DRAFT ENVIRONMENTAL IMPACT REPORT

AMENDMENT

EE 79.157

AMENDMENT TO
WEST SIDE
TRANSPORT/STORAGE
PROJECT
EE 75.304

SAN FRANCISCO WASTEWATER MASTER PLAN
IMPLEMENTATION PROJECT IX

Public Comment Period: 25 May 1979 to 5 July 1979

Public Hearing: 21 June 1979

Written comments should be sent to the Environmental Review Officer, 45 Hyde Street, San Francisco, CA 94102

PREFACE

On 28 July 1977, the San Francisco City Planning Commission adopted Resolution No. 77-83, certifying the Final Environmental Impact Report EE75.304, Westside Transport/Storage Project, as fulfilling the requirements of the California Environmental Quality Act. The project as described in this EIR included a large concrete box culvert (consolidation sewer) under the Upper Great Highway from Fulton Street south to a point about 200 feet south of Sloat Boulevard, a distance of 13,300 feet (Figure 2, page 8), and a pump station west of the San Francisco Zoo along the Great Highway Extension. Also, sewers under eight other City streets would be enlarged and extended to connect the proposed facility with the existing sewer system (Figure 2).

In dry weather, sewage flows from the Richmond/Sunset drainage basin north of Sloat Boulevard would be transported through the consolidation sewer to the pump station for pumping to the proposed Southwest Water Pollution Control Plant, north of Lake Merced. In wet weather, sewage combined with storm runoff would be stored in the consolidation sewer and pumped to the Southwest Treatment Plant as treatment capacity became available. The project would have provided 11.8 million cubic feet of storage capacity, which would have been sufficient to reduce the average number of yearly overflows of untreated sewage and storm runoff onto Ocean Beach from 114 to 1. Since July 1977 when the Final EIR was certified, the regulations for number of overflows allowed per year have changed to allow an average of 8 overflows per year instead of 1. The increase in number of overflows causes changes to the project as originally proposed, necessitating this Amendment to the Westside Transport EIR. The project now proposed would provide 6.4 million cubic feet of storage capacity, which would be sufficient to reduce the average number of yearly overflows of untreated sewage and storm runoff onto Ocean Beach from 114 to 8.

The Amendment follows the format of the Westside Transport EIR; however, not all topics discussed in that EIR are discussed here. Only those subject areas which require substantial modification or amplification in order to discuss potential impacts of proposed project changes have been included. For this reason, the Table of Contents and amended sections it reflects do not appear in consecutive order. The remainder of the information in the Final EIR is still germane to the modified project and is incorporated by reference into this report.

The certified Final EIR was also amended 8 June 1978 by a memorandum to the file. The amendment covered the following project changes: 1) the sewer would be moved approximately 75 feet west of the location described in the Final EIR; 2) contractors would not be restricted to vertical-wall construction but would be allowed to use a slope-sided trench north of Santiago Street; 3) traffic would be routed to a temporary roadway east of the construction as described in the EIR, but a separate roadway for construction traffic could be provided in addition to a two-lane, two-way road for normal public traffic; and 4) construction segments would be changed to allow a single contractor to build the portion of the sewer between Santiago Street and Lincoln Way instead of the scheme described in the Final EIR for two construction contracts, and road reconstruction, landscaping and underpass replacement could be bid separately rather than as a single restoration contract. The first change, moving the sewer 75 feet west, may or may not occur. The exact location of the sewer will be determined at the conclusion of the wave erosion studies and after the State Coastal Commission meetings in May and June 1979. The west wall of the consolidation sewer will be located in the recreational corridor somewhere in the area between the Golden Gate National Recreation Area (GGNRA) boundary line and approximately 90 feet to the east. If the first change does not occur, then the third change (traffic routed to a temporary roadway) would also not be necessary. However, the second (slope-sided construction) and fourth (construction contracts) changes are still valid. Because the consolidation sewer can be designed smaller with the allowance of eight overflows, then slope-sided construction becomes a possibility. It is still anticipated that sewer construction would be built in four segments, and the landscaping and highway restoration could be bid separately rather than as a single contract. A copy of the 8 June 1978 amendment is attached as Appendix A.

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CHAPTER I
SUMMARY

The proposed Westside Transport/Storage project would include a consolidation sewer, a pump station, and improvements to the existing sewer system. The consolidation sewer would consist of a concrete box culvert under the Upper Great Highway from Fulton Street to a point about 200 feet south of Sloat Boulevard. It would transport dry weather sewage from a portion of the Richmond-Sunset drainage basin to a pump station, from which it would be pumped to the proposed Southwest Water Pollution Control Plant. During wet-weather, sewage combined with storm runoff would be stored in the consolidation sewer and pumped to the plant as treatment capacity became available.

Since July 1977 when the Final EIR on this project was certified, the regulations for average number of wet-weather overflows allowed per year have changed to permit an average of 8 overflows per year instead of 1. This increase in number of overflows permits the following changes to the project as originally proposed:

1) The transport can be designed to a smaller inside width (25 feet vs. 50 feet) along much of its alignment.

2) The smaller width decreases storage capacity from 11.8 million cubic feet to 6.4 million cubic feet.

3) The pump station's dry-weather peak pumping capacity would increase from 37 million to 50 million gallons per day (mgd), while its wet-weather capacity would decrease from 440 mgd to 240 mgd.

4) There would be a net savings in planning, design and construction costs of $39 million.

The proposed project would improve the quality of receiving waters at Ocean Beach. The average number of annual overflows would decrease from 114 to 8, a reduction of 93%. The average number of overflow hours would decline to 32, a reduction of 91%. The average number of overflow gallons would diminish to 449 million, a reduction of 84%. The coliform level would be reduced from between 79%-86% (depending on the standard applied) from present levels. The BOD_5 level would diminish by 84$ from present levels. The suspended solids level would decrease by 84% from present levels.

Despite these improvements in water quality, the coliform level standards in the Ocean Waters of California Water Quality Control Plan of the State Water Resources Control Board would be exceeded between 10-25 days per year because of overflows. Limiting concentrations for toxic materials would also be exceeded a portion of the time. Overflows would continue to deposit debris on the beach and in ocean waters, although in smaller amounts than present occur.

The beneficial uses of the ocean waters affected by the overflows include recreation, aesthetic enjoyment, and preservation and enhancement of other marine resources. Studies by the Public Health Department indicate that there would be no public health hazards to recreational users of Ocean Beach. Aesthetic enjoyment could be lessened because of overflow debris; the length of time such material would remain on the beach would vary from 1 day to 2 weeks, depending on tide and wind conditions. Surveys of the marine environment indicated that few shellfish and fish species live in the surf zone and that the changing nature of this environment, combined with the intermittent nature of the overflows make it difficult to assess the impacts of overflows on marine resources.

Electrical energy consumption in the dry-weather facilities would icnrease by 73% over that predicted in the Final EIR, because wastewater from the proposed Lake Merced Transport would be added to the pump station's capacity. Diesel fuel requirements for the wet-weather facilities would decrease by about 52%, because of the reduced volume of the consolidation sewer.

Mitigation measures considered by the engineers to reduce the impacts of overflows include: 1) baffling of overflows to reduce floating debris, 2) screening overflows, 3) extending overflow outfalls, and 4) disinfecting overflows. Measures 2, 3, and 4 were rejcted, because they were not cost-effective and because their use would create additional impacts. Baffling of overflows would be incorporated into the project and could reduce floating debris by between 70% and 95%.

Alternatives to planning, designing, and constructing the project for an average of 8 overflows per year would be no project, and planning, designing, and constructing the project for an average of 1 overflow per year.

CHAPTER II
BACKGROUND

The City and County of San Francisco maintains a combined sewerage system in which the sewers transport both domestic and industrial dry-weather flows and rainwater runoff in wet weather. The existing sewerage system is large enough for dry-weather flows but has insufficient capacity to treat heavy wet-weather flows. As a result, when rainfall exceeds about 0.02 inch per hour (about 114 times a year on the Westside), the combined flows overflow the system to the near-shore waters surrounding the City.

The Federal Water Pollution Control Act Amendments of 1972 (PL 92-500) established the national goal of elimination of discharge of pollutants into navigable waters. The law established a permit program, the National Pollution Discharge Elimination System (NPDES), to assure attainment of the desired effluent quality. Locally, this program is administered by the California Regional Water Quality Control Board, San Francisco Bay Region (Regional Board). The Regional Board issues permits to assure compliance with national standards. The proposed West Side Transport/Storage Facility would be one step in San Francisco's program of compliance with Regional Board orders that incorporate Federal and State standards for discharge of pollutants and for maintenance of the environmental quality of receiving water.[1]

For more information on background and regulatory issues, please refer to the following sections of the Final EIR certified in 1977: A. The Problem; B. Regulatory Actions; and D. Environmental Review (pages 16-21). These sections remain unchanged from the certified EIR. Following are the changes to Section C. San Francisco Wastewater Management Plan.

Change in Number of Overflows

The City and County of San Francisco adopted a Master Plan for Wastewater Management in 1974 and has been implementing that plan in stages, with some portions under construction and others still under design. Since adoption of the Master Plan, San Francisco has been designing its facilities to meet Regional Water Quality Control Board orders. These orders, #76-22, #76-23, and #76-24, established in 1976 specific numbers of wet weather combined sewer overflows for the Southeast, Westside, and North Shore zones respectively.

[1]Receiving waters: Waters into which treated or untreated sewage is discharged.

These orders allowed for an average of 1 to 4 overflows Citywide but for Westside, specifically, only 1 overflow was allowed. On 16 January 1979, the City requested, and the Regional Board granted, an amendment to Order #76-23 (the Westside Zone) to allow an average of 8 wet weather combined sewage overflows per year for the Westside. On 16 March 1979, the State Water Resources Control Board granted an exemption to the Water Quality Control Plan for Ocean Waters of California (Ocean Plan) to permit the increased number of overflows.

The City petitioned the Regional Board for 8 overflows on the Westside in January for the following reasons:

"1. The State Water Resources Control Board is urging the City to award the Westside contracts as rapidly as possible. In order to proceed with advertising the control level must be established. Each month's delay causes an inflationary cost of approximately 1.5 million dollars per month.

"2. The California Coastal Commission has denied the City a required development permit based on overflow along the Great Highway in part because of concern for the size/location of the transport necessary for a 1 overflow system. Key to developing a new permit application is the selection of a final alignment for Westside facilities, for which a decision on overflow frequencies is required. Only after the alignment is established can the City proceed to obtain the Coastal Commission Permit necessary to construct the facilities.

"3. The Citizens of San Francisco have become extremely sensitive to the tremendous increases to the sewer service charge and are demanding that Wastewater quality be improved at a substantially reduced cost level than the current NPDES permit allows. The 1977 amendment to the Federal Clean Water Act parallels citizen concern on this point and underscores the need to consider cost-effectiveness of Wastewater plans."[1]

Upper Great Highway Redesign and Wave Erosion

Two other issues related to the Westside Transport/Storage project are the redesign of the Upper Great Highway and wave erosion. The following events have occurred on those two issues since certification of the EIR on 28 July 1977:

[1] San Francisco Wastewater Program, Westside Wet Weather Facilities Revised Overflow Control Study, December 1978.

September 1977	Redesign plan for the Upper Great Highway was prepared by Michael Painter and Associates
5 December 1977	Board of Supervisors approved the Redesign Plan for the Upper Great Highway by Res. No. 984-77
15 June 1978	North Central Region Coastal Commission hearing on permits for Westside Transport/Storage Project and Redesign of the Upper Great Highway. Both matters were continued in order to hear recommendations of Golden Gate National Recreation Area (GGNRA) Wave Erosion Conference
7 September 1978	GGNRA Wave Erosion Conference
28 November 1978	Regional Coastal Commission rejects permits

In December 1978, the Wastewater Program began negotiating with the State Coastal Commission staff on the content of the Westside Transport, Pump Station and Upper Great Highway Redesign permit application. The Regional Commission staff had been willing to consider the Upper Great Highway Redesign Plan in its current status, dealing with the unresolved issues of pedestrian crossings, parking spaces, and intersections by means of specific conditions in the permit. However, the State staff required that these issues be resolved before the new application was submitted. In addition, the State Commission staff required that an independent panel of urban design professionals evaluate the plan and that a new beach erosion expert be retained.

The design panel consists of one member selected by the State Coastal Commission, one by GGNRA, and one by the Wastewater Program. Dr. Cyril Galvin, selected by the State Coastal Commission as a wave erosion expert, has been retained to work directly with the Coastal Commission. To parallel the work of the design panel, the California Coastal Conservancy set up three public meetings to discuss the unresolved design issues as well as a conceptual plan for the area of the Upper Great Highway Corridor north of Fulton. These meetings were held 6 and 26 February and 8 March 1979.

Hearings on the permit application were held by the State Coastal Commission on 1 May 1979 and were continued to 5 June. Before that date, the wave erosion and design issues are expected to be resolved.

CHAPTER III
PROJECT DESCRIPTION

A. Location and Purpose

The proposed Westside Transport/Storage Facility would be located in the City and County of San Francisco, California (Figure 1, page 7). It would be constructed parallel to the Pacific Coast under the Upper Great Highway, bounded on the north by the north edge of Golden Gate Park and on the south by the San Francisco Zoological Gardens (Figure 2, page 8).

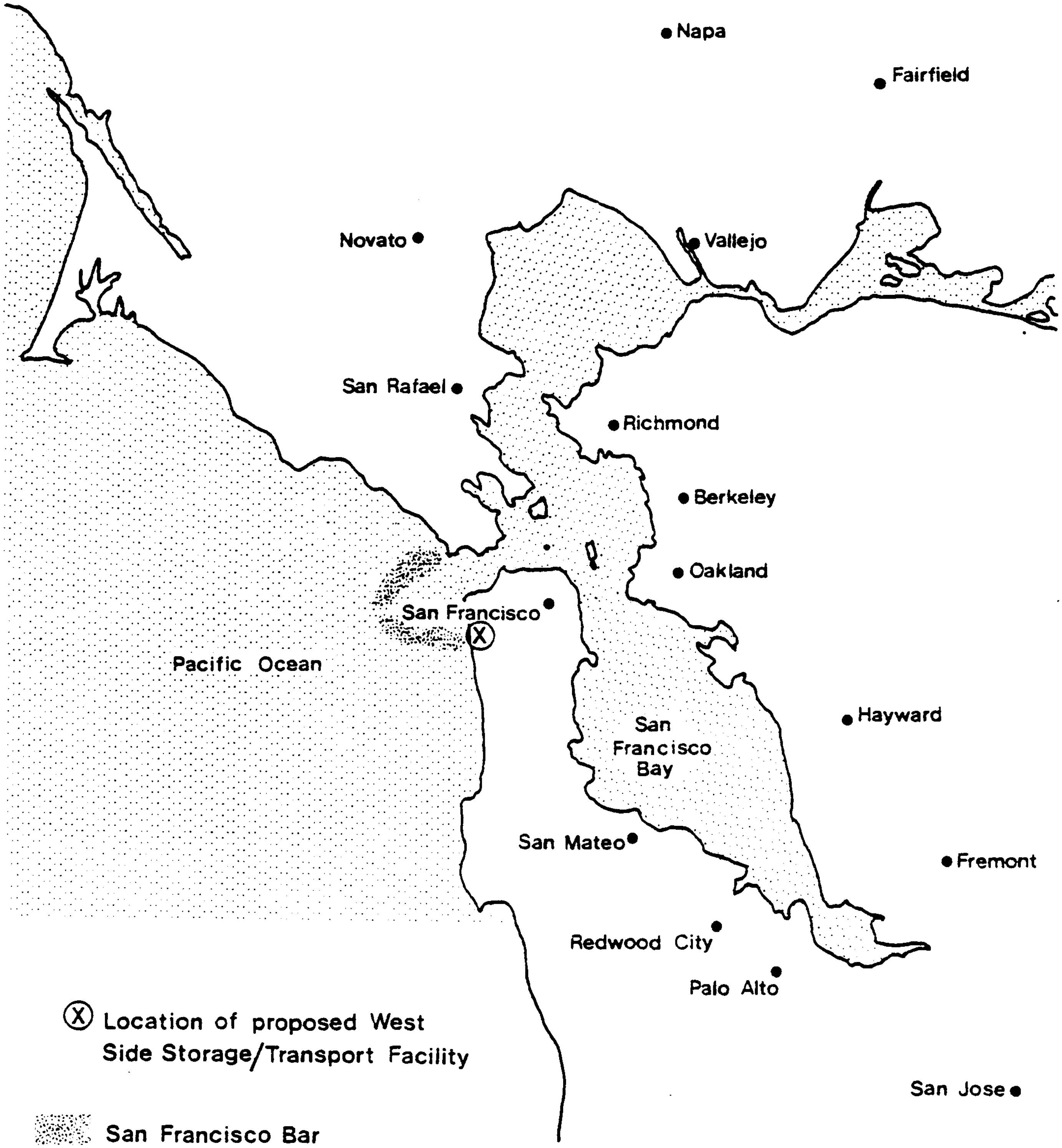
The purpose of the proposed project would be to provide storage/transport facilities that would reduce overflows of untreated wastewater to Ocean Beach from the average of 114 per year which presently occur. The Final EIR on page 23 assumed an average of 1 overflow per year. The project as now proposed would reduce overflows to an average of 8 per year instead of 1. The area served by the proposed project would include a portion of the drainage district currently served by the Richmond-Sunset Water Pollution Control Plant (see Figure 3, page 9). The other portions of the Richmond-Sunset Drainage District would be served by the proposed Richmond Transport and Lake Merced Transport. These elements of the Wastewater Master Plan will be described in future environmental analyses.

B. Project Components

1. Consolidation Sewer

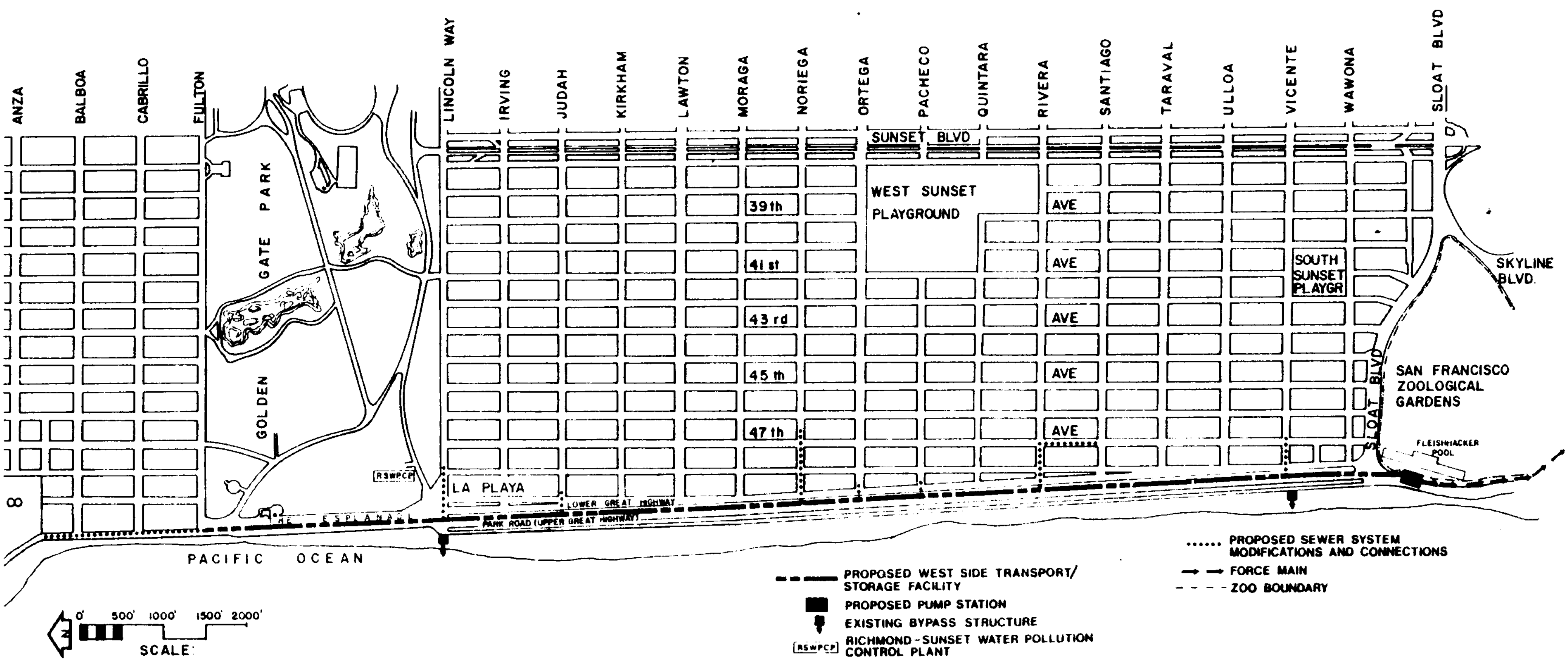
The proposed Westside Transport/Storage consolidation sewer would consist of a concrete box culvert under the Upper Great Highway from Fulton Street south to a point about 200 feet south of Sloat Boulevard, a distance of 13,300 feet. It would transport dry weather sewage flows from a portion of the Richmond-Sunset drainage basin to a pump station from which they would be pumped to the proposed Southwest Water Pollution Control Plant, south of the San Francisco Zoo. During wet weather, sewage combined with storm runoff would be stored in the consolidation sewer and pumped to the Southwest Treatment Plant as treatment capacity became available.

