STATE OF CALIFORNIA
STATE WATER RESOURCES CONTROL BOARD

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| In the Matter of the Petition of Marina County Water District for Review of Failure to Act by the California Regional Water Quality Control Board, Central Coast Region. Our File No. A-235(b). | Order No. WQ 80-13 |

BY THE BOARD:

On April 20, 1979, the Marina County Water District (Marina) requested the California Regional Water Quality Control Board, Central Coast Region, (Regional Board) to consider amending the Water Quality Control Plan, Central Coast Region, (Basin Plan) to delete the prohibition of discharges to the southern extreme of Monterey Bay. On June 18, 1979, the Regional Board held a preliminary public hearing to determine whether there was sufficient evidence and cause to warrant further review and consideration of modification of the prohibition area. At the conclusion of that hearing, the Regional Board adopted Resolution No. 79-06 concluding that amendment of the Basin Plan with respect to the southern Monterey Bay discharge prohibition zone is unwarranted.

On July 18, 1979, the State Board received a petition from Marina seeking review of the Regional Board's determination not to review the prohibition zone provision of the Basin Plan.[1/] The State Board, on its own motion, decided to review the propriety of the Regional Board's action. (See State Board Order No. WQ 79-31.)[2/] On December 7, 1979, the State Board

held a hearing to consider whether there was sufficient evidence to warrant deletion or modification of the prohibition of discharge into the southern extreme of Monterey Bay. Upon the close of the hearing, the record remained open for 20 days to allow interested parties to file additional testimony and closing statements. A final submittal was received from the petitioner on January 4, 1980.

## I. BACKGROUND

A Water Quality Control Plan for the Central Coast Basin was adopted by the Regional Board on March 14, 1975, and approved by the State Board on March 20, 1975. One of the actions taken in the Basin Plan was the establishment of certain discharge prohibitions "due to unique cultural, scenic, aesthetic, historical, scientific, and ecological values of the Central Coast Basin, and the necessity to protect public health, and the desire to achieve water quality objectives".[3/] The Basin Plan states that "waste discharges...are prohibited effective July 1, 1977, in Monterey Bay, northern and southern extreme, within the following areas: ...inshore from a line extending from Point Pinos to the mouth of the Salinas River; and the offshore area within a three-mile radius of Point Pinos".[4/] On June 10, 1977, the Basin Plan was amended to state that waste discharge is prohibited "effective July 1, 1983, in the southern extreme of Monterey Bay, inshore from an imaginary line extending from Point Pinos (36°-38.3'N, 121°-56.0'W) to the mouth of the Salinas River (36°-44.9'N, 121°-48.3'W)".[5/] As a result of the Basin Plan prohibition, the cities of Pacific Grove,

Monterey, Salinas, Seaside, Del Rey Oaks, and Fort Ord are constructing a regional wastewater treatment system. This was found to be the most cost-effective solution to the wastewater problems of the area. The regional system is being built with state and federal Clean Water Grant funds. Marina would also have been eligible for state and federal financial assistance if it chose to join in the regional system, but it has not done so.

## II. CONTENTIONS AND FINDINGS

1. Contention: Petitioner contends that the zone of prohibition was never properly approved as required under the Federal Clean Water Act and is therefore illegal. In addition, petitioner asserts that the Federal Act requires review of applicable water quality standards at least once every three years and that this periodic review has not taken place.

Finding: The legality and enforceability of the zone of prohibition under California law is not contingent upon federal approval. Therefore, it is not necessary for us to consider whether the part of the Basin Plan containing the prohibition zone was properly approved by the Environmental Protection Agency, as suggested by the petitioner. The Basin Plan, including the prohibition zone, was adopted and approved by the State Board in accordance with Water Code §§13240-13247.[6/] The Regional Board then adopted an NPDES permit to implement the requirements of the Basin Plan as required by Water Code §§13263(a) and 13377. As we have stated in innumerable prior Board orders, both Water Code §13377 and §510 of the Federal Clean Water Act

authorize the State to impose requirements in an NPDES permit which are more stringent than those required by the federal government. Therefore, compliance with the permit terms is required pursuant to State law.

