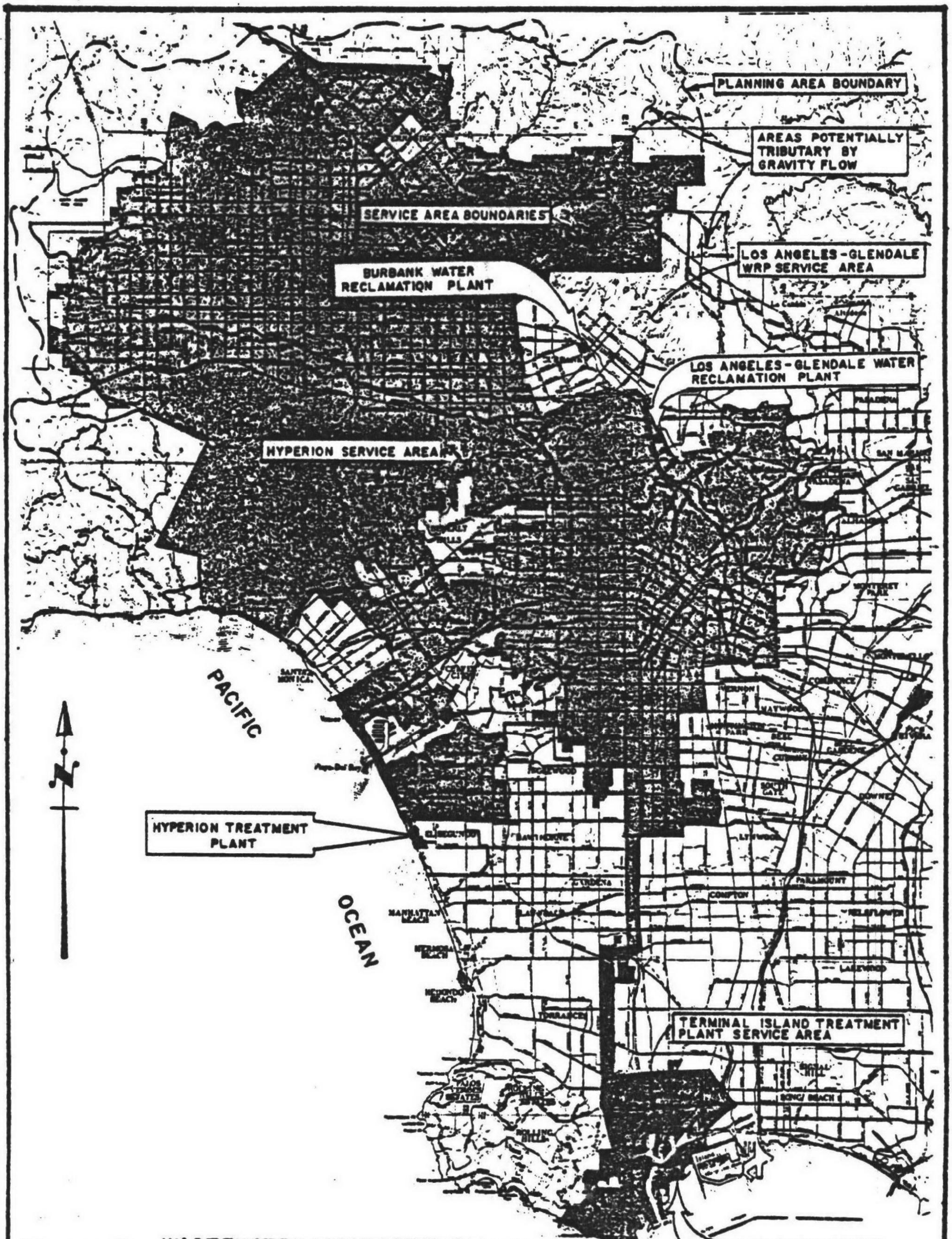


Figure 7 - WASTEWATER TREATMENT FACILITIES PLANNING AND SERVICE AREAS

screening grit removal and primary sedimentation. Secondary treatment is accomplished by means of the conventional activated sludge process followed by sedimentation. Currently all wastewater receives primary treatment and about one-third of the primary treated wastewater receives secondary treatment.

The settled solids, grease and other floatable material is conveyed to the plants sludge digestion and treatment facility. All of the sludge from primary treatment and one half of the sludge from secondary treatment is anaerobically digested. The remainder of the secondary sludge is aerobically digested. After screening the sludge is mixed with secondary effluent and discharged to Santa Monica Bay.

The HTP has three ocean outfalls. The one-mile long, twelve foot diameter line is now maintained for emergencies only. It is a gravity line having eight discharge ports at a depth of 45 feet. The primary and secondary treated effluent is discharged through the five-mile long 12 foot diameter outfall. The discharge point is identified as latitude 33 degrees 54 minutes 45 seconds N, longitude 118 degrees 31 minutes 15 seconds W. The outlet of this five-mile outfall consists of two identical 4,000 foot long diffuser legs.

The diluted digested sludge is discharged through the seven-mile long 20 inch diameter outfall. The discharge point is described as latitude 33 degrees 55 minutes 35 seconds N, longitude 118 degrees 33 minutes 15 seconds W., and takes place at a depth of 320 feet. The permitted effluent limitations for these discharge points is described in Table 10.

TABLE 10

Discharge Permit Requirements

City of Los Angeles-Hyperion Wastewater Treatment Plant
EPA NPDES Permit No. CA 01009991; California Regional Water Quality Control Board Los Angeles Region Order no 75-100.

Effective Date: September 17, 1975
Expiration Date:[1] December 17, 1979 - California Regional Water Quality Control Board Los Angeles Region-Order No. 77-84

FOR DISCHARGE SERIAL NUMBER 001 - (1 mile outfall) based on a design capacity of 100 MGD

Parameter	Units	Discharge Limitations 30-Day Average	7-Day Average	Daily Maximum
BOD_5 20°C[2]	lbs/day	25,000	37,500	50,000
	mg/l	30	45	---
Suspended Solids	lbs/day	25,000	37,500	50,000
	mg/l	30	45	---
pH	range	6.5-9.0		
Total Identifiable[3] Chlorinated Hydrocarbons (Based on a design capacity of 420 MGD effluent From the discharge of 001 and 002)	mg/l	0.002		0.004

1 The conditions of an expired permit continue in force under 5 USC section 558(c), Administrative Procedures Act, until the effective date of a new permit if 1) the permittee has submitted a complete application for a new permit and 2) the EPA does not issue a new permit on or before the expiration date of the previous permit.

2 The arithmetic mean of the BOD5 and suspended solids values, by weight, for effluent samples collected in a period of 30 consecutive calendar days shall not exceed 15 percent of the arithmetic mean of the values, by weight, for influent samples collected at approximately the same times during the same period.

3 Compliance date July 15, 1978.

TABLE 10 (continued)

Discharge Permit Requirements
EPA NPDES Permit No. CA0109991
City of Los Angeles-Hyperion Water Pollution Control Plant

Discharge Serial Nos. 002 and 003

Effective Date: October 19, 1982
Expiration Date: July 31, 1985 for 002 and July 1, 1985 for 003
Discharge Serial No. 002 (5-mile outfall) - Based on a design capacity of 420 MGD

Effluent Characteristics	Units	Discharge Limitations 30-Day Average	7-Day Average	Instantaneous Maximum
BOD_5 20°C	lbs/day	648,000	788,000	----
	mg/l	185	225	290
Suspended Solids	lbs/day	280,000	350,000	----
	mg/l	80	100	170
pH	range	6.0 std. units - 9 standard units		

	Units	Discharge Limitations 6 mo. Avg.	Daily Max.	Instantaneous Maximum
Total Identifiable Chlorinated Hydrocarbons	lbs/day	11	14	----
	mg/l	0.003	0.004	0.01

Discharge Serial No. 003 - (7-mile outfall)

	Units	Discharge Limitations 30-Day Ave.	Daily Max.
Total Identifiable Chlorinated Hydrocarbons	lbs/day	0.1	0.2
	mg/l	0.002	0.004
Total Solids	lbs/day	900,000	1,350,000
	mg/l	18,000	

The treatment system as it has been proposed in the 301(h) application will consist of: a) the existing primary treatment system plus four new primary sedimentation tanks; b) the existing activated sludge secondary treatment system upgraded to handle 150 MGD of primary effluent instead of 100 MGD; c) the existing secondary sedimentation system plus ten new secondary clarifiers; d) all necessary appurtenances and channels; e) the existing effluent pumping plant and outfall system. All of the waste activated sludge from this system would be thickened and anaerobically digested, either separately or in combination with the primary sludge. Since the 301(h) modified permit will include a schedule for discontinuing the ocean discharge of sludge, the digested primary sludge and waste activated sludge will be mechanically dewatered and then dehydrated. The dehydrated sludge is to be used for energy recovery (U.S.E.P.A., 1980c).

The 301(h) discharge limitations which have been proposed are described in Table 11. The application for a variance from secondary treatment requirements is only being sought for the effluent discharge line number 002 (5-mile outfall). The sludge discharge line, 003, currently must meet the NPDES permit limits shown in Table 10. In addition, the City of Los Angeles is required to cease the discharge of sludge by July 1, 1985 under consent decree No. CV-77-3047 as amended April, 1982 (see Section 6.1). The emergency outfall, 001, will remain subject to the current NPDES limitations.

Table 11

City of Los Angeles-Hyperion Waste Water Treatment Plant discharge limits for discharges serial number 002. (From the Tentative Decision for the CLA Hyperion POTW) 301(h) waiver, November 30, 1981.

Based on a flow rate of 350 million gallons per day

Effluent Characteristics	Discharge limitations
BOD	125 mg/l
TSS	68 mg/l
pH	6-9

The conversion of the HTP to a full secondary treatment facility would involve upgrading the existing secondary activated sludge system to a high rate oxygen activated sludge system. The remaining portions of the treatment system would remain the same as they are currently but would have to be upgraded to increase the total plant efficiency. Sludge handling for the Hyperion plant with full secondary treatment would be an expanded version of the energy recovery facilities designed for partial secondary treatment under 301(h).

The 1981 data in Table 12 shows that the TICH limit of .003 mg/l from the discharge serial number 002 was being met. More recent discharge monitoring reports indicate that the October and November 1982 TICH discharge concentrations were 0.0001 mg/l and 0.00013 mg/l respectively in the effluent (City of L.A., 1982).

As with Los Angeles County, improved treatment efficiency should result in greater removal of chlorinated hydrocarbons. In addition, since the City of Los Angeles began their industrial pretreatment program in 1975 significant reduction in chlorinated hydrocarbons in the influent to the sewage treatment plant have been evident. The control of the influent should continue to play a significant role in the effluent quality.

The estimated removal efficiencies associated with the planned improvements at the Hyperion treatment plant are shown in Table 13. These are based on the effluent discharge only and do not consider the sludge discharge.

It is assumed that the influent concentration for BOD, SS, DDT and PCB will remain at the current levels. The predicted removal percentages for TICH, DDT and PCB are based on a flow weighted average of primary and secondary removal through the Hyperion facility for the 301(h) waiver treatment level.

Estimates of the mass emissions for present, 301(h), and secondary treatment levels are summarized in Table 14. The estimates project a future decrease in the mass emissions with improved treatment facilities. Table 14 does not include statistics for the sludge outfall, but further emission reductions would be realized upon cessation of the sludge discharge.

TABLE 12
Discharge Characteristics
City of Los Angeles - Hyperion Wastewater Treatment Plant

Year	Flow Rate MGD Outfall Numbers 001	002	003	Suspended Solids[6] mg/l Infl.	Effl. 001	Effl. 002	Effl. 003	BOD[6] mg/l Infl.	Effl. 001	Effl. 002	Total DDT[1,2,4] ug/l Infl.	Effl. 001	Effl. 002	Effl. 003	Total PCB[1,3,4] ug/l Infl.	Effl. 001	Effl. 002	Effl. 003	TICH[6,7] ug/l Infl.	Effl. 001	Effl. 002	Effl. 003
1970	---	341	4.87	281	8.0	73	8700	245	6.0	119	---	---	0.66	5.5	---	---	0.35	135	---	---	---	---
1971	---	337	4.69	273	7.0	78	8000	261	8.0	116	---	---	0.10	2.38	---	---	0.95	38.5	---	---	---	---
1972	---	330	4.62	285	10.0	80	8600	256	8.0	97	---	---	0.39	6.75	---	---	---	---	---	---	---	---
1973	---	339	4.82	257	9.0	81	8500	245	9.0	98	1.59	---	0.66	3.94	2.40	---	2.00	25.4	2.7	---	3.1	33.1
1974	---	338	4.70	262	8.0	83	8400	258	10.0	121	0.89	---	0.72	2.55	0.44	---	0.36	3.3	1.8	0.5	1.4	7.4
1975	4.96	345	4.29	269	34.0	110	9200	249	30.0	121	0.93	0.04	0.88	3.13	0.89	0.04	1.57	3.4	2.2	1.9	6.1	27.5
1976	<1	359	4.10	274	4.0	77	9900	253	7.0	127	1.26	0.29	1.35	7.05	1.29	2.15	3.30	36.0	3.0	2.9	5.4	46.6
1977	0.17	319	4.60	290	6.0	61	9100	300	10.0	146	0.03	0.04	0.18	1.39	1.45	3.70	2.07	17.6	1.5	3.9	2.4	20.1
1978	0.26	341	4.60	262	4.0	66	8400	285	7.0	148	0.24	0.09	0.18	2.15	1.31	0.99	1.07	9.4	1.7	1.3	1.4	13.2
1979	0.76	349	4.79	259	4.0	75	7500	259	9.0	144	0.14	0.08	0.18	0.89	1.25	0.61	0.60	9.3	1.5	0.8	0.9	10.ß
1980	2.8	363	4.84	252	11.0	77	7200	281	1.0	158	0.03	0.10	0.08	1.04	0.24	0.25	0.66	6.5	0.4	0.4	0.8	8.1
1981	0.04	369	4.70	249	17.0	77	7100	286	42.0	169	0.08	0.03	0.06	0.58	0.92	0.44	0.76	3.1	1.1	0.6	0.8	4.6

1 Analyses performed in Hyperion effluent discharges Serial Nos. 001 (1-mile) 002 (5-mile) and 003 (7-mile) covering the period 1970 through 1981. Analyses previous to 1973 were performed by four separate laboratories and PCB results were especially subject to large fluctuations.

