

SAN FRANCISCO, SAN PABLO AND SUISUN BAYS

HARBOR SAFETY PLAN

Submitted by the
Harbor Safety Committee of the
San Francisco Bay Region

Pursuant to the
California Oil Spill
Prevention and
Response Act of 1990

Adopted August 13, 1992

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INTRODUCTION

The San Francisco Bay Harbor Safety Plan encompasses a series of connecting bays, including the San Francisco, San Pablo and Suisun Bays, and the Sacramento River to the Port of Sacramento and the San Joaquin River to the Port of Stockton. It is almost a hundred miles from the San Francisco lighted horn buoy outside the bay to the Ports of Stockton or Sacramento. The 548-square-mile Bay has an irregular 1,000 mile shoreline composed of a variety of urban and suburban areas, marshes and salt ponds. Several significant islands are within the Bay, including Angel Island, Alcatraz Island, Yerba Buena Island and Treasure Island. Map 1 depicts the geographic boundaries of the area covered by the Harbor Safety Plan.

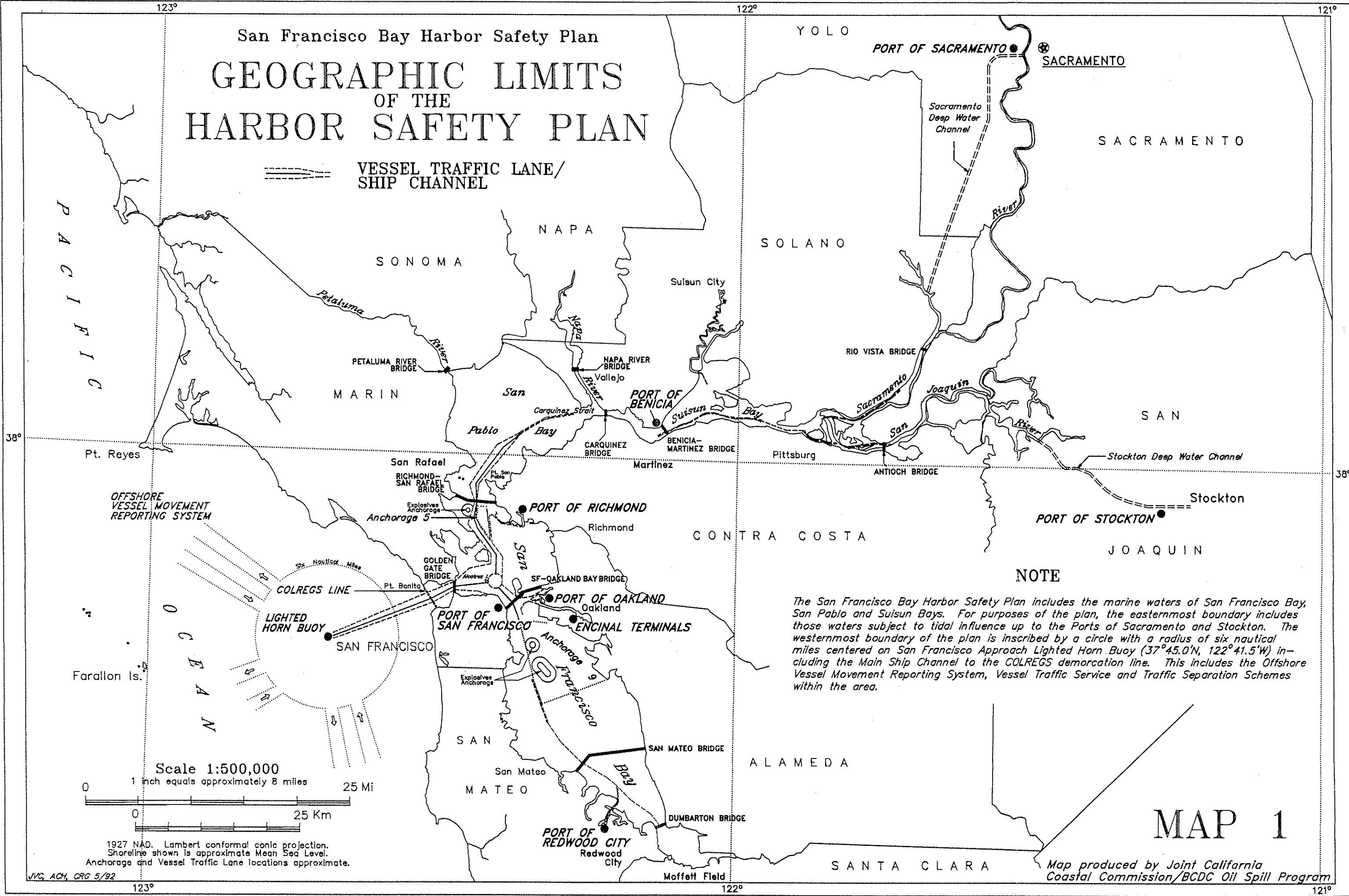
The San Francisco Bay system is the largest estuary along the Pacific Coast of North and South America. Waters from the two major river systems and the Bay flow through a single opening at the Golden Gate Bridge, which is less than a mile wide at its narrowest point. Because of the volume of water moving through the narrow opening on a daily basis, strong tides and currents occur in the Bay. While the Bay is extremely deep (356 feet) by the Golden Gate Bridge because of the swiftly moving volume of water, the Bay is very shallow at its extremities and subject to sedimentation from the rivers emptying into the Bay. Sediment is deposited outside the entrance to San Francisco Bay where a semi-circular bar extends out into the Pacific Ocean. A dredged Main Ship Channel allows deep-draft ships to navigate into the Bay. About two-thirds of the Bay is less than 18 feet deep. The Bay is significantly more shallow due to human alteration. Over a hundred years ago the Bay was larger and deeper prior to the gold mining era. Hydraulic miners pumped vast quantities of muddy tailings silting the streams, rivers and Bay system. As a result, the present Bay has widely varying depths. The Bay bottom is predominantly mud.

The Bay has a number of hazards to navigation, such as strong tides and currents and variable bottom depths, which confine large vessels to specified shipping lanes within the Bay. Navigating the Bay becomes more complex during periods of restricted visibility due to winter storms and fog during the spring months when heavy runoff from melting snows floods the river systems which drain into the Bay. The San Francisco Bar Pilots regularly compile recommended guidelines for safe navigation entitled "Port Safety Guidelines for Movement of Vessels in San Francisco Bay and Its Tributaries" (see Appendix A). The guidelines are sent to members of the shipping industry, and are based on a general consensus among pilots as to recommended navigation practices.

San Francisco Bay Harbor Safety Plan

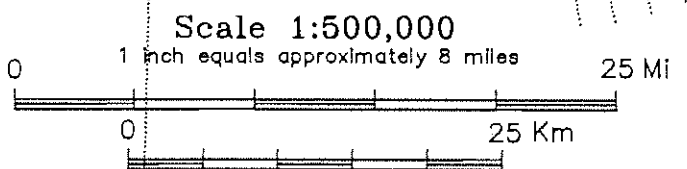
GEOGRAPHIC LIMITS OF THE HARBOR SAFETY PLAN

=====
 VESSEL TRAFFIC LANE/
 SHIP CHANNEL



NOTE

The San Francisco Bay Harbor Safety Plan includes the marine waters of San Francisco Bay, San Pablo and Suisun Bays. For purposes of the plan, the easternmost boundary includes those waters subject to tidal influence up to the Ports of Sacramento and Stockton. The westernmost boundary of the plan is inscribed by a circle with a radius of six nautical miles centered on San Francisco Approach Lighted Horn Buoy (37°45.0'N, 122°41.5'W) including the Main Ship Channel to the COLREGS demarcation line. This includes the Offshore Vessel Movement Reporting System, Vessel Traffic Service and Traffic Separation Schemes within the area.



1927 NAD, Lambert conformal conic projection.
 Shoreline shown is approximate Mean Sea Level.
 Anchorage and Vessel Traffic Lane locations approximate.

MAP 1

Map produced by Joint California Coastal Commission/BCDC Oil Spill Program

The natural harbor of the Bay serves the shipping and fishing industries. There are eight ports, twenty-six marine terminals and a number of naval facilities at Alameda, Treasure Island, Hunters Point, Point Molate, Mare Island, Concord Naval Weapons Station and Moffet Field. In addition, an expanding ferry system annually makes approximately 60,000 trips, mainly to and from San Francisco in the central part of the Bay. Because a substantial portion of the Bay shoreline is urbanized, recreational boating and the growing sport of board-sailing are popular with an estimated 20,000 boat berths around the Bay, exclusive of the Sacramento and San Joaquin Rivers.

The shipping industry is a particularly vital part of the Bay Area economy. Shipping spokesmen estimate that approximately 100,000 jobs are dependent upon the shipping industry and that the industry contributes \$4.5 billion to the economy. In 1991 the Marine Exchange of the San Francisco Bay Region, which tabulates information about shipping in the Bay, reported 3,671 vessel arrivals, of which 1,006 vessels were oil tankers -- 27% of the total inbound vessels. This tally does not include military vessel movements. A list of tankers calling in the Bay in 1991 is listed in Appendix B. According to the Vessel Traffic Service (VTS), which is operated by the Coast Guard, 3,680 military vessel movements occurred in the Bay in 1991. Since this figure includes both in-Bay, intra-Bay and out-Bay movements, some ships may be counted three separate times as a vessel movement. Since there was no separate figure for military vessel arrivals, no direct comparison can be made with commercial vehicle movements tabulated by the Marine Exchange. Also because of the varying depths of the Bay and the significant distances within the Bay, 2,238 shifts or total in-Bay vessel movements occurred in 1991 of which well over half were oil tankers or barges. Because the water depths near refineries in Contra Costa and Solano Counties cannot safely accommodate larger oil tankers, large tankers lighter oil to smaller tankers or barges to move cargo in-Bay to marine terminals. Map 2 identifies the location of marine terminals in the Plan area. Other in-Bay vessels, originating from the U.S. Naval facility at Point Molate near the Richmond-San Rafael Bridge, move an estimated 3.6 million barrels of diesel and jet fuel annually to other naval bases from this location. Other military and contract commercial vessels move explosives to the Concord Naval Weapons Station along the Contra Costa/Solano County shoreline.