Since the Basin Plan was adopted and implemented pursuant to California law, the federal requirement for review of applicable water quality standards at least once every three years is irrelevant. Water Code §13240, however, does require that basin plans "shall be periodically reviewed and may be revised". We do not believe that the requirement of periodic review mandates a complete and total review of the entire Basin Plan every three years. Rather, we view the Regional Board action in regard to the petitioner's request for amendment of the Basin Plan as an appropriate fulfillment of the requirement of Water Code §13240. In response to the petitioner's request, the Regional Board held a hearing to determine whether there was sufficient evidence and cause to warrant further review and consideration of modification of the prohibition area. A review of the record of that hearing indicates that petitioner was given ample opportunity to present any and all relevant evidence for Regional Board consideration. Once a basin plan has been established, it is appropriate for the burden of establishing the basis for change in that plan to rest with the person, be it the Regional Board or a third party, who is seeking the change. We do not believe that §13240 requires the Regional Boards to periodically rejustify and re-establish basin plan provisions as if considering those provisions for the first time.

In any event, we have conducted the "periodic review" of the zone of prohibition which is contained in the Basin Plan prior to our adoption of this order and, regardless of whether the burden of proof was on the petitioner or not, find that there is substantial evidence to support the prohibition as it is presently contained in the Basin Plan. The basis for this determination is discussed in the subsequent parts of this order.

2. Contention: Petitioner contends that Monterey Bay is a navigable ocean water and therefore, for the purpose of water quality control, is subject only to the California Ocean Plan. Petitioner also cites Water Code §§13280-13281 as applicable to this appeal. These provisions establish a specific review standard for certain Regional Board actions.

Finding: The California Ocean Plan, both as adopted in 1972 and as amended in 1978, states that Regional Boards may establish more restrictive water quality objectives and effluent quality requirements than those set forth in the Ocean Plan as necessary for the protection of beneficial uses of the ocean.[7/] Therefore, the Ocean Plan merely establishes the minimum requirements for discharges to the ocean. Basin plans have appropriately established more stringent requirements as needed. As discussed in regard to Contention 1 above, the Water Code requires that NPDES permits implement these basin plan requirements once they have been established.

Water Code §§13280-13281 apply to discharge of waste from individual disposal systems or from community collection and disposal systems which utilize subsurface disposal. Petitioner

discharges wastewater via an outfall into the ocean; therefore, these code sections are not applicable, and it is not necessary for us to consider whether the requirements of these sections have been met.

3. Contention: Petitioner contends that there is insufficient evidence to justify the need for the zone of prohibition as it is presently defined in order to protect the beneficial uses in the southern part of Monterey Bay.

Finding: The primary thrust of the petitioner's appeal is concerned with the technical, scientific aspects of the basis for the prohibition. Before reviewing this issue, we want to clarify several factors pertinent to our decision today.

First of all, the petitioner has asked us to consider several factors which we do not feel are relevant to the propriety of the prohibition. The possibility of increased reclamation of wastewater is cited as a means of decreasing the total discharge into the prohibition zone. We do not presume to direct the local agencies in how they can comply with the prohibition. Marina and any other discharger is free to develop a reclamation project as a means of complying with the prohibition. However, the fact remains that the prohibition has been in effect for nine years, and compliance has still not taken place.

Secondly, the petitioner also references a request which is presently pending before the Environmental Protection Agency by the Monterey Regional County Sanitation District for a waiver of secondary treatment requirements for its discharge into Monterey Bay. We do not believe this is relevant, first of all,

because a decision about whether or not to grant the waiver has not yet been made. In addition, the discharge by the regional facility would not be into the prohibition zone and therefore is not an appropriate basis for comparison.