2 Total DDT is interpreted to mean the sum total of the isomers of DDT and its related compounds, as follows: op'DDT, pp'DDT, op'DDD, pp'DDD, op'DDE and pp'DDE.

3 PCB analyses included Aroclor 1242 only in 1970; 1242, 1254, and 1260 in 1971; 1242 only in 1972 through 1975; and 1242 and 1254 since January of 1976. Therefore best results are 1976 onward.

4 Limit of detectibility for each isomer of DDT is 0.02 ug/l; for PCB isomer 0.1 ug/l for discharge serial numbers 001, 002 and raw influent. Limit of detectibility for each isomer of DDT is 0.2 ug/l and for PCBs 1.0 ug/l for discharge serial number 003 (7-mile outfall).

5 Data generated by the L.A. City Hyperion laboratory - contained in the annual reports submitted to the State of California Regional Water Quality Control Board, Los Angeles Region. The concentrations measured for discharge serial 003 are total solids, rather than suspended solids.

6 Analytical error is responsible where effluent concentration exceeds the influent concentration.

TABLE 13

Existing and Estimated Overall Removal Efficiencies - Hyperion Wastewater Treatment Plant

	Existing Avanced Primary Treatment (%)	Partial Secondary Treatment (150 MGD Secondary) 301(h) (%)	Full Secondary Treatment (%)
BOD	40[7]	56[2]	85[4]
SS	69[7]	75[6]	85[4]
TICH.	30[1]	52[5]	81.5 ± 4.5[3]
DDT	30[1]	52[5]	81.5 ± 4.5[3]
PCB	30[1]	52[5]	81.5 ± 4.5[3]

1 A removal efficiency assumed.

2 Developed from the current influent BOD concentration and the BOD effluent limittation in Table 10.

3 PCB's Removal in Publicly - Owned Treatment Works - Criteria and Standards Division, U.S. EPA July 19, 1977, EPA 440/5-77-017.

4 EPA full secondary definition, 40 CFR . Part 133.

5 The estimates for TICH, DDT and PCB removal efficiency are based on weighted averages of primary and secondary removal. Assumes 150 MGD at 81.5% removal and 200 MGD at 30% removal.

6 Water Quality Control Plan for Ocean Water of California - Adopted and effective 1978 - State of California, State Water Resources Control Board.

7 Developed from the 1981 discharge characteristics for discharge serial number 002.

TABLE 14. Hyperion Wastewater Treatment Plant
Current and Projected Mass Emission Rates
lbs/day (kg/day)

Parameter	Current NPDES Effluent Limits	Existing Treatment (100 MGD 2°)	301(h)[1] Treatment (150 MGD 2°)	Full 2°[2] Treatment (350 MGD 2°)
Flow	420	369	350	350
BOD-30 day Avg.	648,000 (293,932)	520,090 (236,069)	367,326 (166.619)	125,225 (56,802)
SS-30 day Avg.	280,000 (127,008)	236,069 (107,487)	181,707 (82,422)	109,024 (49,453)
TICH	14.0 (6.35)	2.46 (1.12)	1.40 (0.64)	0.44 (0.20)
DDT	N/A	0.18 (.083)	0.11 (0.05)	0.04 (0.02)
PCB	N/A	2.33 (1.06)	1.28 (0.58)	0.40 (0.18)

1 Flow rate per 301(h) application. The current influent concentrations were used.

2 Influent concentrations used are current influent concentrations.

5.3 County Sanitation Districts of Orange County

The County Sanitation Districts of Orange County (CSDOC) serve an area of approximately 200,000 acres and a population of approximately 1.6 million in northeastern Orange County. The service area is divided up into seven individual districts which collectively operate separate interceptor sewers and pump stations. The existing sewerage facilities consist of 500 miles of major interceptor sewers 30 pump stations and two large regional treatment plants which collect and treat the sewage from some 23 cities and unincorporated areas. The two regional treatment facilities are known as Plant No. 1 and Plant No. 2. Plant No. 1 is located in Fountain Valley California and Plant No. 2 is located in Huntington Beach, California. Figure 8 is a map depicting the service area.

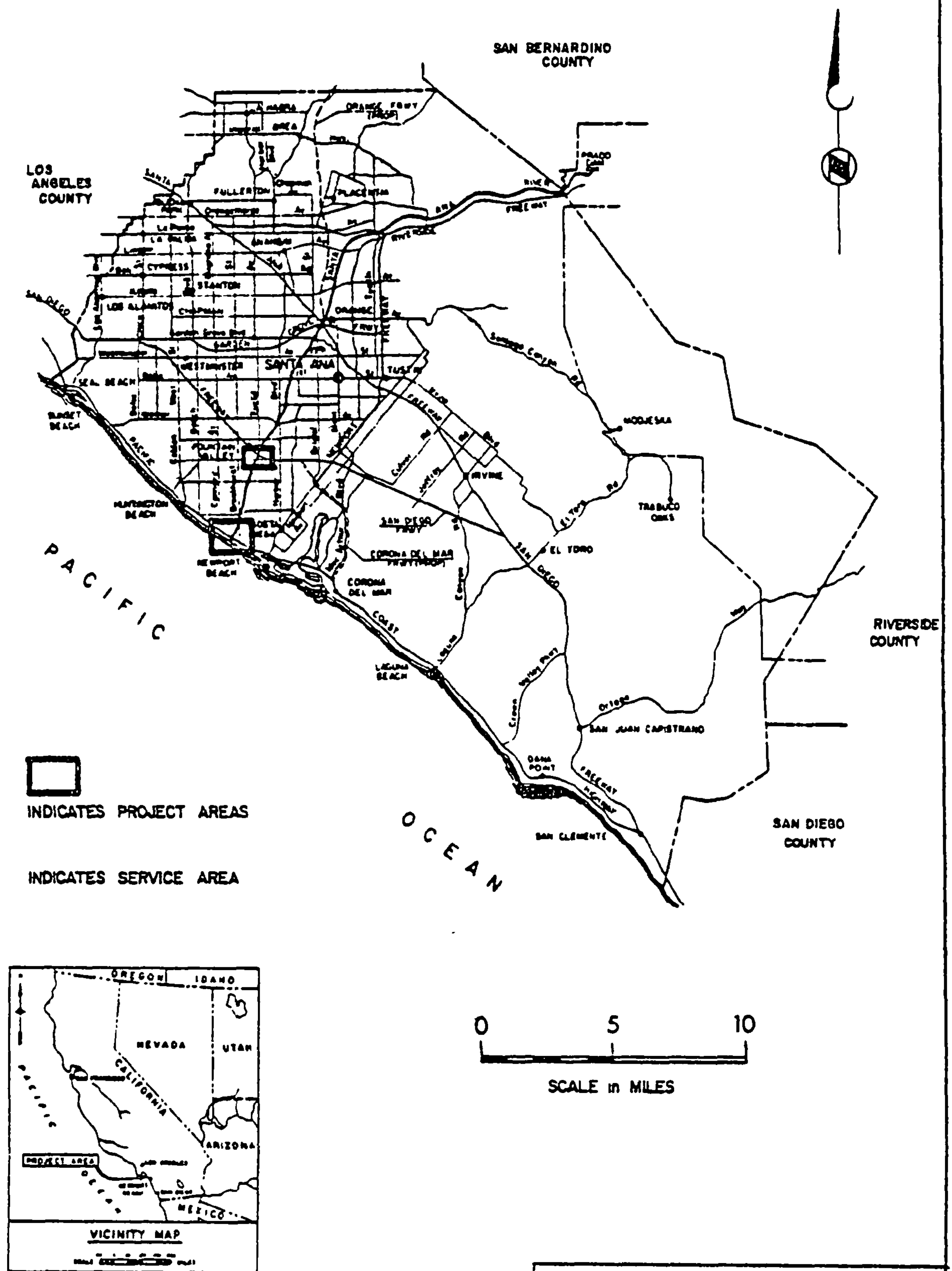
The concept of an Orange County Sanitation District Joint Outfall system began in 1921. Construction of trunk sewers, a screening plant and an ocean outfall was started in 1923 and placed into operation in the spring of 1924. The ocean outfall was extended in 1927 to a distance of 3,000 feet into the ocean.

A primary treatment plant was constructed in 1941 in Fountain Valley and served a population of 103,000 people. Some of these facilities are still in existence as part of Plant No. 1. In 1951 a second primary treatment facility, Plant No. 2, was constructed in Huntington Beach.

This plant had a design flow capacity of 18 MGD and included a new 7,000 foot long outfall, 78 inches in diameter. This outfall replaced the 3,000 foot outfall constructed in 1927 and discharged the combined effluents from the two primary treatment plants. In 1963 Plant No. 1 was expanded to a 15 MGD trickling filter secondary treatment plant. In 1973 an additional 46 MGD of secondary activated sludge treatment was added.

Plant No. 1 presently treats 60 MGD. Influent flow to Plant No. 1 enters the headworks and passes through mechanically cleaned bar screens, aerated grit chambers and primary sedimentation basins. Twenty million gallons per day of this primary effluent is treated by the trickling filter process. The remaining primary effluent flows to an activated sludge plant along with a portion of the effluent from the trickling filter plant. The effluent from the activated sludge process is then settled in secondary clarifiers. Final effluent from Plant No. 1 is transported to Plant No. 2 or diverted to the Orange County Water Districts Factory "21" for tertiary wastewater treatment and ground water injection.

Waste Activated sludge from Plant No. 1 is thickened in air floatation thickeners. Thickened sludge is then pumped to anaerobic digesters and digested. Digested primary sludge is presently dewatered by centrifugation and disposed of via truck hauling to a composting facility. Centrate from the certrifugation of sludge flows to Plant No. 2. Belt presses will be used for dewatering digested sludge beginning sometime in January of 1983.



LOCATION MAP — ORANGE COUNTY

Figure 8

TAKEN FROM CSDOC 301(h) App.

Plant No. 2 is a 160 MGD average flow primary treatment facility. Wastewater treatment at Plant No. 2 consists of mechanical bar screens and primary sedimentation. New secondary treatment facilities, utilizing the pure oxygen activated sludge process, are currently under construction. This new secondary treatment facility will treat 75 MGD of the primary effluent and is expected to start up in mid-1983.

Raw sludge from the primary settling basins is collected and piped to the anaerobic digesters. Digested sludge is dewatered via belt presses. It is then composted and hauled to a landfill. EPA and the State are currently developing a joint EIS/EIR on the Facilities Plan for the ultimate sludge management program. Several alternatives including co-combustion, landfill, and composting are being examined. Figure 9 summarizes the treatment scheme for both Plant No. 1 and Plant No. 2. The combined effluent from Plant No. 1 and Plant No. 2 is then discharged to the Pacific Ocean.

CSDOC has three possible discharge points. The primary point, discharge serial number 001, extends 23,800 feet offshore of the mouth of the Santa Ana River. Discharge number 001 is a 120 inch diameter outfall with a 6000 foot diffuser. Discharge serial number 002 is an emergency discharge point and extends 7,200 feet offshore of the mouth of the Santa Ana River. Discharge 002 is a 78 inch diameter outfall with a 1,000 foot diffuser. Discharge serial number 003 is also an emergency discharge point discharging to the Santa Ana River (001 and 002 are regarded as dischargers to the Pacific Ocean).

In 1977 the CSDOC was issued an NPDES discharge permit jointly by the California Regional Water Quality Control Board, Santa Ana Region and the United States Environmental Protection Agency, Region 9. The permit is summarized in Table 15. The Federal secondary limitations of 30 mg/l of suspended solids and 30 mg/l of biochemical oxygen demand were incorporated into the permit. California's Ocean Plan limitations on toxic materials were also incorporated in this permit.

The secondary treatment levels were to be accomplished by July 1, 1977 as mandated by PL 92-500. Because this deadline could not be met, the state and the EPA agreed upon an enforcement compliance schedule. The new compliance dates are also given in Table 15.

The CSDOC is also requesting a variance from these secondary treatment requirements of the Clean Water Act pursuant to Section 301(h). The treatment facilities proposed in the 301(h) application for Plant No. 1 and No. 2 are essentially the same as those described for the existing facilities but include the addition of 75 MGD of pure oxygen activated sludge treatment at Plant No. 2, scheduled to begin operation in 1983. The CSDOC based the application for modification of secondary treatment requirements on an effluent flow of 227 MGD (annual average). The draft 301(h) permit is summarized in Table 16 for the discharge from Plant No. 1 and Plant No. 2.

