STATE OF CALIFORNIA—HEALTH AND WELFARE AGENCY
GEORGE DEUKMEJIAN, *Governor*

DEPARTMENT OF HEALTH SERVICES
TOXIC SUBSTANCES CONTROL DIVISION
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Dr. Teng-Chung Wu, Chief
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Surface Water Protection Division
San Francisco Bay Region
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December 12, 1988

Dear Dr. Wu:

I have made a preliminary review of several South San Francisco Bay (South Bay) studies as requested by the Citizens for a Better Environment (CBE) dated December 2, 1988. These are the Five-year South Bay Discharger Authority (SBDA), United States Geological Survey (USGS), Aquatic Habitat Institute (AHI) and other relevant studies of the South Bay including comments of the CBE and Regional Water Quality Control Board (RWQCB).

I have made the following comments based upon my own research and experience in different estuaries. They address some of CBE's concerns about the South Bay. These review comments reflect my own opinion and not the position of the Department of Health Services (DHS).

1. I found each of the above mentioned works very useful and valuable. They provided significant information on the South Bay particularly the works of USGS scientists and Five-Year SBDA study. The SBDA study indicated that the advanced treatment by the SBDA has resulted considerable improvement of water quality. However, the water quality problems still exist in the South Bay. The levels of a few trace metals in that area are comparable with the other estuaries (NOAA, 1988) including the polluted Mersey estuary in Liverpool Bay, England.

2. The Basin Plan prohibits discharge of waste water containing constituents of concern south of the Dumbarton Bridge. The CBE believes that the dischargers may continue to discharge at their present locations only if toxic pollutant discharges are reduced at the source and wetlands losses are mitigated.

3. In December, 1982, I made a presentation to the California Academy of Sciences at a conference organized by the Pacific Estuarine Research Society, and the American Association of Advancement of Science. I was encouraged by several leading

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estuarine scientists of the Pacific Coast to design a study on Water Quality and Aquatic Habitat of the San Francisco Bay.

In my preliminary review of the literature on the Bay, the South Bay seemed to be a problem area. I immediately discovered that the ongoing SBDA study based on a single species was not adequate and may not reflect the area's existing ecological status and the health of the aquatic habitat.

A detailed proposal (pp 1-134) on Aquatic Habitat and Water Quality Monitoring of the South Bay was prepared in order to supplement the SBDA study. This proposal included the use of slow moving benthic organisms and flatfish which cannot escape pollution. The proposal was submitted to the RWQCB in September 1983. Copies of the proposal were submitted to the Chairman of the Aquatic Habitat Institute and its members, the SBDA and the Environmental Protection Agency (EPA Region IX) as recommended by the staff of the RWQCB. About a year later a copy of the proposal was also forwarded to the City of San Jose. Please review this proposal for a more detailed discussion of the South Bay studies (Ghosh, 1983).

4. The acceptability of a single species study by the SBDA appears to be a key question for the South Bay. A single species study may sometimes be applicable (in a case where ongoing long-term monitoring has determined based on multiple species studies that a single species reflects the impact of environmental factors on a localized affected area) to use an appropriate slow moving resident species in monitoring an area in order to assess its improvement and degradation in a cost effective way. It may be stressed that the five-year study by the SBDA {Kinnetic Laboratories Inc., (KLI) 1987} presented high quality data on the South Bay. However, the study could not by itself assess the full impact of toxic elements on all species, nor could it rule out the potential for toxicity based on "indicator species" studies using Crangon franciscorum (bay shrimp) alone. Single species monitoring can be risky and often does not help policy makers to determine whether all species are being protected. (For details regarding appropriate species for benthic and epibenthic monitoring studies see Ghosh, 1983).

For example, Crangon crangon (vulgaris) was common at the middle reach of the polluted Mersey estuary and it was a major catch at the mouth of the estuary while other fisheries drastically declined. Macoma balthica was the only bivalve present in the upper Mersey estuary and its population density (in a localized area of the middle reach) is higher than the M. balthica population of the South Bay but the growth rate of that species was slightly higher and it lives longer in the moderately polluted South Bay.

5. Bioaccumulation of the discharge metals is of concern in the South Bay. Bioaccumulation of heavy metals in benthic organisims can cause serious hazards for aquatic life and public health.

I agree with the conclusions of Thompson et al. (1984) from their study that measured bioavailable trace metals discharges from point and nonpoint sources in the Palo Alto area.

6. Benthic populations can be extremely variable for a variety of reasons. Sediment characteristics and chemistry are important factors, but are not the only factors that may affect these populations. I believe that we need to see more detailed studies that measure all of these parameters and their distribution in San Francisco Bay. Specifically, these studies should measure pollutant body burdens and organisms' responses along pollution gradients in the Bay.

Toxicity tolerance differs among species and sometimes among individuals of the same species, hence incorrect identification can give wrong results. This is one reason why it is important to correctly identify benthic organisms that are an important part of the food chain in the Bay/Delta, but there are other reasons as well (Ghosh, 1979, 1982, 1983, 1988; Thomas & Ghosh 1982; Carlton, 1972, 1979).

7. I agree with the RWQCB staff review comments that the San Francisco Bay has historic problems that need remedy. I am aware of the Aquatic Habitat Institute' comments on the RWQCB June 1988 draft SBDA report, and I look forward to reviewing the results of the Santa Clara Valley Nonpoint Source Study.

I wish to acknowledge and thank the RWQCB staff, Marty Stevenson of KLI, J R. Hunt and R. Denton of University of California, Berkeley, Greg Karras of CBE, scientists of AHI, Ted Smith of Silicon Valley Toxics Coalition and others for their generous offer to share their data and results in connection with my work on the South Bay {"Comparison of the Pollution effects of Liverpool and South San Francisco Bays", National Center for Intermedia Transport Research (NCITR), 1988 and "Ground and Surface Water Contaminatin of Santa Clara Valley, California (best case) and Dhaka, Bangladesh" (worst case), Hazardous Materials Control Research Institute (HMCRI), 1989, 6th National Conference}. [illegible] thanks to DHS.

Please feel free to call me (415-841 3253) or write to me if you have any questions.

Sincerely

Rash B. Ghosh

cc. Mr. Greg Karras, CBE
Chief, Region 2, DHS