DFG EXHIBIT 45

Exhibit 45, Entered by the California Department of Fish and Game for the State Water Resources Control Board 1987 Water Quality/ Water Rights Proceeding on the San Francisco Bay/Sacramento-San Joaquin Delta

POLLUTANTS IN THE BAY-DELTA ESTUARY

Statement on Pollutants in the Bay-Delta Estuary

1. Beneficial Uses

The beneficial uses of San Francisco Bay San Joaquin-Sacramento River Delta which are in need of protection from pollutants are appropriately listed in the latest edition of the Water Quality Control Plan, San Francisco Bay Basin (2) adopted by the California Regional Water Quality Control Board, San Francisco Region. Those of special significance to fish and wildlife include: water contact recreation, nonwater contact recreation; ocean, commercial and sport fishing, wildlife habitat, preservation of rare and endangered species, marine habitat, estuarine habitat, fish migration, fish spawning and shellfish harvesting.

Recreational opportunities, whether contact or noncontact, depend largely upon the maintenance of suitable nonpolluted aesthetically pleasing habitat not only for the recreationalist but for fish and wildlife as well. Maintenance of water quality is of paramount importance to the protection of these beneficial uses.

The Bay/Delta is critical to the very survival of a multitude of fish and wildlife species. Examples of fish and wildlife resources which are dependent upon clean water quality in the Bay/Delta estuary include; the dungeness or market crab; various species of shellfish, marine fishes, and anadromous fishes;

migratory and resident birds; marine mammals; and the food web of support organisms necessary for the sustenance of these resources. All anadromous fish, i.e., salmon, steelhead, striped bass, sturgeon and shad, require this area as a migratory corridor between the ocean and upstream spawning areas in order to successfully complete their respective life history cycles.

A complete listing of these living resources may be found in the Department's publication, "Fish and Wildlife Resources of San Francisco Bay" (Skinner, 1962).

2. Pollutants

There are a variety of problems affecting fish and wildlife resources in the Bay/Delta today. Many of the problems are related to waste discharge and resultant water quality changes. These problems include; fish die offs, continued decline and suppression of some resources and tainting and contamination of shellfish, certain fisheries and migratory birds. The causes of these problems are not entirely known. Our knowledge of the scope and breadth of these problems is incomplete. However, given the fact that several hundred regulated discharges of waste amounting to hundreds of millions of gallons enter the Bay-Delta everyday along with unregulated nonpoint source wastes and illegal spills we believe pollutants are a major cause of the problems. For example, recent investigations by the National Marine Fisheries

Service (NMFS) (Whipple, 1984) have suggested that at least part of the decline in striped bass may be due to the deleterious interactive effects of water diversion and pollution. Analyses of striped bass collected from this estuary indicate correlations of pollutants (principally petrochemicals and heavy metals) with parasites burden body condition, liver condition, and most significantly, egg and gonad condition. Fish from the Bay-Delta appear to have higher and more damaging parasite loads than fish examined from other areas. This seems to indicate that this species, and by implication perhaps many other species, is not currently receiving the necessary protection from pollutants. Although the data may not be conclusive, the fact that there are extraordinary body burdens of contaminants in the fish warrants further investigation and resolution of this problem.

In another example, the State Mussel Watch program has found elevated concentrations of silver, cadmium, copper and mercury in mussels within many areas of the Bay, as well as DDT and its metabolites, from mussels in Richmond Harbor (Stevenson, 1985). While the physiological significance of these findings is open to scientific debate, the fact that Bay mussels had the highest concentrations of heavy metals of any bay in California (Stevenson, 1980) also suggests a substantial risk to the valuable fish and wildlife resources of the Bay-Delta system from pollutants.

The cumulative effects of municipal and industrial waste discharge relate to a host of subtle effects to fish and wildlife resources which cannot be attributed to any one source or event. An example which most frequently comes to mind is the widespread problem of shellfish contamination in the Bay. At the turn of the century, clams and oysters were abundant supporting an extensive commercial harvest and aquaculture industry in the Bay. By 1908, the oyster fishery had collapsed, and commercial landings of clams, mussels and other shellfish had greatly degenerated (Skinner, 1962). The destruction of this resource was probably the result of increased silts from upstream mining activities together with increased urbanization, industrialization and water-related development. Today, most shellfish beds which remain are frequently contaminated with fecal coliform; perhaps not from sewage discharges, as in the past, but probably from urban runoff. Excessive body burdens of heavy metals further restrict the use of this fishery.