Full secondary treatment at Plant No. 1 and Plant No. 2 was planned and described in the 1979 facilities plan for the CSDOC. The total treatment capacity for both Plants No. 1 and No. 2 for the year 2000 was described

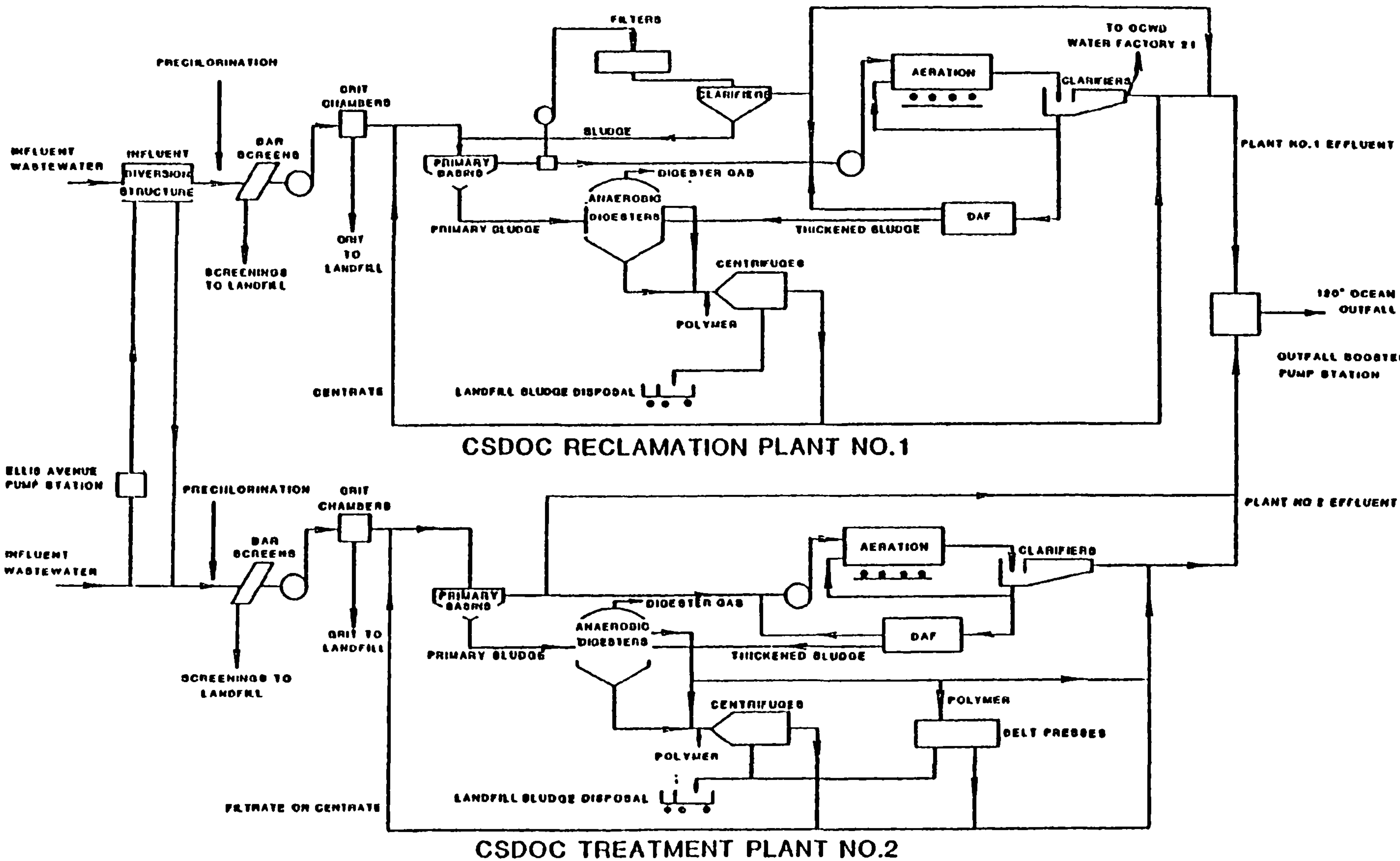


Figure 9 PROCESS FLOW DIAGRAM FOR CSDOC PLANT NO.1 AND NO. 2.

TABLE 15. Authorization to Discharge Under the National Pollutant Discharge Elimination System (NPDES)

CA0011604 - County Sanitation Districts of Orange County

Effective Date: August 22,1977
Expiration Date: June 1, 1982 - The Complianoer date for the treatment levels discribed below was extended to January 1, 1983 per order number 77-125.

Based on a design flow of 227 MGD.

Effluent Limitations for discharge serial Nos. 001, 002 & 003[1].

Parameter	Units	30-Day Avg.	7-Day Avg.	Daily Maximum
Biochemical Oxygen Demand	kg/day	26,000	39,000	
	lbs/day	57,000	85,000	
	mg/l	30	45	
SS	kg/day	26,000	39,000	
	lbs/day	57,000	85,000	
	mg/l	30	45	
pH	Shall not exceed 9.0 or be less than 6.0.			
Total Identifiable Chlorinated Hydro-Carbons	kg/day	1.7		3.4
	lbs/day	3.8		7.6
	mg/l	0.002		0.004

[1] The use of discharge serial No. 002 or 003 is prohibited except under emergency conditions.

TABLE 16

Permit No. CA0110604 - County Sanitation Districts of Orange County - Plant No. 1 and Plant No. 2 Draft NPDES Permit Requirements Waiver of Secondary Treatment Requirements

NPDES No. CA0110604 - Based on a design flow of 242 MGD

Effluent Characteristics	Units	Discharge Limitations 30-Day Average	7-Day Average	6-Month Medium
Carbonaceous BOD	kg/day	91,600	137,000	
	lbs/day	202,000	302,000	
	mg/l	100	150	
Suspended Solids	kg/day	87,000	131,000	
	lbs/day	192,000	289,000	
	mg/l	95	143	
Total Identifiable Chlorinated Hydrocarbons	kg/day			1.8
	lbs/day			4.0
	mg/l			.002

as 285 MGD. This has since been changed to 314 MGD. The ultimate capacity at Plant No. 2 is to be limited to 175 MGD while the remaining capacity is to be provided by Plant No. 1 or upstream reclamation plants. This plan was developed to meet the secondary treatment levels described in the current NPDES permit.

Plant No. 1 would utilize the existing 20 MGD trickling filter process to reduce the loading to the activated sludge process. The activated sludge process would be converted to pure oxygen activated sludge. Solids handling at Plant No. 1 would consist of anaerobically digesting the primary and trickling filter sludges. The waste activated sludge would be thickened via dissolved air floatation and then digested. The digested sludge would then be dewatered at Plant No. 2 via belt filter presses. The dewatered sludge would be trucked to the Coyote Canyon landfill for processing and disposal.

Full Secondary treatment at Plant No. 2 would consist of 175 MGD of pure oxygen activated sludge preceded by primary sedimentation. Secondary clarification would follow the activated sludge process. Primary and waste activated sludge from Plant No. 2 would be thickened prior to anaerobic digestion via dissolved air floatation. Anaerobically digested sludge would be dewatered in solid bowl centrifuges and then transferred to a landfill.

The current effluent quality from Plant No. 1 and Plant No. 2 is summarized in Table 17. The effluent limit of 0.002 mg/l for TICH is currently being met. Since no improvements to the treatment facilities have occurred from 1973 to 1982, any observed improvements in the effluent quality are largely atributable to decreased concentrations in the influent.

The influent has been controlled since 1976 when the District's present sewerage use ordinance was established. Quantity and quality limitations were placed on all wastewater dischargers to the sewer which would adversely affect either the sewerage systems or the effluent quality. The limit placed on the total identifiable chlorinated hydrocarbons is 0.02 mg/l.

It is expected that future additions of secondary treatment at plant 1 and plant 2 will also act to improve the effluent quality by improving the removal efficiency of those facilities. The existing and estimated removal efficiencies are summarized in Table 18. The treatment efficiencies estimated here are also dependent upon the ability of the CSDOC to continue to dispose of their sludge by means other than ocean disposal. Assuming the influent concentration remains the same as the existing influent concentration, the predicted average daily mass emissions can be calculated for the 301(h) treatment level and the full secondary treatment level. Table 19 is a summary of the present and predicted mass emissions. The estimates in Table 19 are developed from the removal efficiencies given in Table 18.

TABLE 17
Influent and Effluent Characteristics

County Sanitation Districts of Orange County - Plant No. 1 and Plant No. 2

Year	Influent Flow Rate MGD[4]	Suspended Solids[1,3] mg/l Influent #1	Suspended Solids[1,3] mg/l Influent #2	Suspended Solids[1,3] mg/l Combined Effluent	BOD[1,3] mg/l Influent #1	BOD[1,3] mg/l Influent #2	BOD[1,3] mg/l Combined Effluent	Total DDT[1,2] ug/l Influent #1	Total DDT[1,2] ug/l Influent #2	Total DDT[1,2] ug/l Combined Effluent	Total PCB[1,2] ug/l Influent #1	Total PCB[1,2] ug/l Influent #2	Total PCB[1,2] ug/l Combined Effluent	TICH[1,2] ug/l Influent #1	TICH[1,2] ug/l Influent #2	TICH[1,2] ug/l Combined Effluent
1970	133															
1971	140	300	230	150	280	220	180	---	---	---	---	---	---	---	---	---
1972	147	300	220	150	280	210	170	---	---	---	---	---	---	---	---	---
1973	155	280	220	160	190	210	180	---	---	---	---	---	---	---	---	---
1974	171	300	240	150	190	220	170	---	---	---	---	---	3.89	---	---	14.72
1975	177	390	270	120	240	250	180	---	---	0.69	---	---	1.75	---	---	12.02
1976	181	410	350	140	290	300	200	---	---	0.16	---	---	2.69	---	---	2.73
1977	185	490	420	130	340	350	200	---	---	0.03	---	---	1.08	---	---	7.60
1978	193	600	460	140	390	320	160	---	---	---	---	---	1.70	---	---	1.76
1979	202	410	400	150	250	260	150	0.01	0.02	0.04	2.0	1.51	2.0	2.11	1.53	1.95
1980	212	300	230	130	250	220	150	0.02	0.02	0.01	3.3	3.60	2.8	3.32	3.62	1.40
1981	221	270	230	---	220	220	150	---	---	---	2.6	3.97	1.57	2.60	3.97	1.57
1982	222	220	230	116	260	230	150	0.04	---	0.01	4.10	2.65	1.8	4.20	3.15	1.93

1 Summary of Influent and Effluent Quality Data, County Sanitation Districts of Orange County, Director of Operations. Submitted to EPA on December 2, 1982.

2 Influent is sampled 1 to 2 times per year. Effluent is sampled 1 to 2 times per month. All samples are 24-hour composites. Values are averages of 12 months of data from the County Sanitation Districts of Orange County, Director of Operations.

3 24-hour composite, 30 samples per month.

4 Daily readings. Years 1970 to 1976 are taken from the CSDOC 1979 Facilities Plan. Years 1977 to 1982 are taken from footnote 1 above.

TABLE 18. Existing and Estimated Overall Removal Efficiencies
County Sanitation Districts of Orange County

Parameter	Existing Treatment[1] %	301(h) Partial Secondary Treatment %	Full Secondary Treatment %
BOD	38	76[2]	85[5]
SS	48	75[3]	85[5]
DDT	—	61.2[4]	81.5 ± 4.5[6]
PCB	45	61.2[4]	81.5 ± 4.5[6]
TICH	46	61.2[4]	81.5 ± 4.5[6]

1. Estimated from 1982 data obtained from Table 16, using the mean of the influent values for Plants #1 and #2.

2. Assumes influent BOD = 269 mg/l; percentage removal for BOD fromm an average combined effluent for BOD and SS. Taken from the CSDOC 301(h) application, Part F, Calculation of Effluent Quality.

3. Water Quality Control Plan for Ocean Waters of California. 1978. State Water Resources Control Board, Sacramento, California.

4. The estimates for TICH AND PCB removal efficiency are based on weighted averages of primary and secondary removal. Assumes 135 MGD at 32% removal and 92 MGD at 81.5% removal. DDT removal was assumed to be the same as TICH removal, since no references were available on DDT.

5. 40 CFR Part 133.

6. U.S. Environmental Protection Agency. 1977. PCB Removal in Publicly-Owned Treatment Works. Criteria and Standards Division, Office of Water Planning and Strategy, EPA Report No. EPA-440/5-7-77.

TABLE 19 - CSDOC Mass Emission Rates Lbs/day (Kg/day)

Parameter	Current NPDES Limits	Existing Treatment (60 MGD Secondary Treatment)	301(h) Partial (Seconday Treatment) (135 MGD Secondary)	Full Secondary[2] Treatment (242 MGD Secondary)
Flow-MGD	227	222	242	242
BOD-30 Day Average	57,000(26,000)	277,722(125,974)	122,223(55,440)[1]	81,437(36,940)
TSS-30 Day Average	57,000(26,000)	214,771(97,420)	106,491(48,304)[1]	68,116(30,897)
TICH	3.8(1.7)	3.5(1.6)	2.64(1.19)[2]	1.11(0.50)
DDT	N/A	0.0185(.008)	0.028(.012)[3]	0.01(0.005)
PCB	N/A	3.3(1.5)	2.42(1.09)[2]	1.02(0.46)

1 Mass emission based on influent BOD concentration of 2690 mg/l; SS influent concentration of 335 mg/l and estimated removal efficiency in Table 17.

2 Using the current influent concentration for mass emission calculation and estimated removal efficiency in Table 17.

3 Influent concentration used for DDT mass emission rate was from current influent concentration to Plant Number 1 only. The 301(h) value exceeds the existing value due to the limited precision of the monitoring and removal efficiency statistics.

6. COMPARISON OF REGIONAL ORGANOCHLORINE INPUTS

6.1 External Sources of DDT and PCBs

In assessing the probable impacts of the issuance of the proposed 301(h) modified NPDES permits on the California brown pelican, it is useful to evaluate the importance of sewage discharges as sources of DDT and PCBs relative to other modes of organochlorine input to the Southern California Bight. Seven input routes were investigated in an EPA report entitled, A Synoptic Survey of Chlorinated Hydrocarbon Inputs to the Southern California Bight (Young et al., 1975, 1981). The routes investigated were municipal wastewater, direct industrial discharge, vessel antifouling paints, harbor flushing, surface runoff, dry aerial fallout, and ocean current advection. We have expanded this discussion to include an evaluation of accidental spills and storm water runoff from the Montrose Chemical Corporation property. In addition, a separate discussion of sewage sludge discharged from the Hyperion treatment plant's 7-mile outfall is included. In this assessment, current advection is assumed to provide no net transport of chlorinated hydrocarbons into the SCB.