The increase in number of overflows allows the transport to be designed to a smaller width than was described on page 23 of the Final EIR, with the vertical depth remaining the same. The final design of the consolidation sewer would consist of a single channel of approximately 25 feet (inside width), except in the vicinity of the Lincoln and Vicente outfalls.



Regional Location Map

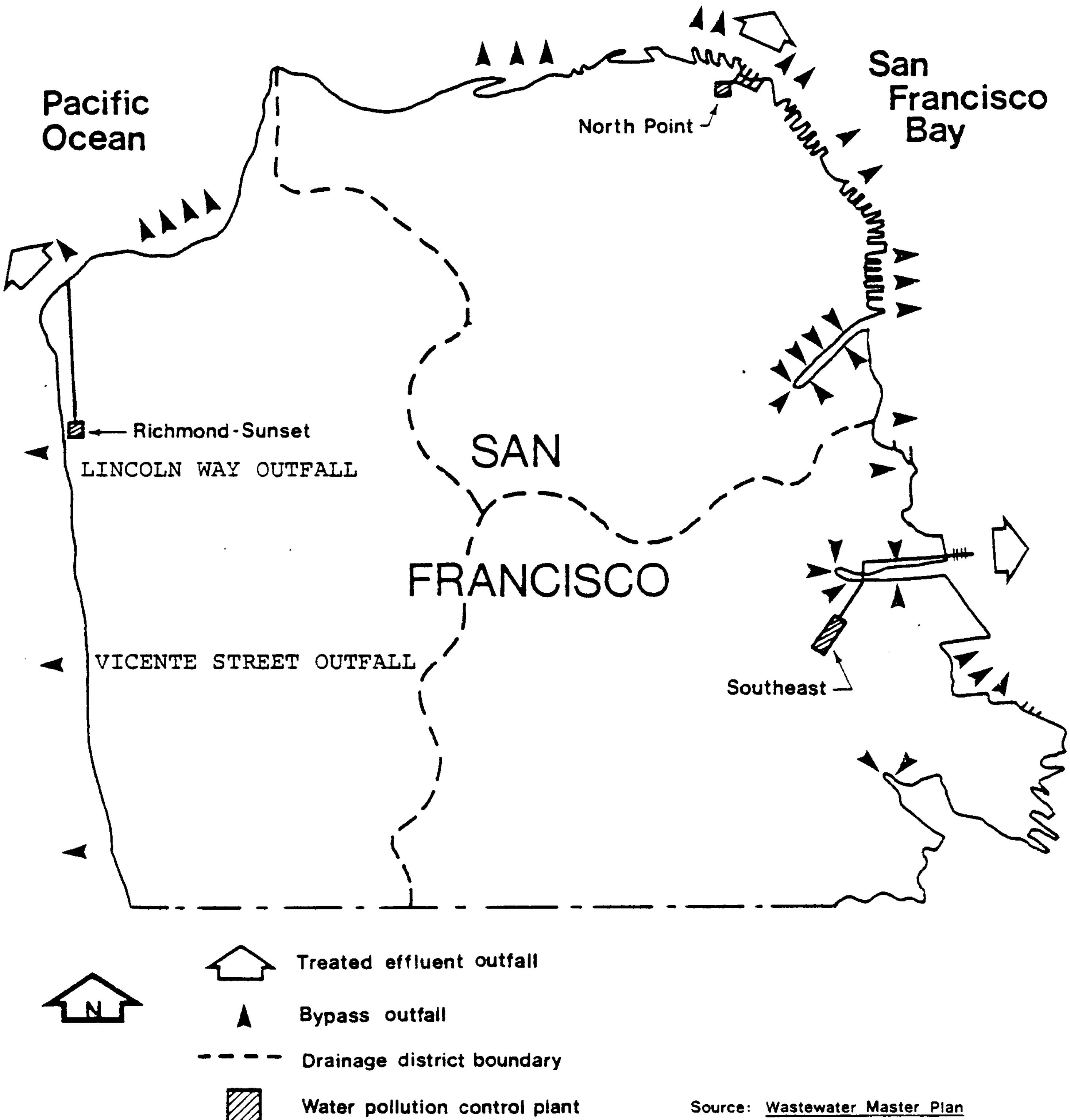
FIGURE 1



SITE OF PROPOSED PROJECT

Source: San Francisco Wastewater Management Program

FIGURE 2



Source: Wastewater Master Plan EIR/S

EXISTING TREATMENT PLANTS AND OUTFALLS

FIGURE 3

From Lincoln Way to Judah Street, approximately 1,250 feet, and from Vicente Street to Sloat Boulevard, approximately 1,200 feet, the consolidation sewer would have an inside width of approximately 50 feet.

The proposed consolidation sewer would be constructed beneath the Upper Great Highway. The alignment is not expected to change from that discussed on page 28 and shown in Figure 5b, page 27 of the Final EIR.

2. Westside Pump Station

The pump station, needed to pump both the dry weather sewage and the combined wet weather storm runoff and sewage flows from the consolidation sewer to the proposed Southwest Treatment Plant, would remain as described on pages 30 through 35 of the Final EIR. However, the peak pumping capacity of the dry weather facility would be increased from 37 million to 50 million gallons per day (mgd), due to the additional flow from the Lake Merced area. The peak pumping capacity of the wet weather facility would be decreased from 440 mgd to 240 mgd as a result of increasing the number of overflows.

3. Entry/Bypass Structures and 4. Sewer System Modifications and Improvements

The entry/bypass structures and the modifications and improvements to the existing sewer system would not change from those shown on pages 35 and 36 of the Final EIR.

C. Construction techniques and Schedule

As the consolidation sewer would be narrower, sloped trench wall construction would be possible north of Noriega Street. This technique was described in the Administrative Amendment to the Final EIR, dated 8 June 1978, found in Appendix A. The sewer south of Noriega Street would be built using one of three vertical-wall construction techniques: sheet piling, soldier beams and lagging, or slurry walls.

The Wastewater Program plans to divide the construction of the proposed project into four major construction contracts, three for the consolidation sewer and one for the pump station. The consolidation sewer contract limits would be based on different methods of construction. The pump station contract is expected to start early in 1980. The first consolidation sewer construction contract is expected to start early in 1980, with the second and third contracts starting in Spring to Summer 1980. The contracts are expected to be finished in 2 to 2½ years from start of construction.

D. Upper Great Highway Redesign

Since certification of the Final EIR, the following events have occurred regarding redesign of the Upper Great Highway.

The Wastewater Program retained Michael Painter & Associates to develop a redesign plan for the Upper Great Highway which was published in September 1977. The plan was approved by the Planning Commission, Recreation and Park Commission and Board of Supervisors. Three public workshops, hosted by the State Coastal Conservancy, were held on the plan in February and March 1979. A 3-member urban design professional panel, selected by the State Coastal Commission, Golden Gate National Recreation Area, and the Wastewater Program, also critiqued the plan. The redesign plan as it emerged after the public workshops and the design panel is shown in Figure 4, page 12. The Wastewater Program, the State Water Resources Control Board and the State Coastal Commission will decide which elements of the plan would be implemented as part of this project. That determination is expected in June 1979.

E. Project Costs and Financing

The planning, design, and construction costs of the proposed West Side Transport/Storage Project for 1 overflow were estimated at $129 million in the Final EIR, adopted July 1977. This figure was based on 1977 costs. Using mid-point of construction costs[1] for comparison, the cost of consolidation sewer and pump station for 8 overflows would be $124 million and for 1 overflow would be $163 million. A saving of $39 million would result from design and construction of the consolidation sewer and pump station for an annual average of 8 overflows instead of 1.

[1]Mid point of construction costs are determined by taking the estimated cost of a project in today's dollars and inflating them at a given rate, in this case 10% per year, to the anticipated mid-point of construction date.

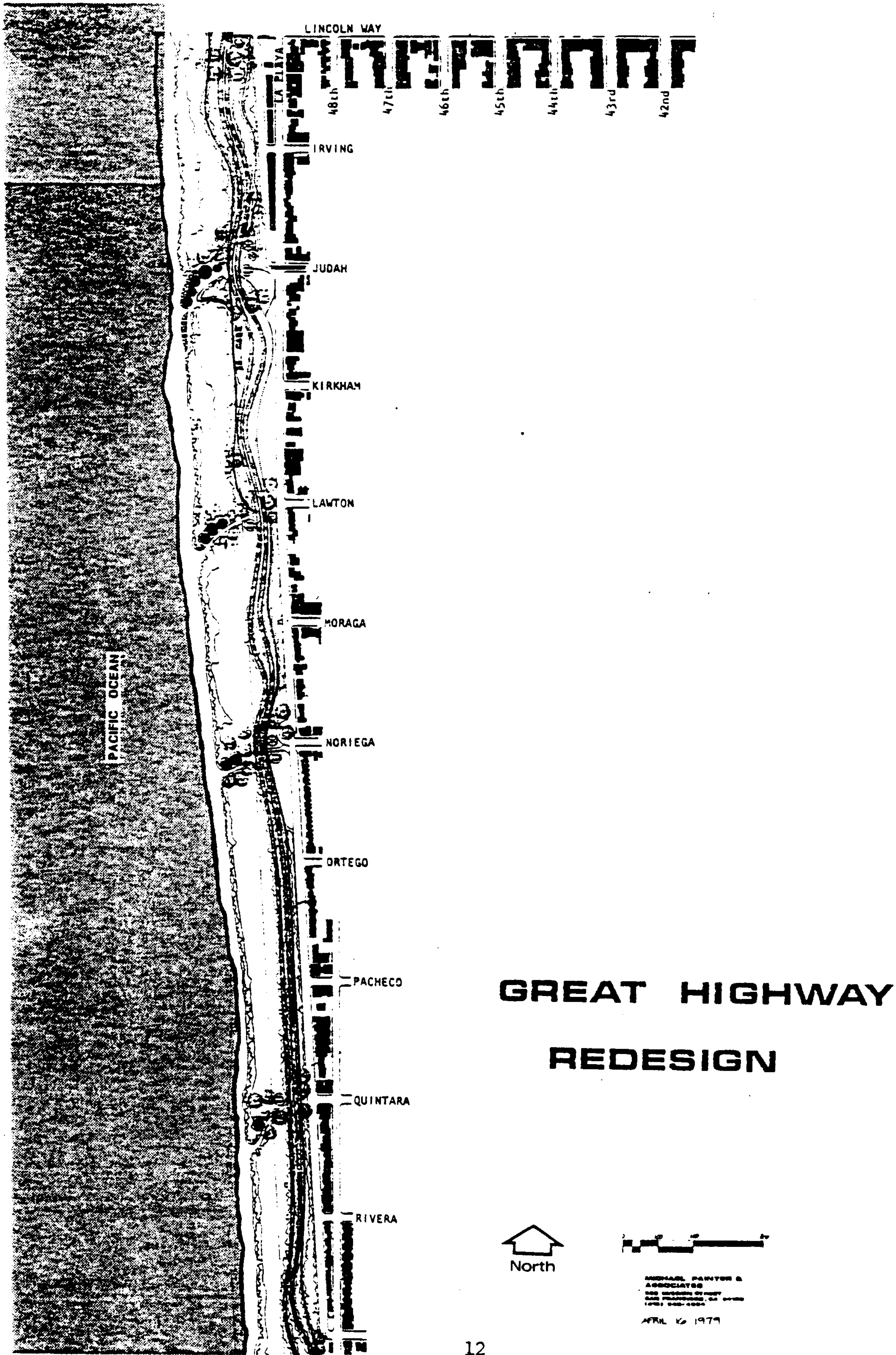
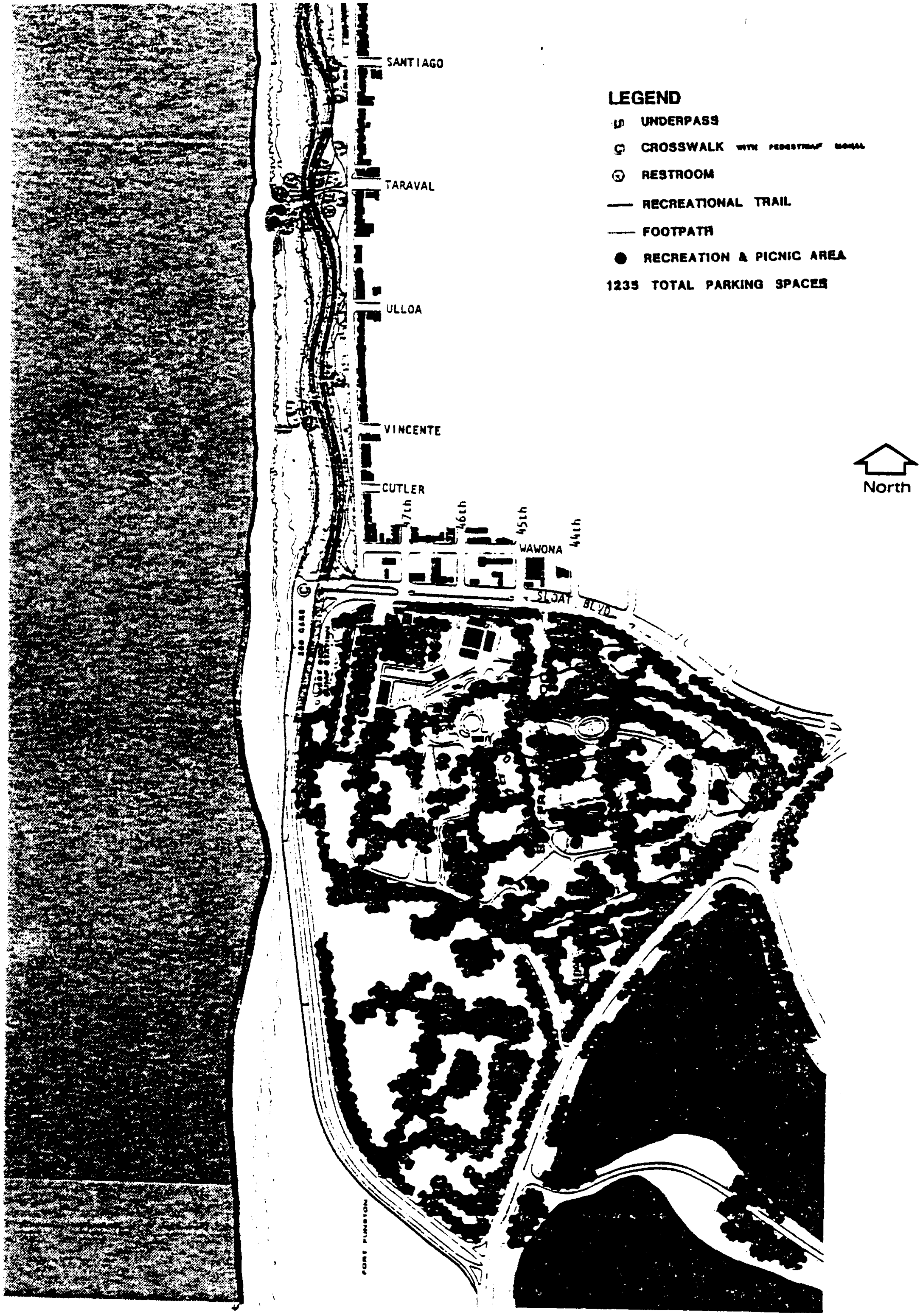

LINCOLN WAY
LA PLAYA
48th
47th
46th
45th
44th
43rd
42nd
IRVING
JUDAH
KIRKHAM
LAWTON
MORAGA
NORIEGA
ORTEGO
PACHECO
QUINTARA
RIVERA
PACIFIC OCEAN
GREAT HIGHWAY
REDESIGN
North

FIGURE 4


SANTIAGO
TARAVAL
ULLOA
VINCENTE
CUTLER
47th
46th
45th
44th
WAWONA
SLOAT BLVD
LEGEND
UNDERPASS
CROSSWALK WITH PEDESTRIAN SIGNAL
RESTROOM
RECREATIONAL TRAIL
FOOTPATH
RECREATION & PICNIC AREA
1235 TOTAL PARKING SPACES
North

CHAPTER IV
ENVIRONMENTAL SETTING

The environmental setting has not changed from that described in the Final EIR, pages 52 through 98. However, additional information has been obtained on water quality (Section E.) and marine resources (Section J. Vegetation and Wildlife). The water quality information in this document regarding the existing situation is directly related to specific impact analyses and is discussed in Chapter V. Environmental Impacts, Section A. Water Quality, page 18. The following marine resources information is an addition to Section J. Vegetation and Wildlife of the Final EIR, pages 89 through 91.

J. Marine Resources

The Lincoln and Vicente outfalls discharge sewage into the surf zone of the Ocean Beach shoreline from Fulton Street south to Fort Funston. Although the shoreline is protected somewhat from the full force of the Pacific Ocean by Point Reyes and the San Francisco Bar, it is still subject to heavy surf during storms and periods of high winds.

Because relatively little information is available on the beach areas affected by the outfalls, reconnaissance surveys[1] were made of the sandy beaches on the west side of San Francisco to determine what fauna were living in the surf zone adjacent to wet weather overflow structures. The survey consisted of taking random sand samples along the beaches in front of and on either side of the outfall structure on Ocean Beach. The outfall structures at Lincoln Way and Vicente Street were sampled on 28 December 1978. The results of the reconnaissance surveys are in Appendix B.

Only three living species were found on the beaches. These were the mole or sand crab, *Emerita analoga* (Stimpson, 1857), a nephtyid polychaete worm, *Nephtys californiensis* Hartman, 1938, and the sand dollar, *Dendraster excentricus* (Eschscholtz, 1829). The sand crab is ubiquitous and abundant all along the open coast beaches; it has no sport shellfishing value other than as bait for surf fishermen. The nephtyid worm, also considered to be very common on beaches, may also be used for bait, but it has no other sportfishing potential. The sand dollar, commonly washed up alive, lives in the surf zone, partially or completely buried in the sand; except as a

[1] Sutton, James E., *Reconnaissance Surveys of Ocean, Baker and Phelan Beaches, City and County of San Francisco, December 28-29, 1978*, 11 January 1979.

favorite find for beachcombers, it has no sport value, even as bait. It is probable that other species, such as other worms, isopods, and amphipods, are living on the beaches, but the relatively coarse mesh (¼") of the screen used may have allowed these species to escape.

Numerous other species were identified on the basis of tests, shells, and other remains. A composite list is present in Table 1, page 15. Almost all of the organisms, with the exception of the sand crab, the nephytid worm, and the razor clams, are normally found subtidally and so are not exposed at low tides. Thus, although the surf clam is present along Ocean Beach, it is not typically accessible to sport shell-fishermen. There is essentially no sport shellfishing activity along Ocean Beach.

Most of the shells which appear on Ocean Beach are washed up after the organisms die, although live specimens may be thrown up during storms. Some transport of shells from other areas also occurs, as some species found on the beaches, such as the California seamussel and the native oyster, are found only on hard substrata, not on sand.

The only hard substratum along Ocean Beach is the old intake pipe for Fleishhacker Pool, located approximately 350 meters south of the Vicente Street overflow structure. Examination indicated that it was covered by what appeared to be a typical assemblage of algae, barnacles, mussels, anemones, worm tubes, tunicates, and other hard-substratum organisms.

