

REMOVAL OF WASTE DISCHARGES FROM SAN DIEGO BAY

by

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One of the Sanitary Engineer's duties is to prevent, control, and remove pollution of our most priceless natural resource--water. The old adage advanced by the Greek dramatist Euripides in about 450 B.C., "All mans' pollution doth the salt sea cleanse," is no longer true. Man has created an artificial environment the like of which has never before been seen, and man must strive to overcome the adverse effects produced by that environment. Everywhere across this nation, pollution, one of the offspring of this environment, is being felt. The people of San Diego recently came face to face with this spectre in the form of a polluted San Diego Bay. What was done to correct this situation will be dealt with in detail in the two papers immediately following my presentation this morning. My purpose is to give you some background information on San Diego Bay, and to summarize both the effects of waste discharge into the bay and the changes in the bay associated with the removal of wastes from this body of water.

San Diego Bay is a crescent shaped basin approximately 15 miles long and varies in width from one-half to two and one-half miles. When Juan Rodriguez Cabrillo dropped anchor in San Diego Bay sometime in 1542 and planted the Spanish flag, he little realized that he had discovered one of the ten great harbors of the world, and started a chain of events which would lead to a problem requiring many millions of dollars to correct. Likewise, the Franciscan Fathers, when they established the first settlement along the shores of San Diego Bay in 1769, had no inkling that this would eventually become a metropolis of three-quarters of a million people discharging wastes to the bay.

John Sutter, when he started the great California Gold Rush of 1849, never dreamed that he would be personally responsible for San Diego's having to install its first sewer system in 1887, with an outfall discharging to San Diego Bay.

After this first system, new sewer systems and outfalls were rapidly added until in 1943, when the first sewage treatment plant was placed in operation, San Diego had 22 outfalls, nine of which emptied into the bay. The cities of Chula Vista, National City, Coronado, and several military institutions, also had outfalls to San Diego Bay. The 1943 plant was immediately overloaded, so the plant was expanded in 1948. This expanded plant was also overloaded soon after being placed in operation in 1950.

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The Metropolitan system really had its beginning in 1950. In that year, the newly formed San Diego Regional Water Pollution Control Board recognized that if San Diego Bay was to be prevented from becoming a marine desert, action should be taken. The Regional Board was the first governmental agency to recognize that the waste assimilative capacities of the bay were being taxed.

To promote adequate joint inter-community planning, the Regional Board requested that a study committee be formed from representatives of each municipality surrounding the bay and to include representatives of the County. So well received was the Board's request that within six months money was appropriated, and a board of three engineers--David Caldwell, Charles Gilman Hyde and A M Rawn--was retained to supervise a county-wide sewerage survey. Their very worthwhile endeavor was published in 1952 as Report on the Collection, Treatment and Disposal of the Sewage of San Diego County. The existing Metropolitan system is a direct result of recommendations contained in this report.

To determine the condition of San Diego Bay and its capacity to go on receiving increased volumes of wastes, the Regional Board undertook a comprehensive survey of San Diego Bay. This study was published in 1952 in Report on the Extent, Effects, and Limitations of Waste Disposal into San Diego Bay. This study was the first one of such magnitude attempted on the West Coast. Mr. Nusbaum, Senior Engineer for the Regional Board at that time, and project engineer for the study, deserves much of the credit for its success.

Based upon these two studies, and on a subsequent report in 1954 by the Regional Board, several plans were advanced over the intervening years. The culmination was the San Diego Metropolitan Sewerage System.

Let us turn now from this brief chronological history of the bay to an examination of some of the effects of these waste discharges on the bay. The effect of waste discharges to a body of water can be likened to the punishment inflicted by a prize fighter of the "body punching" type. At first, the damage inflicted by a body puncher is not apparent. As more punishment is inflicted, the results eventually begin to show on his opponent. Finally, the point is reached when his opponent can absorb no more punishment, and the fight is over. In one case, it is the body of a human being absorbing the punishment; in this case, it is the body of water known as San Diego Bay.