Finally, before we begin our discussion of the technical aspects of this matter, we feel it appropriate to mention certain other factors. The Basin Plan itself states that consideration was given to the unique cultural, scenic, aesthetic and historical values of the area.[8/] The Monterey Bay area has long been recognized as one of California's finest recreational sites. Much of the area's economy is based on tourism. Therefore, we cannot take lightly our responsibility to protect the waters of the bay for water contact sports, non-water-contact recreation and aesthetic purposes. In addition, the prohibition zone includes a designated Area of Special Biological Significance[9/] which heightens the need to preserve the water in the area as a thriving marine habitat. A prime factor in establishing the southern Monterey Bay prohibition zone was the recurring of bacterial contamination of receiving waters and beaches.[10/] Periodic contamination has continued to occur.[11/]

Several of these factors led to the formation of the Association of Monterey Bay Area Governments (AMBAG) in 1970 to review the water quality situation in Monterey Bay. An Oceanographic Technical Advisory Committee was formed by AMBAG and was comprised of technical experts from local agencies and oceanographic institutions, including the Hopkins Marine Station, the Moss Landing Marine Laboratories and the U. S. Naval Post-

graduate School. This committee met once a month for over two years and employed consultants to review technical data relative to existing and future water quality in Monterey Bay. The objective of the AMBAG oceanographic studies was stated to be "to provide input data to the Yoder-Trotter-Orlob modeling effort. The approach was to use the Water Quality Ecological Model to simulate the response to various degrees of wasteloading, i.e., to measure the assimilative capacity of Monterey Bay and the tolerance of bay biota."[12/] The consultant for the petitioner states that the AMBAG Oceanographic Survey, albeit not published in final form, provides an excellent compilation of oceanographic data obtained in Monterey Bay up to 1973.[13/] Both the AMBAG Oceanographic Study and the AMBAG Water Quality Management Plan, which was also published only in draft form, were determined by the Regional Board to support the need for a prohibition in southern Monterey Bay. Thus, although we realize that a very essential part of the issue before us today is our review of the available data and the interpretations and conclusions which we drew from it, it is important to point out that this technical evidence has also been considered at the local level and the conclusion was made that it supported the need for a prohibition zone in southern Monterey Bay.[14/]

We turn now to our review of the technical evidence and our conclusions as to whether this evidence warrants modification of the zone of prohibition.

The Central Coast Basin Plan states with regard to southern Monterey Bay:

"Bay circulation is driven by offshore ocean currents. Water generally moves into the bay from the south and out of the bay from the north with an average speed of 0.1 and 0.2 knots; however, currents are more sluggish in the north and south extremities and in nearshore areas.... A clockwise gyre usually occurs in the southern 'pocket' of the bay where currents average 0.05 knots. There appears to be a counterclockwise gyre in the north bay... higher (nutrient) values appear near shore and in the north and south pocket areas of the bay. Ammonia nitrogen was consistently high in the 'south pocket' in the Monterey-Seaside area."15/

Bay Currents. A key concern is whether the Marina discharge is carried to the extreme south bay. Our review of the literature relative to this matter has led us to conclude that the hydrology of Monterey Bay is very complex and that bay currents shift in direction depending upon many factors including wind direction, speed, and duration; ocean currents; tidal fluctuations; temperature and salinity gradients; and ocean upwelling. Hydrographic parameters and bay circulation can generally be ascribed to three annual oceanic cycles (referred to as the Upwelling, Oceanic and Davidson current cycles), although the distinction between the circulation patterns during these periods is difficult. During the Upwelling period, which occurs from approximately February to September, Smethie16/ and Broenkow and Smethie17/ suggest that water moves up the submarine canyon18/ and diverges to the north and south over the shelf areas, resulting in counterclockwise and clockwise movement of water in the north and south bay, respectively. Although, in testimony, Dr. Broenkow stated that no one has demonstated that existing sewage discharge is trapped in the South Bay, he states in his own scientific

publication[17] that "Replacement time for nearshore bay waters is between two days and two weeks, sufficient for their characteristics to be modified measurably by surface warming, photosynthetic processes and dilution of sewage and stream discharges."

No clear circulation pattern is evident during the Oceanic period, and it appears to be a time of transition between the Upwelling and Davidson current periods. During the Davidson current period, which occurs from approximately November to February, water movement studies in the north bay[19] indicated mass water movement into the bay from the north. However, the Davidson current has been characterized by strong and frequent flow reversals.