A class of students at San Francisco State University, under the direction of Dr. Thomas Niesen, sampled the beach and surf at Thornton State Beach on 16 February 1979. In addition to finding the organisms and shells found by Sutton they also found several additional organisms (Niesen, personal communication, 19 March 1979), as listed in Table 2, page 16. The greater number of species found may be attributed to several factors: greater collecting effort, broader coverage across the beach, and the use of finer-meshed screens. With the exception of the polychaetes, most of the additional organisms are inhabitants of the upper beach, near or above the high tide line, an area not extensively sampled in the Sutton survey.

The species lists reflect the fact that relatively few organisms are found in open coast sandy beach environments. This paucity is due primarily to the nature of the environment (unstable substratum and variations in hydraulic pressure); few organisms are adapted to survival in such conditions. Those that do live on the beaches or in the

TABLE 1

COMPREHENSIVE SPECIES LIST

ANNELIDA - POLYCHAETA

Nephtys californienses Hartman, 1938

unidentified worm tubes

MOLLUSCA - GASTROPODA

Polinices sp. (moon snail)

Nucella lamellosa (Gmelin, 1791)

Nassarius fossatus (Gould, 1850)

MOLLUSCA - BIVALVIA

Mytilus californianus Conrad, 1837 (California seamussel)

probable *Modiolus rectus* (Conrad, 1837) (straight horsemussel)

possible *Ostrea lurida* Carpenter, 1864 (native or Olympia oyster)

Clinocardium nuttallii (Conrad, 1837) (basket or heart cockle)

Spisula catilliformis Conrad, 1868 (surf clam; narrow dish clam)

Tresus sp. (horseneck or gaper clam)

possible *Siliqua lucida* (Conrad, 1837)

Siliqua patula (Dixon, 1789) (northern razor clam)

Tellina bodegensis Hinds, 1845

Tellina nuculoides (Reeve, 1854)

Macoma inquinata (Deshayes, 1855)

Protothaca tenerrima (Carpenter, 1857) (thinshelled littleneck clam)

Petricola carditoides (Conrad, 1837)

Zirfaea pilsbryi Lowe, 1931 (rough piddock)

ARTHROPODA - DECAPODA

Cancer magister Dana, 1852 (market or Dungeness crab)

unidentified hermit crabs, probably associated with *Polinices* (moon snail) shells

Blepharipoda occidentalis Randall, 1839 (spiny mole crab)

Emerita analoga (Stimpson, 1857) (sand or mole crab)

ECHINODERMATA - ECHINOIDEA

Dendraster excentricus (Eschscholtz, 1829) (sand dollar)

TABLE 2

SPECIES COLLECTED BY NIESEN AT THORNTON STATE BEACH IN ADDITION TO THOSE REPORTED BY SUTTON

ANNELIDA - POLYCHAETA (marine worms)

Euzonus dillonensis (Hartman, 1938) (bloodworm)

chaetopterid worm tubes

ARTHROPODA - PERACARIDA (beach hoppers, pill bugs, etc.)

Cirolana harfordi Lockington, 1877

Excirolana kincaidi (Hatch, 1947)

Excirolana sp.

Orchestoidea californiana (Brandt, 1851) (long-horned beach hopper)

Orchestoidea columbiana Bousfield, 1958

Orchestoidea corniculata Stout, 1913 (short-horned beach hopper)

Paraphoxus epistomus Shoemaker, 1938

Pontogeneia intermedia Gurjanova, 1938 surf zones have various adaptations for these conditions: some have very strong shells (basket or heart cockle, surf clam, etc.) while others have great burrowing speed (sand or mole crab, spiny mole crab, razor clam). Most of the species which have sport shellfishing potential, such as surf clam and rough piddock, are actually found some distance offshore, and so are not typically available to shell fishermen even at low tide.

CHAPTER V
ENVIRONMENTAL IMPACTS

The impacts described in the Final EIR, pages 102 through 128 would not change except for Section E, Energy, pages 109-113. Additional impacts on Water Quality and Marine Resources could result from the increase in number of overflows.

A. Water Quality

The impacts of wet weather overflows fall into two main areas: 1) the effects on the quality of the receiving waters *per se*; and 2) the effects on people using the receiving waters and the shore at Ocean Beach.

The proposed project would improve the quality of the receiving waters at Ocean Beach. A comparison of water quality for the existing situation of 114 overflows per year, for 8 overflows per year, and for 1 overflow per year is shown in Table 3, page 19. With 8 overflows per year, there would be an average of 32 hours per year of overflow, a 91% reduction from present levels. In volume 8 overflows represent an average of 449 million gallons per year, of which approximately 29 million gallons would be sanitary discharge and 420 million gallons would be urban runoff. The composition of the discharge would be approximately 6.5% sanitary discharge. At a level of 8 overflows per year, the Ocean Plan 10,000 MPN/100 ml coliform[1] level standard would be exceeded an average of 10 days per year, a reduction of 86% from the present condition. The Ocean Plan 1,000 MPN/100 ml coliform level limit would be exceeded 25 days per year, a reduction of 79% from the present condition. The BOD_5[2] level of 191,000 pounds per year would be an 84% reduction from the present levels. The suspended solids would average 1,890,000 pounds per year, a reduction of 84%.

[1] coliform bacteria: a heterogeneous group of bacteria, some of which normally inhabit human and animal intestinal tracts. Used as an indicator of fecal pollution of water and hence of the probability of presence of organisms causing human disease. Because the individual organisms are too small and too numerous to count, water quality standards for coliform bacteria are expressed in terms of most probable number (MPN) of coliforms per milliliter of water, which is a statistical extrapolation of laboratory culture tests.

[2] BOD: An abbreviation for biochemical oxygen demand; BOD_5 is the quantity of oxygen used in the biochemical oxidation of organic matter in a five-day period, at a specified temperature, and under specified conditions. This is a standard test used to assess water and wastewater quality.

TABLE 3

WESTSIDE

STATISTICAL SUMMARY WET-WEATHER OVERFLOWS

					CONTROL LEVELS					
		Existing			8 per year			1 per year		
Yearly Overflow Totals	Unit	Min	Ave	Max	Min	Ave	Max	Min	Ave	Max
No. of Overflows	Event	26	114	193	1	8	18	0	1	4
% Reduction			Base			93			99	
Hours of Overflow	Hour	163	372	617	2	32	78	0	3.5	18
% Reduction			Base			91			99+	
Total Wastewater	Gal.x10^6	926	2,870	5,030	15	449	1,070	0	52	265
% Reduction			Base			84			98	
Sanitary Discharge	Gal.x10^6	149	341	566	1.8	29	72	0	3.2	17
% Reduction			Base			91.5			99+	
Urban Runoff	Gal.x10^6	774	2,520	4,450	13	420	998	0	49	248
% Reduction			Base			83			98	
Composition of Discharge (% Sanitary)	%		12			6.5			6.2	
Days Receiving Water (near outfalls) coliform levels exceed;										
(1) 10,000 MPN/100ml	Days	41	70	103	2	10	23	0	1	6
% Reduction			Base			86			98.6	
(2) 1,000 MPN/100ml	Days	67	119	147	6	25	51	0	4	14
% Reduction			Base			79			96.6	
BOD_5	lbs.x10^3	394	1,220	2,140	6.4	191	460	0	22	113
% Reduction			Base			84			98	
Suspended Solids	lbs.x10^3	3,890	12,100	21,200	63.1	1,890	4,550	0	219	1,110
% Reduction			Base			84			98	

Source: San Francisco Wastewater Program, Westside Wet Weather Facilities Revised Overflow Control Study, December 1978.

The effects of wet weather overflows on people using the beach during and after overflow periods fall into three categories: 1) possible direct health hazards; 2) possible indirect health hazards; and 3) reduced aesthetic enjoyment of the beach and water area.

To obtain some estimate of winter usage of Ocean Beach, the Wastewater Program undertook a combination of spot and continuous counts of oceanside recreational activities during the first two weekends in December 1978. The results of these counts are shown in Table 4, page 21. The Ocean Beach information is shown in the fifth, sixth, and seventh columns (Fulton to Lawton, Lawton to Santiago, and Santiago to Sloat). For the Ocean Beach area (between Fulton and Sloat) the table indicates average daily winter-time use of approximately 15 swimmers, 50 surfers, 10 fishermen, 60 people wading below the waist, 15 people wading above the waist, and 910 people using the beach without coming in contact with the water. The weather during the first weekend was good (clear, sunny and calm), and the weather during the second weekend was above average (partially overcast with mild winds). Beach usage would probably be lower during storm conditions when overflows occur.

Polluted water could pose a direct health hazard to people engaging in water contact activities on Ocean Beach, if they ingest or otherwise contact disease organisms or toxic materials. However, information received from the City and County of San Francisco Public Health Department (Appendix C), based on 25 years of records, shows no clinically confirmed cases of enteric (intestinal) diseases, from either recreational contact with Bay or Ocean water or from the consumption of shellfish from these waters. Information received from the California Department of Health Services confirms this finding (Appendix E). Because the cause of particular cases of disease is often difficult to establish, a comparison was made by the City and County of San Francisco Department of Health of the reported disease rates for wet, dry and normal rainfall years (Appendix D). No disease rate-rainfall correlations were evident.

Swimming in fecally contaminated natural bodies of water is not a major factor in the transmission of enteric diseases. In 1977, the only swimming related reported outbreak of disease in the United States occurred in a swimming pool.[1] It should be pointed out that public health statistics do not reflect minor illnesses, as most people do not seek medical assistance for such illnesses, or if they do, the diagnosis is frequently not confirmed by clinical testing.

[1] Cabelli, V. J., Journal Water Pollution Control Federation, June 1978.

TABLE 4

BEACH ACTIVITY SURVEY

Estimates of Daily Winter Time Usage(1)

ACTIVITY	Baker Beach	Phelan Beach	Lands End	North of Fulton	Fulton to Lawton	Lawton to Santiago	Santiago to Sloat	Ft. Funston	Thornton Beach	TOTALS(2)
Swimming	< 5	< 10	–	< 5	< 5	<5	< 5	<5	< 5	30
Surfing	<5	< 5	–	30	10	15	25	5		90
Fishing	20	5	10	–	–	6	5	5-10	5	60
Shell Fishing	< 5	< 5	<5	–	–	–	–	–	–	10
Wading below waist	15	5	–	30	25	20	15	< 5	<5	120
Wading above waist	< 5	< 5	–	5	5	< 5	< 5	< 5	< 5	25
Non-contact usage	250	60	50	600	430	220	260	300	35	2,165

(1) San Francisco Wastewater Program, Westside Wet Weather Facilities Revised Overflow Control Study, December 1978. Figures are averages of data gathered on 4 weekend days.

(2) Fewer than 5 people counted as 2½ for total.

The public may be exposed to possible indirect health hazards if it consumes fish or shellfish contaminated by wet weather overflows. As noted above, there have been no confirmed cases in San Francisco or in the Bay Area of enteric disease resulting from such possible contamination. The sandy beaches are not typically used for shellfishing, because the edible shellfish (such as *Tresus*, *Spisula*, and *Zirfaea*: horseneck or gaper clam, surf clam and rough piddock) are generally subtidal. The occasional shellfisher observed on Ocean Beach is probably digging for *Emerita* (sand crab) for bait, or attempting to find specimens of the *Siliqua* (razor clam). However, this latter species is not common in this area (Ricketts and Calvin, 1968).

There is shorefishing or surf fishing activity along Ocean Beach. However, the temporary nature and short duration of the overflows, combined with rapid dilution of the overflow field should result in minimal effects, if any, on the fish species found in the surf zone.

All users of Ocean Beach, whether in contact with the receiving waters or not, may continue to have reduced aesthetic enjoyment of the beach and waters because of the presence of various constituents of the overflows, and their attendant odors during wet weather months. Particularly obvious would be floatable items, such as feces, toilet tissues, condoms, sanitary napkins and tampon applicators. These materials would be retained as a narrow band on the beach after the overflows occur. The length of time these solids would remain on the beach varies from perhaps less than a day to two weeks, depending on tide and wind conditions. With the existing situation of an average of 114 overflows per year on the Westside, an average of 2,870 million gallons of combined wastewater flows out the overflow structures. With an average of 8 overflows per year, an average of 449 million gallons would flow out the overflow structures. This represents an 84% reduction in amount of combined overflow. In addition, the proposed baffling system in the new storage/transport sewer could reduce the amount of such materials on the beach by 70% to 95% or more.

E. Energy

An estimated 5.7 million kwh a year of electricity would be needed to power the dry weather facilities, including pumping, ventilation and lighting. This represents a 73% increase over the energy use predicted on page 110 of the Final EIR. Pumping requirements would increase, because wastewater from the proposed Lake Merced Transport would be added to the pump station's capacity. PG&E's Substation L would be upgraded as described on page 112 of the Final EIR, with no changes expected.

The wet weather pumps would be powered with direct-drive diesel engines, as described on page 113 of the Final EIR, but the reduced volume of the consolidated sewer would reduce the necessary horsepower to 3600, a decrease of 67% from that previously estimated. For the estimated 500 hours of annual operation, the engines would require 24,200 gallons of diesel fuel (3.5 billion BTU), a reduction of about 52% from that predicted in the Final EIR.

H. Marine Resources

The wet weather overflows currently occur approximately 114 times per year. Because the Final EIR assumed an average of 1 overflow per year, the impacts on marine resources were not addressed. This section will address impacts resulting from the increase in allowable overflows from an average of 1 per year to an average of 8 per year. Impacts on marine resources could be either 1) acute toxic effects or 2) chronic, long-term effects. The acute toxic effects can be determined by testing; however, the chronic or long-term effects are difficult if not impossible to determine.

1. The acute toxic effects are measured primarily by standard 96-hour bioassay tests. Data from samples taken during three overflows in January and February 1979 (Appendix F) show high levels of survival in every sample (90% or greater). Likewise, tests on effluent from Lincoln Way and Baker Beach during a storm on 7-8 January 1979 resulted in 100% survival in every sample (Appendix G).

   Tests by Brown and Caldwell[1] on adult and immature sand crabs collected from Ocean Beach indicate that it is susceptible to concentrated sewage, but that in dilute solutions, such as 50:1 or 100:1, its survival rate is about the same as in the controls. The sewage used in these tests was a composite City sample of dry weather flow; thus the sewage is not totally representative of the type of overflow with which the crab would come in contact during a wet weather overflow, both in terms of composition and dilution. However, the results suggest that the sand crab would not be adversely affected by the brief exposures typical of wet weather overflows.

2. The chronic or long-term effects of the overflows, if any, are difficult, if not impossible, to determine for several reasons. One difficulty is sampling the environment to assess possible changes. The beach area, and particularly the surf zone (the area most affected by the overflows), is a hostile environment for organisms. It

[1]Brown and Caldwell Consulting Engineers, <u>A Predesign Report on Marine Waste Disposal</u>, Volume II, Data Supplement, 1971.

is characterized by an unstable substratum and by variations in hydraulic pressure. Relatively few organisms, notably razor clams, mole crabs and a few polychaete worms, are adapted to this zone. Quantitative sampling of these organisms is complicated by their burrowing habits, their mobility, and by the instability of the substratum.

A second difficulty is establishing direct links between wet weather overflows and effects on the environment. Certain amounts of dilute sewage, organic compounds, heavy metals, and other substances are introduced into the environment by the overflows. While levels of metals or other materials in beach organisms may be monitored and changes could be observed, it would probably not be possible to relate those levels directly and exclusively to the overflows, because the overflows are random and transitory events (8 overflows would average a total of approximately 31 hours per year).

A complicating factor is that the ocean beaches are contacted by waters flowing out of San Francisco Bay. Thus, the organisms may be exposed to substances carried in these waters in addition to anything entering from the beaches or from other points along the coast. The organisms do not exist in an environment which is affected only by the wet weather overflows from the west side of San Francisco. In this context, determining the chronic effects of wet weather overflows would be a complex undertaking. At present the most practical measurement is determining the total amount of toxic substances which are being introduced into the environment.

Table 5, page 25, shows concentration levels of toxic materials found in combined sewage and stormwater flows for the Westside and limiting concentration levels for toxic materials.

The first column shows the limiting concentrations found in Table B, Toxic Materials Limitations, of the Ocean Plan.[1] In the second column are the levels of concentrations found in combined sewage and storm runoff flowing into the Richmond-Sunset Treatment Plant. On 17 March 1979, samples of the influent were taken every hour for 24 hours. These 24 samples were mixed together and then analyzed. The Report of Analyses for these samples is shown in Appendix H . In the third column are

TABLE 5.

Levels of Concentrations for Toxic Materials
(mg/1)

	Limiting Concentrations[1]		Level of Concentration from Wet Weather Influent at R-S Plant[2]	Level of Concentration from overflow through Lincoln Way Outfall[3]
	Daily Maximum	Instantaneous Maximum		
Arsenic	0.032	0.08	<.005	
Cadmium	0.012	0.03	<.004	<.001
Chromium	0.008	0.02	0.010	
Copper	0.020	0.05	0.115	
Lead	0.032	0.08	0.183	0.181
Mercury	0.00056	0.0014	<.001	0.0017
Nickel	0.08	0.2	0.070	
Silver	0.0018	0.0045	0.025	
Zinc	0.08	0.2	0.300	
Cyanide	0.02	0.05	<.004	
Phenol	0.12	0.3		
Chlorine	0.002	-		
Ammonia	0.6	6.0		
Chlorinated Pesticides & PCB's	0.002	0.006	Not Detectable	.0001

[1]State Water Resources Control Bd., Water Quality Control Plan, Ocean Waters of Calif., 1978

[2]Samples of wet weather flows into Richmond-Sunset Treatment Plan every hour for 24 hrs.

[3]Samples taken of wet weather overflow from Lincoln Way Outfall.

the levels of concentrations found in samples taken from Lincoln Way outfall. On 30 January 1979, 13 February 1979, and 20 February 1979, samples were taken of the overflow at 11 locations in and near the outfall. The samples were taken approximately 1-2 hours after the overflow started and were analyzed for lead, mercury, cadmium, total identifiable chlorinated hydrocarbons, and PCB's (poly chlorinated biphenols). The levels shown in column 3 are maximum levels found in the samples and should be compared to the instantaneous maximum limiting concentrations in column 1.

[1]State Water Resources Control Board, <u>Water Quality Control Plan, Ocean Waters of California</u>, 1978.

CHAPTER VI
MITIGATION MEASURES PROPOSED TO MINIMIZE
THE IMPACT OF THE PROPOSED PROJECT

The mitigation measures described in Chapter VI, Sections A through P, pages 129-144A, of the Final EIR, as modified by the 8 June 1978 Administrative Amendment, would be unchanged. No measures were proposed for impacts on water quality, because only 1 overflow was permitted at that time. However, due to the increase in the number of permissible overflows (8), measures would be needed to mitigate the impacts of overflows on recreational use of receiving waters.

Mitigation of Water Quality Impacts

Four possible mitigation measures are: 1) baffling of overflows to reduce floatables; 2) screening overflows; 3) extending overflow outfalls; and 4) disinfecting overflows. The mitigation measure being incorporated into the project is baffling overflows to reduce floatables. Measures 2, 3 and 4 have been rejected.

Baffling

Solid materials in combined sewer flows that could degrade the appearance of beaches if washed ashore include: rags, fecal material, toilet tissue, paper towels, tampon applicators, sanitary napkins, condoms, dead rats, candy and cigarette wrappers, and cigarette filter tips. In addition to these coarse solids, combined sewage flows can contain a considerable quantity of natural vegetable material, including leaves and twigs. Much of this material may float to the surface in the consolidation structure and could be trapped by a suspended baffle extending several feet below the water surface. Figure 5, page 28, shows a representative baffle layout.

In October 1978, Hydro Research Science, a consultant to the Wastewater Program, ran a series of physical model tests to evaluate the feasibility of baffling. These tests indicated that a well-designed baffling system could result in a 70% to 95% or more reduction in discharged floatables. Costs to install the baffle walls would run about $500,000.00 for the two baffle walls. This mitigation measure would be implemented at the Lincoln and Vicente outfalls.