Table 20 provides a comparison of the relative magnitude of several external organochlorine sources. Although data for DDT sources other than municipal wastewater are less comprehensive than municipal wastewater data, it appears that the major input routes for DDT and PCBs are aerial fallout and municipal wastewater. Figure 10 is a diagram representative of the distribution of chlorinated hydrocarbons in the coastal environment.

Municipal Wastewater and Sludge

This was the dominant source of chlorinated hydrocarbon input to the SCB through the early 1970's. Although DDT emissions were not monitored prior to 1970, LACSD estimates that an average of 227-272 kg of DDT were discharged daily by the JWPCP for the years 1956 through 1970 (Tetra Tech, Inc., 1981). Although this estimate is speculative (Jukes, 1982), it represents about 10 times the amount of pesticides estimated to be carried into the Gulf of Mexico by the Mississippi River (Butler, 1969). Since the implementation of measures to reduce this input (discussed in Section 5 of this assessment), the municipal wastewater input of DDT and PCBs has declined dramatically. DDT continues to decrease at a rate of 20 to 30 percent per year. The major source is the JWPCP, and LACSD speculates that continued DDT emissions result from residual deposits remaining in the sewer trunk lines from pre-1971 inputs. Overall PCB emissions have not changed significantly since 1979.

In addition to its sewage effluent discharge, the City of Los Angeles Hyperion Treatment Plant presently discharges approximately 140 dry tons per day of digested sludge through a seven-mile ocean outfall. The average annual emissions of DDT and PCBs from this outfall for the period 1972 - 1979 were 25 kg and 132 kg, respectively (Bascom, 1980). Based on the January 1983 Hyperion discharge monitoring report, TICH emissions have declined to approximately 25 kg/year.

TABLE 20 - Summary of Chlorinated Hydrocarbon Inputs to the Southern California Bight (Adapted from Young, 1981).

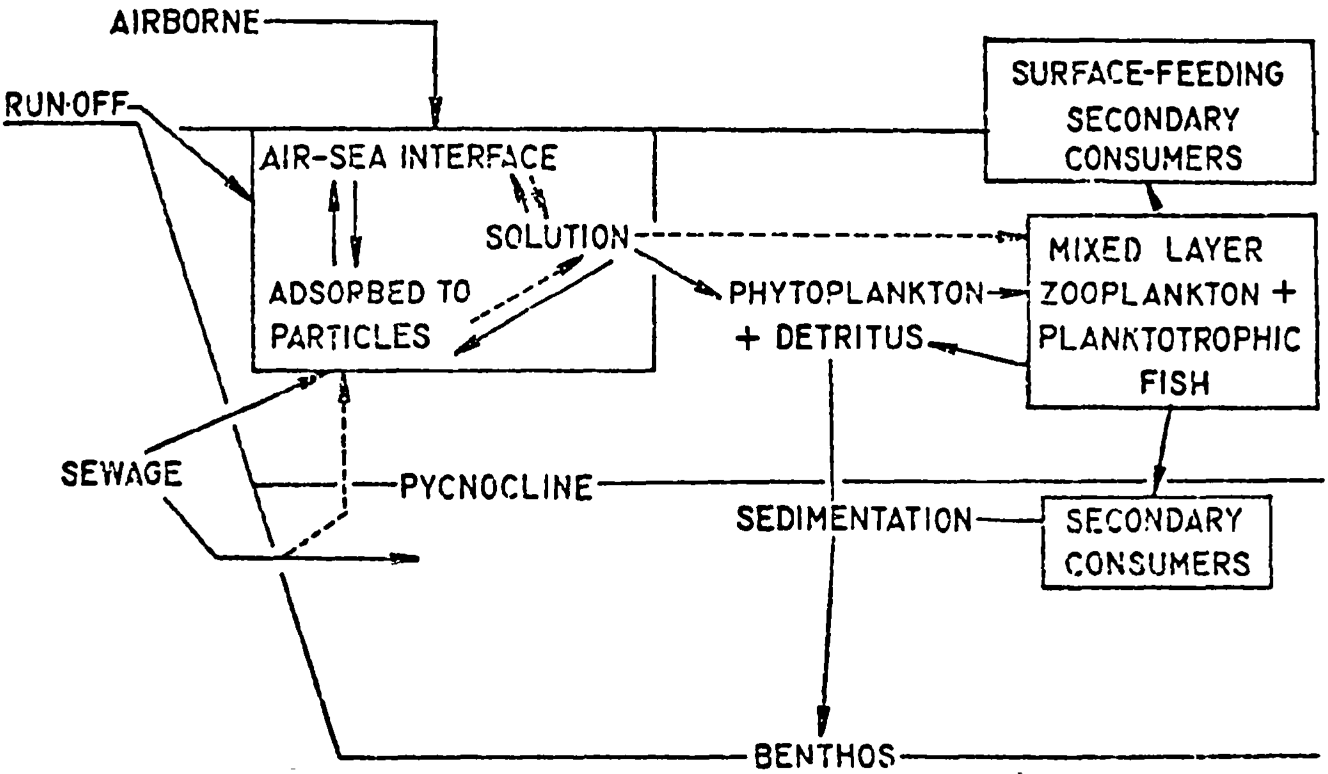
		kg/yr	
Route	Year	Total DDT	Total PCB
Muni. Wastewater[1]	1971	21,700	8,730
" "	1972	6,540	19,490
" "	1973	3,830	3,390
" "	1974	1,570	5,420
" "	1975	1,150	3,070
" "	1976	970	2,820
" "	1977	780	1,560
" "	1978	1,050	590
" "	1979	728	1,466
" "	1980	644	1,129
" "	1981	474	1,250
" "	1982	292	1,085
LACSD (301(h) Scenario)	----	128	77
CSDOC " "	----	4	398
CLA " "	----	18	212
LACSD (full secondary scenario)	----	66	40
CSDOC " "	----	2	158
CLA " "	----	6	66
Industrial Discharge	1973-74	40	100
Antifouling Paint	1973	1	1
Surface Runoff[2]	1971-72	100	190-280
Surface Runoff[2]	1972-73	320	250-830
Aerial Fallout[3]	1973-74	1,800	1,800
Accidental Spills	----	N. A.	N. A.
Harbor Flushing	----	25	50

1 Refers to the sum of wastewater inputs originating from the five major municipal wastewater dischargers to the Southern California Bight: LACSD, CLA (includes sludge discharge), CSDOC, City of San Diego, and City of Oxnard. LACSD, CLA, and CSDOC account for approximately 85% of the total DDT and PCB emissions.

2 Does not include measurements of surface runoff from Montrose Chemical Corporation to Los Angeles Harbor via the Domingues Channel.

3 Aerial inputs since 1973 appeared to be decreasing at an average rate of 10% per year for DDT and 5% per year for PCBs as of 1976.

Figure 10. Schematic depiction of the fate and distribution of chlorinated hydrocarbons in the coastal environment (taken from Cox, 1972).



Hyperion's discharge of sewage sludge into the ocean has been a water quality concern for many years and the subject of an EPA enforcement action since 1977. An agreement was reached with the City of Los Angeles in 1980 resolving litigation that had been pending before the U.S. District Court for the Central District of California. This consent decree requires that the City terminate the ocean discharge of sludge before July 1, 1985 by constructing and operating alternative sludge management facilities. The City's current NPDES permit also requires the cessation of the sludge discharge by the same date. During the development of the LA/OMA Sludge Management Program (USEPA, 1980c), the City of Los Angeles selected the Hyperion Energy Recovery System (HERS)) which involves the Carver-Greenfield dehydration process and thermal processing of sludge for volume reduction and energy recovery. The EPA has consulted with the USFWS and the National Marine Fisheries Service on the effects to endangered species of ceasing the sludge discharge and constructing the HERS facilities (biological opinions dated 16 January 1979, is October 1980, and 20 August 1982).

Aerial Fallout

Aerial fallout is now thought to be the predominant route of organochlorine entry to the ocean waters off of Southern California, although there are no recent studies available to update Young's studies conducted in the mid 1970's. Aerial fallout measurements were conducted using a glass plate collection technique developed by Vance McClure of the National Marine Fisheries Service. The greatest inputs were found to occur off the densely populated Los Angeles Orange County Basin. DDT fallout was found to be heaviest in the vicinity of the Montrose Chemical Corporation and a sanitary landfill which previously received DDT wastes from the Montrose plant. The aerial DDT sources probably include fugitive dust from the manufacturing process as well as dust from the surrounding property (soil and storm runoff analyses have indicated high DDT levels) and from the sanitary landfill. Fallout rates of both DDT and PCBs are slowly decreasing.

Industrial Discharges and Antifouling Paints

Direct industrial discharge (i.e., wastes from industries which discharge directly to the ocean rather than through a municipal treatment plant) was found to be a relatively insignificant source of DDT and PCBs, as were vessel antifouling paints. The latter was probably a significant source of PCBs prior to the 1971 nationwide restrictions on the use of PCBs, which had been employed as plasticizers in paints.

Harbor Flushing

High PCB contamination in coastal harbors prompted researchers to investigate the possibility that significant levels of PCBs might be moving from the harbors to the open ocean during periods of tidal flow. On the basis of analyses of water samples taken from the mouths of San Pedro, Newport, and San Diego Harbors, it was determined that the maximum net transport of total DDT and PCBs from the harbors to the adjacent ocean waters was relatively insignificant. This study did not consider the transport of DDT and PCBs via sediment drift or harbor dredging operations utilizing ocean disposal sites.

Surface Runoff

In most coastal areas, surface runoff constitutes the major source of pesticide contamination to the coastal ecosystem; however, surface runoff in arid and densely populated Southern California is less significant than fresh water discharge from sewers. Based on the analysis of water samples taken from the mouths of four major drainage channels - the Los Angeles River, the Santa Clara River, the Santa Ana River, and Ballona Creek - Young concluded that surface runoff was only a secondary contributor of ocean DDT and PCB contamination.

In arriving at an estimated total input for all surface waters, the results of water quality sampling in these four major channels were applied to other drainages. No sampling appears to have been performed at a potential hot spot: the Dominguez Channel which receives storm water runoff from the Montrose Chemical Corporation property.

There is reason to suspect that DDT continues to be transported into Los Angeles Harbor via surface runoff collected from the Montrose property. Soil samples from around the Montrose site have indicated a high degree of DDT contamination, and recent Mussel Watch data show an increase in total DDT accumulated by mussels in L.A. Harbor (Jim Steele, California Department of Fish and Game, personal communication). L.A. Harbor mussels contain DDE concentrations nearly three times greater than mussels from a coastal station near the JWPCP outfall, suggesting continued inputs (Martin, et al, 1982).

The California Department of Fish and Game has received anonymous phone calls reporting DDT spills witnessed during the onloading of sacks of DDT for shipment in the Port of Los Angeles. The reports claim that the spilled contents of broken sacks have been swept into the water by longshoremen. DFG has not been able to verify this information (Jim Steele, DFG, personal communication). Montrose completely dismantled their DDT manufacturing facilities early this year.

As a result of an investigation by EPA Region 9 personnel (Simanonok, 1983), it was determined that surface runoff from the Montrose property contained significant concentrations of DDT. The runoff is eventually discharged to Los Angeles Harbor. On May 10, 1983 the EPA issued an administrative order to Montrose to cease and desist from further discharging and to submit a sampling and clean-up plan for the site and surrounding property.

6.2 Continuing Contribution of Historical DDT Reservoir in Ocean Sediments

The relative importance of the continued manifestation of earlier DDT discharges from Los Angeles County's outfall which remain in bottom sediments around the outfall was one of the primary concerns raised by U.S. Fish an Wildlife Service in their May 14, 1982 letter. Although the results of past studies cannot provide a definitive ratio for DDT released from bottom sediments and DDT released from continuous municipal discharge, certain qualitative conclusions can be drawn from available information.

The low water solubility of DDT (1.2 ppb) promotes its uptake by sediments, other particulate matter, and living organisms. Dimond et al (1972) describe a striking example of DDT persistence in sediments for a period up to 10 years after only one application of the pesticide. A 1974 study of DDT in sediments around the major Southern California sewage outfalls found that between 180 and 250 metric tons of the pesticide are contained in the upper 30 centimeters of a 48 square kilometer area around the JWPCP outfall system (McDermott et al, 1974). Pesticide contamination of sediments around the other outfalls is 3 to 4 orders of magnitude lower (Young et al, 1976).

LACSD discusses the sediment contamination in detail in their 301(h) application. The seabed accumulation of solids under several levels of sewage treatment was projected to determine the optimal means of reducing the availability of the large DDT reservoir in the sediments. LACSD concludes that partial secondary treatment may be as effective as, or more effective than, full secondary treatment or even zero discharge in suppressing contaminants on the ocean bottom. This conclusion is based on models and historical data that indicate that solids discharged under existing conditions - less contaminated than a decade ago due to improved source control and treatment - effectively bury the more contaminated sediments. Removal of these solids under full secondary treatment or total elimination of settleable solids may result in the gradual erosion and exposure of the DDT contaminated sediments, according to the LACSD analysis.

Studies on DDT uptake in marine fishes in the Southern California Bight have found that, despite the major decreases in DDT and PCB emissions after 1971, elevated levels of DDT and PCBs have persisted in bottom and, to a lesser degree, in water column feeding fish. For the period from 1970 to 1977, data suggests an overall decrease of total DDT residues in water column feeders by a factor of three, while bottom feeding fish experienced no measurable decrease (Smokler, et al, 1979). Since wastewater emissions of total DDT during this same period dropped by a factor of 30, Smokler proposes that the DDT sediment reservoir is the likely source of persistent contamination to organisms. More recent monitoring data provided by the LACSD indicate a slow decline of DDT levels in bottom feeding fish.