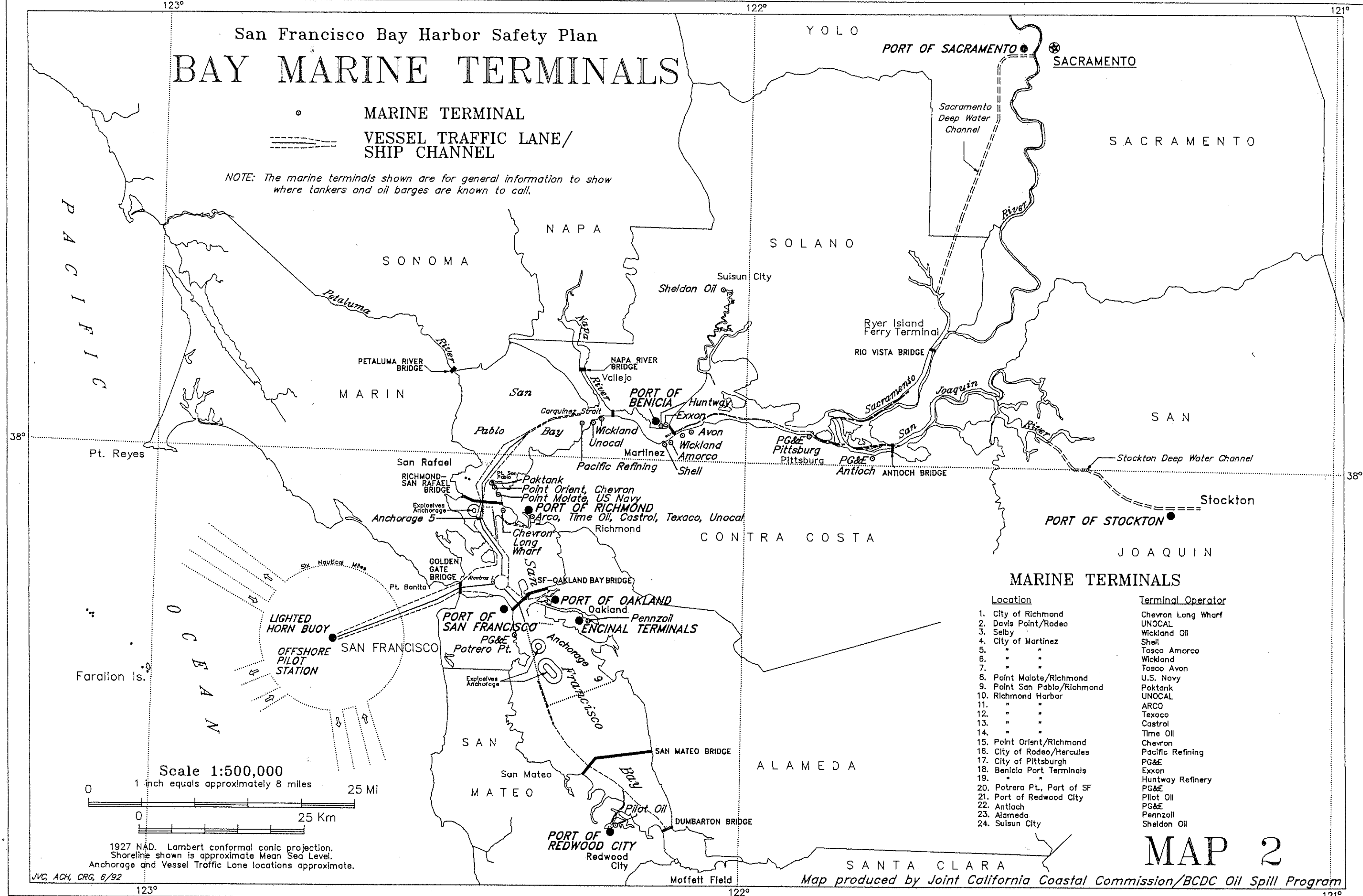
Thus, vessel traffic in the Bay consists of a complex variety of inbound and outbound vessels, wholly in-Bay vessel movements, military vessels, ferry passenger ships, recreational boats, commercial and sports fishing boats, boardsailors and personal watercraft (jet skis) within the series of bays, channels and rivers that comprise the San Francisco Bay planning area.

San Francisco Bay Harbor Safety Plan

BAY MARINE TERMINALS

○ MARINE TERMINAL
 --- VESSEL TRAFFIC LANE/
 SHIP CHANNEL

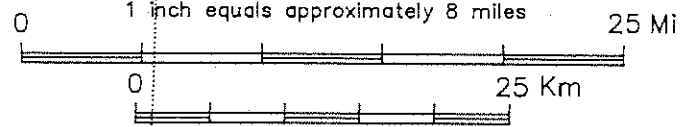
NOTE: The marine terminals shown are for general information to show where tankers and oil barges are known to call.



MARINE TERMINALS

Location	Terminal Operator
1. City of Richmond	Chevron Long Wharf
2. Davis Point/Rodeo	UNOCAL
3. Selby	Wickland Oil
4. City of Martinez	Shell
5. " "	Tosco Amarco
6. " "	Wickland
7. " "	Tosco Avon
8. Point Malate/Richmond	U.S. Navy
9. Point San Pablo/Richmond	Poktank
10. Richmond Harbor	UNOCAL
11. " "	ARCO
12. " "	Texoco
13. " "	Castrol
14. " "	Time Oil
15. Point Orient/Richmond	Chevron
16. City of Rodeo/Hercules	Pacific Refining
17. City of Pittsburg	PG&E
18. Benicia Port Terminals	Exxon
19. " "	Huntway Refinery
20. Potrero Pt., Port of SF	PG&E
21. Port of Redwood City	Pilot Oil
22. Antloch	PG&E
23. Alameda	Pennzoil
24. Suisun City	Sheldon Oil

Scale 1:500,000
 1 inch equals approximately 8 miles



1927 NAD. Lambert conformal conic projection.
 Shoreline shown is approximate Mean Sea Level.
 Anchorage and Vessel Traffic Lane locations approximate.

Harbor Safety Committee of the San Francisco Bay Region

In 1990 the California Legislature enacted the Oil Spill Prevention and Response Act (OSPRA). The goals of OSPRA are to improve the prevention, removal, abatement, response, containment and clean-up and mitigation of oil spills in the marine waters of California. The Act (S.B. 2040) created harbor safety committees for the major harbors of the state of California to plan "for the safe navigation and operation of tankers, barges, and other vessels within each harbor ... [by preparing] ... a harbor safety plan, encompassing all vessel traffic within the harbor." The Harbor Safety Committee of the San Francisco Bay Region was officially sworn in on September 18, 1991 and held its first meeting that date.

The full committee of the Harbor Safety Committee held regular monthly public meetings to assemble the Harbor Safety Plan. The committee chairman appointed a series of subcommittees to review the mandated components of the Harbor Safety Plan. All committee and subcommittee meetings were noticed to the public. Public comments were received throughout discussions of the various issues, which resulted in full public participation in developing the Harbor Safety Plan of the San Francisco Bay Region.

Membership of the Harbor Safety Committee of the San Francisco Bay Region

There are 15 voting and 6 non-voting members of the Harbor Safety Committee. The following is the membership of the Committee as of June 1992:

Port Authorities (4):

David Adams, Chief Wharfinger, Port of Oakland
C. James Faber, Operations Manager, Port of Richmond
Alexander Krygsman, Port Director, Port of Stockton
Roger Peters, Director of Maritime Affairs, Port of San Francisco

Tanker Operators (2):

Morris Croce, Manager, Ports and Navigation, Chevron Shipping Company
Dwight Koops, Ocean Fleet Manager, Exxon Shipping Company

Pilot Organization (1):

Captain Arthur J. Thomas, President, San Francisco Bar Pilots

Dry Cargo Vessel Operators (2):

John C. Gosling, Vice President, Engineering, Matson Navigation Company
James A. Mes, District Manager, Transmarine Navigation Corp.

Commercial Fishing or Pleasure Boat Operator (1):
Margot Brown, President, National Boating Federation

Representative of Recognized Nonprofit Environmental Organization (1):
Ann Notthoff, Senior Planner, Natural Resources Defense Council

Representative of San Francisco Bay Conservation and Development Commission (BCDC) (1):
Joan Lundstrom, Coastal Analyst, San Francisco Bay Conservation and Development Commission

Representative from Recognized Labor Organization Involved with Vessel Operation (1):
Gunnar Lundeborg, President, Sailor's Union of the Pacific

Representative of Barge Operators (1):
James Macaulay, Regional Manager, Marine Operations, Harbor Tug & Barge Co.