Screening

Because non-floatable sewage solids could flow under a baffle, the feasibility of several screening methods was evaluated. Fine-mesh screens were rejected from further consideration because of high costs (over $10 million),

REPRESENTATIVE BAFFLE LAYOUT

NO SCALE

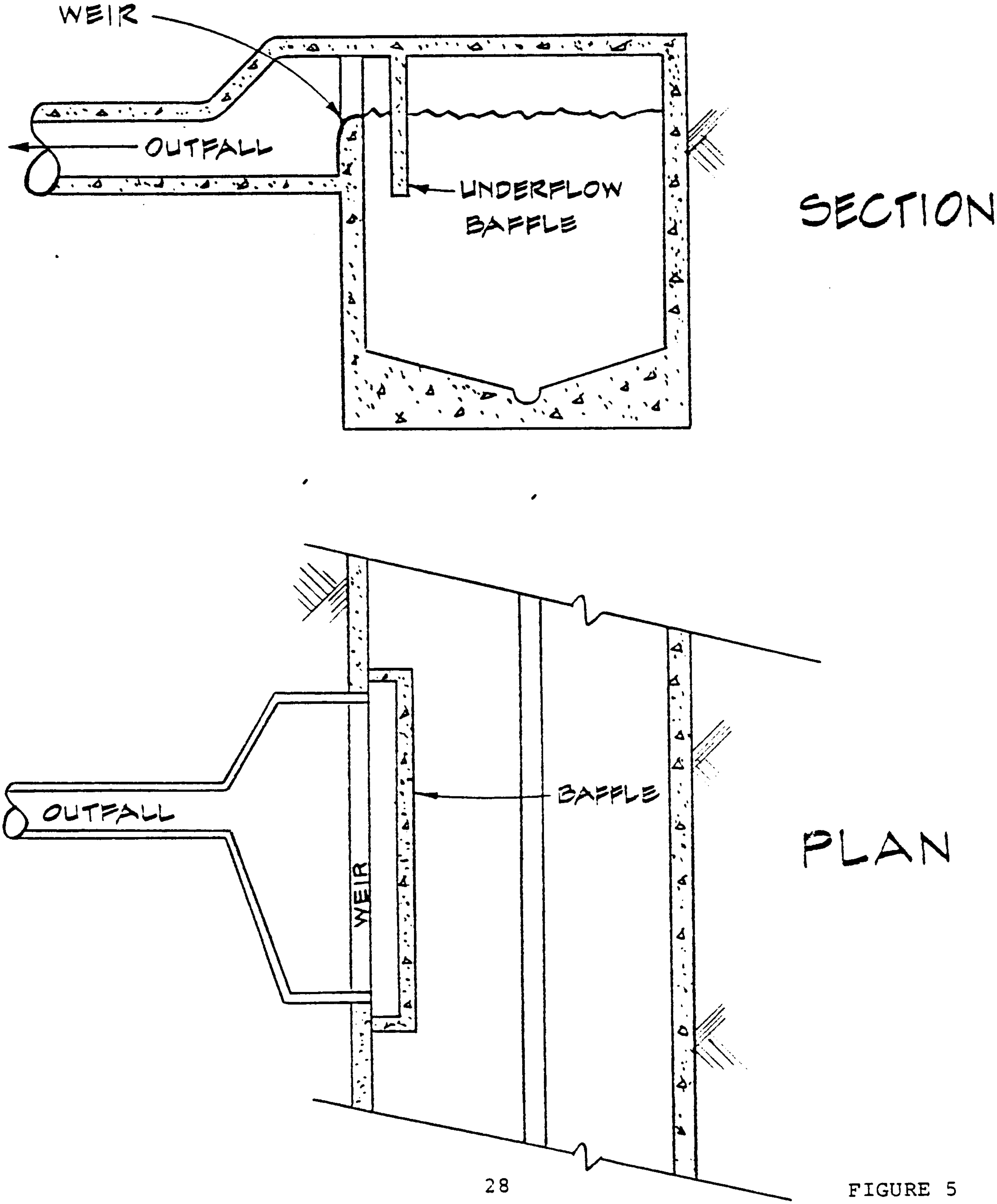


FIGURE 5

creation of flow resistance, and uncertainties about operational reliability under intermittent operations. Mechanically cleaned treatment plant bar racks were rejected because of expense (over $1 million), uncertain operation, and vertical clearance problems under streets or beach areas. (These racks would require a drive mechanism 15-feet high, and there is not enough cover over the outfalls to accommodate the machinery.) Coarse racks with spacing greater than 1 inch would probably have minimal potential for clogging, but they would trap less than 10% of sewage solids. Racks fine enough to trap a greater percentage of solids (those between 5/16 and 5/8 inch in size) may be prone to clogging with a resultant loss in speed and force of flow and the potential for upstream basement flooding. City engineers question whether the benefits derived would offset the costs and potential for flooding.

Because of this concern for flooding, the decision on screening would be deferred until the project was completed and the baffling's effectiveness could be evaluated. If the flow still contained substantial quantities of sewage solids, then the outfalls could be retrofitted with bar racks of various sizes for evaluation.

Extended Outfalls

The Wastewater Program requested that a consultant (Parsons-Brinckerhoff-Quade-Douglas) prepare a feasibility study of extended outfalls (May 1978) for the Ocean Beach area. The consultant assumed a flow of 1,100 cubic feet per second (CFS), the rate estimated to approximate the one-year peak hourly overflow in the Westside system. The study reached the following conclusions:

1. The Lincoln Way site would appear to be a better location than the Vicente Street site for an outfall between 1,000-5,000 feet in length. At the Lincoln Way site, the water depth is greater, permitting more dilution; and there is less wave energy, because of more protection afforded by the San Francisco Bar.

2. The 3,000-foot long outfall would be a better length than a 1,000 or 5,000-foot long outfall. At 1,000 feet from shore there would be more potential for ocean bottom shifts, and the closer proximity to land makes it more probable that the wastefield would return to the beach. A 5,000-foot long outfall would be larger and costlier than a 3,000-foot long one, but would not sufficiently improve dilution or lessen the chances of the wastefield returning to shore enough to compensate for the increased size and cost.

3. Gravity flow could be obtained in an outfall system consisting of:

   - o A single conduit 15 feet in diameter or a double pipe, each section 11 feet in diameter;
   - o A 660-foot long diffuser perpendicular to the predominant current;
   - o 4 vertical supply pipes (risers) 8 feet in diameter; and
   - o 32 ports, each 2 feet in diameter (8 ports per riser).

4. An average initial dilution of 10.1 could be obtained, as required by the RWQCB Order #76-23, amended 16 January 1979.

5. The plume may surface or remain submerged, depending upon the stratification in the receiving water.

6. The wastefield would have a probability of between 0.5-1.0% of reaching shore in the first 24 hours after discharge.

7. The construction, operation and maintenance of the intermittent flowing outfall would be difficult, because any site this close to shore is subject to problems of bottom movement, sediment suspension and wave action.

   Design and construction costs for this proposal are an estimated $36,000,000. Operation and maintenance costs are unpredictable but could be considerable, as underwater maintenance problems would occur and underwater maintenance work would be expensive.

Disinfection

The feasibility of disinfection was evaluated in two alternative proposals: 1) constructing contact basins separate from the Westside Transport and 2) using the Westside Transport structure itself as the contact chamber. The first alternative, separate basins, would need to be at least one-half the volume of the Westside Transport (2 million cubic feet) to achieve the desired 30-minute contact time. About 4 acres of surface land would be necessary to accommodate the basins.

Evaluating the second alternative (using the Westside Transport itself) requires the following assumptions:

1. The volume of water to be treated ranges from 0 to 700 MGD (1 year overflow rate) and is totally dependent on the weather.

2. The City is committed to using liquid sodium hypochlorite for disinfection until a more cost effective alternative is developed during ongoing studies.

3. The wet weather disinfectant demand is variable and nearly impossible to predict in advance.

4. Dechlorination by sodium bisulfite would be necessary to eliminate the toxic effects of chlorination on marine organisms.

5. Thirty minute contact time is necessary for effective disinfection.

6. A central chemical storage site is used.

Disinfecting wastewater discharges properly is complicated because there are no reliable means for predicting the quantity requirements of the selected disinfectant.[1] In the case of Westside wet weather discharges, complications to be overcome include:

1. Disinfection chemicals would need to be on hand at all times to treat the "worst case incident;" this would require year-round storage of about 25,000 gallons of disinfectant. Sodium hypochlorite deteriorates with time, reducing its effectiveness, and it is not always commercially available on short term demand.

2. Disinfection dosage is usually controlled by wastewater flowrate, and demand is determined by periodic analysis. In the case of an overflow, demand could not be quickly determined, because the composition not the flow route of the overflow would determine the demand, and analyzing the various overflow components would take time. Consequently, overdoses or underdoses could occur due to improper control. Both situations would incur undesirable results: underdosing would mean inadequate disinfection and overdosing would mean release of toxic substances to the aquatic environment.

3. Dechlorination facilities are subject to similar problems of flow measurement as are chlorination facilities. If there were not rapid and accurate measurement of flow, it would be difficult to assess the needed disinfectant dosage, thereby negating the intended purpose, i.e., eliminating the chlorine residual.

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[1] San Francisco Wastewater Program, Westside Wet Weather Facilities Revised Overflow Control Study, December 1978.

4. The cost of chlorination and dechlorination chemicals is high and, if they are not applied efficiently, would result in wasteful practice.

5. Large quantities of chemicals cannot be stockpiled, as they deteriorate in about 2 weeks. Consequently, frequent replenishment would be required, necessitating numerous truck deliveries (about 6 trucks for each delivery).

6. On a theoretical basis, the volume of the Westside Transport would be sufficient to provide a 59-minute contact time for the 1-year design flow. However, the transport storage system is designed to allow gravity flow of sewage and stormwater, not to act as an efficient contact basin. Considerable "short-circuiting" (a portion of the flow would not remain in the basin but move on through) would occur due to multiple inflow and outflow points. Baffling could be installed to lessen this problem; but short-circuiting would still occur, and some portion of the flow would not receive adequate contact time and, hence, adequate disinfection.

7. The most practical way to inject the disinfectant would be in the influent sewers several hundred feet upstream of the consolidation structure. As there are 6 major influent sewers distributed along an 8-mile length of the total Westside system, at least 8 miles of piping from a central disinfectant distribution station would be required. The alternative of storing the disinfectant near the influent sewers was considered unacceptable because of the security systems necessary to prevent spills of this hazardous chemical.

Because of the uncertainties about the performance of this system and the numerous operational complexities, the Wastewater Program concluded that disinfection would not be a viable mitigation measure.

CHAPTER VIII
ALTERNATIVES

The alternatives described in Chapter VIII, Alternatives, pages 147-173 of the Final EIR, remain essentially as described. Specific design for the reconstruction of the Upper Great Highway has not yet been finalized.

Alternative locations for the sewer remain as described except that the newly proposed B-level control (8 overflows) sewer could now be designed to physically fit under 42nd Avenue or the Lower Great Highway. The construction effects on residents described in the Final EIR on pages 166a-167 would remain, including traffic rerouting and temporary elimination of parking in front of residences during construction. As noted on page 166a of the Final EIR, a tunnel would be needed through Golden Gate Park for the 42nd Avenue alignment. For both alternatives construction of retention basins and pump stations would still be necessary on the Upper or Lower Great Highway. If the sewer were to go under 42nd Avenue or the Lower Great Highway, it would need to be redesigned to be narrower (less than 25 feet) and deeper in order for the construction activities to remain in the street and sidewalk areas. This redesign effort could take up to one additional year, with related cost increases due to inflation.

No Project

This alternative was discussed on page 173 of the Final EIR. If the no-project alternative were implemented, there would be continued violations of waste discharge requirements and water quality objectives of the California Regional Water Quality Control Board, San Francisco Bay Region, the State Water Resources Control Board, and the Federal Environmental Protection Agency.

1 Overflow

The Final EIR certified in July 1977 assumed an average of 1 overflow per year for design and construction of the West Side Transport/Storage project.

CHAPTER XII

ENVIRONMENTAL IMPACT REPORT AMENDMENT AUTHORS AND CONSULTANTS

<u>Draft EIR Author</u>

San Francisco Department of City Planning
Office of Environmental Review
45 Hyde Street
San Francisco, CA 94102
Environmental Review Officer: Dr. Selina Bendix
Assistant Environmental Review Officer: Barbara Sahm
(415) 552-1134

<u>Preliminary Draft EIR Amendment Authors</u>

San Francisco Wastewater Program
150 Hayes Street
San Francisco, CA 94101
Environmental Analyst: Carol Thompson
(415) 431-9430

James E. Sutton
Consultant in Marine Biology
1839 Ninth Street
Alameda, CA 94501
(415) 521-7675

ORGANIZATIONS AND PERSONS CONSULTED

Agency, Person, and Title	Subject
San Francisco Wastewater Program	
Daniel Champeau	Design & Construction
Anthony Rando	Pump Station Design
Vitaly Trojan	Financing
Mohindo Khonna	Influent Analysis
David Jones	Project Design

CHAPTER XIII
DISTRIBUTION LIST

FEDERAL

Department of Health,
Education, and Welfare
Region IX
50 V. N. Plaza
San Francisco, CA 94102
Attn: ORD, Environmental
Director

Army Corps of Engineers
South Pacific Division
630 Sansome Street
San Francsico, CA 94111

Army Corps of Engineers
San Francisco District
211 Main Street
San Francisco, CA 94105

Department of the Army
Coastal Engineering Research
Center
Kingman Building
Fort Belvoir, VA 22060
Attn: J. Richard Weggel

National Marine Fisheries
Service, Southwest Region
300 South Ferry
Terminal Island, CA 90731

Office of Oceanographer of
the Navy
The Madison Building
732 N. Washington Street
Alexandria, VA 22314

Environmental Protection Agency
Region IX
100 California Street
San Francisco, CA 94111
Attn: Harry Seraydarian
Project Officer

National Park Service
Golden Gate National
Recreation Area
Fort Mason
San Francisco, CA 94123
Attn: Lynn Thompson

U. S. Coast Guard
12th Coast Guard District
630 Sansome Street
San Francisco, CA 94111

STATE

State Water Resources Control
Board
1416 Ninth Street
Sacramento, CA 95814
Attn: Robin Reynolds
Ray Von Dohren

State Office of Intergovernmental
Management
State Clearinghouse
1400 Tenth Street
Sacramento, CA 95814

Department of Transportation
(CALTRANS)
District 4
150 Oak Street
San Francisco, CA 94102
Attn: R. C. Harrison, Associate
Transportation Engineer

California Coastal Commission
631 Howard Street
San Francisco, CA 94105
Attn: Don Neuwirth

State Lands Division
1807 - 13th Street
Sacramento, CA 95814
Attn: R. G. Horn

Air Resources Board
Evaluation and Planning
1709 - 11th Street
Sacramento, CA 95814
Attn: William Lockett

State Attorney General's Office
6000 State Building
350 McAllister Street
San Francisco, CA 94102

History Preservation Section
Department of Parks
and Recreation
Resources Agency
P. O. Box 2390
Sacramento, CA 95811

Department of Fish and Game
2201 Garden Road
Monterey, CA 93940
Attn: Mike Martin

Department of Public Health
2151 Berkeley Way
Berkeley, CA 94704
Attn: Arnold Greenberg, Chief
Bio-Environmental
Laboratory

Department of Navigation and
Ocean Development
1629 "S" Street
Sacramento, CA 95814
Attn: John Habel

REGIONAL

Regional Water Quality
Control Board
San Francisco Region
1111 Jackson Street, Room 6040
Oakland, CA 94607
Attn: Donald Dalke

Bay Area Air Pollution
Control Board
939 Ellis Street
San Francsico, CA 94109
Attn: Ralph Meade

North Central Coast
Regional Commission
1050 Northgate Drive, Suite 130
San Rafael, CA 94903
Attn: Steve Scholl

Association of Bay Area
Governments
Hotel Claremont
Berkeley, CA 94705

San Francisco Bay Conservation
and Development Commission
30 Van Ness Avenue
San Francisco, CA 94102
Attn: Kent Watson

SAN FRANCISCO

Public Utilities Commission
287 City Hall
San Francisco, CA 94102
Attn: James J. Finn,
Director of Transportation

Committee for Utility Liaison
on Construction and Other
Projects (CULCOP)
%GES - Utility Liaison
363 City Hall
San Francisco, CA 94102
Attn: Herman Beneke

San Francisco Water Department
287 City Hall
San Francisco, CA 94102
Attn: Eugene Kelleher
General Manager

San Francisco Fire Department
260 Golden Gate Avenue
San Francisco, CA 94102
Attn: Gilbert Bendix
Superintendent of
Water Supply and Engineering

San Francisco Recreation and
Park Commission
McLaren Lodge - Golden Gate Park
San Francisco, CA 94117
Attn: Thomas Malloy
Executive Assistant
to General Manager

Bureau of Engineering
260 City Hall
San Francisco, CA 94102
Attn: Don Birrer
City Engineer

San Francisco Real
Estate Department
450 McAllister Street
San Francisco, CA 94102
Attn: Wallace Wortman
Director of Property

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University Library
Government Documents Department
1600 Holloway Avenue
San Francisco, CA 94132
Attn: Helene Whitson

Hastings College of the Law -
Library
198 McAllister Street
San Francisco, CA 94102

Government Documents Section
Stanford University
Stanford, CA 93063

Library
A. P. Giannini Junior
High School
39th Avenue and Ortega Street
San Francisco, CA 94122

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Abraham Lincoln High School
2162 - 24th Avenue
San Francisco, CA 94116

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Lowell High School
1101 Eucalyptus Drive
San Francisco, CA 94132

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450 - 30th Avenue
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San Francisco, CA 94121

Library
Aptos Junior High School
105 Aptos Avenue
San Francisco, CA 94127

Library
Lick-Wilmerding High School
755 Ocean Avenue
San Francisco, CA 94112

CITIZENS ADVISORY COMMITTEE ON
WASTEWATER MANAGEMENT

Mr. Allen Mitchum
570 El Camino Del Mar
San Francisco, CA 94121

Mr. Harold Madison
1250 Shafter Avenue
San Francisco, CA 94124

Mr. George Tainter
4145 Ocean Avenue
San Francisco, CA 94132

Mr. Orvell R. Wilson, Sr.
112 Carona Street
San Francsico, CA 94127

General Paul D. Berrigan
2366 Leavenworth Street
San Francisco, CA 94133

Mr. Bernard Speckman
3068 - 16th Street
San Francisco, CA 94103

Shari Mann
1910 Great Highway
San Francisco, CA 94116

Ms. Marguerite Warren
1746 - 32nd Avenue
San Francisco, CA 94122

American Society of Civil
Engineers
171 Second Street
San Francisco, CA 94105

Mrs. Ethyl Garlington
3 Maddux Avenue
San Francisco, CA 94124

Mrs. Ann Fogelberg
2980 Vallejo
San Francisco, CA 94123

Ms. Ruth Gravanis
74 Mizpah Street
San Francisco, CA 94131

Mr. Gregory Hurst
Chamber of Commerce
465 California Street
San Francisco, CA 94104

Mr. George O. Gates
2594 Great Highway
San Francisco, CA 94116

Mrs. Jane Nurre
779 - 38th Avenue
San Francisco, CA 94121

Mr. Roy Scola
1735 Beach Street
San Francisco, CA 94123

Mr. Henry Jefferson
27 Williar Avenue
San Francisco, CA 94112

Mr. N. Arden Danekas
1327 Cabrillo Street
San Francisco, CA 94118

Mr. Stephen Ziman
2020 Kirkham Street
San Francisco, CA 94122

Mr. Bruce Miller
19th Floor
One Maritime Plaza
San Francisco, CA 94111

Mr. Robert Bacci
5844 Geary Boulevard
San Francisco, CA 94121

Ms. Lynn Breger
3755 Fillmore Street
San Francisco, CA 94123

Mr. John Stark
2595 Washington Street
San Francisco, CA 94115

Save San Francisco Bay Assoc.
P. O. Box 925
Berkeley, CA 94701

Mr. James Walsh, Jr.
2662 - 40th Avenue
San Francisco, CA 94116

Mr. Hugh Douglas
2168 Baker Street
San Francisco, CA 94115

Association of S. F. Junior
Chamber of Commerce and Industry
Mr. Allen J. P. Gehrig, Jr.
251 Kearny Street, Suite 205
San Francisco, CA 94108

GROUPS AND INDIVIDUALS

San Francisco Tomorrow
728 Montgomery Street
San Francisco, CA 94111
Attn: Susan Smith

Sierra Club
San Francisco Bay Chapter
Steve Ziman
2020 Kirkham
San Francisco, CA 94122

Friends of the Earth
529 Commercial Street
San Francisco, CA 94111
Attn: Connie Parrish

Oceanic Society
San Francisco Bay Chapter
Fort Mason, Building 240
San Francisco, CA 94123
Attn: Dr. Michael Herz