The AMBAG study provides the most comprehensive analysis available on currents in the south bay.[20] This study led to additional scientific studies of Monterey Bay. Smethie[21] and Broenkow and Smethie[22] have inferred clockwise movement in the south bay. Pirie and Steller[23] observed gyres or southerly movement in the south bay for eight months out of the year. These observations were confirmed by detailed studies in Monterey Bay by Pirie and Steller..[24] They observed several eddies in the south bay with divergence opposite the Salinas River or Marina area. It is not clear from these latter two studies whether the circulation patterns indicate the movement of surface waters or deeper currents.

Current metering studies closest to Marina were conducted near the mouth of the Salinas River. These studies indicated

there were frequent flow reversals and periods of strong and sustained downcoast flow. Although there is controversy regarding the size and persistence of clockwise water movement in the south bay, all data available supports the existence of such a movement.

Sensitivity: We define sensitivity as a "potential for increased productivity". The potential for increased productivity (measuring chlorophyll) in the South Bay appears to be significantly greater than in the North or Central Bay especially during the Upwelling months.[25/]

Productivity is often low in the Central Bay. This is due to mixing in the water column which causes planktonic organisms to spend less time in the upper layers of the water column, thus slowing production and preventing available nutrients from being depleted.[28/] Greater quantities of available nutrients in the Central Bay combined with winds from the north and northwest increase the drift of available nutrients into the shallow, less turbulent portions of the South bay.[29/] These nutrients, in the more stable waters of the South Bay, are more susceptible to depletion by planktonic organisms and contribute to the increase in the populations of those organisms.

The AMBAG Oceanographic Survey supports the concept of an increased total productivity potential in the South Bay and lesser potential in the Central Bay. The AMBAG Oceanographic Survey also brought out the tendency for the southern reaches of the bay to be warmer than the central bay.[26/] Broenkow and Smethie[17/] referred to extended residence times, the consequent warming tendencies, and increased photosynthetic processes that could measurably modify the

characteristics of the nearshore waters of the bay. Thus, the available data supports a circulation pattern during the Upwelling months which would tend to concentrate nutrients and planktonic organisms into the southern portions of the bay.[27]

Increased availability of nutrients yielding increased productivity, warmer waters, and extended residence times all tend to enhance the growth of planktonic organisms. Therefore, the data available still supports the suggestion, developed from the analysis of the nutrient and current data, that the South Bay would be more "sensitive" to waste discharge than other areas. Sensitivity of south Monterey Bay is further supported by the Brown and Caldwell report which concludes that the Monterey Harbor area is more productive than the canyon vicinity during the warm autumn period. [30]

Given the possibility of the concurrent occurrences of high concentrations of naturally available nutrients, warmer temperatures, [31] longer residence times, [32] and shallower water, the south bay would be susceptible to phytoplankton blooms. [33] During late summer and fall, dinoflagellate (Gonyaulax) population blooms have been recorded in Monterey Bay. [34] This group of organisms is responsible for "red tide" occurences. The accumulations of the toxic excretions of these organisms can degrade marine habitats. As the dinoflagellate bloom occurs, nitrogen becomes a population limiting factor. [35] If summer temperatures were extended, the nitrogen discharged from sewage treatment plants could enhance the growth of Gonyaulax. Thus, a potential exists for a red tide in Monterey Bay when the hydrographic elements are correct and the

elements for high productivity are present. Marina's discharge along with all the others to the South Bay would increase the effect of such a red tide or of lesser planktonic blooms.