Representative of Tug Operators (1):
Mary McMillan, President, Westar Marine Services

Non-Voting Members (6):
Captain J.M. McDonald, U.S. Coast Guard, Captain of the Port
Commander Thomas P. Dolan, U.S. Coast Guard, Commanding Officer, VTS
Max R. Blodgett, Acting Chief, Construction-Operations Division, U.S. Army Corps of Engineers
Captain Thomas Rose, U.S. Navy Harbor Pilot
Joseph A. Gaidstick, Vice President, Benicia Industries
Floyd Shelton, Executive Director, Port of Redwood City

Organization of the Harbor Safety Committee of the San Francisco Bay Region

Chair: Captain Arthur J. Thomas, President, San Francisco Bar Pilots

Vice Chair: Ann Notthoff, Senior Planner, Natural Resources Defense Council

Executive Secretary: Terry Hunter, Marine Exchange of the San Francisco Bay Region

Committee Consultant: Patrick Moloney, California Maritime Academy

Subcommittees:

1. Dredging: Mary McMillan, Chair
2. Harbor Safety Plan: Ann Notthoff, Chair
3. Procedures: Ann Notthoff, Chair
4. Tug Escorts: Roger Peters, Chair
5. Bridge Management: Dwight Koops, Chair
6. Port Construction and Channel Design: David Adams, Chair
7. Vessel Traffic Service: Morris Croce, Chair
8. Pilotage: Alexander Krygsman, Chair
9. Enforcement, Funding and Competitive Aspects: James A. Mes, Chair

SUMMARY OF RECOMMENDATIONS

The Harbor Safety Committee, through its nine subcommittees, has adopted the following recommendations to reduce the risk of oil spills in the San Francisco Bay Region. Each section of the Harbor Safety Plan contains the complete text and background for each recommendation.

WEATHER CONDITIONS

The following are recommended guidelines for safe movement of vessels within the Geographic Boundaries of the Harbor Safety Plan during periods of minimum visibility:

1. Because it may be more dangerous for a vessel to remain offshore in the Pacific Ocean in the approaches to the Bay during periods of restricted visibility, vessels inbound from the Pacific Ocean should continue to proceed from the Pilot Area into the Bay to a safe anchorage.
2. Ships within the Bay at a dock or at a safe anchorage should not commence movement if visibility is less than .5 nautical miles throughout the intended route, unless the Pilot's assessment of all variables listed under general principles is that the vessel can proceed safely. The Pilot's local knowledge should include knowledge of historic weather patterns during that time of year, current weather reports, and checking with reporting stations along the route.

TIDES AND CURRENTS

The Harbor Safety Committee recommends that the following action be taken to improve accuracy of information available to mariners transiting the Bay:

3. Secure funding totaling \$4.2 million for the National Oceanic and Atmospheric Administration (NOAA) to conduct adequate surveys and install state of the art equipment such as the Physical Oceanographic Real Time System (PORTS) for tide and current measurement in the San Francisco Bay Region (see Appendix C). The Committee also recommends that OSPR allocate funds to maintain the system once it is installed (see Appendix D).

DEPTHS AND SURVEYS

4. The Harbor Safety Committee recommends that facility owners/operators conduct comprehensive annual condition surveys noting depths alongside and at the head of their facilities, in accordance with standards set by NOAA, and including any additional information reflecting local pilotage issues.

5. The Committee recommends that the Corps of Engineers immediately initiate surveys for Corps-maintained deep-water navigation channels and that NOAA immediately survey all other channels used by deep-draft vessels or oil barge traffic that have not been formally surveyed within the last five years, with highest priority where known shoaling has taken place. Heavily traveled navigation lanes should be designated by the Corps of Engineers as project areas in order to ensure frequent, up-to-date surveys of channel depths.

6. The Committee recommends that NOAA update its charts in a timely fashion to reflect survey information from NOAA, COE and independent sources. NOAA should devise a system to quickly alert VTS, vessel masters, and pilots when surveyed channel depths vary more than one foot from published NOAA chart depths.

CHANNEL DESIGN AND DREDGING

The Harbor Safety Committee recommends that the following actions be taken to enhance the safe passage of commercial vessel traffic:

7. Reduce areas like Arch Rock, Harding Rock, and Shag Rocks to a minimum of 55 feet depth MLLW to facilitate the establishment of a new two-way Traffic Separation Scheme north of Alcatraz to allow safer navigation of deeply laden shipping.

8. Dredge the western side of Anchorage Area No. 5 and reroute the Traffic Separation Scheme eastward to eliminate the dog leg at buoy "C" of the San Rafael main ship channel in order to maintain proper two-way traffic separation.

HISTORY AND TYPES OF ACCIDENTS AND NEAR-ACCIDENTS

9. The Committee recommends that the Coast Guard and VTS devise a more consistent system of reporting accidents and near accidents standardized with other areas. The annual reports should together be analyzed on an annual basis by the service and a report made to OSPR with recommendations on the effectiveness of harbor safety measures taken.

SMALL VESSELS

The Harbor Safety Committee recommends that the following actions be taken to reduce conflicts between small vessels and commercial shipping:

10. A meeting should be convened by the Harbor Safety Committee with the state OSPR, Fish & Game officials, herring fishermen, port/terminal operators and Coast Guard to discuss ways to avoid conflict in navigational channels. This meeting could result in

yearly pre-season meetings with fishermen, Fish & Game mailers to the fishermen informing them of spill prevention concerns, or other actions.

11. Pilots, Masters and other interested parties should be invited to witness a series of sailboat races from the St. Francis Yacht Club race deck or other appropriate location to obtain a view of events from the competitors' level.

12. Race officials and other interested parties should be invited aboard a large commercial vessel while under way to get the pilots' perspective of racing vessels.

13. The Yacht Racing Association of San Francisco Bay should furnish full annual race schedules to all interested shippers, and, in particular, the Harbor Safety Committee Secretariat for distribution.

14. The Yacht Racing Association should furnish optional courses and rounding marks used by participating entities to interested shippers and the Harbor Safety Committee Secretariat. The Harbor Safety Committee encourages the race committee for each day's event to choose a course compatible with anticipated large vessel traffic.

15. The Coast Guard Auxiliary should observe and report infractions. The U.S. Coast Guard suggested that a mailer be prepared, to be inserted with vessel license renewal notices, advising owners of Inland Steering and Sailing Rules, Rule 9.

CONTINGENCY ROUTING

16. The Harbor Safety Committee recommends that a high degree of cooperation and consultation between pilot organizations, the U.S. Coast Guard, port authorities and appropriate agencies and contractors should continue from the project planning stage through the construction stage of projects that may impact safe navigation in the Bay. The planning stage should include an evaluation of various alternatives to ensure harbor safety.

PUBLIC EDUCATION

The Committee recommends that the following actions be taken to educate waterway users about safe navigation, spill prevention, and the work of the Harbor Safety Committee:

17. Expand the distribution of existing educational pamphlets available from the U.S. Coast Guard. Distribute these educational pamphlets by: enclosing them in the boat registration renewal notices sent to boat owners by the Department of Motor Vehicles in the State of California (A follow-up mailing might also be considered to remind boat owners

of these courses); enclosing them in local boat marina mailings to slip renters (along with monthly billing notices or newsletters); requesting marinas to offer a one-time slip rental rebate for completion of a safe boater course.

18. Encourage vessel operators to document and report violations of the Rules of the Road to the local U.S. Coast Guard office. This would include a direct request to the San Francisco Bar Pilots to assist in this reporting effort.

19. Make public any punitive action taken against offenders by the U.S. Coast Guard. This information should be distributed to local yachting and boating magazines and marina newsletters. In addition, the California Department of Motor Vehicles should distribute a summary of punitive activities to registered boat owners.

20. Support the ongoing efforts of the local U.S. Coast Guard Auxiliary and Power Squadron organizations in their boating education and safety effort.

21. Arrange a meeting with representatives of the San Francisco Boardsailing Association to promote safer navigation in the Bay by discussing a range of issues including Inland Steering and Sailing Rules, Rule 9, race schedules, and possible education efforts.

VEHICULAR BRIDGE MANAGEMENT

The Harbor Safety Committee recommends the following actions be taken to improve navigational safety with regard to bridges:

22. Install energy absorbing fendering systems, vice wood pilings or liners on steel structures, particularly narrow ones.

23. Install bridge clearance gauges where needed, particularly at drawbridges.

24. Install water level gauges at approach points to bridges.

25. Request the Golden Gate Bridge Highway and Transportation District to install a racon (radio beacon) to mark the center of the channel between the towers of the Golden Gate Bridge.

26. Request the Department of Transportation (CalTrans) to install racons in the A-B and D-E spans of the San Francisco-Oakland Bay Bridge.

27. Request the Department of Transportation (CalTrans) and the Golden Gate Bridge Highway and Transportation District to shield bridge floodlights to reduce glare for ships.

SAN FRANCISCO VESSEL TRAFFIC SERVICE

The Harbor Safety Committee recommends that the following actions be taken to enhance the performance and efficiency of the San Francisco Vessel Traffic Service (VTS):

28. Scope of coverage

a) Develop standard VTS traffic management procedures for U.S. ports that conform to international standards. Adopt the U.S. Coast Guard proposed rules for standards and procedures published in a Notice of Proposed Rule Making, Federal Register, August 1, 1991 (Appendix M).

b) Make mandatory the current voluntary participation in VTS for civilian and military vessels and extend required participation to include vessels certified to carry 49 passengers or more (i.e. ferries).

c) Incorporate the provisions of International Rule 10 in the federal regulations regarding VTS (Appendix N).

d) Expand the area of sensor coverage by VTS-SF to monitor the navigable waters of San Pablo Bay north of the San Rafael-Richmond bridge and east of the Carquinez Straits to New York Point and Antioch.