Cumulative impacts occur to fin fishes as well, often by more subtle means. The recent studies by the NMFS and University of California have revealed reproductive problems in striped bass and starry flounder which appear, at least in part, to arise from significant accumulations of certain petrochemicals. More research needs to be undertaken to better resolve the cause and effect relationships.

Recently, during a fish behavioral testing program using treated petrochemical refinery effluent, striped bass were actually attracted to the effluent and would remain in the waste field to their own detriment (Jefferson Assoc., 1987). Further analysis of the attractive nature of petrochemical wastes was conducted at another refinery which revealed the attraction was strong at dilutions as high as 1000:1. If these tests accurately depict field responses of striped bass, the cumulative impact of the numerous petrochemical waste discharges along the migratory corridor of this species alone would be enormous.

In addition to direct effects on fishery resources and shellfish contamination, another concern relates to the tainting and contamination of other fish and wildlife which renders them unfit for human consumption. A wide variety of organic compounds are capable of imparting objectionable tastes and odors to the flesh of fish and other aquatic organisms. "The value of many recreationally and commercially important fisheries is thus significantly being reduced by the introduction of fish tainting substances into surface waters." (Shumway and Palensky, 1973) The extent to which tainting of fish and shellfish is an impairment to recreation uses of the Bay are largely unknown. However, not a month goes by without several calls to the local Fish and Game warden or regional office from local sportsmen on the odd tastes of something caught locally in the Bay.

A more frequent and important inquiry relates to the safe consumability of their catch. Health advisories on the consumption of striped bass from the Bay-Delta by pregnant women and children have been issued by the State Department of Health Services due to high concentrations of mercury. Just recently, a similar advisory has been issued for excessive concentrations of selenium in some waterfowl of Suisun Bay.

In 1968, the Department of Fish and Game attempted to quantify the population of various resident and migratory fish and wildlife of the Bay and the recreational opportunities they create. The striped bass population was estimated at that time to be between 2,500,000 to 8,000,000; king salmon, 1,000,000; steelhead, 40,000 to 60,000; American shad, 2,000,000 to 4,000,000; sturgeon, 9,000 to 16,000; clams, 20,000,000 and between 300,000 and 1.5 million waterfowl and shorebirds.

In the Bay, pier and shore fishing amounted to 643,000 angler-days (a-d) of recreation. It was estimated, at that time (1967), between 1.5 and 3 million (a-d) were spent in the striped bass fishery alone while the other anadromous fish were somewhat less (salmon, 187,000 a-d; shad, less than 100,000 a-d; steelhead, less than 3,000 a-d; and sturgeon, less than 6,000 a-d). It was estimated that these recreation statistics would double by the year 2000 on the assumption that, 1) poor water quality

would not be the environmental control limiting fish and wildlife populations or their use, and 2) major environmental problems posed by water development and reclamation would be avoided or solved (Kelley, et al. 1968). Since 1968, the catch of striped bass has steadily declined as has that for chinook salmon and steelhead (Meyer, 1985).

Although the use data needs updating, it is clear that the assumptions made in 1967 were overly optimistic. Pollutants, as well as other factors, are adversely affecting fish and wildlife resources. We know the State Water Resources Control Board (Board) recognizes the importance of these resources and we need the Board's help to turn this situation around.

The Board's Water Quality Control Policy for the Enclosed Bays and Estuaries of California states in part that "scientific evidence and opinion . . . suggests the existence of biological degradation, due to long-term exposure to toxicants . . . discharged to the San Francisco Bay-Delta system. Implementation of a program which controls toxic effects through a combination of source control for toxic materials, upgraded wastewater treatment, and improve dilution of wastewaters, shall proceed as rapidly as is practicable with the objective of providing full protection to the biota and the beneficial uses of Bay-Delta waters in a cost-effective manner." The Department strongly endorses this policy as being most responsive to the issue; however, some

qualification and clarification of this endorsement is necessary. The Department's endorsement of rapid dilution of waste applies to individual regulated waste discharges and to rapid initial dispersion of wastes which have been properly treated to remove acute toxicity and cumulative toxicants prior to discharge. The use of the waters of the Bay/Delta including freshwater outflow should not be for diluting wastes which are not properly treated before discharge.