Ammonia Concentrations. Elevated ammonia concentrations have been reported for southern regions of the bay.[36/] High ammonia concentrations are of importance both to toxicity and nutrient enhancement analysis. Although there has been opposition to the validity of some of the ammonia data, scientific investigators [37/] support a trend of elevated ammonia concentrations in the North and South Bays. No additional data have been presented that would yield a different analysis. Dr. Broenkow, in a letter to the State Board dated December 21, 1979, opposes the use of some of the ammonia data. However, his own scientific paper[38/] presents an ammonia analysis of Monterey Bay as late as 1978 using the ammonia values that are in question. This analysis does not refute the existence of high ammonia concentrations in the South Bay. In fact, Broenkow and Smethie, in their analysis, state that: "The ammonia concentrations expected from the dilution of sewage (Table 4) using the mean sewage discharge rates into nearshore areas (Table 3) show that the observed areas of relatively high ammonia concentrations (Figure 10) could be easily attributed to sewage. The uncertainty in estimating the biological ammonia excretion and assimilation rates precludes unequivocal conclusions regarding the origin of distributions (Figure 10). The nearshore ammonia distributions are consistent with our knowledge of the water residence time and with measured sewage discharge rates."[39/]

Heavy Metals: As part of the California Mussel watch program, heavy metal concentrations accumulating in mussel tissue have been analyzed. Mussel sampling took place in Areas of Special Biological Significance (ASBS) all along the coast of California. The Pacific Grove area of Monterey Bay has been established as being a "hot spot" where there are elevated heavy metal concentrations in the mussel tissue. Specifically, in Pacific Grove Marine Gardens Fish Refuge and Hopkins Marine Life Refuge (an ASBS), mussel tissue analysis for heavy metals has shown elevated levels of lead, zinc, and silver.41/ These elevated levels of heavy metals have been attributed to the discharge of sewage effluent.42/

Marina's secondary effluent discharge will add quantities of heavy metals including lead and zinc to Monterey Bay.40/ Although it has not specifically been proven that Marina's discharge is directly responsible for the elevated heavy metal concentrations found in the mussel tissue, the fact remains that Marina is discharging quantities of heavy metals in an area known to have mussels with elevated tissue concentrations of lead, zinc, and silver.

Location of Marina's Discharge. In late 1978, it was discovered that Marina's discharge pipeline had broken somewhere near the middle of the pipe. Therefore, the discharge from Marina took place approximately 700 feet offshore until just prior to our December 7, 1979 hearing when this break was repaired. The effluent now is being discharged approximately 2000 feet

offshore. This occurrence is of importance because it would partially account for not finding elevated concentrations of effluent material near the discharge end of the pipe. Sediment analysis was performed at four selected outfalls (Santa Cruz, Watsonville, Monterey, Marina) by Soil Control Laboratories/ Watsonville, under contract to the Regional Board. Although the study failed to find heavy metal concentrations in the sediment surrounding Marina's outfall, the validity of the sediment data is in question because the study clearly indicates that the analyses were not properly conducted. Additionally, following the sediment analysis, it was determined that Marina's outfall had been broken closer to shore.

The record of our hearing of December 7, 1979, at Seaside indicates that there is disagreement in the scientific community regarding the influence of Marina's discharge upon the waters of the south bay. Dr. Broenkow, who testified on behalf of Marina, agrees, based on studies of salinity and nutrients, with the existence of a gyre in the south bay given the proper hydrographic and meteorologic conditions.[43/] Dr. Broenkow agrees with the concept that the replacement time for nearshore bay waters could be as much as two weeks, which would be sufficient time to measurably modify these waters by surface warming, photosynthetic processes, dilution of sewage, and stream discharges.[44/] However, Dr. Broenkow does not agree that the gyre, when it does exist, encompasses Marina's discharge. Dr. Thornton, in support of the prohibition, agrees with the existence of a gyre in the south bay

and believes the Marina discharge is within the general area of the gyre.45/

In light of the data reviewed and the disagreement within the scientific community about many of the technical issues before us today, we find that the existing area of prohibition should not be altered. In the absence of more specific data, we must conclude that there is a reasonable probability that the Marina discharge would, at times, be carried into the southern portion of the bay. The impact of this discharge on a unique environment such as the southern extreme of Monterey Bay would be to add amounts of heavy metals where these metals are already at elevated concentrations and to contribute nutrients to the growth of organisms, including at certain times of the year those organisms responsible for toxic red tides.