29. Changes in VTS operations and requirements

a) Adopt a dedicated VHF working frequency, Channel 14, for the exclusive use of VTS-SF ship/shore communication system. Channel 13 should continue to be monitored and used for ship/ship communications.

b) Adopt pre-designated anchorage areas within the existing general anchorages throughout the VTS-SF area as defined in Section A, and in particular within general anchorage No. 9 so that safer and more disciplined anchoring practices may be managed by VTS-SF with due consideration for pilot and vessel master concerns.

c) Upgrade the current equipment used by VTS-SF to include state-of-the-art technology (see Appendix O).

RADIO COMMUNICATIONS

The Harbor Safety Committee makes the following recommendations about communication practices in San Francisco Bay:

30. The Harbor Safety Committee supports the Coast Guard's efforts to shift the primary VTS channel to Channel 14 in order to avoid congestion on Channel 13.

31. The Harbor Safety Committee recommends the acquisition of adequate backup power supplies for the San Francisco Bar Pilots and San Francisco Marine Exchange communications systems. At a minimum, portable diesel generators obtainable commercially should be procured and arrangements made to provide means of powering minimal lighting and communications circuits.

TUG ESCORTS

32. The Harbor Safety Committee submitted a set of Interim Tug Escort Guidelines, adopted March 12, 1992, to the State Office of Oil Spill Prevention and Response. An abridged version of the guidelines appears below.

•Tug escorts shall be required of vessels carrying five thousand metric tons or more of oil or other petroleum products (as defined in S.B. 2040) as cargo, (double hull vessels are exempt).

The Harbor Safety Committee has established a zoning system for tug escorts. Tug escorts shall be required when a Regulated Vessel is underway in the following areas:

•From the Golden Gate Bridge, south to a line between the southern tip of Bay Farm Island and the southeastern tip of Point San Bruno Peninsula and north to Point San Pablo.

•From one mile north of and to one mile south of the San Mateo Bridge.

•From Light 15, through the Carquinez Strait, north on the Sacramento Ship Channel to one mile beyond the Ryer Island Ferry Terminal and east on the San Joaquin River to one mile beyond the Antioch Bridge.

Standby Tug Escort(s) shall be required to be on standby status within an area three miles east of the Golden Gate Bridge when a Regulated Vessel is the area from the offshore Pilot Station, eastward to the Golden Gate Bridge.

Operations

•Regulated Vessels in Zones requiring Tug Escorts shall not exceed the speed at which their Tug Escort(s) can render assistance.

•Escort Tugs shall maintain a station-keeping distance of no more than one-half mile from their Regulated Vessel while engaged in escort activity.

•Regulated Vessels shall have sufficient and qualified line-handling-capable crew members standing by available to immediately receive lines from each Tug Escort(s).

Minimum Requirements for Escort Tugs and Crews

•Escort Tugs shall meet prescribed minimum equipment standards which shall be established. Escort Tugs shall have their static bollard pull measured, inventoried and published by the Central Clearing House.

•Tug escort crews shall be certified by the Department of Fish & Game as meeting minimum training requirements and educational program completion.

Formula for Matching Tugs to Vessels

•Tug Escorts shall be capable of providing a total ahead static bollard pull in pounds equal to the Regulated Vessel's deadweight tonnage.

•A naval architecture consultant was retained in June 1992 to develop a scientific formula for linking tug escort bollard pull to the dead weight tonnage of tankers and identify minimum tug equipment standards specific to the escort function. The report is under consideration by the Committee.

Central Clearing House

•A central clearing house shall be responsible for the measurement and publication of tug boat bollard pull, be the organization which shall maintain an inventory of Escort Tugs as well as their real-time availability, and be the organization which shall monitor and document compliance with Tug Escorting regulations and report violations to the Department of Fish and Game and U.S. Coast Guard.

PLAN IMPLEMENTATION AND ENFORCEMENT

33. The Committee recommends that the Coast Guard and the Department of Fish and Game work together to coordinate with each other, and with other state and local agencies, their policies, procedures, and regulations. The Coast Guard is the primary enforcement agency for federal regulations, and the State Department of Fish and Game is the primary enforcement agency for state regulation.

I. GEOGRAPHIC BOUNDARIES

The policies and recommendations contained in the San Francisco Bay Harbor Safety Plan address vessel safety in the marine waters of San Francisco, San Pablo and Suisun Bays. For purposes of the Harbor Safety Plan, the eastern boundary includes those waters subject to tidal influence up to the Ports of Sacramento and Stockton. The western boundary of the plan is inscribed by a circle with a radius of six nautical miles (nm) centered on San Francisco Approach Lighted Horn Buoy SF (37°45.0'N., 122°41.5'W.) including the Main Ship Channel to the COLREGS demarcation line (see Map 1). This includes the Offshore Vessel Movement Reporting System, Vessel Traffic Service and Traffic Separation schemes within the area. The following NOAA charts cover the Harbor Safety Plan area:

- #18645-----Gulf of the Farallones
- #18649-----Entrance to San Francisco Bay
- #18651-----San Francisco Bay Southern Part
- #18654-----San Pablo Bay
- #18656-----Suisun Bay
- #18661-----Sacramento and San Joaquin Rivers
(Stockton)
- #18662-----Sacramento River (Sacramento)

It should be noted the following plan elements apply to a smaller geographic area as follows:

Vehicular Bridge Management (§ V): The westernmost boundary is the COLREGS Demarcation Line, between Pt. Bonita and Mile Rocks, and the easternmost boundary includes the Rio Vista Bridge over the Sacramento River and the Antioch Bridge over the San Joaquin River. Vehicular bridge recommendations are discussed in section V.

Tug Escort (§ VIII): The easternmost boundary of the tug escort area is one mile beyond the Ryer Island Ferry Terminal and on the San Joaquin River one mile beyond the Antioch Bridge. Recommended zones for tug escorts are described in section VIII.

II. GENERAL WEATHER, TIDE AND CURRENT, AND DEPTH CONDITIONS

San Francisco Bay is the largest harbor on the Pacific coast of the U.S. It is made up of a series of connecting bays and harbors, of which San Francisco Bay, San Pablo Bay and Suisun Bay are considered jointly for the purposes of the San Francisco Bay Harbor Safety Plan. Most of the information presented here has been derived from the U.S. Coast Pilot, Pacific Coast, 25th Ed., 1989. It is augmented with observations from local sources.

Ships traveling into the Bay encounter diverse weather, currents, tides and bottom depths. Because of the often varied and changing set of harbor conditions, mariners must be observant about up-to-date conditions to navigate safely. For example, while the heaviest rains occur in January and February, spring is the windiest season; fogs frequently shroud the narrow sea lanes around the approach to the Golden Gate Bridge and the Carquinez Strait; heavy rip tides and currents occur in the Central Bay; shoals may shift into navigation lanes. Knowledge of these factors is essential to understanding navigation in the Bay.

The movement of vessels in San Francisco Bay should be guided by certain general principles.

- o The safe navigation of the vessel shall be the duty of the Master who shall have full command of the vessel, whether or not a Pilot is on board. With a Pilot on board, it shall be the duty of the Master and Pilot to fully comply with all safety and navigational provisions of applicable state, federal and international regulations for safe navigation.
- o Nothing in the guidelines shall require a Master or Pilot to move any vessel in any condition unless the Master and the Pilot of the vessel agree that the movement can be safely accomplished.
- o The decision-making process by the Master or Pilot shall consider all relevant factors, including, but not limited to:
 - + The characteristics of the vessel, such as maneuverability, size and draft;
 - + The quality of the vessel's radar capabilities;
 - + Tide, current, and wind conditions on the intended route;

- + Time of the day in relation to whether the fog may be in a cycle of "burning off" or lifting;
 - + Possible hazards along the route, such as bridges, and amount and nature of vessel traffic; and
 - + Visibility conditions at the dock, en route and at the destination, and assessment of whether these conditions are changing.
- o The Master and Pilot must be allowed the flexibility to cautiously proceed during periods of minimum visibility if deemed prudent based upon the Pilot's local knowledge of the Bay, including localized weather patterns, and the assessment of the factors outlined above in relation to the specific route to be taken.

A. Weather

1. Winds. Bay Area weather is seasonably variable with three discernable seasons for marine purposes.

Winter. Winter winds from November to February shift frequently and have a wide range of speeds dependent on the procession of offshore high and low pressure systems. Calms occur between 15 and 40% of the time inside the bay and 10 to 12% outside. Extreme wind conditions of 50 knots gusting to 75 knots have occurred during the winter. The strongest winds tend to come from the Southeast to Southwest ahead of a cold front.

Spring. Spring tends to be the windiest season with average speeds in the bay of 6-12 knots per Coast Pilot. Extremes are less likely than during the winter but wind speeds from 17-28 knots occur up to 10% of the time. The approaches to the Golden Gate receive heavier weather and may experience the 17-28 knot winds up to 40% of the time. Wind direction stabilizes as the Pacific High Pressure System becomes the dominant weather influence. Northwesterly winds are generated and reinforced by the sea breeze. Inside the Bay winds are channeled and vary from Northwest to Southwest.

Summer. Summer winds are the most constant and predictable. The winds outside the Golden Gate are normally from Northwest to North and are generated by the strong Pacific High. This condition lasts through October until the system weakens and the winter cycle starts again. Winds inside the Bay are local depending on the land contours acting on the onshore flow. One of the few occurrences that will alter this pattern is when a high pressure system settles over Washington and Oregon. When that happens a Northeast flow develops bringing warm dry air with

it. This will clear away the summer fog but also dries the landscape and increases fire dangers.