In practice, eliminating toxicity at the source and improving dilution has more often than not been one and the same. As a means to implement this policy, the San Francisco Bay Regional Water Quality Control Board Basin Plan includes a prohibition of discharge to areas having less than 10:1 minimum initial dilution. The intent is to insure protection of nearshore or tidally restricted waters having limited assimilative capacity. The total concept was originally supported by the Department in the late 1960s to afford greater protection of sensitive nearshore habitats easily compromised by high oxygen demanding substances commonly found remaining following source control and treatment of municipal wastes. Almost without exception, municipal dischargers, largely funded through State and Federal grants, have constructed deepwater discharge structures with diffusers while upgrading the general effluent quality. Most industrial dischargers, with a few notable exceptions, have followed suit.

However, the concept of providing 10:1 dilution has also led to the widespread notion that dilution of treated effluent is always sufficient to prevent the adverse effects of any residual toxicants that may remain. We cannot subscribe to this notion.

As already indicated, we have consistently maintained that all discharges must be adequately treated at the source to remove constituents which are toxic or otherwise deleterious to fish, wildlife or the food chain upon which they depend. This must include the removal of long-term cumulative toxicants. The San Francisco Bay RWQCB was instrumental in promoting this concept through the use of static acute toxicity bioassays on the effluent as discharged. Their standards, first imposed in the early 1970s, required essentially complete survival of all test fish (stickleback) in those cases where 10:1 dilution could not be achieved. Fifty percent survival was required when a deepwater outfall was provided. At the time, this biological testing of whole effluent was innovative and believed to be responsive to our concerns. However, as more information was gathered, the subtleties of toxicity evaluation and effects of toxic substances on fish and wildlife demonstrated that short-term static tests on adult forms of hardy species failed to provide the protection needed, especially to sensitive larval stages of the fishery resources or food chain organisms.

After much testimony and debate, the San Francisco RWQCB recently revised the toxicity testing protocol to include the requirement of a flow-through bioassay using rainbow trout or other sensitive test fish for compliance monitoring. They have further required a staged implementation of toxicity reduction evaluation for most large municipal and industrial dischargers to identify, isolate, and hopefully remove constituents which contribute to effluent toxicity. We applaud these efforts, but must reiterate that our objective is not to make waste discharges swimmable or fishable, but to insure that the Bay's complex biota is able to feed, grow, reproduce and be safe for human consumption. We ask that the Board uphold this standard as the most basic of program objectives.

We encourage the State Board to consider a regulatory approach which not only identifies and controls those constituents which cause direct mortality of sensitive life forms, but those constituents which limit or modify migratory behavior or their ultimate use by sportsmen.

In summary, the Department recommends that the Board's policy for control of pollutants should provide for elimination of all potential adverse effects on fish and wildlife prior to discharge to the Bay/Delta. Potential effects to be considered should include the well-being and survival of the fish and wildlife themselves and factors making them less suitable for human

consumption. This includes the prevention of tainting of the flesh, and the prevention of accumulation of concentrations of toxicants in the flesh, which would make these important resources distasteful or dangerous for human consumption.

The pollution-prevention policy should be based on source control of wastes, proper treatment of wastes including removal of acute toxicity and long-term cumulative toxicants before discharge; and adequate monitoring including the use of flow through bioassays on appropriate representative species of the Bay/Delta at their most sensitive life history stage. The use of deepwater rapid-dispersion systems should only be employed to resolve any remaining oxygen demand remaining in the effluent and blend the already properly treated wastes with the receiving waters.

As a final comment, from a policy standpoint, it will be essential for the Board to discern the significant difference between the use of freshwater outflow necessary for salinity control and maintenance of fish and wildlife resources in an estuarine system and the use of the receiving waters to dilute or flush inadequately treated wastes. Freshwater flows should be used for the purpose of maintaining optimum levels of fish and wildlife which are dependent upon the proper balance of fresh and salt water in an estuarine system. As previously stated, adequate treatment should be required for wastes prior to discharge. The Department will comment further on this aspect in future segments of the Bay/Delta hearings.

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