The attack was mounted on San Diego Bay with the 1887 sewerage system which discharged several hundred feet offshore from the foot of Market Street. The effect of this, and other early discharges, was not readily discernible. The attack was stepped up during World War I, with increased volumes of wastes being discharged. Coliform counts of 10/ml

or greater were found in several areas in 1924. The bay was jabbed with more outfalls during the next few years until by 1940, counts of 10 coliform per ml or greater were found in limited areas in all parts of the bay. World War II slammed and ripped into the bay with the large volumes of wastes generated by the immigration of defense workers. By 1944, considerable fields of high counts were demonstrated.

The bay study of 1951 revealed just how severe this damage was. Coliform counts in the central portion of the bay had risen to 70 per ml. Dissolved oxygen sampling revealed a severe depression of D.O. levels throughout the bay. Sludge deposits up to three feet thick were found 200 feet from shore for 9,000 feet along the San Diego shoreline. Almost the whole body of water had assumed a murky, green color, indicative of the bruises it had absorbed. Average transparency was about four feet.

The blows dealt by the advent of the Korean War sent the bay reeling back on its heels. Coliform averages soared to 215 per ml in the central bay area; dissolved oxygen was further depressed. Sludge bottom deposits were increasing in thickness; transparency was diminishing. The bay had very visibly weakened.

By 1963, the bay was ready for the knockout. Coliform counts were averaging 240 per ml. Counts in excess of 1000 per ml were everyday occurrences. Dissolved oxygen was approaching zero in several locations. Sludge depth was reaching seven feet; transparency was two feet or less. Fortunately, the knockout blow was never thrown. With the inauguration of the Metropolitan system in August 1963, the savage attack on San Diego Bay was suddenly withdrawn, and the victim was left to lick its wounds and recover.

And recover it did. Less than two months after the cessation of discharges to the bay, sampling by the staff of the Regional Board revealed only one coliform count in excess of 11 per ml. The lone high count resulted from the raw sewage discharge by the City of Coronado, which did not connect to the Metropolitan system until February 1964. Sampling subsequent to Coronado's connection showed all but two counts below 10 per ml. Dissolved oxygen levels increased rapidly and by early 1964, the dissolved oxygen in the central bay had risen to six parts per million.

The most noticeable sign of recovery to the inhabitants of the San Diego area was the color and transparency of bay waters. Whereas before, in the murky, green water, you were lucky to be able to see your hand in front of your face, skin divers have reported visibilities in excess of 30 feet. No longer do the ferries plying their way between San Diego and Coronado leave a brilliant green wake. The bay is once again a sparkling blue.

Another change noticeable to the naked eye is the return of fish and other sea animals to the bay. Investigation of reports of "skin divers" in restricted areas of the bay has revealed these "skin divers" to be seals, which are returning to the bay to play and frolic now that it is once again habitable.

San Diego Bay is still a long way from complete recovery, especially as pertains to the sludge beds. The thickness of the beds has decreased by something less than 50% since wastes were removed from the bay. Since the bay bottom which is overlain by this sludge is a marine desert, the eventual re-establishment of bottom life may form an important link in the food chain necessary for larger animals.

Another problem still existing in San Diego Bay is that of waste discharges from vessels moored in the bay. Special sampling has indicated that these discharges may be having an effect on the bacterial quality of adjacent waters. Early in 1964, the Regional Board brought the problem of waste discharges from ships into San Diego Bay to the attention of the President's Advisory Board on Water Pollution Control. We are hopeful that a study will soon be made in San Diego Bay to clearly delineate the problem and afford a method of solution.

During the ten years that were required to study, plan, design and construct the San Diego Metropolitan Sewerage System, San Diego Bay was grossly polluted, causing the loss of beneficial uses of these waters. The area was fortunate in that the communities adjacent to the bay were able to implement an economic alternate method of disposing of their waste products. The remarkable recovery in the quality of the bay waters, and the return of the availability of all beneficial uses, should provide an example demonstrating to other communities that the construction of new sewerage facilities can be a major asset to an entire area.

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