Safety Issues Associated with Winds. Adverse wind conditions may cause ships at anchor, such as at Anchorage 9, to change position and drag anchor away from the intended mooring position. Winds in San Pablo Bay may be particularly strong and must be taken into consideration by tankers transiting to oil terminals along the Contra Costa County shoreline. Apparent significant discrepancies exist in the reported winds noted in the Coast Pilot and observations made by local professional mariners and recreational boaters. Possible causes for this are the locations of reporting sites on land where deflection and channeling of wind provides data at variance with conditions on the water.

2. Fog. Fog is a well known problem in the Bay Area, particularly around the Golden Gate. It is most common during the summer, occasional during fall and winter, and infrequent during spring. Unfortunately the long-term fluctuations are not predictable but daily and seasonal cycles are.

Summer. Summer fog is dependent on several routine conditions. The Pacific High becomes well established off the coast and maintains a constant Northwest wind. It also drives the cold California Current south and causes an upwelling of cold water along the coast. Air closest to the surface becomes chilled so that the temperature increases with altitude. This forms an inversion layer at about 500-1500 feet. Moist, warm ocean air moving toward the coast is cooled first by the California Current, then more by cold coastal water. Condensation occurs and fog will form to the height of the inversion layer. This happens often enough to form a semipermanent fog bank off the Golden Gate during the summer. Under normal summer conditions a daily cycle is evident. A sheet of fog forms off the Golden Gate headlands during the morning and becomes more extensive as the day passes. As the temperature in the inland valleys rise, a local low pressure area is created, and a steady indraft takes place. By late afternoon the fog begins to move through the Golden Gate at a speed of about 14 knots on the afternoon sea breeze. Once inside the bay it is carried by local winds. In general the north part of the bay is the last to be enveloped and the first to clear in the morning. There are times when the flow is so strong that the sea fog penetrates as far east as Sacramento and Stockton. If it continues for a few days, cooler ocean air replaces the warm valley air and causes the sea breeze mechanism to break down. Winds diminish and the Bay Area clears for a few days. Slowly the valley reheats and starts the cycle again.

Winter. Winter fogs are usually radiation fog or "tule" fog. With the clear skies and light winds, land

temperature drops rapidly at night. In low damp, places such as the Delta and central valley (where tules and marsh plants grow) it results in a shallow radiation fog (moist sea air reacting to cold land mass) which may be quite dense. In contrast to the summer fog that moves from sea to land at about 14 knots, the winter tule fogs move slowly seaward at about 1 knot.

Fog patterns can differ within the Bay region on the same day because of the unique geography of the Bay, which consists of two mountain ranges, the large expanse of bays, and a major river system. For example, on a summer day, a ship going under the Golden Gate Bridge may be in dense fog, while Benicia, its destination some thirty miles away, may be in bright sunshine. Conversely, on a winter day, tule fogs may completely obscure the Carquinez Strait, while high fog or sunshine may occur in the Central Bay. This phenomenon is more completely described in the book, Weather of the San Francisco Bay Region, by Harold Gilliam. Gilliam characterizes Bay region weather as: "Probably no comparable area on earth displays as many varieties of weather simultaneously as the region around San Francisco Bay.... Because of these complex forms of the land, there is actually no such thing as Bay Region climate."

Bay fog patterns occur in daily, weekly and seasonal cycles. A daily cycle might occur during the summer when fog rolls in from the cool ocean over gaps along the coastal hills at night, to be "burned off" by the morning sun. The incoming cool, heavy sea air begins to replace the rising, warm land air, and the valley nearest the Bay cools off. When the valley cools sufficiently, the fog system breaks down and the area will be fog-free for a few days until the entire process begins again. This cycle can continue weekly. However, depending on the location, an area may experience high fog, dense fog or relatively little fog. Depending upon high and low pressure systems over the continent, these cycles may be erratic.

Safety Issues Associated with Adverse Weather

Conditions. Reduced visibility during periods of fog requires that mariners observe caution particularly when going under the bridges spanning the Bay. At times shipping is stopped in the Carquinez Strait when low fog reduces visibility to unsafe distances. Generally during periods of dense fog, ships remain at their dock. If a ship is underway, the decision might be made to anchor until there is improved visibility. In addition, radar targets may be difficult to obtain during periods of decreased visibility, especially images of small vessels. Due vigilance must be used in the more heavily traveled navigation lanes, where deep draft vessels cross movements with other large vessels. Notwithstanding, the Captain of the Port has the authority to prohibit movement of vessels within all or portions of the Bay during adverse weather conditions.

RECOMMENDATIONS

The following are recommended guidelines for safe movement of vessels within the Geographic Boundaries of the Harbor Safety Plan during periods of minimum visibility:

1. Because it may be more dangerous for a vessel to remain offshore in the Pacific Ocean in the approaches to the Bay during periods of restricted visibility, vessels inbound from the Pacific Ocean should continue to proceed from the Pilot Area into the Bay to a safe anchorage.
2. Ships within the Bay at a dock or at a safe anchorage should not commence movement if visibility is less than .5 nautical miles throughout the intended route, unless the Pilot's assessment of all variables listed under general principles is that the vessel can proceed safely. The Pilot's local knowledge should include knowledge of historic weather patterns during that time of year, current weather reports, and checking with reporting stations along the route. This guideline acknowledges that the Bay region is a series of bays and rivers, in-Bay distances are long and that there is not a single Bay region climate, but a series of many microclimates with variable fog patterns.

B. Tides and Currents

1. Currents. The currents at the entrance to San Francisco Bay are variable, uncertain and at times attain considerable velocity. Immediately outside the bar is a slight current to the North and West known as the Coast Eddy Current. The currents which have the greatest effect on navigation in the bay and out through the Golden Gate are tidal in nature.

- 1) Golden Gate Flood Current. In the Golden Gate the flood or incoming current sets (direction of flow) straight in with a slight tendency to the North shores and with heavy turbulence at both Lime Point and Fort Point when the flood is strong (this causes an eddy or circular current between Point Lobos and Fort Point).

- 2) Golden Gate Ebb Current. The ebb or outgoing current has been known to reach more than 6.5 knots between Lime and Fort Points. It sets from inside the North part of the Bay toward Fort Point. As with the flood, it causes an eddy between Point Lobos and Fort Point, and a heavy rip and turbulence reach a quarter of a mile south of Point Bonita.

- 3) Golden Gate Current Maximums. In the Golden Gate the maximum flood current occurs about an hour and a half before high water, with the maximum ebb occurring about an hour and a

half before low water. The average maximums are 3 knots for the flood and 3.5 kts for the ebb.

4) Inner Bay Currents. Inside the Golden Gate the flood sets to the Northeast and causes swirls and eddies. This is most pronounced between the Golden Gate, Angel Island, and Alcatraz Island. The current sets through Raccoon Strait (north of Angel Island) taking the most direct path to the upper bay and the delta area. The ebb current inside the Golden Gate is felt on the South shore first. The duration of the ebb is somewhat longer than the flood due to the addition of runoff from the Sacramento and San Joaquin River systems.

2. Tides. Tides in the San Francisco Bay Area are mixed in that there are usually two cycles of high and low tides daily but with inequality of the heights of the two. Occasionally the tidal cycle will become diurnal (only one cycle of tide in a day). As a result, depths in the Bay are based on "mean lower low water" (MLLW) which is the average height of the lower of the two daily low tides. The mean range of the tide at the Golden Gate is 4.1 feet, with a diurnal range of 5.8 feet. During the periodic maximum tidal variations the range may reach as much as 9 feet and have lowest low waters 2.5 feet below mean lower low water datum.

Safety Issues Associated with Current and Tide Conditions. This is a general description of the tidal current situation in the Bay Area. Unfortunately, there are no valid tidal current charts in effect. In late 1991, the National Oceanic and Atmospheric Administration (NOAA) withdrew the local tidal current charts from use due to significant errors in predictions and because the errors exceeded NOAA standards. Because of the variable depths of the Bay, safe navigation is highly dependent upon accurate tidal and current charts. This may impact the reliability of the tide tables. As a result mariners are "proceeding with caution" until the charts and tables are updated.

RECOMMENDATIONS

NOAA is addressing the problem of inaccurate tide and current information but faces severe problems in funding. The agency anticipates there will be a two-year time delay in gathering data.

3. The Harbor Safety Committee supports the efforts to increase funding to NOAA and has submitted a resolution to the California Congressional Delegation seeking funding totaling \$4.2 million for NOAA to conduct adequate surveys and install state of the art equipment such as the Physical Oceanographic Real Time System for tide and current measurement (see Appendix C). The Committee has

also proposed that OSPR allocate funds to maintain the system once it is installed (see Appendix D). Ongoing efforts to secure funds will be required.

4. The Committee concurs with the U.S. Coast Guard that, in addition to the NOAA surveys, facility owners/operators should conduct annual condition surveys noting depths alongside and at the head of their facilities. These surveys should be conducted in accordance with standards set by NOAA and finalized at the end of the year for chart and publication updates. Additional information by NOAA should reflect local pilotage issues such as currents, tidal ranges, depth of water needed to safely navigate to and alongside facilities and piers, unique meteorological conditions and aids to navigation maintained by the facility. The most updated information should be published in the Coast Pilot to reflect changed conditions, particularly relating to hazards to navigation.