Biomonitoring studies utilizing intertidal mussels (Mytilus californianus) have been useful in characterizing water column contamination in coastal waters, under the California State Mussel Watch Program. Mussel biomonitoring was also performed around the major Southern

California wastewater outfalls in a trial study from 1974 to 1976 (Young, et al, 1981). Specimens were placed at five different depths from surface to bottom on a special taut-line buoy system suspended above the outfalls.

The results from the experiment performed in the summer of 1974 at the JWPCP outfalls showed a direct relationship between uptake of DDT and PCBs and proximity of the mussels to the contaminated bottom sediments and to the wastewater plume which, during the summer months, is largely trapped beneath the thermocline. To further examine this effect, the experiment was repeated in the winter season (January 1976) when no significant thermocline develops and the wastewater plumes are capable of rising to the surface. The winter experiment was also expanded to include the Hyperion 7-mile sludge outfall and the CSDOC outfall off Newport Beach.

The significant finding of this second study was that the steep vertical gradients in DDT and PCB uptake levels seen during the summer experiment were greatly reduced. Whereas bottom specimen concentrations had exceeded those at the surface by a factor of 10 in the presence of a thermocline, corresponding concentrations observed in the winter experiment for the JWPCP and CSDOC outfalls generally agreed within a factor of 2, with middle depth specimens often containing concentrations equal to or exceeding those measured in bottom mussels. The Hyperion sludge outfall maintained a strong correlation between depth and concentration, probably as a result of the high solids content of the sludge.

Young concludes that the results of the buoy experiments indicate in contrast to other studies referenced above that the wastewater plume rather than the contaminated bottom sediments is the source of chlorinated hydrocarbon uptake in aquatic organisms; however, the possibility that conditions which cause the wastewater plume to rise might also resuspend contamination from the bottom sediments is not discussed. These experiments have not been duplicated since 1976, although the concentration in LACSD's wastewater effluent has declined during this period from 1.79 ug/l to 0.47 ug/l.

The general consensus among researchers is that it is not possible to accurately trace the sources of the DDE still found at chronic levels in pelican eggshells, in spite of our present understanding of the pelican food web, the dynamics of DDT and its derivatives, and advances in biomonitoring. In Section 8 of this report, we propose measures which could be undertaken by the permittees to help improve our understanding of the situation.

7. PROBABLE IMPACTS OF 301(h) ACTIONS

In assessing the probable impacts of the proposed 301(h) permit actions on the California brown pelican and comparing these impacts to those likely to occur under the no action or full secondary treatment scenarios, it is necessary to make several assumptions regarding future environmental conditions in Southern California. If one assumes that the character of wastewater influent and treatment removal efficiencies (both theoretical and empirical) remain the same,[1] and that wastewater flows increase according to present projections, then a rough comparison between the mass emissions of DDT and PCBs under the three scenarios may be calculated (Table 21). The accuracy of these projections is limited not only by the aforementioned assumptions, but also by the inherent imprecision of the monitoring data for substances present in such low concentrations and measured monthly. Although the actual numbers presented in Table 21 may

[1]Studies have shown the chlorinated hydrocarbon removal efficiency to vary with the concentrations in the influent to treatment plant (USEPA, 1979). This variable is not considered here due to the scarcity and lack of precision of the monitoring data used to generate Table 21.

lack accuracy, they nevertheless demonstrate a likely relationship between the scenarios: the 301(h) scenario lies somewhere between the status quo and emissions achievable under full secondary treatment. At issue is whether the difference between chlorinated hydrocarbon emissions under full secondary treatment and under treatment commensurate with the proposed 301(h) permits is significant where the brown pelican is concerned.

Based on the information reviewed during the course of this assessment, it is unlikely that the incremental decrease in emissions that would be realized under full secondary treatment would have a noticeable effect on brown pelican productivity in the Southern California Bight. There are several considerations which lead to this conclusion:

1) DDT and PCB emissions are steadily declining in spite of the fact that little improvement in treatment facilities has taken place in recent years. Regulatory bans, source control measures, and the gradual flushing of the sewer lines appear to be more significant factors than the efficiency of the treatment plants in removing these substances.

2) The persistence of DDT in bottom sediments appears to overshadow the input from external sources. The release of DDT from these sediments is likely to continue for the foreseeable future.

3) Other external sources of DDT and PCBs, such as aerial dispersion and surface runoff, appear to be more significant then current wastewater inputs.

Table 21. Projected mass emission characteristics for LACSD, CSDOC, and L.A. City, in kg/yr. Precision is limited, since values are based on data from tables 8, 13, and 18 and do not consider potential variations in wastewater flow and influent characteristics.

		1982 Conditions	301(h) Scenario	Full Secondary Scenario
LACSD	DDT	259	128	66
	PCB	150	77	40
CSDOC	DDT	3	4	2
	PCB	548	398	158
LA City	DDT	30	18	6
	PCB	387	212	66
Total	DDT	292	150	74
	PCB	1085	687	264

4) Several factors unrelated to DDT contamination significantly impact on the productivity of the brown pelican in Southern California. Variables such as food availability and human disturbances make it impossible to develop a direct correlation between pollutant levels and reproductive success.

In conclusion, although there is insufficient information for tracing the pathway of the DDT residues in pelicans to the ultimate source, it is likely that the persistence of the contaminant in ocean and harbor sediments is the major reason for its persistence in pelicans. Recommendations for improving our understanding of this question are proposed in the final section of this report.

8. RECOMMENDATIONS

As a condition to receiving variances from secondary treatment requirements, each discharger is required to have an extensive monitoring program to evaluate the impact of the discharge on the marine biota, demonstrate compliance with applicable water quality standards, and measure toxic substances in the discharge (40 CFR 125.62). The details of the proposed monitoring programs for LACSD, L.A. City/Hyperion, and CSDOC have not been finalized, but each program would contain provisions for the analysis of wastewater influent, wastewater effluent, sediments, and ocean water quality; and surveys of benthic infauna, fish, and macroinvertebrates. In addition, LACSD is proposing a 1 year pilot biomonitoring program utilizing mussels suspended at several depths in the outfall regions.

The following measures are recommended for inclusion as additional requirements for 301(h) permit issuance, and may form a basis for resolution of concerns regarding endangered species:

1) Chemical analyses of ocean water samples taken in 1972 and 1973 showed concentrations of DDT in excess of the EPA criterion for saltwater aquatic life, which had been derived on the basis of studies of DDT's effects on brown pelicans. More current data on DDT levels in the

ocean and harbor waters of the Southern California Bight should be generated by the proposed 301(h) permittees to aid in tracing the sources of DDT and its derivatives which persist in the California brown pelican population.

2) Periodic analyses of chlorinated hydrocarbon concentrations should be performed on plankton samples from the sewer outfall regions and from control stations in the Southern California Bight to determine whether the wastewater discharges constitute a significant source of contamination relative to other non-point sources such as aerial discharge.

3) There is only scattered data on DDT levels in pelican food sources. Given our present understanding of chlorinated hydrocarbon biomagnification through the food chain, a comprehensive program of monitoring DDT residues in anchovies would provide valuable information regarding the sources of contamination.

4) A biomonitoring program utilizing mussels suspended at several depths in the outfall regions should be developed by all of the dischargers. These programs would provide valuable information on the sources and scale of pollutant effects attributable to wastewater discharges.

5) The closure and dismantling of the Montrose DDT manufacturing facility should be closely monitored by EPA or the State Department of Health Services to minimize releases of DDT. The surrounding property should be examined to determine whether significant residual contamination poses a serious problem.

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Norman Richards, U.S.E.P.A., Gulf Breeze, Florida
Henry Shaffer, Southern California Coastal Water Research Program, Long Beach, CA
James Steele, Department of Fish and Game, Long Beach, CA
Virginia Stout, National Marine Fisheries Service, Seattle, WA
David Young, Dames and Moore, Los Angeles, CA

COMMENTS AND RESPONSES

SPEED-letter

K. P. LINDSTROM & ASSOCIATES
1177 BROWNWYK DRIVE
SACRAMENTO, CALIFORNIA 95822
(916) 447-5893

To

Mr. Greg Baker
U. S. Environmental Protection
Agency, Mail Code-W-5-1
215 Fremont Street
San Francisco, CA. 94105

Date April 8, 1983

Subject 301(h) Brown Pelican Biologica
Assessment

Enclosed is some background information on the present discharger position with regard to the use of mussels for monitoring the water column in the vicinity of deep ocean outfalls. This will help clarify the recommendations which are being suggested in the 301(h) biological assessment which will soon be sent out for review.

Kris

Excerpt

Entire document submitted to Bill Pierce

Response to EPA Tentative 301(h) Ocean Waiver Decision and Proposed Revised Monitoring Program

County Sanitation Districts
of Orange County, California

March 1982

IN SITU BIOASSAYS USING MUSSELS

In the District's original application, it was proposed that mussels be used for *in situ* bioassay monitoring of the outfall discharge in and around the ZID. The purpose of the *in situ* bioassays are to: (1) measure the bioaccumulation of toxic pollutants by a marine organism and (2) measure any adverse effects such as death, abnormalities, and physiological stresses caused by the discharge.

The California State Water Resources Control Board (SWRCB) and the U.S. Environmental Protection Agency (EPA) have established research and monitoring programs which use bay (*Mytilus edulis*) and the California coastal (*M. californianus*) mussels for the first aforementioned purpose. In 1977 the SWRCB established a State Mussel Watch (SMW) Program. The SMW has monitored the bioaccumulation of selected trace metals and organic compounds along the embayments and coast of California. Several SMW annual reports describing the results have been published. In brief summary are some major points on the use of mussels for monitoring toxic pollutants and biological responses:

1. Resident and transplanted mussels are good accumulators of certain trace metals, pesticides, petroleum compounds, and PCBs. Correlations between certain metals have been shown. However, the effectiveness of mussels in bioaccumulating the remaining list of EPA priority pollutants is unknown.

The analytical methodology for detecting and quantifying petroleum hydrocarbons and many of the synthetic organic compounds in tissue are developmental and require an intercalibration program with specialized research facilities for quality results. Chromatograms with "unidentified peaks", which represent unidentified hydrocarbons, were found in mussels from all of the SMW stations. It is not known if these "unidentified peaks" are environmental pollutants or toxic substances.

3. The SMW studies had fouling problems with the transplanted mussels. In fact, some of the samples were believed to be of "somewhat questionable value". It is thought that fouling by small barnacles and mussel spat limits the organism's ability to obtain enough of the surrounding water, thereby limiting feeding and growth. The technique of transplanting mussels needs to be refined to reduce the fouling problem.

4. To obtain valid trace metal bioaccumulation data, the transplanted mussels were collected after six months' exposure. This period was selected to ensure that chemical equilibrium of the trace metals in the mussels was attained.

5. There is a need to investigate the influence salinity exerts on trace metal concentrations in mussel tissues.

6. The use of transplanted mussels to monitor environmental pollutants is promising but work needs to be continued in refining the field and laboratory procedures.

7. And, lastly, the bioaccumulation of certain toxic pollutants by mussels does not indicate adverse biological effects. The SWRCB recognized this drawback and initiated a major study to interpret the effect of elevated levels of toxic substances in mussels. This study, titled the "Biological

Effects Assessment", will identify which toxic substances are primarily responsible for the decrease in mussel "Scope for Growth" (SFG). The SFG index gives a numerical value for how much energy the mussel has available for growth and reproduction. The higher the SFG value, the healthier the mussel is. Completion of this study is scheduled for sometime in 1983 or 1984, depending on the need for additional work.

In view of the limitations in using transplanted mussels in monitoring EPA's priority pollutants and the inability to interpret the meaning of elevated levels of bioaccumulated toxics in mussels, we can conclude that it is premature to initiate the use of mussels for in situ bioassays. Much more work is needed in refining the field and laboratory methodologies as well as identifying the effects of transplanting. Research is already underway by the SWRCB and EPA.

The Districts do, however, support the concept and pilot program effort proposed by the Los Angeles County Sanitation Districts and will follow the progres of their work. Should the use of mussels for in situ bioassays prove to be effective of toxic pollutants, the CSDOC may implement such a program at its outfall.

California Ocean Dischargers

P.O. BOX 8127, FOUNTAIN VALLEY, CALIFORNIA 92708

Large Dischargers
Representative Blake Anderson
(714) 540-2910

Small Dischargers
Representative Felix Martinez
(805) 967-4519

March 31, 1983

One of 14 Position Papers submitted to SWRCB 3/31/83

California State Water Resources
Control Board
P. O. Box 100
Sacramento, CA 95801

Attention: Mr. John Huddleson, Chief
Division of Technical Services

Subject: Position Papers of California Ocean Dischargers on the Draft Ocean Plan

Gentlemen:

Transmitted herein are position papers of the California Ocean Dischargers written in response to the Draft Ocean Plan issued by the State Water Resources Control Board (SWRCB) in January 1983. The California Ocean Dischargers is an informal association of POTWs. It was created to develop a coordinated technically-based response to the Draft Ocean Plan.

On February 17, 1983, the Goleta Sanitary District invited all coastal agencies to participate in a day-long roundtable session to discuss the Draft Ocean Plan. As a result of that meeting, (attended by 17 coastal agencies) a list of concerns over the Draft Ocean Plan was developed. Also, a group of 7 people were appointed to translate these concerns into technically based position papers. The technical committee consists of the following people:

Blake Anderson	Orange County SD
Felix Martinez	Goleta SD
Irwin Haydock	Los Angeles County SD
Frank Wada	Los Angeles City
Kris Lindstrom	K. P. Lindstrom & Associates (for Orange County SD)
Bill Sukenik	Aliso Water Management Agency
Salar Niku	Brown & Caldwell (for Goleta)

Members of the Technical Committee began drafting the position papers in late February and continued through March. Draft position papers were distributed to all coastal dischargers for technical review as they were completed.