Our decision stems in part from our belief that Regional Boards can, and should, take preventive action to regulate activities that may affect the quality of the waters in the State from degradation. In this regard, the Study Panel to the California State Water Resources Control Board which prepared a report on recommended changes in water quality control for the California Legislature in March 1969 stated:

> "Conservatism in the direction of high quality should guide the establishment of objectives both in water quality control plans and in waste discharge requirements. A margin of safety must be maintained to assure the protection of all beneficial uses."

The report also stated that corrective actions must be initiated before a problem becomes acute and forces are set in motion which may well be irreversible except over very long periods of time.46/

In light of this policy and the many factors discussed herein, we conclude that there is sufficient evidence to sustain the zone of prohibition in southern Monterey Bay as it is presently outlined in the Central Coast Regional Basin Plan.

## III. ORDER

IT IS HEREBY ORDERED that the prohibition of discharge into the southern extreme of Monterey Bay as contained in the Water Quality Control Plan Report, Central Coast Basin, is appropriate and proper. The petition is dismissed.

Dated: July 17, 1980

Carla M. Bard, Chairwoman

NO
William J. Miller, Vice-Chairman

L. L. Mitchell, Member

ABSENT
Jill B. Dunlap, Member

ABSENT
F. K. Aljibury, Member

FOOTNOTES

1. Pending State Board review of this issue, Marina requested a stay of its NPDES permit (Order No. CA0047988) and Cease and Desist Order No. 79-07, both of which implement the prohibition contained in the Basin Plan. State Board Order No. WQ 79-31, adopted September 20, 1979, denied the request for a stay.

2. The petitioner filed a related petition dated May 15, 1979. (In the Matter of the Petition of Marina County Water District for a Stay and Review of Order No. 79-48 (NPDES Permit No. CA0047988), California Regional Water Quality Control Board, Central Coast Region. Our File No. A-235.) The issues raised in that petition were resolved in State Board Order No. WQ 79-30, adopted September 20, 1979; however, we have agreed to consider the exhibits submitted with petition A-235 as part of the record for the matter under review herein.

3. Water Quality Control Plan Report, Central Coast Basin, pp. 5-41.

4. Water Quality Control Plan Report, Central Coast Basin, pp. 5-42.

5. California Regional Water Quality Control Board, Central Coast Region, Resolution No. 77-04; Amendment approved by the State Board, August 18, 1977, State Water Resources Control Board Resolution No. 77-73.

6. Ibid. State Water Resources Control Board Resolution No. 75-21.

7. State Water Resources Control Board, Water Quality Control Plan for Ocean Waters of California, July 6, 1972, Chapter IV, General Provision D. State Water Resources Control Board, Water Quality Control Plan for Ocean Waters of California, 1978, Chapter VI, General Provision B.

8. Water Quality Control Plan Report, Central Coast Basin, pp. 5-41.

9. Areas of Special Biological Significance are those areas designated by the State Board as requiring protection of species of biological communities to the extent that alteration of natural water quality is undesirable. The concept of "Special Biological Significance" recognizes that certain biological communities because of their value or fragility deserve very special protection consisting of preservation and maintenance of natural water quality conditions to the extent practicable.

10. A Study of the Bacteriological Quality of Monterey and Carmel Bays, April 1969 through May 1970, Marina County Health Dept., Santa Cruz County Health Dept., State Dept. of Health, and Central Coast Regional Water Quality Control Board.

11. A letter from Walter Wong, Director, Environmental Health, Monterey County Dept. of Health, to Robert W. Tuttle, Esq., dated September 18, 1979.

12. Oceanographic Services, Inc., 1973, AMBAG Oceanographic Survey (Draft Copy), prepared for Yoder-Trotter-Orlob and Associates, pp. 1-1, 1-2.

13. Review of Literature Pertaining to the Area of Prohibition in South Monterey Bay, California, by Northwest Consultant Oceanographers, March 12, 1979, p. 8.

14. AMBAG Water Quality Management Plan, 1973, Yoder-Trotter-Orlob and Associates (Draft Copy), pp. 12-70.

15. Water Quality Control Plan Report, Central Coast Basin, p. 6-2.

16. Smethie, William M., Jr., Some Aspects of the Temperature, Oxygen and Nutrient Distributions in Monterey Bay, California, Moss Landing Marine Laboratories Technical Publication 73-1, 1973.