5. The Committee recommends immediate surveys by the Corps of Engineers for Corps-maintained deep-water navigation channels and by NOAA for all other channels used by deep draft vessels or oil barge traffic that have not been formally surveyed within the last five years. Heavily traveled navigation lanes should be designated by the Corps of Engineers (COE) as project areas in order to ensure frequent, up-to-date surveys of channel depths. Of highest priority are those areas where known shoaling has taken place and where changes in bottom contours have been reported to differ by more than one foot from NOAA charts. Such areas would include shoaling areas east of Alcatraz and west of the Oakland Harbor.

6. The Committee further recommends that NOAA update its charts in a timely fashion to reflect survey information from NOAA, COE and independent sources. When surveyed channel depths vary more than one foot from a NOAA chart, such information should be provided to VTS (Coast Guard), masters and pilots of deep-draft vessels as soon as available. NOAA should improve the frequency of published data on channel depths in areas heavily trafficked by oil tankers and barges. NOAA should devise a system to quickly alert VTS, masters and pilots.

C. Depths

Water depth in the Bay Area is generally shallow and subject to silting from river runoff and dredge spoil recirculation. Economic pressures are causing mariners to navigate in waters of marginally adequate depth basing their keel clearances on charted depths and predicted tidal levels. As noted above, the information provided for tidal prediction is not accurate and unfortunately the same conditions may prevail for charted depths.

1. Surveys. Specific areas with high interest levels are surveyed on a frequent basis. The last general surveys of the Bay Area were completed as follows:

San Francisco Bay, North Part	Late 1970's
San Francisco Bay, Middle Part	Early 1980's
San Francisco Bay, South Part	Mid 1980's
San Pablo Bay	1983-4
Suisun Bay	Late 1980's

Source: Index of Hydrographic Surveys 1978-1991, San Francisco Bay and Vicinity.

2. Variables. Even charts based on modern surveys may not show all seabed obstructions or shallow areas due to mobile bottoms (due to localized shoaling). The hydrodynamics of the Bay estuary change because of a variety of factors such as drought and flood cycles, dredging projects, and in-Bay dredge disposal which may affect navigation channels. It is possible that strong seismic events may shift shoals in more narrow channels. Recent observations have indicated that manmade channels may be influencing tidal currents to a greater degree than anticipated with consequent effect on silting. There are additional indications that not as much dredge spoil deposited in the Alcatraz dump site may be making its way to sea as estimated, causing alterations in the bottom topography and silt recirculation in the north and middle San Francisco Bay regions. It is thought that a recent shoal near the navigation channel east of Alcatraz Island may be caused by the migration of dredge spoils initially deposited at the Alcatraz dump site, which is southwest of the island.

Navigational Safety Issues Associated with Channel Depth. Deep draft vessels in the Bay must carefully navigate many of the main shipping channels because channel depths in some areas are just sufficient for navigation by some of the modern larger vessels, depending upon how deeply laden the vessel is. Groundings have been reported mostly in the Sacramento and San Joaquin River Channels and near the Southampton Shoals (see Appendices D and E for accidents and near-misses in the Bay). Groundings are not generally considered hazardous in terms of a ship breaking up since most of the Bay bottom is mud. However, there are submerged rock outcroppings in the Bay where groundings might split open the hull of a ship. More importantly, the maneuvering of deep draft ships in channels with marginal depths may pose higher navigational risks, given the complexities of tides, currents, and weather conditions in the Bay.

Underkeel Clearance. Many of the navigation channels within the Bay are subject to shoaling because of the nature of the Bay system which is more fully described in the section on channel design and dredging. Accurate tidal information is

essential in order to calculate required underkeel clearances. This is particularly critical in the Bay region where one-foot clearances may occur in certain channels. The committee reiterates its support for "real time" accurate measurement of tides, such as the PORTS system recommended in the section on Tides and Currents. Guidelines for underkeel clearances will be analyzed and recommendations will be made in future updates of the Harbor Safety Plan.

III. HARBOR CONDITIONS

A. Channel Design and Dredging

San Francisco Bay is one of the world's greatest natural harbors. The tributary of rivers and streams that empties into San Francisco Bay carry large quantities of silt into the harbors and shipping channels of the Bay. Therefore, channel depths must be regularly maintained and shoaling must be prevented in order to accommodate deeper draft vessels. Maintenance dredging accounts for approximately 5,000,000 cubic yards of sediments dredged from the Bay each year, not including maintenance dredging of the Sacramento and San Joaquin ship channels. Beginning in 1868, Congress passed the River and Harbor Act and the federal government began dredging a channel to create a main ship channel. Actual channel depths may vary from project depths and must be checked with the most recent hydrographic surveys. Presently the project depth of the main ship channel from the Pacific Ocean into the Bay is 55 feet deep and 2,000 feet wide (U.S. Army Corps of Engineers, 1991). However, continual sedimentation flowing out of the river systems into the ocean creates main channel depths ranging between 49 and 55 feet. According to the U.S. Army Corps of Engineers, there are no current plans to change the entrance channel width or depth within the next decade. The depth of the main channel limits the draft of vessels able to enter the Bay.

During the past century the federal government deepened a number of shipping channels, removed various shoals, and topped rocks near Alcatraz Island. Present channels leading to the various Bay Area ports are at project depths ranging from 35 feet MLLW to 45 feet MLLW. In 1987 the Port of San Francisco dredged two approach channels to the south container terminal to a depth of 42 feet MLLW. The Redwood City Harbor project was first authorized for dredging by the federal government in 1910. The 30 foot deep channel includes turning basins (U.S. Army Corps of Engineers, 1991). The Port of Redwood City and Leslie Salt Company also extended the channel. At the Port of Oakland the federal government began improvement of the harbor in 1874. The project depth of the entrance channel to Oakland Outer Harbor is 35 feet. The project depth of the entrance channel to Oakland Inner Harbor is 38 feet deep to the Park Street Bridge (U.S. Army Corps of Engineers, 1992) but conditions vary. Richmond Harbor has been under improvement by the federal government since 1917. The project includes a 45 foot deep project depth channel, 600 foot wide channel from adjacent to Southampton Shoal to the Richmond Outer Harbor, a 45 foot deep maneuvering area at Richmond (Chevron) Long Wharf, and a 35 foot deep Inner Harbor entrance channel (U.S. Army Corps of Engineers, 1991). The City of Richmond and other local interests have made other navigation improvements.

To the north, navigation channels in San Pablo Bay and Mare Island Strait have been improved by the federal government beginning in 1902 (U.S. Army Corps of Engineers, 1991). A 600 foot wide, 11 mile long channel, with a project depth of 45 feet, extends through San Pablo Bay to Carquinez Strait. The Suisun Bay Channel in the Carquinez Strait has a project depth from 30 to 40 feet. To the east the Suisun Bay Channel is 35 feet deep to the mouth of the New York Slough.

To accommodate the present generation of container ships and tankers, within the next ten years the Corps includes plans to deepen the Oakland Inner Harbor Channel, the Richmond Inner Harbor Channel and the Baldwin Ship Channel between the Carquinez Bridge and the Benicia-Martinez Bridge (U.S. Army Corps of Engineers).

Navigational Issues Associated with Channel Design and Dredging. Harding, Arch, and Shag Rocks are large submerged rocks located approximately one to one and a quarter miles northwest of Alcatraz Island. The tops of the rocks are 33 feet and 36 feet respectively below the surface of the water. The submerged rocks are within the outbound navigation lane of the shipping channel which passes north of Alcatraz Island which is designated one way for vessels going out to sea. Inbound vessels sail south of Alcatraz Island. However, ships with a draft of more than 38 feet sail north of Alcatraz in the outbound navigation lane, contrary to the published traffic lane, in order to maintain safe depths in the deeper waters within this area and to avoid an area congested with small boat traffic. Harding, Arch, and Shag Rocks were lowered some decades ago for the shipping lanes, but today's large tankers and container ships have deeper drafts and now must avoid the submerged rocks. Lowering the rocks to accommodate the most modern ships would help create sufficient depths for a new two-way navigation lane north of Alcatraz Island.

In addition to the problem of insufficient channel depths near the submerged rocks off Alcatraz Island, channel depths in an area south of the Richmond-San Rafael Bridge pose a hazard to navigation. The West Richmond Channel is a segment of the Baldwin Ship Channel located a few miles south of the Richmond-San Rafael Bridge where ships maneuver to transit under the bridge, sailing north principally to the refineries along the Contra Costa and Solano County shorelines. The concern is to have sufficient channel width to line up a vessel to clear the supports of the Richmond-San Rafael Bridge. If the "dog leg" were dredged at this time to 35 feet, the Corps of Engineers estimates that minimal dredging would be involved, as much of the area in question is now at that depth. The West Richmond Channel is scheduled to be deepened to 45 feet in 1994; the deepening

project would involve the removal of 700,000 cubic yards of material.

RECOMMENDATIONS

7. Establish a new two-way Traffic Separation Scheme north of Alcatraz to allow safer navigation of deeply laden tankers. Several areas, such as Harding, Arch, and Shag Rocks, should be reduced to a minimum of 55 feet depth MLLW.

8. Eliminate the dog leg at buoy "C" of the San Rafael main ship channel in order to maintain proper two-way traffic separation. The Traffic Separation Scheme should be re-routed eastward after due dredging of the western side of Anchorage Area No. 5. This recommendation, along with all others in this Plan, should be the subject of a complete environmental analysis and examination of alternatives before implementation.

B. Anchorages

Because of the extent of the Bay, a number of federally designated anchorages have been established in the San Francisco, San Pablo, Suisun Bays and the San Joaquin and Sacramento Rivers. The Coast Pilot 7, Twenty-fifth Edition, 1989, lists the area's anchorages and limitations (see Appendix E).