Jeff Gabe
Citizens for a Better Environment
88 First Street #600
San Francisco, CA 94117

David Fogarty
Save S.F. Bay Assn.
P.O. Box 925
Berkeley, CA 94701

James G. Fussell
South End Rowing Club
350 Sutter Street
San Francisco, CA

Human Rights Commission
1095 Market Street, Room 501
San Francisco, CA 94103

San Francisco Mechants and
Industry Association, Inc.
P.O. Box 24211
San Francisco, CA 94124

Heritage Foundation
2007 Franklin Street
San Francisco, CA 94109
Attn: Robert Berner

San Francisco Zoological
Society
Zoo Road and Skyline Boulevard
San Francisco, CA 94132
Attn: Margaret Burks
Executive Director

Great Highway Neighborhood
Association
1910 Great HIghway
San Francisco, CA 94116
Attn: Shari Mann

Outer Sunset Action Committee
4120 Irving Street
San Francisco, CA 94122
Attn: Ken Brien

SPEAK
2159 - 42nd Avenue
San Francisco, CA 94116
Attn: Evelyn Wilson

Tides End Community
Association (TEKA)
4733 Lincoln Way
San Francisco, CA 94122
Attn: Frances Larkin

Irving Street Merchants
Association
2161 Irving Street
San Francisco, CA 94122
Attn: Ms. Carol Spencer
President

Parkside District Improvement
Club
2187 - 40th Avenue
San Francisco, CA 94122
Attn: Mrs. Mary Marquering
President

Sunset Community Improvement
Club, Inc.
1883 - 23rd Avenue
San Francisco, CA 94122
Attn: Mr. Harry G. Ritter
President

Taraval-Parkside Merchants
Association
2017 Taraval Street
San Francisco, CA 94116
Attn: Bill Slissman
President

Judah Street Merchants and
Property Owners Association
2320 Judah Street
San Francisco, CA 94122
Attn: H. P. Wright
President

Noriega Merchants Association
2533 Noriega Street
San Francisco, CA 94122
Attn: Larry Mao
President

Ocean View-Merced Heights-
Ingleside (OMI) Community
Association
141 Thrift Street
San Francisco, CA 94127
Attn: Mr. I. T. Bookman
President

Sunset Community Education
Center
A. P. Giannini Junior High
School
3151 Ortega Street
San Francisco, CA 94122
Attn: Ed Gendeson

Coalition for San Francisco
Neighborhoods
P.O. Box 5882
San Francisco, CA 94101
Attn: Barbara Martin

San Francisco Horsemen's
Association
2721 Oakmont Drive
San Bruno, CA 94066
Attn: Dawn Bridgeman
Corresponding Secretary

San Francisco Bicycle Coalition
1405 - 7th Avenue
San Francisco, CA 94122

People of GGNRA
3627 Clement Street
San Francisco, CA 94121
Attn: Amy Meyer

Esherick, Homsey, Dodge and
Davis
2789 25th Street
San Francisco, CA

Dr. Joel Hedgpeth
5660 Montecito Avenue
Santa Rosa, CA 95404

Gloria Eberling
1992 Great Highway
San Francisco, CA 94116

Environmental Science
Associates
1291 East Hillsdale Boulevard
Foster City, CA 94404

John Ladd
Hotel Employees Association of
San Francisco
1 Post Street, Suite 3400
San Francisco, CA 94104

C. Douglas
Deslon
P. O. Box 8666
Emeryville, CA 94662

Loring Hanson
CH2M Hill
450 Sansome Street
San Francisco, CA

Jacob Miller
3145 David Avenue
Palo Alto, CA 94306

Pearl and Spencer Allie
1683 - 41st Avenue
San Fracisco, CA 94122

Adolph Barbosa
2112 Great Highway
San Francisco, CA 94116

John Bardis
1353 - 4th Avenue
San Francisco, CA 94122

C. M. Carman
1650 Great Highway
San Francisco, CA 94122

Rose M. Cassidy
2219 - 47th Avenue
San Francisco, CA 94116

Cliff Conklin
2200 - 47th Avenue
San Francisco, CA 94116

Mrs. Georgia Connelly
1916 Great Highway
San Francisco, CA 94116

Mrs. Costa
1746 - 47th Avenue
San Francisco, CA 94122

Gretchen Cotter
4116 Ortega Street
San Francisco, CA 94122

Ed Cowing
2570 Great Highway
San Francisco, CA 94116

C. Cresci
1886 Great Highway
San Francisco, CA 94122

Robert K. Dalby
2690 Great Highway
San Francisco, CA 94116

Shirley Dambouradjian
2116 Great Highway
San Francisco, CA 94116

H. A. de Carvalho
2200 - 48th Avenue
San Francisco, CA 94116

Kenneth de Luca
1626 Great Highway
San Francisco, CA 94122

Willa Drummond
1763 - 48th Avenue
San Francisco, CA 94122

George Duesdieker
1850 - 39th Avenue
San Francisco, CA 94122

Carl J. Erickson
559 Ortega Street
San Francisco, CA 94122

Dennis O'Rorke
711 - 48th Avenue
San Francisco, CA 94122

Rosemary Farsh
1986 - 48th Avenue
San Francisco, CA 94122

Ernst M. Feibusch
2821 Taraval Street
San Francisco, CA 94116

Marsha Fontes
545 Junipero Serra Boulevard
San Francisco, CA 94127

Jim Gabbard
2026 Great Highway
San Francisco, CA 94116

Max Woods
1305 - 48th Avenue
San Francisco, CA 94122

Elwin Giddings
3401 Lawton Street
San Francisco, CA 94122

John Gonsalves
3731 Rivera Street
San Francisco, CA 94116

J. Gough
2029 - 48th Avenue
San Francisco, CA 94116

Elaine Grimm
1924 Great Highway
San Francisco, CA 94116

David Haase
722 - 21st Avenue
San Francisco, CA 94114

Rita Haase
37 Oceanside Drive
Daly City, CA 94015

Virginia Hall
2201 - 47th Avenue
San Francisco, CA 94116

Barbara Hatcher
1848 - 48th Avenue
San Francisco, CA 94116

Alvin Herrold
1887 - 48th Avenue
San Francisco, CA 94116

William Hickey
1678 Great Highway
San Francisco, CA 94122

Bill Hopkins
1430 42nd Avenue
San Francisco, CA 94122

Inge Horton
2362 - 44th Avenue
San Francisco, CA 94116

R. Hurlbert
4111 Clement Street
San Francisco, CA 94121

Dennis Hyde
1285 Second Avenue
San Francisco, CA 94122

J. F. Johnson
2040 Great Highway
San Francisco, CA 94116

Randall Jones
143A Connecticut Street
San Francisco, CA 94107

Steve G. Kakos
2108 Great Highway
San Francisco, CA 94116

Douglas Keech
2045 Great Highway
San Francisco, CA 94116

Yvett Labarthe
1201 - 44th Avenue
San Francisco, CA 94122

Donald Lando
2000 Great Highway
San Francisco, CA 94116

Martin Larkin
4733 Lincoln Way
San Francisco, CA 94122

Anna Larsson
2539 - 47th Avenue
San Francisco, CA 94116

Alan G. Lawson
1723 - 46th Avenue
San Francisco, CA 94122

Marilyn Lohrback
4721 Lincoln Way
San Francisco, CA 94122

George Long
1870 Great Highway
San Francisco, CA 94122

David Looman
1710 - 30th Avenue
San Francisco, CA 94114

Elizabeth Marshall
3820 Ortega Street
San Francisco, CA 94116

Judy McCabe
2206 Great Highway
San Francisco, CA 94116

John McCann
68 Vulcan Stairway
San Francisco, CA 94114

John McEwan
2342 - 48th Avenue
San Francisco, CA 94116

R. C. McKnight
2378 - 48th Avenue
San Francisco, CA 94116

Charles Meyers
1789 Eucalyptus Drive
San Francisco, CA 94132

Michael Nurre
779 - 38th Avenue
San Francisco, CA 94121

Thomas M. Paderna
2386 - 19th Avenue
San Francisco, CA 94116

Kevin Parsglove
710 Clayton Street #1
San Francisco, CA 94117

Cletus Peck
1626 Great Highway
San Francisco, CA 94122

Jackie Pomies
1271 - 38th Avenue
San Francisco, CA 94122

William J. Peck
2206 - 43rd Street
San Francisco, CA 94116

Richard Petrick
1488-86 La Playa
San Francisco, CA 94122

Dana Pettingill
1911 - 48th Avenue
San Francisco, CA 94116

Joseph Phillips
3136 Geary Boulevard
San Francisco, CA 94118

Maria Quaranta
2290 - 42nd Avenue
San Francisco, CA 94116

Quentin Johnson
1333 Gough Street 2L
San Francisco, CA 94109

Ralph Rogers
15 Neuman Lane
Woodside, CA 94062

John B. Schmidt
48 Clifford Terrace
San Francisco, CA 94117

William Scully
1346 La Playa
San Francisco, CA 94122

Helen Vidak Sharp
1738 - 9th Avenue
San Francisco, CA 94122

R. J. Snow
1682 - 48th Avenue
San Francisco, CA 94122

Margaret Tenneran
1310 - 45th Avenue
San Francisco, CA 94122

Jesse Tepper
1467 Clayton Street
San Francisco, CA 94122

Elizabeth Truka
2174 - 41st Avenue
San Francisco, CA 94116

Hetty Vander Hoeven
457 Alvarado Street
San Francisco, CA 94114

John Vitali
1810 Great Highway
San Francisco, CA 94122

Jane Weaver
1996 Great Highway
San Francisco, CA 94116

Mr. and Mrs. James White
2022 - 47th Avenue
San Francisco, CA 94116

C. L. Whitney
1645 Great Highway
San Francisco, CA 94122

Richard Wilson
1917 - 48th Avenue
San Francisco, CA 94116

Rebecca Stillerman Witter
1268 - 5th Avenue #5
San Francisco, CA 94122

Liz Zenassi
2471 - 47th Avenue
San Francisco, CA 94116

NEWSPAPERS

San Francisco Chronicle
925 Mission Street
San Francisco, CA 94103
Attn: Dale Champion

San Francisco Bay Guardian
2200 - 19th Street
San Francisco, CA 94110
Attn: Ken McEldowney

San Francisco Progress
851 Howard Street
San Francisco, CA 94103
Attn: Marc Elliot

San Francisco Examiner (2)
110 Fifth Street
San Francisco, CA 94103
Attn: Don Cantor
Jack Castel

Oakland Tribune
13th and Franklin
Oakland, CA 94612
Attn: Fred Garretson

CHAPTER XIV

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SAN FRANCISCO DEPARTMENT OF CITY PLANNING 100 LARKIN STREET · SAN FRANCISCO, CALIFORNIA 94102

APPENDIX A

MEMORANDUM

8 June 1978

TO: File EE75.304, West Side Transport/Storage Project

FROM: Selina Bendix

RE: Analysis of Proposed Project Changes

SUMMARY

Since the EIR on the West Side Transport/Storage project was certified, both engineering design activities on the sewer under the Upper Great Highway and additional concept design activities for the roadway restoration have continued. As part of this engineering refinement, the following changes have been proposed in the West Side project: the sewer would be moved approximately 75 feet west of the location described in the Final EIR as "under the eastern northbound lanes of the Upper Great Highway and the existing equestrian path" (page 29); contractors would not be restricted to vertical-wall construction but would be allowed to use a slope-sided trench north of Santiago Street; traffic would be routed to a temporary roadway east of the construction area as described in the EIR, but a separate roadway for construction traffic could be provided in addition to a two-lane, two-way road for normal public traffic; construction segments would be changed to allow a single contractor to build the portion of the sewer between Santiago Street and Lincoln Way, and road reconstruction, landscaping and underpass replacement could be bid separately rather than as a single restoration contract. The changed project would generally have impacts similar to those described in the Final EIR. Because the sewer would be approximately 75 feet closer to the Ocean, more of the west side and top of the sewer could be exposed to wave action if erosion of Ocean Beach were to occur without sand replenishment or other erosion mitigation following the extension of the beach according to the Upper Great Highway Redesign Plan developed by Michael Painter & Associates.

Slope-sided construction would remove dunes and planting west of the present Upper Great Highway, but implementation of the Redesign Plan also would have that impact, regardless of sewer location or construction methods. Construction activities would be seventy-five feet further from homes lining the Lower Great Highway, and construction traffic could be about thirty-five feet further away than described on page 155k of the Final EIR. Pile driving and slurry trench construction techniques and accompanying probable noise would not occur if the contractor chose slope-sided construction methods. Costs of consolidation <u>sewer</u> construction could be reduced by about 8%,

(or about $6.5 million) by permitting other than vertical wall techniques.

ANALYSIS

Description of Changes

The design engineers are proposing that the consolidation sewer between Sloat Boulevard and Lincoln Way be placed under the Upper Great Highway seventy-five feet further west than was described in the EIR (see page 29 and Figure 5, page 28). This move would put the west edge of the sewer at the west edge of the present roadway, which is the Golden Gate National Recreation Area boundary. The center of the sewer would be about thirty feet east of the boundary instead of 108 feet east, as described in the EIR on page 29. The move west would provide enough space between the sewer and the eastern top of the Upper Great Highway bluff to allow open-trench, slope-sided construction north of Santiago Street as an alternative to the vertical-wall construction techniques that were described on pages 36-38 of the EIR (see also page 122). A slope-sided trench would require a wider excavation than would vertical-sided techniques, as is shown in Figure 1 on the following page. As the trench goes deeper, dewatering becomes increasingly difficult and the top of the opening must be wider if the same slope is to be maintained. South of Santiago Street a slope-sided trench would be too wide to allow for the temporary roadways on the east side of the Upper Great Highway bluff and would be closer to the Ocean on the west side, increasing the contractor's risks and thereby increasing construction costs.

An engineering evaluation of slope-sided and other construction methods was performed in July 1977 for the Bureau of Sanitary Engineering.[1] Although this evaluation assumes that the sewer is under the eastern lanes of the roadway, the basic analysis of construction feasibility and cost is applicable to a sewer 75 feet further west. The consultant determined that slope-sided construction of the consolidation sewer could be about 8% to 9% less costly than vertical-wall techniques, basing the evaluation in part on a judgment that the slope of the sides could be 1.25:1 (horizontal to vertical). To use this slope, the consultant assumed complete dewatering of the trench and possible treatment of the sandy soil with grout or other stabilization methods to prevent sloughing and rain erosion of sand back into the trench.[2] The consultant indicated that "there would be an increase in dewatering costs due to the influence of proximity to the Ocean," but noted that this would probably not be a major cost.[3]

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[1] Jacobs Associates, Consultants to Bureau of Sanitary Engineering, "Feasibility Study Estimates - Great Ocean Highway Location West Side Transport Project," July 1977, submitted by letter of September 7, 1977, to Alan O. Friedland, Chief, Bureau of Sanitary Engineering.

[2] Ibid., pages 4, 5.

[3] Ibid., page 12.

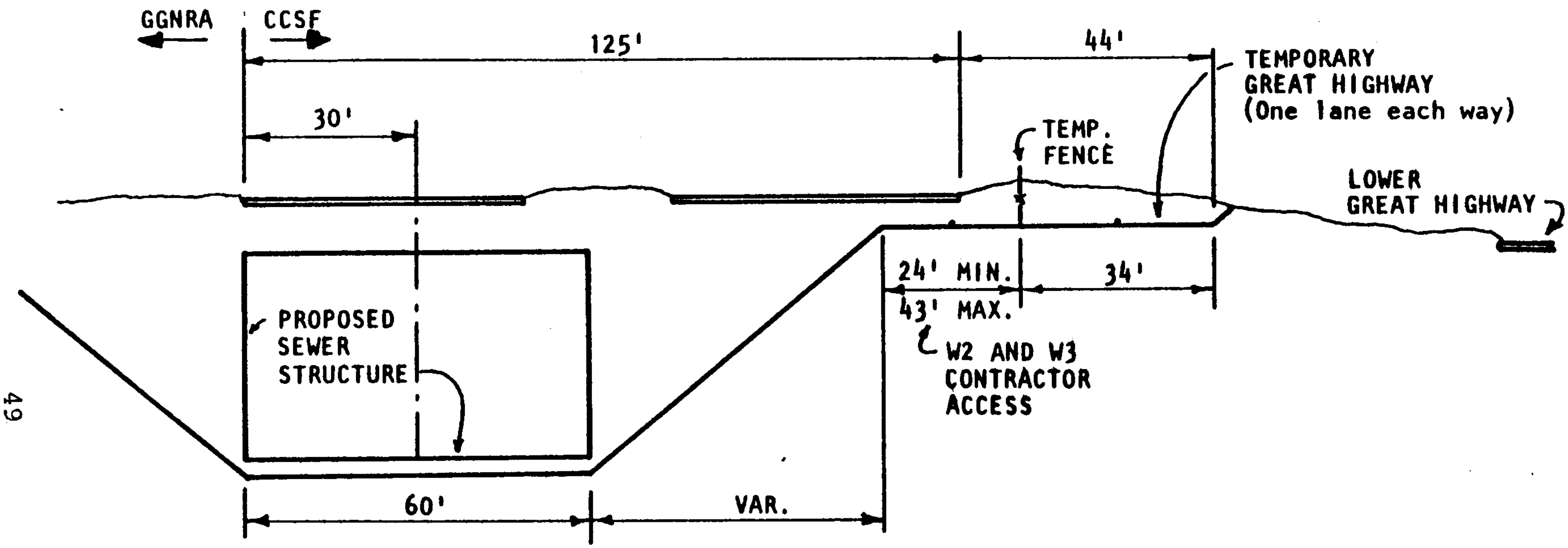
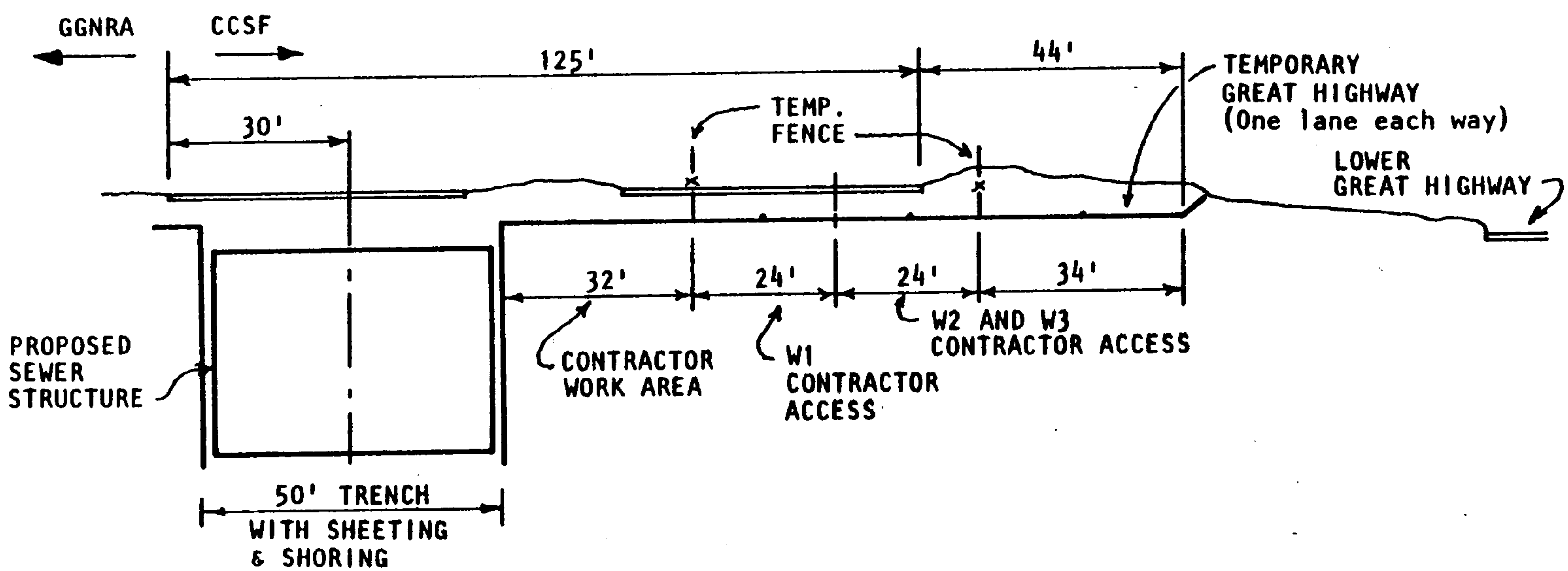


DIAGRAM ILLUSTRATES DEEPEST POINT OF SLOPE-SIDED EXCAVATION

NOTE:
DISTANCES ARE APPROXIMATE AND SUBJECT TO CONTRACTOR VARIATION AT CONSTRUCTION

NORTH OF SANTIAGO STREET   FIGURE 1 Possible Slope-sided Construction Configuration



NOTE:
DISTANCES ARE APPROXIMATE AND SUBJECT TO CONTRACTOR VARIATION AT CONSTRUCTION.