The results of the California Ocean Dischargers efforts are 14 position papers that include the following issues:

1. Purpose and Use of the Ocean Plan
2. Total vs. Fecal Coliform Bacterial Standards
3. Kelp Beds Designated as Shellfishing Areas
4. Light Measurements
5. Radioactivity
6. Caged Bivalves for Pollutant Uptake Monitoring
7. Effluent Grease and Oil
8. Effluent Suspended Solids
9. Effluent Turbidity
10. Effluent Toxicity
11. Chlorinated Phenols
12. Polychlorinated Biphenols
13. Ocean Disposal of Municipal Treatment Plant Sludges
14. Monitoring Frequency

Political and managerial endorsement of these position papers by the effected coastal dischargers will follow. Copies of these position papers are being sent to the distribution list accompanying this letter. The effected agencies are being asked to review these final versions and forward their endorsements to the SWRCB.

We believe that this unified approach will help the SWRCB to forcus on the concerns that are of primary importance to the community of coastal agencies. We also understand that several of the coastal agencies are forwarding to the SWRCB independent responses that concern issues of particular importance to those agencies.

The California Coastal Dischargers are willing to meet with your staff to discuss these position papers and explain our concerns. To this end, Blake Anderson and Felix Martinez will meet with your staff on this date to transmit the position papers and to answer your preliminary questions.

Very truly yours,

Blake P. Anderson
Representing the Large Dischargers

Felix Martinez
Representing the Small Dischargers

/km

POSITION PAPER
OF
THE CALIFORNIA OCEAN DISCHARGERS

DRAFT WATER QUALITY CONTROL PLAN, OCEAN WATERS OF CALIFORNIA, 1983

ISSUE: Caged Bivalves for Pollutant Uptake Monitoring

REFERENCE: Draft Ocean Plan, Page 4, Chapter III, Section B, Item 3, and Footnote 14

LANGUAGE OF OCEAN PLAN DRAFT BY SWRCB

Waste Discharged to the Ocean Must be Essentially Free of:

Substances which will accumulate to toxic levels in marine waters, sediments or biota, (14).

Footnotes

(14) Increased tissue burdens of conservative toxicants in marine biota may be determined using caged bivalves transplanted to the discharge zone. Results of the pollutant uptake monitoring shall be interpreted on a case-by-case basis and shall be used at the discretion of the Regional Board.

POSITION OF CALIFORNIA OCEAN DISCHARGERS

The California Ocean Dischargers cannot support the use of caged bivalves as a routine monitoring method in deeper ocean waters until this technique has been further developed.

LANGUAGE PROPOSED BY CALIFORNIA OCEAN DISCHARGERS

Footnote 14: Increased tissue burdens of conservative toxicants in marine biota may be determined by measuring the increase in species indigenous to the specific discharge site. The use of caged bivalves transplanted to the discharge zone can be used at the discretion of the Regional Board after techniques have been adequately developed by the State Mussell Watch Program of the SWRCB.

TECHNICAL DISCUSSION

The California Ocean Dischargers recognize the Board's interest in the use of caged bivalves and their recognition of the present limitations on the use of this monitoring technique for deeper ocean waters. We agree with the DEIR (Page 25) which states:

"Prior to routine implementation of caged bivalve monitoring, three tasks will need to be completed to assure standardized data acquisition and interpretation. These tasks are:

1. Preparation of a manual for agencies involved in caged bivalve monitoring to ensure a standardized and compatible approach.

2. Refinement of offshore, deep water caged bivalve transplant techniques to improve present deployment/retrieval methods.

3. Development of an efficient and economical caged bivalve grid of network siting formula to be applied to each discharge's characteristics; i.e., ocean currents, zone of initial dilution, etc."

We also agree that it is premature to use mussels for direct enforcement purposes.

The California State Water Resources Control Board (SWRCB) and the U. S. Environmental Protection Agency (EPA) have established research and monitoring programs which use bay (Mytilus edulis) and the California coastal (M. californianus) mussels for the first aforementioned purpose. In 1977, the SWRCB established a State Mussel Watch (SMW) Program. The SMW has monitored the bioaccumulation of selected trace metals and organic compounds along the embayments and intertidal open coast of California. Several SMW annual reports describing the results have been published. In brief summary are some major points on the use of mussels for monitoring toxic pollutants and biological responses:

1. Resident and transplanted mussels are good accumulators of certain trace metals, pesticides, petroleum compounds, and PCBs. Correlations between certain metals have been shown. However, the effectiveness of mussels in bioaccumulating the remaining list of EPA priority pollutants is unknown.

   The analytical methodology for detecting and quantifying petroleum hydrocarbons and many of the synthetic organic compounds in tissue are developmental and require an intercalibration program with specialized research facilities for quality results. Chromatograms with "unidentified peaks", which represent unidentified hydrocarbons, were found in mussels from all of the SMW stations. It is not known if these "unidentified peaks" are environmental pollutants or toxic substances.

2. The SMW studies had fouling problems with the transplanted mussels. In fact, some of the samples were believed to be of "somewhat questionable value". It is thought that fouling by small barnacles and mussel spat limits the organism's ability to obtain enough of the surrounding water, thereby limiting feeding and growth. The technique of transplanting mussels needs to be refined to reduce the fouling problem.

3. To obtain valid trace metal bioaccumulation data, the transplanted mussels were collected after six months' exposure. This period was selected to ensure that chemical equilibrium of the trace metals in the mussels was attained.

4. There is a need to investigate the influence salinity exerts on trace metal concentrations in mussel tissues.

5. The use of transplanted mussels to monitor environmental pollutants is promising but work needs to be continued in refining the field and laboratory procedures.

6. And, lastly, the bioaccumulation of certain toxic pollutants by mussels does not indicate adverse biological effects. The SWRCB recognized this drawback and initiated a major study to interpret the effect of elevated levels of toxic substances in mussels. This study, entitled the "Biological Effects Assessment", will identify which toxic substances are primarily responsible for the decrease in mussel "Scope for Growth" (SFG). The SFG index gives a numerical value for how much energy the mussel has available for growth and reproduction. The higher the SFG valve, the healthier the mussel. Completion of this study is scheduled for sometime in 1983 or 1984, depending on the need for additional work. Final results of this work are still pending State Board review.

In view of the limitations in using transplanted mussels in deeper ocean waters, (i.e., mooring, fouling, growth, salinity, temperature, etc.), and the inability to interpret the meaning of elevated levels of bioaccumulated toxics in mussels, we can conclude that it is premature to initiate the use of mussels for definitive bioaccumulation studies. Much more work is needed in refining the field and laboratory methodologies as well as identifying the effects of transplanting. Research is already underway by the SWRCB and EPA.

In March 1983, the SWRCB and several of the dischargers began to develop a plan for a demonstration project. The dischargers are willing to participate in a cooperative effort to develop the techniques for caged bivalves pollutant uptake monitoring in deeper ocean monitoring. However, until this project is completed we believe it is not cost effective to establish any routine monitoring requirements.

REFERENCES

California Department of Fish and Game. 1982. California State Mussel Watch 1980-81, State Water Resources Control Board Water Quality. Monitoring Report, 81-11TS, May.

Martin, M., D. Crane, T. Lew, and W. Seto. 1980. California Mussel Watch: 1979-1980 Synthetic Organic Compounds in Mussels, Mytilus californianus, and M. edulis, along with the California coast and selected harbors and bays - Part II. State Water Resources Control Board. Water Quality Monitoring Report 80-8, Sacramento. 49 pp.

Risebrough, R.W., B.W. De Lappe, E.F. Letterman, J.L. Lane, M. Firestone-Gillis, A.M. Springer, and W. Walker II. 1980. California Mussel Watch 1977-1978 Volume III - Organic Pollutants in Mussels Mytilus californianus and Mytilus edulis, along the California coast. SWRCB Water Quality Monitoring Report No. 79-22, Sacramento. 108 pp. plus 7 appendices.

Stephenson, M.C., M. Martin, S.E. Lange, A.R. Flegal, and J.H. Martin. 1979. California Mussel Watch 1977-1978 Volume II Trace metal concentrations in the California mussel, Mytilus californianus. State Water Resources Control Board, Sacramento. Water Quality Monitoring Report. 79-22. 110 pp.

STATE OF CALIFORNIA—RESOURCES AGENCY

GEORGE DEUKMEJIAN, Governor

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SANTA ANA REGION

6809 INDIANA AVENUE, SUITE 200
RIVERSIDE, CALIFORNIA 92506

PHONE: (714) 684-9330

April 29, 1983

Mr. William H. Pierce
Chief, Technical Support Branch
United States Environmental Protection
Agency
Region IX
215 Fremont Street
San Francisco, CA 94105

Dear Mr. Pierce:

Re: Draft Biological Assessment of 301(h) Permit Actions on the Endangered California Brown Pelican

We have reviewed this Draft Biological Assessment and find it to be very well done - a thorough and responsible assessment of the situation.

We recommend that the process of developing 301(h) permits for Southern California be continued.

We look forward to receipt of the Final Biological Assessment when it becomes available.

Sincerely,

Joanne E. Schneider

Joanne E. Schneider
Environmental Specialist II

JES:kyb

WASTEWATER RECLAMATION
SOLID WASTE MANAGEMENT

COUNTY SANITATION DISTRICTS
OF LOS ANGELES COUNTY

1955 Workman Mill Road / Whittier, California
Mailing Address / P O Box 4998, Whittier, California 90607
Telephone (213) 699-7411 / From Los Angeles (213) 685-5217

WALTER E. GARRISON
Chief Engineer and General Manager

May 11, 1983

File No: 31-220.20B

Mr. Frank M. Covington, Director
Water Management Division
Environmental Protection Agency
Region IX
215 Fremont Street
San Francisco, California 94105

Dear Mr. Covington:

The Sanitation Districts' staff has reviewed the March 1983 Draft Brown Pelican Biological Assessment received in this office April 14, 1983. In sum, this document presents a more than adequate case to sustain the conclusion that the minor decrease in (DDT) emissions that could be realized from full secondary treatment over that allowed under 301(h) waivers would be unlikely to have a noticeable effect on pelican productivity in the Southern California bight.

Further, the Districts are confident that the proposed 301(h) monitoring programs will adequately address significant environmental parameters and will assure that clean water goals are being met. As for the specific recommendations, resulting from the biological assessment, it is the Districts' position that these items (residue levels in water, plankton, and fish, biomonitoring with shellfish, and surveillance following the closure of Montrose) are best addressed by focused research rather than routine monitoring. There is little hope that monitoring efforts carried out in the immediate vicinity of outfalls will provide meaningful results to assess the continuing status of the Brown Pelican population throughout Southern California waters. On the other hand, carefully planned and executed research (such as that carried out on the east coast by Blus) can lead to both better definition of the potential problem and to development of meaningful environmental standards. Population trend assessment of endangered species, such as has been supported or carried out by federal and state officials, is meaningful and should continue.

From the work to date it is clear that pesticide residues act in concert with other factors, such as anchovy food availability, human disturbance, and even malicious acts of maiming recently noted in Southern California. The end result may be a Brown Pelican population decline, but the answer to this will require a more balanced response of fishery regulation, pesticide regulation, habitat protection, human concern, and other strategies. The Districts agree with the report's conclusion that source control and treatment have already brought about substantial declines in pesticide residues and that further controls would not be cost effective compared to reductions in other potential sources.

A final comment would be that if a monitoring program were implemented on waste dischargers, an equally rigorous program would need to be implemented to assess aerial fallout, harbor inputs, and flood control runoff, in order to provide the proper perspective. The Districts contend that since the impact on pelicans is the concern here, it is the birds and their eggs that should be watched for some indication that the improving population trend will continue.

With regard to the two original issues cited by USFWS: (1) chronic eggshell thinning and (2) effluent pesticide standards; there is no reason to suspect that the discharger monitoring proposed will answer these crucial questions. Again, the literature (Blus) indicates that 3 ug/g DDE in eggs is marginal and 4 ug/g causes reproductive failure in East Coast pelicans. All things considered, the most direct approach would appear to be a research program to determine first the average concentration in pelican eggs, adults (especially blood samples or fresh carcasses) and representative samples of anchovies caught in pelican feeding areas up and down the coast, including Mexico. Based on the data given in Tables 2 and 3 of the report, the biomagnification of DDT from anchovy pelican fodder and pelican eggs averages 39 and ranges from 11-79. If 3 ppm is taken as the critical level not to be exceeded, then anchovies should not exceed 0.08 ppm or about twice the level noted in 1980-81 (0.047 ppm).

An additional issue questioned was the effectiveness of existing water quality standards in protecting Brown Pelican needs. This issue has already been addressed in the recently proposed revisions to the State Ocean Plan which is presently being held up to scientific, regulatory and public scrutiny. Revisions are scheduled at regular intervals to take account of the most recent scientific and social findings as well as to carefully consider the economic costs and benefits involved in additional controls.

Also enclosed for your use are some detailed corrections to tables and text; wherever these seem to be in error.

Very truly yours,

Walter E. Garrison

Irwin Haydock

Irwin Haydock, Ph.D
Supervisor, Monitoring and Research

IH:ar
Encl.

Additional notes, comments and corrections to EPA letter of May 6, 1983 regarding EPA Draft Biological Assessment on the Brown Pelican.

Page No.

1. DDT (formerly named p,p'-dichlorodiphenyl trichloroethane) is listed as 1,1-dichloro-2,2-bis(p-chlorphenyl) ethane (MacGregor, 1974) or 1,1'-(2,2,2-trichloroethylidene.bis(4-chlorobenzene)(Baird-LACSD, 1983 memo). I am unsure which is correct, or if it matters in this context (see PCB, same list).