Within the Anchorage 9 area, few marine casualties and near-misses have been reported during the past three years. Most incidents involved mechanical failure, but one grounding occurred. Two tankers had a minor collision while lightering at Anchorage 9, but no oil pollution occurred. This is discussed in more detail in the VTS section.

Because of the number of active military bases situated around the Bay, the Coast Guard has established several explosive anchorages, primarily within Anchorages 5 and 9 (see Map 1). The anchorages are used at specified times for ammunition ships, such as during the recent Persian Gulf war. Notice of activation of an explosive anchorage is made in the Coast Guard Notice to Mariners to advise vessels not to anchor within the area while vessels are loaded with, loading or unloading explosives.

IV. VESSEL TRAFFIC PATTERNS

A. Ship Traffic

A wide variety of commercial and military vessels enter, exit and transit the Bay. Many vessels, such as barges and small tankers, remain entirely within the Bay because of the shallower depth of much of the Bay and the distances between facilities. The number of ship movements is more fully described on page two of this report. As reported by the San Francisco Bay Region Marine Exchange for calendar year 1991 foreign flag vessels outnumber American vessels by a ratio of 2:1. Full container ships, oil tankers and bulk carriers account for the greatest percentage of ship arrivals. Other categories of ships include vehicle carriers, break bulk, chemical tankers and passenger ships. Types of military vessels include aircraft carriers; surface combatants; naval auxiliaries such as oil tankers, supply ships and ammunition ships; and submarines.

The precise amount of oil shipped annually into and within the Bay is difficult to determine. A military spokesperson estimated that approximately 3.6 million barrels of diesel and jet fuel is transported into and around the Bay for military purposes. Diesel fuel arrives in tankers, while jet fuel arrives in an overland pipeline to Point Molate in Contra Costa County. Regarding commercial shipments of oil, federal staff responsible for carrying out the Oil Pollution Act of 1990 recently studied U.S. ports where high volumes of oil movement occurred. Based on an analysis of oil movements in United States ports during the past five years, San Francisco Bay ranked seventh in the volume of oil transported. 40,154,200 tons of oil were transported by water. In comparison, Los Angeles/Long Beach Harbor handled 47,319,100 tons during the same period and ranked fifth in the United States in this category. Another measurement of oil movement was a weighted index of oil volumes and amount of vessel traffic. By this measurement San Francisco Bay oil movements were the same as Valdez, Alaska, ranking third highest in the United States after New York and Houston/Galveston Harbors.

B. Lightering.

Because of the shallower depths of portions of the Bay near marine terminals along the Contra Costa and Solano County shorelines, a number of large oil tankers lighter oil to smaller ships. Lightering is the process of unloading oil from a larger ship into smaller ships in order to reduce the draft of the larger ship. The larger tanker can then proceed to the marine terminal and continue unloading the balance of its cargo. Lightering primarily takes place at Anchorage 9, just south of the Bay Bridge.

It is estimated that approximately 10 to 15 lightering operations take place monthly at Anchorage 9, primarily by Exxon Shipping Company. Companies such as Exxon are members of Clean Bay Cooperative and arrange to have Clean Bay station a skimmer boat at Anchorage 9 during the lightering operation. Nonmember companies generally contract with Clean Bay to provide this stand-by service in order to provide immediate response in case of an oil spill. The 58 foot-long Clean Bay skimmer boat has 2,000 to 3,000 feet of boom on board capable of ready deployment. Additional boats can be contracted to be at Anchorage 9 to provide an additional level of oil spill containment capacity.

C. History and Types of All Accidents and Near-Accidents Occurring within the Bay During the Past Three Years.

Accidents. The Coast Guard compiles reports of marine accidents or reportable casualties of commercial, military and recreational vessels. A "reportable casualty" is defined in Title 46, Part 4, Code of Federal Register as grounding, loss of primary steering or propulsion or associated control system, the seaworthiness of a vessel is adversely affected or fitness for service, loss of life, injury beyond first aid, and damages over \$25,000. Appendix F contains marine casualties which occurred within the geographic boundaries of the San Francisco Bay Harbor Safety Plan for 1988 through 1990, with partial data for 1991 and 1992. Coast Guard personnel caution that the primary cause listed for marine accidents is subjective in nature and the data cannot be compared from year to year. A compilation of tanker and barge accidents, taken from Coast Guard records, is presented in Appendix G.

Six major bridges span Bay ship channels, connecting various populated areas of the Bay. The bridges are important traffic connectors whose underpilings must be carefully navigated by large vessels. Because of the importance and potential hazard of bridges, an accident record was compiled of all vessel collisions with bridges for the past ten years. Appendix H summarizes bridge accidents for 1981 through 1991 from California Department of Transportation (Caltrans) and Golden Gate Bridge Highway and Transportation District records.

Near-Accidents. The Vessel Traffic Service (VTS), managed by the U.S. Coast Guard, summarizes near-accidents or close calls reported within the area covered by VTS. See Appendices F and H for a complete listing of bridge accident locations. Possible near-accidents may not be reported outside VTS boundaries as well as accident occurrences within the VTS area. Appendix I contains the reports for calendar years 1989 through 1991. The summary is not inclusive of all possible incidents and does not cover the entire geographic area of the Harbor Safety Plan. Incident reports are designed to include near collisions, vessels impeding progress of other vessels, and violations of rules of the road.

VTS personnel emphasize that categorizing an incident as a near-miss is a subjective determination based on available information.

Analysis and Actions Taken to Alleviate Reoccurrences.

With the exception of the Golden Gate Bridge, all major Bay bridges have been struck by vessels within the past ten years. The most serious recent accident relative to a potential major oil spill occurred in 1988 when a 57,692 ton oil tanker hit the Carquinez Bridge, creating a 200-foot-long split in the ship's hull, exposing several oil tank compartments. However, because the tanker emptied its load of crude oil at a refinery along Carquinez Strait a few hours earlier, a major oil spill did not occur. A representative of Caltrans stated that a radar beacon (racon) device was installed on the Carquinez Bridge after this incident occurred.

Previously, in 1971, two tankers collided in the main ship channel west of the Golden Gate Bridge, resulting in an oil spill. As a direct result of this accident the Vessel Traffic Service (VTS) was established for the Bay. Up-to-date information on ship movements, weather and aids to navigation, etc. are reported; a traffic separation scheme was established. The VTS system is more fully described under Aids to Navigation.

The U.S. Coast Guard, Marine Safety Office for the San Francisco Bay, commented as follows on corrective actions taken by the Coast Guard in response to accidents and near-accidents in the Bay for the past three years:

"All marine casualties occurring in the subject area meeting those criteria set forth in Title 46 Code of Federal Regulations Part 4 are assigned to an investigation by Investigating Officers located in the Investigations Department at the U.S. Coast Guard Marine Safety Office, San Francisco Bay, located in Alameda. These investigations are conducted to obtain information surrounding the apparent cause of the casualty so that corrective action can be taken and subsequent casualties of the same nature can be avoided. Examples would include: the reoccurrence of equipment failure involving the same or similar equipment on various vessels; accidents involving similar human factors where fatigue is an issue necessitating additional crew members; multiple groundings or allisions in the same general area necessitating new, improved, or additional navigational aids. The severity of the casualty would delineate the level of investigation conducted.

Casualty investigations are also conducted to ascertain whether personnel misconduct, negligence or drug/alcohol use was a factor in the casualty. In such instances a personnel

investigation would be conducted with possible outcomes including: no action; verbal admonishment; written letter of warning; or suspension and revocation proceedings. Procedures such as these are administrative in nature and only affect a person's license or Merchant Mariner's Document. Civil penalty procedures would be warranted in a situation where a law or regulation has been violated. Civil penalty procedures are the only actions appropriate against the following: foreign flag vessel; personnel aboard foreign flagged vessels licensed under the authority of another nation; federally licensed pilots operating aboard a foreign flagged vessel while under the authority of a State Pilot's license; and unlicensed U.S. citizens. If a violation were criminal in nature, such action would be reported to and pursued by the U.S. Attorney's Office. Personnel investigations are considered to be remedial in nature with behavior modification being the intended goal.

In addition, the Coast Guard has taken the following actions to alleviate reoccurrences of vessel accidents and near-accidents:

- (1) The forwarding of information to the Coast Pilot on unique tidal and non-tidal currents and supporting the establishment of PORTS to ensure that the mariner is properly informed of updated information;
- (2) The planned revision of the Tidal Current Tables once accurate information is obtained; and
- (3) Ongoing dialogue with the Pilot Association on subjects such as Rule 9 violations, drug and alcohol testing procedures, congestion points in the subject area and casualty reporting.

All of this information will be included in the Coast Guard Marine Safety Office's soon-to-be-published Waterways Area Management Survey (WAMS)."

RECOMMENDATION

9. The Coast Guard and VTS should devise a more consistent system of reporting accidents and near accidents, standardized with other areas. The annual reports should together be analyzed on an annual basis by the Coast Guard and a report made to OSPR with recommendations on the effectiveness of navigational safety measures.

D. Small Vessels

Background. Within the Bay, many recreational boats, windsurfers and commercial fishermen transit navigational shipping lanes and some approaches to port and marine terminal facilities. The central part of the Bay, with the heaviest concentration of population in close proximity to the shoreline, boasts the largest number of small boat marinas along the San Francisco, Alameda, Contra Costa and Marin County shorelines. Two-thirds of approximately 20,000 Bay Area marina berths are located in the central Bay (BCDC 1982). This number does not include facilities on the Sacramento and San Joaquin Rivers. While only a percentage of boat owners are on the Bay at a given time, on a sunny weekend up to 1,000 boats may participate in races and various events on the Bay (BCDC 1982).