LOCATION OF TRENCH VARIES; GRADUALLY SHIFTS EASTWARD TO CONNECTION WITH PUMP STATION ON EASTERLY SIDE OF GREAT HIGHWAY.

SOUTH OF SANTIAGO STREET FIGURE 1 (CONTINUED)

With the sewer trench 75 feet west, if vertical-wall construction techniques were used, the easterly, northbound lanes of the existing roadway could be used for construction and normal traffic (see pages 147-151 of the Final EIR). Using slope-sided construction methods, construction traffic and public traffic could flow east of the construction area on a temporary roadway built on the eastern side of the Upper Great Highway berm, similar to the situation described on page 155k of the Final EIR. In this section of the EIR, the combined public/construction-access road was described east of an easterly-located sewer, to allow regrading of the road and dune area, implementing the redesign concept developed by Michael Painter & Associates. Moving the sewer west would allow space for separate roads for construction and public traffic between Sloat Boulevard and Lincoln Way, instead of a single roadway used by both construction trucks and general public traffic (see pages 135 and 147-151 of the Final EIR for a discussion of safety hazards of combined construction and regular traffic). The Upper Great Highway Redesign Plan (see pages 155g-160 of the Final EIR) can be carried out as planned regardless of the sewer location underground and regardless of the construction methods used by the low-bidding contractor.

The EIR indicated that there would be five construction contracts plus contracts for landscaping and reconstructing the Upper Great Highway (see pages 38 and 297). The engineers in the Bureau of Sanitary Engineering and the Construction Management offices have suggested reorganizing contractor locations to avoid potential inter-contractor conflicts. The proposal would combine the areas labeled W1-B (between Santiago and Noriega Streets) and W-2 (Noriega Street to Lincoln Way) on Figure 8, page 39, into a single W-2 contract extending from Santiago Street north to Lincoln Way. The engineers have also suggested breaking reconstruction work into several small contracts for landscaping, roadway reconstruction and underpass replacement in order to facilitate opportunities for smaller and minority-owned contracting companies to bid West Side construction work. Contract designation changes would not change the 2-1/2-year project construction schedule; the W-2 contractor would probably use two construction areas, similar to the two allowed for former contracts W1-B and W-2, as shown on Figure 8 of the Final EIR.

Impacts

Water quality impacts generally would be the same as described on page 102 of the Final EIR. Moving construction closer to the Ocean could increase the possibility of temporary salt water intrusion caused by a lower ground water table during construction trench dewatering activies. Although the ground water is part of the aquifer which feeds wells used to water Golden Gate Park landscaping, Recreation and Park engineering has indicated that if some salt water intrusion were to occur at about one mile away, it would not be expected to impact the City use.[1] No local,

[1] Douglas Martin, Senior Civil Engineer, personal communication, June 7, 1978.

private uses of ground water are authorized in the Upper Great Highway area. If salt water mixed with ground water during construction, the contractor might need to find another source of water for concrete curing. As noted on page 102, "if the ground water were allowed to reach its original level after construction, the salt concentration would probably return to its present level."

Geologic and seismic impacts would be the same as those described in the EIR on pages 102-104. If the contractor for the area north of Santiago Street chose to use slope-sided construction techniques, the sides of the trench might need to be stabilized to prevent sloughing of the sand back into the trench. Soil stabilization can be accomplished using a variety of methods ranging from spraying water to keep sands damp, to hemp mats laid on the sloped sides with water sprays reducing blowing sands, to a light cement, silica or other chemical used to solidify soils. Donald J. Birrer, senior civil engineer in the Bureau of Sanitary Engineering, has indicated that the contractor would be prohibited from using a stabilization method which would be toxic to ground water or which would provide an impermeable soil surface following backfill of the trench hindering future landscape growth.[1] Regulations of the National and State Occupational Health and Safety Acts would prohibit the use of chemicals toxic to the workers.[2] If the soils were not stabilized, it is possible that some sand would slough back into the trench, causing construction difficulties and slowing work. If separate roads were provided for construction access and public traffic, the temporary public roadway would be approximately 25 feet from the construction area, and would not be endangered by soil problems if problems were to occur.

Windblown sand impacts would be the same as those described on page 105 of the EIR if vertical-wall construction techniques were used. If a slope-sided trench were used, the soil stabilization methods described above would reduce the potential for windblown sand impacts during construction. Excavation, transport for disposal, and storage of sand during construction would have impacts as described on page 105, and would require mitigation as described on page 134 of the EIR.

Beach erosion impacts are described on pages 104-105 of the EIR. As noted, erosion of the Upper Great Highway bluff has occurred occasionally and has been mitigated in the past. If erosion were not mitigated, or if it proceeded further into the Upper Great Highway bluff than has been allowed in the past before mitigation measures have been instituted, more of the upper west corner of the sewer (up to 10 feet of the west

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[1] Personal communication, 26 May 1978.

[2] For example, on 15 May 1978 the California State Water Resources Control Board sent notices to the City Wastewater Offices warning against the use of AM-9 chemical grout which contains dimethylaminopropionitrile (DMAPN), a catalyst used in some grouts and recently shown to be carcinogenic.

wall) would be exposed to wave action than would occur if the sewer were built under the eastern lanes of the present road. Locating the sewer further west would not change beach erosion processes. The sewer would be exposed in isolated areas south of Noriega Street, and could not be exposed for more than a few hundred feet in any area.[1] The areas most commonly affected by erosion in the past have been south of Noriega Street. The bottom of the sewer would be at about -15 feet City Datum and below in this area, more than 6.5 feet below mean sea level. Figures 7 and 8 in Professor Johnson's report for the Bureau of Sanitary Engineering[2] show that the surface of the pre-Upper Great Highway 1915 natural shoreline and dune area was several feet above mean sea level at this point. There is no reason to expect that the shoreline would move further east than the line which existed before the Upper Great Highway bluff was built. Although more of the west wall and a portion of the top of the sewer could be exposed in the new location, as noted on page 105, "the bottom of the sewer would be too deep to be undermined by the waves." The existing low sea wall extending between about Santiago and Taraval Streets on Ocean Beach provides some protection to the toe of the Upper Great Highway bluff in that area,[3] and could also be expected to protect the sewer there. Erosion would be mitigated for some period by implementation of the Upper Great Highway Redesign Plan developed for the Wastewater Program by Michael Painter & Associates (see pages 155g-160 of the Final EIR for a discussion of the Redesign Plan, and pages 131-133 for a discussion of the kind of mitigation measures (items numbered 4, 5 and 6) that would be implemented by the Plan). Additional mitigation and/or maintenance of beach and dune areas could be implemented either by the City or by the National Park Service which has jurisdiction over the beach.

On pages 130-131 of the Final EIR (see also Responses 6, 7, 42 and 83) design of the sewer as a seawall is discussed as one potential for mitigating beach erosion processes. Although the sewer is being proposed in the more westerly position described in this erosion mitigation measure, the sewer is not proposed to be enlarged or designed to enhance its ability to serve as a kind of seawall (for discussion of a true seawall, see page 130, item 1 in the Final EIR). In the westerly location, if no other erosion mitigation were instituted, and if erosion were to increase, the sewer would naturally serve as a seawall, not preserving the beach, but stopping erosion for areas east of the sewer.

Since the Final EIR was certified, the San Francisco Board of Supervisors has approved

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[1] J. W. Johnson, Consulting Engineer, "Shoreline Characteristics: Ocean Beach-San Francisco," 10 May 1977, page 5 and Figures 7 and 8 in Appendix C.

[2] Ibid., Appendix C.

[3] Ibid., page 2.

the Upper Great Highway Redesign concept (Resolution No. 984-77, adopted on 5 December 1977).

If the Upper Great Highway Redesign Plan were not implemented, the proposed changes in sewer location and in construction described above would remove existing coastal native and non-native plants and animals on the dunes west of the Upper Great Highway. The redesign plan to lower, widen and landscape the dunes, extend the beach and narrow the roadway, will disrupt existing dunes and vegetation, and will replace them with more planting and a wider dune area (see especially page 158 of the EIR). Therefore, the impact of moving the sewer west and allowing a wider open trench would not cause impacts different from those previously described and analyzed in the EIR under the Redesign Plan. The easterly-located sewer built using a vertical-wall trench,described in the Final EIR on pages 29 and 36-37, would not impact the dunes west of the Upper Great Highway (see pages 120-121 of the Final EIR). The westerly dune area is under the jurisdiction of the National Park Service and is part of the Golden Gate National Recreation Area. The National Park Service has indicated that it will permit dune disruption during sewer construction (as would occur if a westerly sewer location and slope-sided trench were permitted) if the Painter Redesign Plan is implemented:

> If the City were to decide to haul away the excavated sand instead of placing it on the beach, we would not allow any disruption of the existing dunes, their vegetation or the recreation the dunes offer to walkers, joggers, and people on horseback. Consequently, vertical excavation methods would need to be applied by the City. The National Park Service would allow the existing dunes to be disturbed, however, if the City decides to place the excavated sand on Ocean Beach as shown in the Painter Plan to help protect the Westside Transport. . . .We strongly believe that if all these elements of the Painter Plan are not provided we will not be able to issue the City a permit for sand placement or open-cut construction and you should consider some other method of sand disposal and protection for the Westside Transport.[1]

Public traffic on an easterly-aligned temporary roadway would be close to homes along the Lower Great Highway; impacts would be as described on page 155k of the EIR. However, construction traffic on the temporary haul road, if it were separate from the public traffic road, would be about 35 feet further away from homes than described in the Final EIR, reducing noise levels but not by a perceptible amount.

As noted on pages 106-107 of the EIR, the contractors would be required to meet the noise limitations of the San Francisco Noise Ordinances (see Table 10, page 106). If

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1 Letter of 6 February 1978 from Jack Wheat, Acting Superintendent, Golden Gate National Recreation Area, to Richard Sklar, Wastewater Management. Copy available in Department of City Planning files.

the contractor were simply to meet these limitations in the new, more westerly location for the construction area, noise impacts would not change from those described in the EIR. If the contractor were to use equipment quiet enough to meet the ordinance limitations at a construction site under the eastern lanes of the Upper Great Highway, but were working in the western lanes of the road, noise impacts could be reduced by 2 or 3 dBA, normally a barely noticeable reduction. If slope-sided construction techniques were used in areas north of Santiago Street, pile driving probably would not be required and no slurry processing plant would be needed in this area. Absence of these two potentially noisy operations could reduce construction noise impacts.

Energy use would not change substantially. Additional concrete would be used in construction of the consolidation sewer in the area of the Sloat/Upper Great Highway intersection to connect the sewer on the western side of the Upper Great Highway to the West Side Pump Station on the east side of the Great Highway Extension. The additional amount of concrete would not be large enough to cause a statistically significant increase in overall construction energy use (see page 109). Operational energy uses would not change.

Climate and air quality impacts would not change due to the proposed changes in sewer location or construction techniques.

Transportation impacts would be generally as described on pages 117-120, 147-154 and 155k-157, and Appendix D. Since certification of the EIR in July 1977, the San Francisco Board of Supervisors has passed Resolution No. 984-77 approving the Redesign concept described on pages 155g-160, and approving a 4-lane roadway for the reconstructed Upper Great Highway (see pages 147-148 and 155k in Volume I and pages 92-93 in Volume II of the EIR for a discussion of impacts of a 4-lane roadway).

Construction of the sewer 75 feet further west would allow enough space east of the construction area, even allowing for a slope-slided trench, to provide a 4-lane temporary roadway carrying both construction traffic and normal public traffic. If a two-lane, two-way, 35-foot wide road were provided for public traffic, a narrower (24 feet), two-lane road could be provided for the exclusive use of construction traffic, reducing the safety hazards of mixing slower construction trucks with higher speed traffic (see page 135 of the EIR for note of this safety hazard). Impacts of a two-lane, two-way roadway are discussed on pages 148-151 and 155m-156 of Volume I and in Appendix D, page 94, in Volume II of the Final EIR. Slope-sided construction would result in a wider construction area than would vertical-wall methods. If the contractor chose to construct using vertical-wall techniques, about 40 feet of the eastern, 50-foot wide northbound lanes of the present roadway plus a portion of the eastern top of the bluff would be available for 4 lanes of combined construction and regular traffic, with traffic impacts as described on pages 147-151 except that traffic would be east of the construction area, as noted on page 155k. Changing contractor location, providing one contractor instead of two in the area between Santiago Street and Lincoln Way, would reduce the potential for conflict between contractors using the road for construction access and for sand haul operations for beach extension and spoils disposal.

Pedestrian access, parking and public transit impacts would be the same as those described on pages 117-119 and 147-153.

Visual impacts of construction activities would be similar to those described on pages 121-122, but would occur 75 feet further away from homes. Removal of dunes and dune vegetation would be the same as would occur in implementing the Redesign Plan described on pages 155g-160. The temporary roadway for construction vehicles, and for public traffic, if allowed, would be east of the construction area, as described in the impacts of construction of the Upper Great Highway Redesign Plan. As noted on page 155k of the Final EIR, "traffic on this temporary construction roadway would be visible to residents along the Lower Great Highway."

If no beach erosion mitigation were implemented and if the former natural shoreline and dune area were established by beach erosion, the sections of the concrete sewer walls that could be exposed would have a visual impact on users of the recreation area.

Land use and zoning, and community services impacts would be the same as those described in the EIR on pages 123 and 127-128. Historic resources impacts would be similar to the discussion on page 123.

Employment would be substantially the same as discussed on pages 124-126. Allowing contractors the option to construct using slope-sided construction techniques could reduce the cost of sewer construction by about 8% (note that this reduction is in the consolidation sewer construction costs, not total project construction costs).[1] This cost reduction includes the additional costs of about $100,000 for increased length of connections between the consolidation sewer and the collection sewers in the sewer system, and about $1,000,000 for increased consolidation sewer length in the gradual crossing from the west side to the east side of the Upper Great Highway to connect with the West Side Pump Station south of Sloat Boulevard. According to the present best estimates, one-third to one-half of the cost savings would be offset by the increased costs of implementing the Upper Great Highway Redesign Plan, compared to replacing the Upper Great Highway roadway as it is today. The State Water Resources Control Board Staff has been asked to consider the entire Redesign Plan eligible for Clean Water Grant funding as mitigation of project impacts and as a requirement of permitting agencies such as the California Coastal Commission and the National Park Service.

Mitigation

The commitments to mitigation measures for erosion, dune stabilization, landscaping,

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[1] Op. Cit., Jacobs Associates, Consultant to the San Francisco Bureau of Sanitary Engineering.

transportation, noise, etc., described on pages 129-144a and 155k-170 of the Final EIR, are unchanged by the proposed changes in sewer location and construction methods.

Implementing the described changes would reduce safety hazards of mixing construction vehicles and normal traffic (see page 135) if a separate construction access road were provided. The changes would move construction activities further from homes than previously described, possibly reducing noise. The proposed changes would not substantially change the location of the temporary road described in the EIR on page 155k; the east edge of the temporary road would be no more than 175 feet east of the west edge of the Upper Great Highway. Allowing reconstruction work to be broken up into several small contracts would provide opportunity for small and minority contractors to bid on these jobs and could provide increased opportunity for local business enterprises to work on this project.

Contractors would be prohibited from using toxic substances as grouting for soil stabilization if stabilization were necessary for slope-sided construction techniques.

FINDING

Based on the above discussion and reevaluation of impacts of the West Side Transport/Storage Project, and pursuant to Section 31.35(d)1. of Chapter 31 of the San Francisco Administrative Code, I find that there could be no substantial change in the environmental effects of the project as a result of the proposed project changes

Selina Bendix, Ph.D.
Environmental Review Officer

Selina Bendix

Rai Y. Okamoto
Director of Planning

Rai Y. Okamoto

cc. Steven Scholl
Staff Analyst
California Coastal Commission
North Central Regional Commission
1050 Northgate Drive, Suite 130
San Rafael, California 94903

Ronald Treabess
Program Manager for Planning and Design
National Park Service
Golden Gate National Recreation Area
Fort Mason, Building 201
San Francisco, California 94123

APPENDIX B

RECONNAISSANCE SURVEYS OF OCEAN, BAKER AND PHELAN BEACHES, CITY AND COUNTY OF SAN FRANCISCO DECEMBER 28-29, 1978*

Reconnaissance surveys were made of the sandy beaches on the west side of San Francisco to determine what fauna, if any, were living in the surf zone adjacent to wet weather overflow structures.

The survey consisted of taking random sand samples along the beaches in front of, and to either side of, the three outfall structures on Ocean Beach, plus a survey of the beach area between Lobos Creek on Baker Beach and the extreme western end of Phelan Beach. The samples were washed through a screen of ¼" (6.4mm) mesh. In addition, dead specimens, exuviae, shell fragments, and worm tubes were collected and retained for identification.

The three outfall structures on Ocean Beach (at Lincoln Way, at Vicente Street and below Fort Funston) were sampled on 28 December 1978; the lowest tide level was approximately -1.3 feet below MLLW. Baker and Phelan Beaches, which have wet weather outfalls at Lobos Creek and at Sea Cliff, were sampled on 29 December 1978; the lowest tide level was approximately -1.5 feet below MLLW. There was no flow from any of the Ocean Beach structures, except for some fresh water running from a broken flush pipe at Lincoln Way. Flow in excess of the input from Lobos Creek was observed at

*James E. Sutton
Alameda, California
11 January 1979

the Baker Beach structure. The flow lasted for at least one hour, and had declined by the time the survey was completed at sunset. The source of water is unknown, but the flow was clear and odorfree, suggesting that it was not sewage or street runoff. It possibly was a release from Mountain Lake, which overflows into the Baker Beach storm drain.

Only three living species were found on the beaches. These were the mole or sand crab, Emerita analoga (Stimpson, 1857), a nephtyid polychaete worm, Nephtys californiensis Hartman, 1938, and the sand dollar, Dendraster excentricus (Eschscholtz, 1829). Emerita is ubiquitous and abundant all along the open coast beaches; it has no sport shellfishing value other than as bait for surf fishermen. Most of the specimens caught were under 2 cm in length; specimens were identified in the field, and none were retained for collections. The Nephtys worm, also considered to be very common on beaches, may also be used for bait, but it has no other sportfishing potential. Three specimens were taken (two from Ocean Beach, one from just east of Phelan Beach); all were retained for confirmation of identification. Dendraster, commonly washed up alive, lives in the surf zone, partially or completely buried in the sand; except as a favorite find for beachcombers, it has no sport value, even as bait. It is probable that other species, such as other worms, isopods and amphipods, are living on the beaches, but the relatively coarse mesh used may have allowed these species to escape.

Numerous other species were identified on the basis of tests, shells, and other remains. A composite species list is presented in Table I. Almost all of the organisms, with the exception of Emerita, Nephtys, and the razor clams, Siliqua, are normally found subtidally, and so are not exposed at low tides. Thus, although the surf clam, Spisula, is present along Ocean Beach, it is not typically accessible to sport shellfishermen. There is essentially no sport shellfishing activity along Ocean Beach.

Most of the shells which appear on Ocean Beach are washed up after the organisms die, although live specimens may be thrown up during storms. Some transport of shells from other areas also occurs, since some species found on the beaches, such as the mussel, Mytilus, and the oyster, possible Ostrea, are found only on hard substrata, not on sand. All of the species listed were found along Ocean Beach; only Emerita, Nephtys and fragments of Mytilus were also found in the Baker and Phelan Beaches area.

The only hard substratum along Ocean Beach is the old intake pipe for Fleishhacker Pool, located several hundred meters south of the Vicente Street overflow structure. A cursory examination indicated that it was covered by what appeared to be a typical assemblage of algae, barnacles, mussels, anemones, worm tubes, tunicates, and other fouling or hard-substratum organisms.