26. A group of California Ocean Dischargers has recently gone on record as opposing the very stringent DDT, PCB, etc., limits set in the CALIF OCEAN PLAN'S proposed Table B.

PCBs have not been implicated in reproductive failure of Pelicans (see Blus, various papers and the statements on p.32-33), so PCB need not be included in this review.

32. There are probably not enough data (or samples) available to Table 2 (p. 31) to make the flat statement that "residue levels have stabilized around 5 ppm,...".

This appears to be a crucial point, since Blus has determined 3 ppm to be critical and 4 ppm as causing reproductive failure in Pelicans on the east coast. This seems not be be the case in the SCB. (See attached figures 1 and 2).

33. Biomagnification----statement of Blus (1982) that fish to egg BF (Biomag. factors) are on order of 50-100 fold is not sustained by the bulk of the data of Tables 1 and 2. Further, if 3 ppm is taken as critical level not to be exceeded in CBP eggs, then anchovies should not exceed 3/40 or 0.08 ppm. The 1980-81 anchovy concentrations were about one-half this amount. It would appear (p.38) that much better measurement of bioaccumulation would be critical for assessing any need for further DDT control in the SCB. Comment: anchovy monitoring might better be carried out by CFG and NMFS, those agencies responsible for the fishery, which have larger sampling grids than the discharge agencies involved.

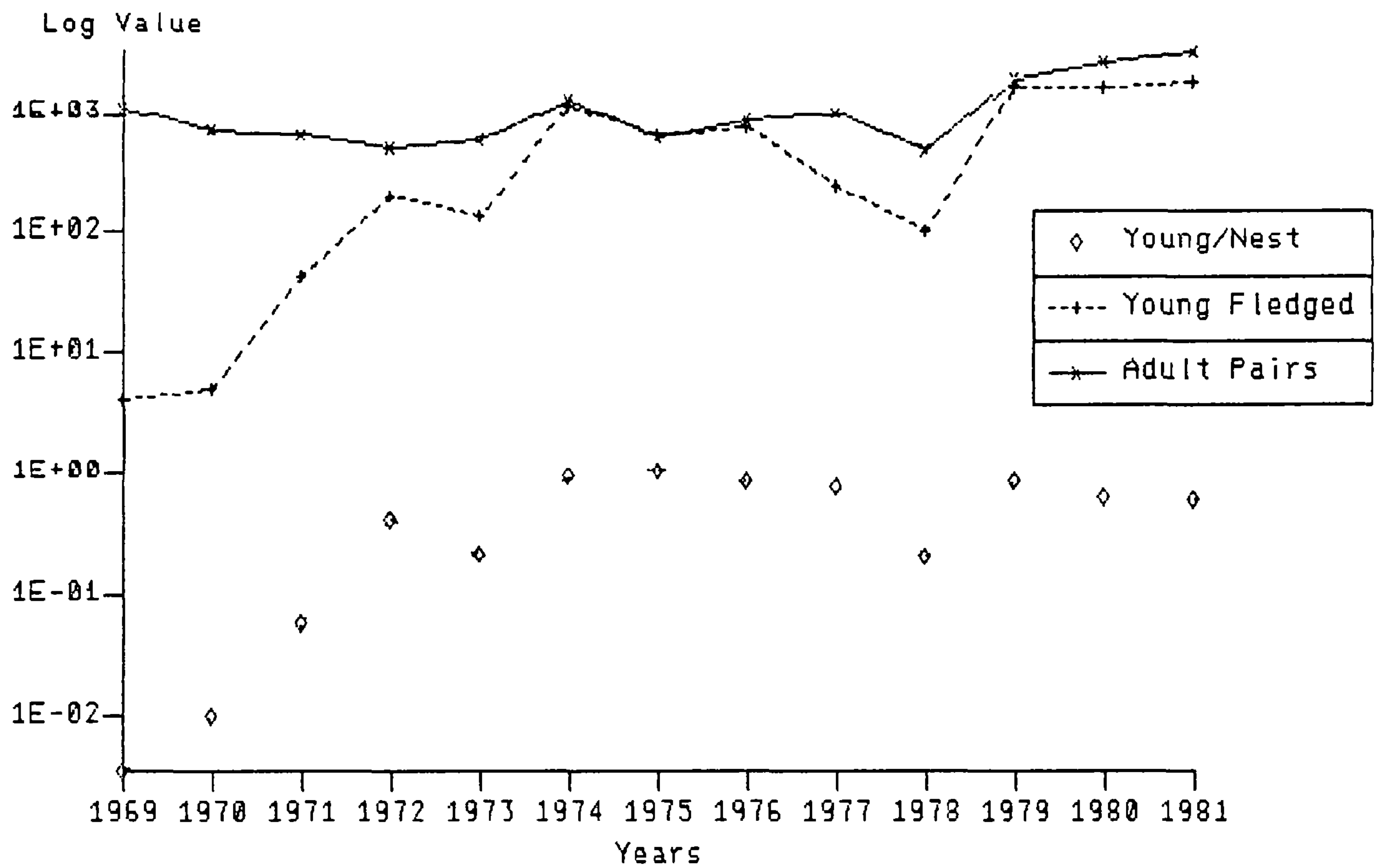
36. If food shortage plays a critical role in CBP reproduction, then serious consideration must be given to anchovy fisheries management, especially on populations in the SCB.

39. CalCOMP - a group of state and local agencies is presently discussing an experimental program to demonstrate the efficacy of mussel watch-type monitoring. Discharge agencies have commented at recent SWRCB hearings on the Ocean Plan that routine monitoring should await the outcome of such studies.

47. Table 5 requirements for JWPCP are <u>not</u> the current established limits--they are for full secondary and source control with a timetable for

Figure 1

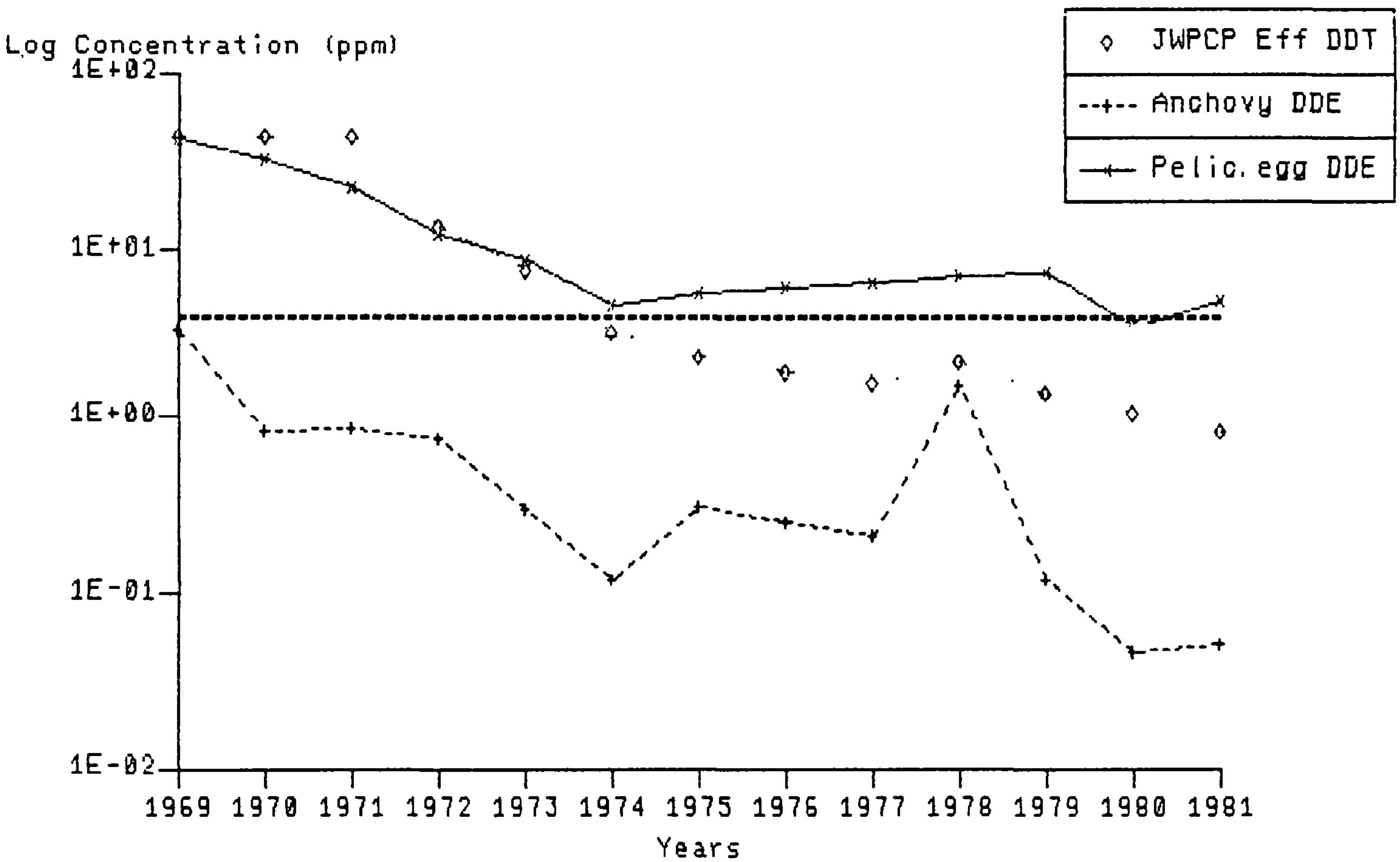
SOUTHERN CALIFORNIA BIGHT PELICAN POPULATIONS
(Adult Pairs, Young Fledged, Productivity)



Data from EPA CBP Biological Assessment, SCB Totals (1983)

Figure 2

SOUTHERN CALIFORNIA BIGHT PELICAN POPULATIONS
(DDT-DDE Concentrations in Anchovy, Pelican Eggs, and JWPCP Effluent)



Data from EPA CBP Biological Assessment, Missing values "eyeballed".
Reference lines= 3, 4 ppm--DDE Critical and Reproductive Failure level

compliance ranging from July 1983 to January 1985 (see attached sheet for corrections).

48. (line 7) ... some of the sludge is dewatered with very inefficient equipment and the high solids centrate is also...

49. (line 3) It (60") is currently used only infrequently during seasonal peak flow periods....

50. (line 3) ... anaerobic digesting dewatering, and final disposal. (2 Par, line 6) There is some question about the final JWPCP flow in the 301(h) permit, now approximately 360 mgd. on pg. AXX-5 of Appendix III of LACSD's 301(h) application, discussion indicates that the permit should be set at 385 mgd for the 5-year period.

53. The values in Table 7, "JWPCP-Influent and Effluent Characteristics" were checked against the cited references. The influent suspended solids for 1982 (8-month average) is incorrect. It should be 444 mg/l. Influent DDT, Influent PCB, Influent TICH and Effluent TICH values for 1971-1977 differed slightly from those in reference 5; however, the differences are not considered significant. The trends remain the same (Table attached).

54. (suggested replacement for lines 5-7, although there have been no improvements...). During the past decade, a number of improvements have been made at JWPCP to reduce the mass emission of suspended solids. Sedimentation tanks have been added, sludge dewatering capacity has been expanded, chemical addition to the sedimentation tanks has been initiated, and fine screening of the effluent has been added. TICH emissions have declined to a greater extent than suspended solids emissions.

(line 11)... constituents is provided by facilities already under construction for secondary treatment and sludge dewatering. Improved removal....

55. (Table 8, add to note 1) Values for advanced primary treatment include centrate returned to effluent from incomplete sludge dewatering, which contribute roughly half of the effluent suspended solids. Data from Table 7 (not 6).

57. Suggest Table 9 reflect proposed revisions to flow as discussed with EPA. Parameters of Table 9 pertain to Scheduled not current NPDES and Existing Treatment is Primary (not adv. 1° level). Note: Existing permit includes schedule for full secondary by January 1985.

Footnote 1 refers to Table 7 (not 6) and same note pertains as in Table 8 regarding centrate.

58-82. LCASD did not review the sections on LAC or CSDOC.

83. It should be emphasized that records of other sources (beyond wastewater) are incomplete, much less comprehensive, and outdated for

TABLE 5 (CORRECTED)

COMPLIANCE DATE	CONSTITUENTS	UNITS	30 DAY	7 DAY	DAILY
July 1, 1977	BOD, 20°C	mg/l	225	-	360
		kg/day	328,000	-	584,000
		lbs/day	722,000	-	1,160,000
	Suspended solids	mg/l	200	-	270
		kg/day	291,000	-	393,000
		lbs/day	642,000	-	867,000
January 31, 1985	BOD, 20°C	mg/l	30	45	-
		kg/day	43,700	65,540	87,400
		lbs/day	96,300	144,500	192,600
	Suspended solids	mg/l	30	45	-
		kg/day	43,700	65,540	87,400
		lbs/day	96,300	144,500	192,600

	CONSTITUENTS	UNITS	30-DAY	not to be exceeded more than 10% of the time	DAILY MAXIMUM
July 1, 1983	Total identifiable chlorinated hydrocarbons	mg/l	.002		.006
		Kg/day	2.91		5.83
		lbs/day	6.42	.004	12.8

July 1, 1978 — B-15 - The concentration in marine sediments of substances listed in item A-3 (includes TICH) shall not be significantly increased above that present under natural conditions.

January 31, 1985 — The final receiving water toxicity concentrations shall not exceed 0.05 toxicity units.