17. Broenkow, William W., and William M. Smethie, Jr., "Surface Circulation and Replacement of Water in Monterey Bay", Estuarine and Coastal Marine Science, Vol. 6, pp. 583-603, 1978.

18. A deep underwater canyon exists in the center of Monterey Bay. The presence of deep water close to shore allows currents to move cold, nutrient-rich water to shallower waters close to shore. When this happens, the enrichment of the shallower waters is called upwelling.

19. Environmental Research Consultants, Inc., Predesign and Predischarge Ocean Study, prepared for the City of Watsonville April 1976; Brown and Caldwell, Oceanographic Predesign Phase Report, Santa Cruz Wastewater Facilities Planning Study, August 1978.

20. Oceanographic Services, Inc., Draft AMBAG and Oceanographic Survey, prepared for Yoder-Trotter-Orlob and Associates, April 1973; Oceanographic Services, Inc., Annotated Bibliography of Historical References, Assessment of Pertinent Data for Monterey Bay, and Abstracted Bibliography of References from OSI's Interim Report, prepared for Association of Monterey Bay Area Governments, August 1972.

21. See Footnote 16 above.

22. See Footnote 17 above.

23. Pirie, Douglas M. and David D. Steller, California Coast Nearshore Process Study, Final Report, ERTS-1 Experiment #088, prepared for Goddard Space Flight Center, 1974.

24. Pirie, Douglas M. and David D. Steller, California Coast Nearshore Process Study -- Landsat II, Final Report, Landsat Investigation #22200, prepared for National Aeronautics and Space Administration, 1977.

25. Russ Waidelich, Seasonal and Spatial Fluctuations of the Phytoplankton in Monterey Bay, January 1976, Masters Thesis, California State University, Hayward.

26. See Footnotes 16 and 20 above.

27. Monterey County Health Dept., Santa Cruz County Health Dept., State Dept. of Health, and Central Coast Regional Water Quality Control Board, A Study of the Bacteriological Quality of Monterey and Carmel Bays: April 1969 through May 1970; See Footnote 25 above.

28. See Footnote 25 above; Silver, Mary W. and Peter S. Davoll, California Cooperative Fisheries Investigations Plankton Data Report, Monterey Bay Coastal Marina Laboratory Technical Report #2, 1975.

29. See Footnote 16 above.

30. Brown and Caldwell Report for the Central Coast Regional Water Quality Control Board, December 1979, p. 10.

31. See Footnote 17 above.

32. See Footnotes 16 and 17 above; Transcript of State Board Hearing in regard to the petition of Marina County Water District, December 7, 1979, pp. 35-36.

33. See Footnote 20 above.

34. Garrison, D. L., "Monterey Bay Phytoplankton I. Seasonal Cycles of Phytoplankton Assemblages", Journal of Plankton Research, Vol. 1, No. 3, 1979.

35. See Footnote 16 above.

36. See Footnote 20 above.

37. See Foot note 17 above; Transcript of State Board Hearing in regard to the petition of Marina County Water District, December 7, 1979, p. 42; Brown and Caldwell Report for the Central Coast Regional Water Quality Control Board, December 1979, pp. 14-18.

38. See Footnote 17 above.

39. See Footnote 17 above.

40. Engineering Science, Final Facilities Plan Report for North Monterey County, prepared for Monterey Peninsula Water Pollution Control Agency, January 1978, Table III-9, p. III-20.

41. Transcript of State Board Hearing in regard to the petition of Marina County Water District, December 7, 1979, p. 72.

42. Id.

43. Transcript of State Board Hearing in regard to the petition of Marina County Water District, December 7, 1979, p. 45.

44. See Footnote 17 above.

45. Transcript of State Board Hearing in regard to the petition of Marina County Water District, December 7, 1979, p. 156 and 158.

46. Final Report of the Study Panel to the California State Water Resources Control Board, Recommended Changes in Water Quality Control, prepared for the California Legislature, March 1969, pp. 3 and 15.