Variations were noted in the distribution of *Emerita* along the beaches. These variations appeared, on preliminary observation, to be related to variations in substratum composition. Although long stretches of beaches often appeared uniform on the surface, layers of pebbles were noted a few centimeters below the surface in some sections. *Emerita* was almost never found in such substrata, even though a thin layer of sand covered the pebbles. Despite the continuous flow of fresh water at Baker Beach, *Emerita* was found within 50 meters of the point where the water flowed into the surf. The area on either side of this entry point had extensive deposits of pebbles, which may have contributed to the apparent absence of *Emerita* from that section of beach.

As noted above, this survey is preliminary and should not be considered quantitative nor comprehensive. It provides some information on what may be found along the beaches, in and below the surf zones. It is important to remember that the surf zone is an inherently hostile environment for most organisms, consisting of an unstable, shifting substratum and tremendous variations in wave pressure. Relatively few species are adapted to this environment; thus the few organisms found in this survey may reflect purely natural conditions.

TABLE I. COMPREHENSIVE SPECIES LIST

ANNELIDA

POLYCHAETA

ORDER: PHYLLODOCIMORPHIDA

FAMILY: NEPHTYIDAE

Nephtys californiensis Hartman, 1938

unidentified worm tubes*

MOLLUSCA

GASTROPODA

ORDER: MESOGASTROPODA

FAMILY: NATICIDAE

Polinices sp. (moon snail)

ORDER: NEOGASTROPODA

FAMILY: THAIDIDAE

Nucella lamellosa (Gmelin, 1791)

FAMILY: NASSARIIDAE

Nassarius fossatus (Gould, 1850)

BIVALVIA

ORDER: MYTILOIDA

FAMILY: MYTILIDAE

Mytilus californianus Conrad, 1837
(California mussel)

probable *Modiolus rectus* (Conrad, 1837)
(straight horsemussel)

ORDER: PTERIOIDA

FAMILY: OSTREIDAE

possible *Ostrea lurida* Carpenter, 1864
(native or Olympia oyster)

ORDER: VENEROIDA

FAMILY: CARDIIDAE

Clinocardium nuttallii (Conrad, 1837)
(basket or heart cockle)

FAMILY: MACTRIDAE

Spisula catilliformis Conrad, 1868
(surf clam; narrow dish clam)

Tresus sp. (horseneck or gaper clam)

FAMILY: SOLENIDAE

possible *Siliqua lucida* (Conrad, 1837)

Siliqua patula (Dixon, 1789)
(northern razor clam)

FAMILY: TELLINIDAE

Tellina bodegensis Hinds, 1845

Tellina nuculoides (Reeve, 1854)

Macoma inquinata (Deshayes, 1855)

FAMILY: VENERIDAE

Protothaca tenerrima (Carpenter, 1857)
(thinshelled littleneck clam)

FAMILY: PETRICOLIDAE

Petricola carditoides (Conrad, 1837)

ORDER: MYOIDA

FAMILY: PHOLADIDAE

Zirfaea pilsbryi Lowe, 1931
(rough piddock)

ARTHROPODA

EUCARIDA

ORDER: DECAPODA

SECTION: BRACHYURA

FAMILY: CANCRIDAE

Cancer magister Dana, 1852*
(market or Dungeness crab)

SECTION: ANOMURA

FAMILY: PAGURIDAE

unidentified hermit crabs, probably
associated with *Polinices* (moon snail) shells

FAMILY: ALBUNEIDAE

Blepharipoda occidentalis Randall, 1839*
(spiny mole crab)

FAMILY: HIPPIDAE

Emerita analoga (Stimpson, 1857)*
(sand or mole crab)

ECHINODERMATA

ECHINOIDEA

FAMILY: DENDRASTERIDAE

Dendraster excentricus (Eschscholtz, 1829)*
(sand dollar)

Voucher specimens of all species have been deposited in the Department of Invertebrate Zoology, California Academy of Sciences, except for those marked with an *.

CITY AND COUNTY OF SAN FRANCISCO
DEPARTMENT OF PUBLIC HEALTH

CENTRAL OFFICE
101 GROVE STREET
SAN FRANCISCO, CALIFORNIA 94102

APPENDIX C

ENTERIC DISEASE INCIDENCE - SAN FRANCISCO - 1964-1978
Prepared in San Francisco Department of Public Health
16 November 1978

In 25 years of records in the Bureau Of Disease Control, there are no documented laboratory- or clinically-confirmed cases of shigellosis, salmonellosis, or hepatitis A produced by direct contact with shoreline waters or by ingestion of raw bivalves in San Francisco. These three diseases, all reportable by law, are of particular interest in examining the potential role of recreational waters with high coliform count, or marine life from such waters, as possible source of diarrheal diseases (enteric infection) in San Francisco. These diseases are contracted by swallowing the infecting organism. Disease incidence records for diarrheal disease reported in the City from 1964 to the present are attached. Prior to 1967, much of the diarrhea was caused by shigella sonnei, a swallowed bacterium; it produced laboratory- or physician-confirmed reports of diarrhea primarily among the residents of the Spanish ethnic community in the City, more commonly among children than adults, with an annual incidence peak in July-September. Where the source could be determined, most of the cases were traced to food-borne transmission, occasionally in a local restaurant, but more commonly by members of the family household who were found to be fecal carriers who prepared meals for the family. During this period, salmonellosis, the other common bacterial cause of diarrheal disease, was reported at a low constant rate of 100-150 cases per year.

In 1967-68, during the Haight-Ashbury period, the incidence of reported cases of shigellosis did not change significantly, possibly due to insufficient medical care or transiency of the population in that area, but it did begin a slow rise thereafter, caused by a different strain of shigella. Hepatitis A, caused by swallowing of the hepatitis virus, increased very remarkably during these two years, and remained then at a high level. The rise was attributed to the multiple personal contacts of the crowded, unsanitary, commune-style living conditions in that area and among that population. (The incidence of salmonellosis, in contrast, did not increase. This difference, we believe, is due to a dose/response factor: 10-100 shigellae can produce diarrhea in a human, but it requires 10,000-1,000,000 salmonellae for the same effect.) At the low temperature and high salinity of shore waters, although the organisms could survive, they could not multiply. Laboratory conditions for successful culture require an appropriate nutrient broth or gel medium, and constant temperature of 35°C. (95°F.) for at least 48 hours.

After 1974, a secondary rise in incidence of shigellosis and hepatitis A was found in the expanding alternate life-style communities within the City. Variously, in 75% to 92% of such patients on whom valid histories could be obtained, transmission was found to be by direct intimate personal or household food contact. There is no significant seasonal variation in the incidence of shigellosis, salmonellosis, or hepatitis A as reported in the City since the Haight-Ashbury summers.

Since the first appearance in the literature of reports of ingestion of raw shellfish as a source of possible infection with hepatitis A virus, Department staff have made inquiry on this point from appropriate patients, without confirming cases of such transmission. Although other bivalves could also theoretically concentrate and transmit the hepatitis virus, the local mussels, shrimp, clams, and crab are usually cooked before eating, and the virus would be expected to be destroyed or inactivated in the process. In 25 years of records in the Bureau of Disease Control, there are no documented laboratory- or clinically - confirmed cases of shigellosis or hepatitis A produced by direct contact with shoreline waters or by ingestion of raw bivalves in San Francisco.

Approved:

Mervyn F. Silverman, M.D., M.P.H.
Director of Public Health

Prepared by:

Selma K. Dritz, M.D., M.P.H.
Assistant Director
Bureau of Disease Control
and Adult Health

REPORTED CASES - SELECTED CAUSES

SAN FRANCISCO DEPARTMENT OF PUBLIC HEALTH

YEAR	SHIGELLOSIS	SALMONELLOSIS	HEPATITIS A
1964	76	104	150
1965	81	99	181
1966	71	118	204
*1967	69	119	552
*1968	48	121	819
1969	144	140	651
1970	85	142	723
1971	159	171	767
1972	254	139	542
1973	208	122	696
1974	189	110	480
**1975	346	107	647
**1976	602	161	912
**1977	325	143	690
**1978 (9 months)	320	110	472

* Haight-Ashbury Period
** Expanded Alternate Life-Styles Period

APPENDIX D

TABULATIONS AND GRAPHS FOR SELECTED DISEASES REPORTED IN SAN FRANCISCO

DESCRIPTION OF SOURCE MATERIALS

From the files of the San Francisco Department of Public Health, Bureau of Disease Control, we present the following month-by-month incidence of laboratory-confirmed cases of shigellosis and salmonellosis, respectively, as reported in San Francisco for five selected years, in a resident population of roughly 700,000. Records are gathered chiefly from laboratory reports and physicians' Confidential Morbidity Reports, both legally required by order of the California State Board of Health, (see Attachment A) and from other sources, such as Departmental inspectors of food establishments, school nurses and teachers, field public health staff, and local citizens. From 3 to 5% of the patients are residents of other counties or states, diagnosed and reported from medical centers in the City, and therefor recorded as San Francisco cases. Though not all physicians file reports as required, the resulting discrepancy is a constant one throughout the year, and does not affect the configuration of the incidence curves. Disease incidence reports are compared for wet, dry and normal years, both prior to, (1964 and 1967) and following (1973, 74 and 77) the intensive drive by the Department to obtain more complete reporting of disease incidence from physicians. Tabulations which we submitted in a prior release were supplied from the Bureau of Statistics of the Department of Public Health, and are based on the date of receipt of the report. In those tables, some cases which developed late in the year were diagnosed and reported in the following year. But the graphs which are shown here are taken from abstracts of patient histories recorded in the files of the Bureau of Disease Control, and are based on actual date of onset of symptoms. These, therefor, have slightly different annual totals for the selected years than the previous tables. We chose to show incidence of shigellosis, because it is caused by the most frequently identified enteric bacterial pathogen in San Francisco, and one which readily causes disease symptoms with swallowing of a minimal dose (10 to 100 organisms). We show incidence of salmonellosis because it is caused by the hardiest enteric bacterial pathogen, although it requires a much larger dose (10^4 to 10^6 organisms). We do not show incidence of hepatitis A in these exhibits, because we have not, as yet, a readily available laboratory method for definitive identification of the hepatitis A virus.

Analysis of graphs and tables

Data were compared for wet, normal and dry rainfall years. The years 1964 and 1967 were, respectively, wet and normal rainfall years prior to a massive effort by the SFDPH to improve reporting of communicable diseases, as required by State law, by physicians in the community. The years 1973 and 1974 were, respectively, wet and normal rainfall years after the reporting had improved, and numbers of recorded cases subsequently increased. The increase was compounded by development of a large, persistent outbreak of enteric (diarrheal) disease resulting from increased household and direct personal transmission of the infecting organisms, without relation to water sports or ingestion of shellfish. The year 1977 was the most recent drought year.

None of the monthly variations in incidence reports were significant numbers in a population of 700,000. If any comment were made on the small seasonal variations in incidence reports, it would be to note that most of the small increases were recorded during the summer months, when little or no rain falls on the City.

Cabelli et al, in 1976, reported a perspective study done for EPA, on pollution effects on swimmers at two New York beaches. They found that symptoms of fever, headache, diarrheal disease, developed within 10 days of swimming at Coney Island Beach, "a barely acceptable (polluted) one," in 3-4% of swimmers, while the incidence of such symptoms was significantly lower at Rockaway Beach nearby, "a relatively unpolluted one". At both beaches, they found a higher incidence of these symptoms in swimmers, as compared to non-swimmers. The authors did not state the numbers of persons in the water at either of the beaches on the days of their study.

We must point out that the symptoms which they described, and ascribed to the ingestion of various enteric bateria, which they found at elevated levels on those days at those sites (particularly total coliforms), are also the symptoms that are produced by infection with enteroviruses; these enteroviruses are frequently cultured from human urine samples in cases of illness marked by the same symptoms as those described in their paper. If the total population in the water were as high as perhaps 100,000, which is not uncommonly reported from Coney Island Beach on a hot day in summer, the concentration of human urine from direct urination in the water, and potential for high viral concentration in the beach shallows, could be, and probably was, considerable. It is my opinion that the probability of developing enteric disease from ingestion of urinary enteroviruses at those beaches in summer is very much greater than that of infection by fecal organisms.

Such a situation is not comparable to beach conditions in San Francisco. If 1000 or even 2000 persons could be found in the water on a particularly hot day, the concentration of urine in the turbulent shore waters would be almost nil. A similar situation might be postulated for Aquatic Park swimming area by the very small number of persons who actually swim in those waters.

State Department of Public Health, (S. B. Werner, MD), report that no cases are known in their files that confirm enteric disease acquired in recreational waters or by ingestion of shellfish from the Bay Area waters, except for PSP (paralytic shellfish poisoning) from mussels taken during forbidden periods of May through October in this area.

State Fish and Game (Walter Dahlstrom) report that shellfish checked for concentration of heavy metals and a variety of pesticides indicate no public health problem from these substances.

Their concern would be aroused only by elevated coliform counts during periods of high runoff in winter storms.

LAWRENCE LAB BAY AREA SHELLFISH AND SEDIMENT STUDY - PLUS JONES AND STOKES EPA 1977

RECOMMENDATIONS AND FDA PROPOSED STANDARDS

Element	Average Daily uptake	Normal body levels	Lawrence lab findings	Jones & Stokes
Ag	na	na	Elevated So. Bay shellfish	no standards
As	na	na	na	no standards
Cd	15-35 ug	1 ug/gm wet tissue	3ppm Tara Hills. Coypte Pt. No., Foster City	0.5 ppm ss clam 1.5 oysters. So. 3.5 oysters. No.
Co.	0.1 ug (B12?)	80-300uug. blood	na	na
Cr.	na	6 mgm total body	na	5 ppm ss clam 2 ppm oysters
Cu	2.5-5 mgm	100 ug/100 ml blood	na	25 ppm ss clam 42 oysters So. 175 oysters No.
Fe	18 mg.	70-18- ug/100 ml serum	na	na
Hg	na	na	safe levels found	0.5 ppm*
I	100 ug	20-35 ug/100ml plasma	na	na
Mg	na	na	na	na
Mn	3-9 mgm, 40% absorbed	2.5 ug/100 ml plasma	na	na
Mo	na	0.1-3 ppm, total body	na	na
Ni	na	na	na	na
Pb	?.20 mgm???-5-10% absorbed?	child: 30ug/100ml bld adult: 60ug/100ml bld	safe levels except Albany Hills & Bayview Park	5 ss clam 2 oysters
Se	? Vit E?? Cystic fibrosis?	0.22 ug/100ml Blood	na	na
Zn	10-15 mgm, 30% absorbed	900 ug/100ml blood	na/	30 ss clam 1000 oysters So., 2000 oysters No.

DDT)
Chlorinated hydrocarbons) all levels safe and acceptable
Organophosphates ??)

* New FDA standard is 1.0 ppm

REGULATIONS OF THE CALIFORNIA STATE BOARD OF PUBLIC HEALTH FOR THE CONTROL OF COMMUNICABLE DISEASES†

GENERAL SECTIONS

2500. *Reporting to the Local Health Authority.* It shall be the duty of every physician, practitioner, dentist, coroner, every superintendent or manager of a dispensary, hospital, clinic, or any other person knowing of or in attendance on a case or suspected case of any of the following diseases or conditions, to notify the local health authority immediately. A standard type report form has been adopted and is available for this purpose.

*Amebiasis
Anthrax
Botulism
Brucellosis (Undulant Fever)
*Chancroid
Cholera
*Coccidioidomycosis
*Conjunctivitis, Acute Infectious of the Newborn (Gonorrheal Ophthalmia, Ophthalmia Neonatorum, and Babies' Sore Eyes in the first 21 days of life)
Dengue
Diarrhea of the Newborn
Diphtheria
Disorders Characterized by Lapses of Consciousness
Dysentery, Bacillary (see Shigella infections)
Encephalitis, viral
Food Poisoning (other than Botulism)
*German Measles (Rubella)
*Gonococcal Infections
*Granuloma Inguinale
Hepatitis, Infectious
Hepatitis, Serum
Leprosy (Hansen's Disease)
Leptospirosis (including Weil's Disease)
*Lymphogranuloma Venereum (Lymphogranuloma Inguinale)
Malaria
*Measles (Rubeola)
Meningitis, Viral
Meningococcal Infections
*Mumps
Paratyphoid Fever, A, B and C (see Salmonella infections)
*Pertussis (Whooping cough)
Plague
Poliomyelitis, Paralytic
Psittacosis
Q Fever
Rabies, Human or Animal
Relapsing Fever
*Rheumatic Fever, Acute
Rocky Mountain Spotted Fever
*Salmonella Infections (exclusive of typhoid fever)
*Scarlet fever
*Shigella Infections
Smallpox (Variola)
*Streptococcal Infections, hemolytic (including Scarlet Fever, and Streptococcal Sore Throat)
Syphilis
Tetanus
*Trachoma
Trichinosis
Tuberculosis
Tularemia
Typhoid fever, cases and carriers
Typhus fever
Viral Exanthem in Pregnant Women
Yellow fever

For outbreak reporting and reporting of occurrence of unusual and rare diseases see Sections 2502 and 2503.

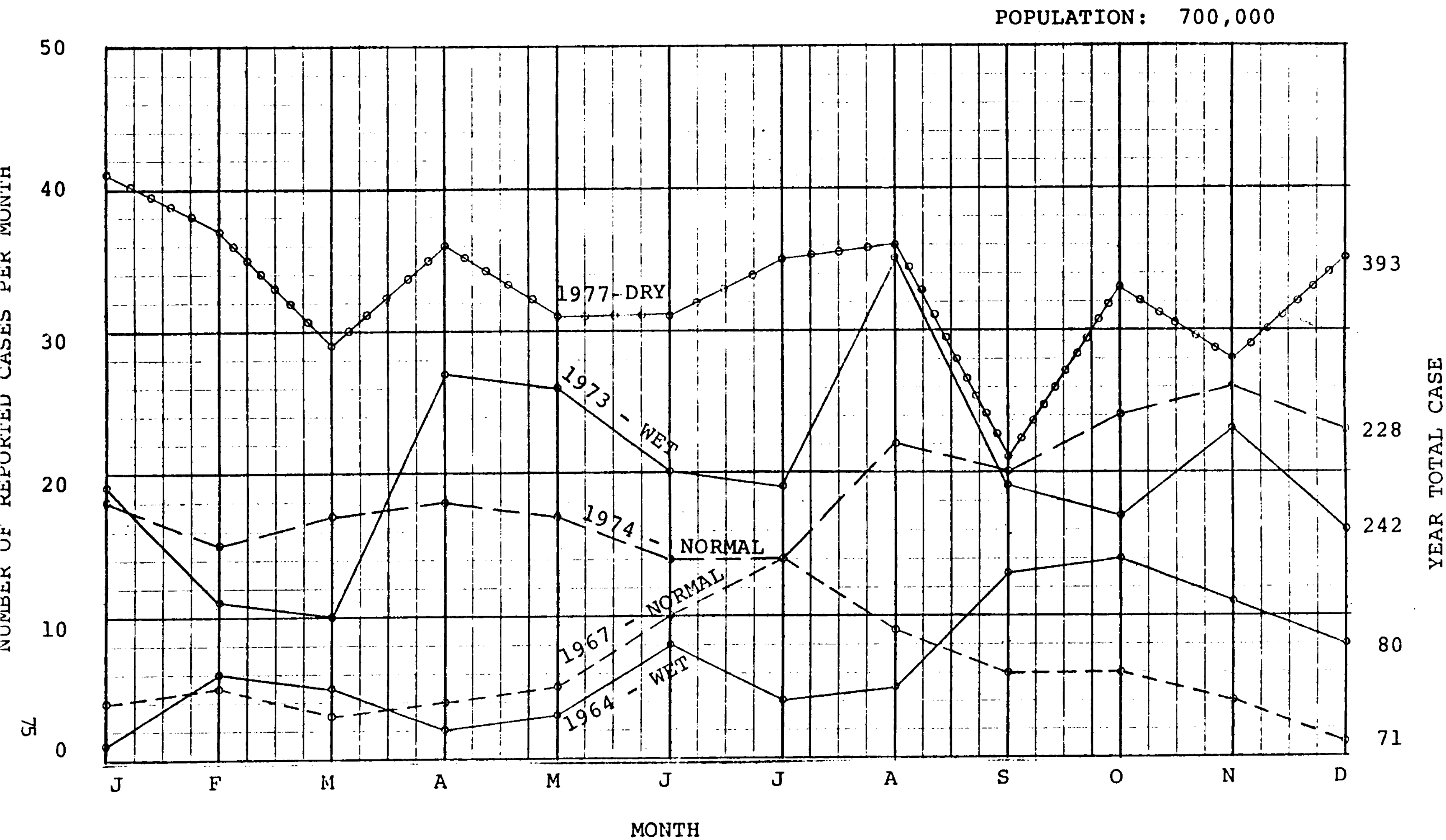
~~2501. *Reports by Local Health Officer to State Department of Public Health.* (a) Individual case reports: Each local health officer shall report at least weekly, on the prescribed form, to the Director of the State Department of Public Health each individual case of those diseases or conditions not marked with an asterisk (*) in the above list (Section 2500) which have been reported to him in the last seven days.~~

† From California Administrative Code, Title 17, Public Health.
* See Section 2501.