Table 7 JWPCP - Influent and Effluent Characteristics

Year	Flow Rate MGD [1]	Suspended Solids mg/l [2] Influent	Suspended Solids mg/l [2] Effluent	BOD [2] mg/l Influent	BOD [2] mg/l Effluent	Total DDT [5,11] ug/l Influent	Total DDT [5,11] ug/l Effluent	PCB [5,6] ug/l Influent	PCB [5,6] ug/l Effluent	TICH [5,6] ug/l Influent	TICH [5,6] ug/l Effluent
	A	A	A	A	A	C	B	C	B	C	C
1970	371										
1971	372	397[3]	325	384[3]	328	33.7	43.9	19.0	10.1	54	54
1972	351	416	293	319	307	14.8	13.4	9.28	7.6	25	22
1973	359	518	289	357	244	7.30	7.52[11]	4.82	2.67	12	10
1974	347	460	276	314	213	3.95	3.05	21.9	12.5	20	15
1975	342	484	278	302	209	1.67	2.17	3.94	2.73	5	5
1976	353	424	282	306	229	2.03	1.79	2.37	2.34	4	4
1977	330	463	220	334	220	2.12	1.58	2.70	1.81	4	3
1978	345	448	219	324	204	<2.80[7] OK	<2.06[7] OK	1.70[7] OK	<1.09[7] OK	<4.67[7] OK	<3.28 OK
1979	367	435	195	322	204	2.14[7] OK	<1.38[7] OK	0.91[7] OK	0.69[7] OK	2.89[7] OK	<2.19[7] OK
1980	374	442	176	335	208	1.66[7] OK	1.05[7] OK	0.83[7] OK	0.65[7] OK	3.03[7] OK	1.91[7] OK
1981	364	442	167	322	202	1.54[8]	0.83[7]	0.96[7]	0.54[7]	4.09[8]	2
1982	363	362[4]	160[4]	323[4]	205	0.89[9]	0.52[9]	0.52[9]	0.33[9]	1.53[9]	2

error should be 441

1 Annual mean of the average daily flows.
2 Annual mean.
3 Average of 6 mo. worth of data.
4 Average of 8 mos. worth of data.
5 From Concentrations of Mass Flow Rates of Trace Constituents in the Joint Outfall System 1971-1976 Norman Ackerman Project Engineer Monitoring Section - County Sanitation Districts of Los Angeles Annual Mean Value.
6 PCB data for JWPCP prior to January 1975 are of questionable accuracy and probably should be disregarded, as should the PCB fraction of the TICH data. Prior to 1975, questionable chromatographic peak were reported as either interference or PCBs, based on technician judgement. An improved analytical procedure was adopted in 1975 which resolved the problem of interference. For further dicussion, see the LACSD report entitled, Control of Plychlorinated Bihpenyls in the Sanitation Districts of Los Angeles County by Choog-Hee Rhee.
7 Water Quality Characteristics - Statistical Summary of 1980 Joint Water Pollution Control Plant - CSDLA Report No. WQCB02.
8 1981 Monitoring Results - JWPCP - Chlorinated Hydeocarbons - Chlorinated Hydrocarbon Monitoring Program - Annual Mean Values. sp
9 JWPCP Chlorinated Hydrocarbon Monitoring Program - Raw Influent and Final Effluent August 3, 1982 - Annual mean values.
10 Effluent samples are taken 100 yards downstream from the effluent pump station. Effluent has had two minutes of sampling.
11 Analytical error is resposible where values for effluent concentration exceed influent concentration. and normal sampling variation?

A From Ackerman's Binder "CSD Flow and Effluent Quality Data"
B From Conc & Mass flow Rates in JOS, 1971-77 values
C Values differ slightly from those in B

6

the most part. Agency responsibilities for non-point source monitoring are not yet defined state-wide.

87. (line 7) 1985 (not 9185).

88. (1st par). landfill, toxic waste dump site studies are underway by responsible state and local agencies.

89-90. (and table 20 footnotes). It should be noted for each source the date and frequency of sampling that went into these estimates vis-a-vis wastewater discharge sources.

91. SCCWRP 60 meter survey data provide SCB area-wide summary of 1977 sediment contamination levels (see Young 1982, attached).

(2nd par. line 8) JWPCP (not A).

(2nd Par. line 10) pesticide contamination...is a few (3-4) orders of magnitude lower. Might also refer to MacGregor (1974, 1976 - Fish. Bull. Vols 72(2) and 74(1) at this point.

92. (last Par.) Smokler's results showed that water column fish DDT levels declined while that of bottom forms did not. This somewhat contradicts first sentence where it's stated that despite major decreases... elevated levels persist in bottom and water column fishes..... However, DDT has slowly declined in the only flatfish (bottom) monitored since the Smokler paper, the Dover sole-see Figures V-21, p. 271 in LACSD annual report 1980-81, which was sent to EPA Reg. IX some time ago (copy attached).

93. Figure 11: Curves are not directly comparable because different sampling devices and analytical techniques were used. Log values plot does not clearly show extent of decrease--5 ppm surface versus 200 ppm buried.

94. (Par. 2) seems out of place. Data provided in Appendix I (? not III) was from modelling a worst case scenario and not actual measurements of massive versus pension. Also fish should be able to avoid low D.O. areas and resuspension (or bioturbation) cannot be large and still account for distinct layering of cores as shown in Figure 11! In sum, the Districts feel that burial presently dominates the situation and is responsible for the lower DDT burdens seen in recent monitoring of fish flesh.

(Par. 3, lines 4-6). We question the validity of the statement about mussel biomonitoring attributed to Young et al (1981); this may refer to the single pilot study at Palos Verdes in June 1974 to early 1975. Also, following paragraph (line 3, page 95) it is stated that the experiment was repeated (January 1976), whereas Young (1982, op cit, p. 28) states: "toward the end (winter) of the June 1974 survey the concentrations tended to merge at the different depths" due to breakdown of stratification. Since the EPA reference cited is not available to us, we are not certain what the facts are in this description.

95. (last Par.) Point is made that wastewater rather than sediment resuspension is the source of DDT. We feel this conclusion is inadequately based; for example, SCCWRP (D. Brown) has found seasonality to be very important in chlorinated hydrocarbon levels in mussels and this could also account for differences observed.

96. The last paragrpah is an important conclusion, but seems out of place here. We doubt if its promise can be demonstrated by the suggested items in Section 8. However, a more focused research effort might be appropriate; certainly not the type of monitoring here suggested.

97. (1st par). Much is made of the limited accuracy of projections here and in Table 21; however, it is much more certain that the inherent variability and accuracy of environmental forecasts of effects (and that of other important sources) are far less understood or even equally well measured.

99. We are unaware of any recent data or models that would allow one to state that sediment sources of DDTs overshadow other inputs. The release of DDT from sediments is a function of burial/resuspension or other release mechanisms. As shown by Figure 11, DDT concentrations are now highest below the surface and should be effectively isolated from the environment, if this remains the case for the next decade.

However, we agree that combined effects and sediment, aerial dispersion and runoff make current wastewater inputs a minor factor.

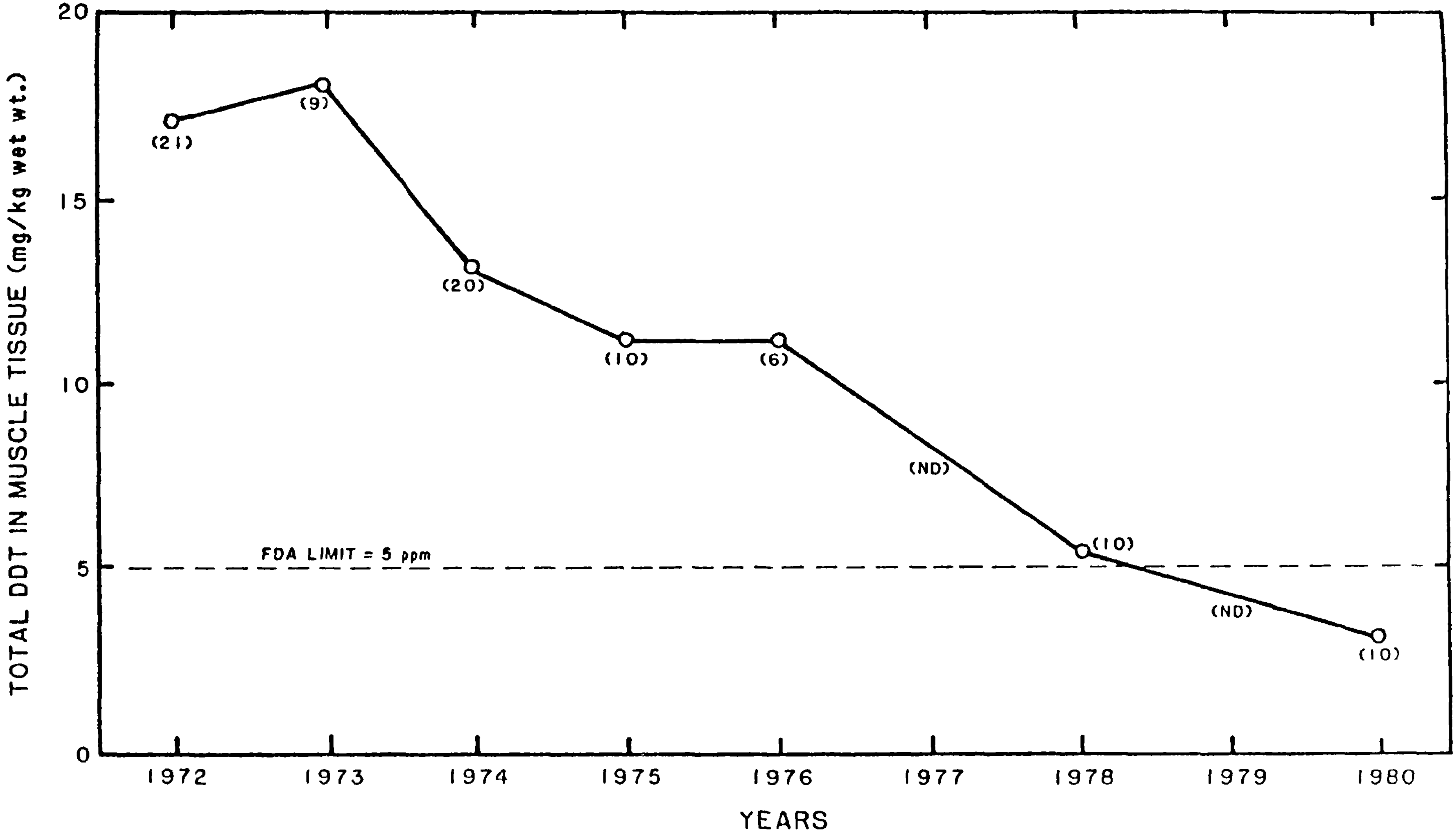


Figure V-21. Trend of median DDT concentration in flesh of Dover sole taken from Palos Verdes. Number of samples indicated in parenthesis.

Page No.	Response
26	The status of the California Ocean Plan revisions has been updated. The opposition of the California Ocean Dischargers (COD) to the proposed limits for trace organics is acknowledged. The EPA supports the proposed limits and finds the COD's arguments unconvincing. In a briefing notebook transmitted to the SWRCB on April 20, 1983, the COD argued that limits for DDT, PCBs. etc., should be based on bioassay results, that the levels proposed are below detection limits, and that background levels from domestic wastewater entering treatment plants exceed the proposed limits. However, the basis for the proposed limits is not simply the direct toxicity effects of these compounds on the marine biota, but their biomagnification through the food chain. In addition, it has not been adequately deomonstrated that the proposed limits are unachievable. The COD base their argument on TICH levels in wastewater influent rather than levels of individual constituents in the effluent.

Although in our assessment PCB concentrations found in brown pelican eggs in Southern California are not inhibiting reproduction, the fact remains that this question was investigated and is an appropriate subject for a full disclosure document.

32 The statement in the assessment has been qualified; however, the figures accompanying the comments do not disprove the the validity of Blus' critical level.

33 We presume that the reference is to Tables 2 and 3. The assessment does state that lower bioaccumulation factors have been oberved. Anchovy sampling is carried out by the agencies mentioned and by the SCCWRP; however the data gathered for Table 3 are from scattered sources and sampling locations. A more concerted monitoring program is required to improve the estimates of biomagnification.

36 Comment acknowledged.

39 Comment acknowledged. We retain our position on the use of caged mussels to monitor increased tissue burdens of toxicants in marine biota.

48 Comment acknowledged and has been used in the text.

49 Comment acknowledged the assessment already states that the 60" outfall is used in emergency situations only.

50	The JWPCP flow rate used for 301(h) is the flowrate identified in the tentative decision document and in the original 301(h) application. "Dewatering" was incorporated into the text.
53	The influent suspended solids value for 1982 has been changed.
54	This comment has been incorporated into the text.
55	Changed table 6 and 7. However, statement about centrate return did not seem necessary after the description of the treatment processes within the text of the report (made change on centrate return according to comment for page 48).
57	Table 9 reflects the flow discribed in the current 301(h) tentative decision document. Current NPDES limits are the once described in Table 5. The Footnote #1 has been corrected in Table 9.
83	The second paragraph on this page has been modified appropriately.
88	Comment acknowledged.
89-90	Sources of data are provided only, to avoid excessive detail in the report.
91	Young's study incorporated by reference. Other comments noted with appropriate changes in the text.
92	Comment acknowledged and sttement on page 92 has been adjusted appropriately.
93,94	Figure 11 and the referenced paragraphs both supporting and refuting DDT suppression through sediment burial have been deleted.

94 The Young study referenced on page 94 is not the single pilot study described in the August 1976 issue of the marine Pollution Bulletin, but a more comprehensive study described in the cited reference.

95 We express no opinion as to the validity of Young's conclusion.

96 See revised text.

97 Our intent in carefully qualifying the numbers in Table 21 was not to criticize the dischargers' monitoring program but rather to prevent the misuse of the simplified and assumptive information.

99 In our opinion, the DDT levels found within the zone of surface sediments that are periodically disturbed remains significant; although concentrations at the surface itself has declined dramatically, concentrations a few centimeters below the surface remain high.