Attachment A

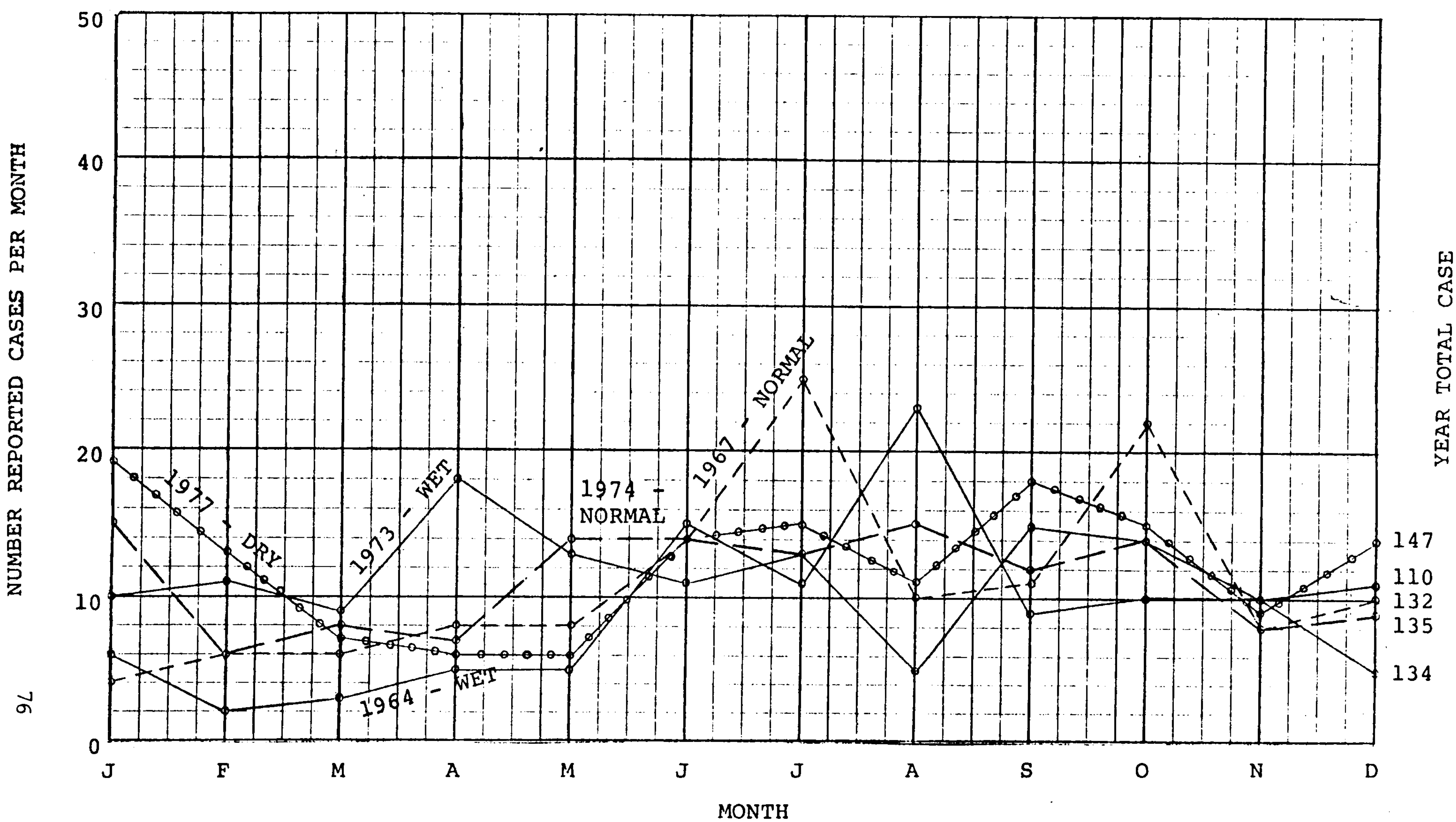
SHIGELLOSIS CASES REPORTED - SAN FRANCISCO

SELECTED YEARS



SALMONELLOSIS CASES REPORTED - SAN FRANCISCO
SELECTED YEARS

POPULATION: 700,000



STATE OF CALIFORNIA—HEALTH AND WELFARE AGENCY

EDMUND G. BROWN JR., Governor

DEPARTMENT OF HEALTH SERVICES
2151 BERKELEY WAY
BERKELEY, CA 94704
(415) 843-7900, Ext. 246

December 6, 1978

APPENDIX E .

Selma Dritz, M.D.
Communicable Disease Control Officer
San Francisco City & County Health Department
101 Grove Street
San Francisco, California 94102

Dear Doctor Dritz:

NO REPORTS OF ENTERIC DISEASE IN SWIMMERS OFF THE SAN FRANCISCO COAST

In response to your request today for a written statement on this issue, let me say that the State's Infectious Disease Section has received no reports in recent years linking any enteric disease in individuals or groups of individuals to recreational use (swimming, surfing, boating, etc.) of waters in the immediate San Francisco area. This should not be construed to mean that there hasn't been any such disease .... only that none has been reported to us.

Potential disease does exist, however, not only from a theoretic point of view but as can be seen by published reports. But reports of disease from polluted recreational water are really quite rare. The major threat from such water comes from purposeful ingestion of the water or the consumption of raw or inadequately heated shellfish harvested from it. Nonetheless, reasonable efforts should be made to minimize the risk that San Francisco Bay waters may pose to the public's health.

Sincerely yours,

Ben

S. B. Werner, M.D.
Medical Epidemiologist
Infectious Disease Section

APPENDIX F

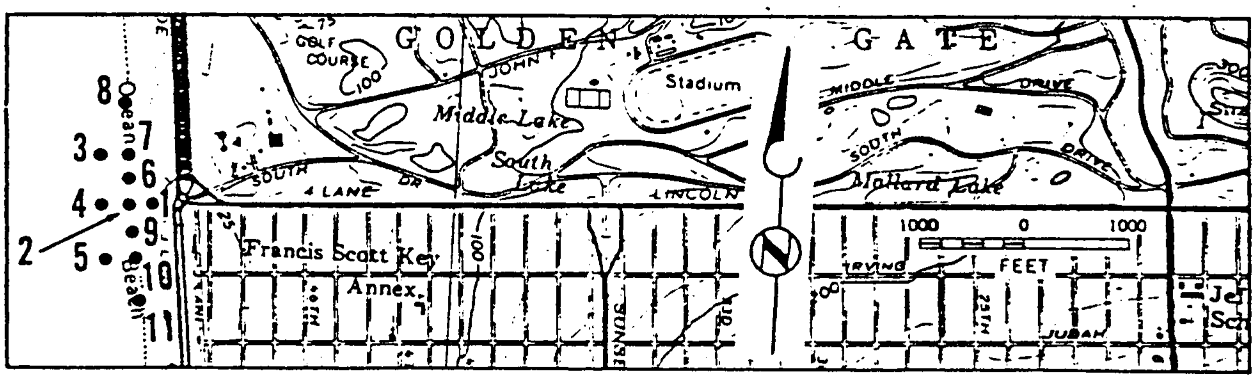
LINCOLN WAY OUTFALL

SUPPLEMENTARY OVERFLOW MONITORING PROGRAM

Survey	Station	Total Coliforms MPN/100 ml	Fecal Coliforms MPN/100 ml	Pb µg/l	Hg µg/l	Cd µg/l	TICH µg/l	PCB µg/l	96-hr Bioassay % survival	Temp. °C	pH	Salinity ppt
30Jan79	1	3.3×10^6	2.1×10^5	42	<0.1	<1	ND	ND	90	7.0	7.5	<1
	2	1.3×10^6	2.8×10^5	32	1.0	<1	ND	ND	100	8.0	7.7	12
	3	1.6×10^5	1.7×10^4	5	<0.1	<1	-	-	-	11.0	7.9	30
	4	2.4×10^4	7.9×10^3	<1	<0.1	<1	-	-	-	11.0	7.9	30
	5	7.0×10^3	2.1×10^3	<1	<0.1	<1	-	-	-	11.0	7.9	30
	6	-	-	-	-	-	-	-	-	-	-	
	7	4.9×10^4	7.9×10^3	-	-	-	-	-	-	10.0	7.8	12
	8	1.3×10^5	6.3×10^3	-	-	-	-	-	-	10.0	7.9	30
	9	-	-	-	-	-	-	-	-	-	-	-
	10	7.9×10^4	1.7×10^3	-	-	-	-	-	-	10.0	7.9	31
	11	3.3×10^4	1.7×10^3	-	-	-	-	-	-	10.0	7.9	30
13Feb79	1	2.7×10^6	9.4×10^5	103	1.7	<1	0.1[a]	ND	100	13.0	6.4	0.55
	2	2.4×10^5	7.9×10^3	4	1.1	<1	ND	ND	90	12.0	8.2	29.4
	3	7.0×10^1	3.3×10^1	<1	0.3	<1	-	-	-	12.0	8.3	29.4
	4	2.4×10^3	3.3×10^2	<1	0.7	<1	-	-	-	12.0	8.3	30.1
	5	1.3×10^4	4.9×10^3	<1	0.5	<1	-	-	-	12.0	8.3	28.0
	6	-	-	-	-	-	-	-	-	-	-	-
	7	4.9×10^5	4.9×10^4	-	-	-	-	-	-	12.0	8.2	25.9
	8	3.3×10^5	4.9×10^4	-	-	-	-	-	-	12.0	8.2	26.6
	9	-	-	-	-	-	-	-	-	-	-	-
	10	1.3×10^4	4.9×10^3	-	-	-	-	-	-	12.0	8.2	30.1
	11	2.6×10^4	4.9×10^3	-	-	-	-	-	-	12.0	8.2	28.7
20Feb79	1	3.3×10^6	1.1×10^6	76	1.4	<1	0.1[a]	ND	100	12.0	6.2	0.04
	2	1.3×10^6	4.9×10^5	181	0.1	<1	0.2[a]	0.1[b]	100	12.0	6.9	6.3
	3	4.9×10^3	1.3×10^3	1	<0.1	<1	-	-	-	-	8.2	27.7
	4	1.3×10^4	4.9×10^2	<1	<0.1	<1	-	-	-	-	8.3	27.7
	5	9.2×10^4	1.7×10^3	9	<0.1	<1	-	-	-	-	8.3	26.0
	6	-	-	-	-	-	-	-	-	-	-	26.7
	7	2.2×10^5	1.3×10^4	-	-	-	-	-	-	-	8.0	26.0
	8	2.2×10^5	2.2×10^5	-	-	-	-	-	-	-	8.2	26.3
	9	-	-	-	-	-	-	-	-	-	-	27.0
	10	1.3×10^5	2.2×10^4	-	-	-	-	-	-	-	8.2	26.0
	11	1.1×10^5	7.9×10^3	-	-	-	-	-	-	-	8.3	27.7

[a] Technical chlordane; all others not detected (ND).

[b] PCB 1254.



RICHMOND-SUNSET WATER POLLUTION CONTROL PLANT

APPENDIX G

Date Collected Jan 7, 1979

Date Received

Type of Sample; Grab

Date Reported Jan 22, 1979

Analysis No.	E-3 Lincoln Way		E-5 Baker Beach	
Source of Sample	Effluent	Receiving Water	Effluent	Receiving Water
DETERMINATION				
Toxicity Bioassay:				
% Survival in Undiluted Sample	100	100	100%	100%
TL_m	None	None	None	None
Toxicity Units	<0.59	<0.59	<0.59	<0.59
Heavy Metals mg/L				
Cadmium	0.000	0.000	0.000	0.005
Lead	0.135	0.140	0.265	0.182
Mercury	0.0007	0.0005	0.0015	0.0006
Total Identifiable Chlorinated				
Hydrocarbons mg/L	0.000094	0.000165	0.000091	0.000078

Comments:

Reported by Roland Chin
Sr. Chemist

RICHMOND-SUNSET WATER POLLUTION CONTROL PLANT

	Date Collected Jan 8, 1979
	Date Received
Type of Sample: Grab	Date Reported Jan 22, 1979

Analysis No.	E-3 Lincoln Way		E-5 Baker Beach	
Source of Sample	Effluent	Receiving Water	Effluent	Receiving Water
DETERMINATION				
Toxicity Bioassay: % Survival in Undiluted sample	100	100	100	100
TL_m	None	None	None	None
Toxicity Units	<0.59	<0.59	<0.59	<0.59
Heavy metals, mg/L, Cadmium	0.000	0.005	0.005	0.005
Lead	0.260	0.276	0.430	0.162
Mercury	0.0015	0.0003	0.0015	0.0005
Total Identifiable chlorinated				
Hydrocarbons mg/L	0.000095	0.000095	0.000103	0.000064

Comments:

Analyst ______ Reported by Roland Olivi
Sr. Chemist

Pomeroy, Johnston and Bailey Specialists in water and waste technology

373 SOUTH FAIR OAKS AVENUE, PASADENA, CALIFORNIA 91105 · TELEPHONE (213) 795-7553 · 681-4655

CUSTOMER City & County of San Francisco

SAMPLE I.D. P79-03-161-1

REPORT OF ANALYSES

SAMPLE DESCRIPTION: D. Mixed Richmond Sunset

NO.	METALS (µg/liter)			CLASSICAL POLLUTANTS (mg/liter)
114	antimony	< 1		
115	arsenic	< 5		
117	beryllium	< 5		
118	cadmium	4		
119	chromium	10		
120	copper	115		
122	lead	183		
123	mercury	< 1		
124	nickel	70		
125	selenium	< 5		
126	silver	25		
127	thallium	< 1		
128	zinc	300	116	asbestos See attached report
	manganese	85		
			121	cyanide < 0.004

SAMPLE I.D.: P79-03-161-1, D. Mixed Richmond Sunset

CUSTOMER: City & County of San Francisco

NO.	COMPOUND	μg/liter	NO.	COMPOUND	μg/liter
1B	acenaphthene	ND	31A	2,4-dichlorophenol	ND
2V	acrolein [1]	ND	32V	1,2-dichloropropane	ND
3V	acrylonitrile [1]	ND	33V	1,3-dichloropropylene	ND
4V	benzene	95	34A	2,4-dimethylphenol	ND
5B	benzidine	ND	35B	2,4-dinitrotoluene	ND
6V	carbon tetrachloride	ND	36B	2,6-dinitrotoluene	ND
7V	chlorobenzene	ND	37B	1,2-diphenylhydrazine	ND
8B	1,2,4-trichlorobenzene	ND	38V	ethylbenzene	7
9B	hexachlorobenzene	ND	39B	fluoranthene	ND
10V	1,2-dichloroethane	ND	40B	4-chlorophenyl phenyl ether	ND
11V	1,1,1-trichloroethane	ND	41B	4-bromophenyl phenyl ether	ND
12B	hexachloroethane	ND	42B	bis (2-chloroisopropyl) ether)	ND
13V	1,1-dichloroethane	ND	43B	bis (2-chloroethoxy) methane	ND
14V	1,1,2-trichloroethane	ND	44V	methylene chloride	7
15V	1,1,2,2-tetrachloroethane	ND	45V	methyl chloride [3]	ND
16V	chloroethane [3]	ND	46V	methyl bromide [3]	ND
17B	bis (chloromethyl) ether	UTD	47V	bromoform	ND
18B	bis (2-chloroethyl) ether	ND	48V	dichlorobromomethane	ND
19V	2-chloroethylvinyl ether	ND	49V	trichlorofluoromethane [3]	ND
20B	2-chloronaphthalene	ND	50V	dichlorodifluoromethane [3]	ND
21A	2,4,6-trichlorophenol	ND	51V	chlorodibromomethane	ND
22A	parachlorometa cresol	ND	52B	hexachlorobutadiene	ND
23V	chloroform	ND	53B	hexachlorocyclopentadiene	ND
24A	2-chlorophenol	ND	54B	isophorone [2]	ND
25B	1,2-dichlorobenzene	ND	55B	naphthalene	ND
26B	1,3-dichlorobenzene	ND	56B	nitrobenzene	ND
27B	1,4-dichlorobenzene	ND	57A	2-nitrophenol	ND
28B	3,3'-dichlorobenzidine	ND	58A	4-nitrophenol	ND
29V	1,1-dichloroethylene	ND	59A	2,4-dinitrophenol [2]	ND
30V	1,2-trans-dichloroethylene	ND	60A	4,6-dinitro-o-cresol [2]	ND

ND = Not detected. Unless otherwise noted, limits of detection for Acids (A), Base/Neutrals (B/N), and Volatiles (V) is 5 μg/l and for Pesticides (P) limit is 1 μg/l.

[1]Limit of detection 500 μg/l. [2]Limit of detection 200 μg/l. [3]Limit of detection uncertain (10-100 μg/l).

UTD = Unable to determine by Protocol methods.

SAMPLE I.D.: P79-03-161-1; D. Mixed Richmond Sunset

CUSTOMER: City & County of San Francisco

NO.	COMPOUND	ug/liter	NO.	COMPOUND	ug/liter
61B	N-nitrosodimethylamine[2]	ND	88V	vinyl chloride[3]	ND
62B	N-nitrosodiphenylamine	ND	89P	aldrin	ND
63B	N-nitrosodi-n-propylamine[2]	ND	90P	dieldrin	ND
64A	pentachlorophenol	ND	91P	chlordane	ND
65A	phenol	ND	92P	4,4'-DDT	ND
66B	bis (2-ethylhexyl) phthalate	140	93P	4,4'-DDE	ND
67B	butyl benzyl phthalate	25	94P	4,4'-DDD	ND
68B	di-n-butyl phthalate	35	95P	α-endosulfan	ND
69B	di-n-octyl phthalate	ND	96P	β-endosulfan	ND
70B	diethyl phthalate	50	97P	endosulfan sulfate	ND
71B	dimethyl phthalate	ND	98P	endrin	ND
72B	benzo(a)anthracene	ND	99P	endrin aldehyde	ND
73B	benzo(a)pyrene	ND	100P	heptachlor	ND
74B	3,4-benzofluoranthene	ND	101P	heptachlor epoxide	ND
75B	benzo(k)fluoranthene	ND	102P	α-BHC	ND
76B	chrysene	ND	103P	β-BHC	ND
77B	acenaphthylene	ND	104P	γ-BHC	ND
78B	anthracene	ND	105P	δ-BHC	ND
79B	benzo(ghi)perylene	ND	106P	PCB-1242	ND
80B	fluorene	ND	107P	PCB-1254	ND
81B	phenanthrene	ND	108P	PCB-1221	ND
82B	dibenzo(a,h)anthracene	ND	109P	PCB-1232	ND
83B	ideno(1,2,3-cd)pyrene	ND	110P	PCB-1248	ND
84B	pyrene	ND	111P	PCB-1260	ND
85V	tetrachloroethylene	10	112P	PCB-1016	ND
86V	toluene	270	113P	toxaphene	ND
87V	trichloroethylene	ND	129B	2,3,7,8-tetrachlorodibenzo-p-dioxin	ND

ND = Not detected. Unless otherwise noted, limits of detection for Acids (A), Base/Neutrals (B/N), and Volatiles (V) is 5 μg/l and for Pesticides (P) limit is 1 μg/l.

[1]Limit of detection 500 μg/l. [2]Limit of detection 200 μg/l. [3]Limit of detection uncertain (10-100 μg/l).

UTD = Unable to determine by Protocol methods.

SAMPLE I.D.: P79-03-161-1; D. Mixed Richmond Sunset

CUSTOMER: City & County of San Francisco

COMPOUND*	μg/liter
mirex	ND
guthion	ND
methoxychlor	ND
parathion	ND
demeton	ND
malathion	ND

* Additional Organophosphorus pesticides called out for analysis in Federal Register, Vol. 43, No. 80, April 25, 1978.