The last Sunday in April (Opening Day on the Bay), Memorial Day and Labor Day are times of extreme congestion by small vessels. There are many occasions where six or eight races may be held in the same venue, vessels starting at five minute intervals. This may lead to more racing congestion than a single large popular regatta.

Race instructions now carry a warning regarding interfering with large vessels. The Yacht Racing Association, indicated a willingness to state in the official regatta instructions that more attention would be paid to perceived interference with large vessels, and the pilots' and masters' protests would be heard at protest hearings, providing the association can be assured of the presence of the protestor at such hearings.

Personal water craft sports, more commonly referred to as jet skiing, is also popular in the Bay Area. Skiers can easily access the water from public launches, marinas and private docks. Personal water craft can attain speeds up to 40 knots per hour and are not dependent upon calm waters or wind. Because of this versatility, operators frequent main ship channels, narrow estuaries, and the open Bay in addition to shallower waters. It is estimated that roughly 5,000 personal water craft are used in the Bay (Kawasaki Jet Ski representative, 1992).

In addition, boardsailing has become a popular Bay Area sport. Primary locations for boardsailing are Crissy Field, the Larkspur Ferry Terminal, Coyote Point in San Mateo County, the Glen Cove Marina in Benicia, and Rio Vista. From Crissy Field, located along the northern shoreline of the San Francisco Peninsula just east of the Golden Gate Bridge, strong winds propel boardsailors across the main shipping lane where inbound and outbound tankers, container ships and other vessels transit under the Golden Gate Bridge.

Coast Guard representatives and ship operators note that small craft are difficult to visually spot during periods of restricted visibility. Because of the size of the vessel, radar images are poor which may create a possible hazard to navigation. One suggestion is to have small vessel operators place radar reflectors on their craft.

The Bay Area commercial fishing fleet is made up of approximately 1,000 boats (Pacific Coast Federation of Fishermen's Associations, 1992). However, of this number, about 150 to 200 boats are used full-time for commercial fishing, principally berthed in San Francisco, Sausalito and Oakland. Many of the licensed commercial fishermen are essentially part-time operators, fishing on weekends and holidays by trailering small boats to launch ramps. In the Bay the only commercial fish caught are herring and anchovies with herring the most important in-Bay fishery. During the December to March herring season, additional boats from other areas enter the Bay to lay their nets. The State Department of Fish and Game controls the number of boats fishing in the Bay during the herring season and regulates the manner of fishing. During the 1991-92 herring fishing season, 416 boats were licensed by Fish and Game to commercial fish for this species (State Department of Fish and Game, 1992). The herring fishery is highly competitive because during a short period of time large profits can be realized.

Vessel Traffic Incidents

1. Recreational Boats. Thousands of recreational boats are located near the major inbound and outbound Bay shipping lanes. While many sailboats and motor boats are on the Bay, particularly on weekends, few near-collisions or accidents have been reported to the Coast Guard and VTS during the past three years. In 1989 a bulk carrier vessel reported that a skiff collided with the ship; the skiff had made several close passes near the ship previous to the incident. In 1990 near-misses with container ships in the Alameda Estuary and Oakland Bar Channel were reported to VTS (see Appendix I). In the latter case the container ship was forced out of the channel and nearly grounded. Both 1990 incidents occurred when sailboat operators refused to yield the right-of-way in violation of Rule 9.

2. Boardsailors. No accidents or near-accidents involving boardsailors and vessels have been reported to the Coast Guard or VTS during the past years. However, many boardsailors cross in front of tankers and container ships off Crissy Field which is close to the Golden Gate Bridge. Competitive races are sponsored at this location during the year.

3. Personal Water Craft. While a number of injury accidents involving personal water craft (jet skis) have occurred during the past three years, none involved a collision with a

vessel and no fatalities have occurred in the Bay Area (California Department of Boating and Waterways, 1992). One fatality occurred in the Delta in 1991 at Suicide Beach.

4. Herring Fishermen. No accidents or near-accidents have been reported during the past three years which involved herring fishermen and vessels. In 1989 a near-collision was reported involving a container ship and a fishing vessel between Mile Rocks and the Golden Gate Bridge. The VTS report did not identify whether this was a herring fishing boat. However, various individuals have recounted possibly dangerous situations involving herring fishermen. A herring fisherman laid a large net around the oil skimmer boat at the Chevron Long Wharf; a herring net impeded a container ship docking in the Oakland harbor; a herring net delayed a pilot boat leaving to meet an inbound vessel; herring nets have been laid around fire boats at the Ports of Oakland and San Francisco. The nets may pose an impediment to emergency response vessels such as fire boats and oil skimmers. Nets near terminal docking areas may possibly cause unsafe ship maneuvers.

RECOMMENDATIONS

10. A meeting should be convened by the Harbor Safety Committee with the state OSPR, Fish & Game officials, herring fishermen, Coast Guard, and representatives of the Ports to discuss ways to avoid problems such as nets impeding navigation lanes or berthing areas, nets blocking the egress of fire boats, oil spill response boats and pilot boats, etc. This meeting could result in yearly pre-season meetings with fishermen, Fish & Game mailers to the fishermen informing them of spill prevention concerns, or other actions.

11. Pilots, Masters and other interested parties should be invited to witness a series of races from the St. Francis Yacht Club race deck to obtain a view of events from the competitors' level.

12. Race officials and other interested parties should be invited aboard a large tanker while under way to get the pilots' perspective of racing vessels, if practicable.

13. The Yacht Racing Association of San Francisco Bay should furnish full annual race schedules to all interested shippers, and, in particular, the Harbor Safety Secretariat for distribution.

14. The Yacht Racing Association should furnish optional courses and rounding marks used by participating entities. The race committee for each day's event should choose a course compatible with anticipated large vessel traffic.

15. The Coast Guard Auxiliary should observe and report infractions. The U.S. Coast Guard suggested that a mailer be prepared, to be inserted with vessel license renewal notices, advising owners of Inland Steering and Sailing rules, Rule 9 (Appendix L).

E. Contingency Routing

The high concentration of navigation and the concentration of population and facilities around the Bay requires many dredging and construction projects to occur on a frequent basis. The committee reviewed current procedures for routing vessel traffic during construction and dredging operations.

A number of activities on the Bay may impact the routing of vessels, namely dredging and construction. Dredging of the shipping lanes is essential for safe navigation to the ports and marine terminals because so much of the Bay is shallow and subject to sedimentation. Therefore, maintenance dredging occurs on an ongoing basis. In addition, during the past ten years, major projects to deepen the Baldwin Ship Channel and various ports have taken place to accommodate the modern deep draft vessels. The Port of Oakland is planning additional port construction during the coming year. Six major bridges span Bay shipping lanes. Ongoing maintenance of the bridge fenders occurs. Projects are proposed to strengthen the supports of several bridges for seismic safety. Within the next ten years, Caltrans proposes to construct a new parallel bridge between Benicia and Martinez spanning the Carquinez Strait shipping channel. Maintenance work and new work on the bridges may impact navigation lanes.

Typically, the construction process proceeds as follows:

During early planning stages of a project that might impact the navigation of vessels, the project proponent consults with affected pilot organizations, the U.S. Coast Guard, affected port authorities, and appropriate agencies to assure that consideration is given to the safety of navigation and temporary or permanent restrictions that may impact the movement of vessels.

During the construction planning stages of channel dredging projects and construction projects that may impact the navigation of vessels, representatives from the affected pilot organizations, the U.S. Coast Guard, and affected port authorities attend pre-construction conferences to ensure that procedures are established in advance with the contractors with regard to safety procedures and communications with vessels and pilots as well as any restrictions proposed to be placed on the movement of vessels.

During construction or dredging projects that may impact safety of navigation of vessels, representatives of affected pilot organizations, the U.S. Coast Guard and the affected port authorities attend weekly progress meetings to ensure that up-to-date information is available to vessels and pilots. Frequent meetings enable the close coordination which is sometimes required to allow the project to proceed smoothly without adversely affecting the safe movement of vessels.

The Captain of the Port has authority under the Ports and Waterways Safety Act to direct vessel movement in case of emergency to ensure the safety of the Port and navigation. The Captain is empowered to create safety zones and to exclude vessel traffic in event of an oil spill or other disaster or emergency. For instance when a vessel goes aground in a narrow channel, the Captain of the Port can take appropriate action such as rerouting or slowing traffic.

RECOMMENDATION

16. The high degree of cooperation and consultation between pilot organizations, the U.S. Coast Guard, port authorities and appropriate agencies and contractors should continue from the project planning stage through the construction stage of projects that may impact safe navigation in the Bay. The planning stage should include an evaluation of various alternatives to ensure harbor safety.

F. Public Education

The Enforcement Subcommittee of the Harbor Safety Committee of the San Francisco Bay Region will evaluate and make recommendations concerning the need for establishing and upgrading existing educational or public awareness programs for all waterway users. A focus of the Committee's public education efforts will be on the interaction of small vessels and ships.

Currently, the following boater education programs are available to the boating public in the nine Bay Area counties. Also shown are the number of participants in 1991:

U.S. Power Squadrons:	1539
Subjects:	Boating Safety Rules of the Road, Basic Rescue (A home video course is available for purchase.)
U.S. Coast Guard Auxiliary:	3000 multi-lesson course 5000 one lesson course
Subjects:	Boating Safety Rules of the Road, Basic Rescue

Dept. of Boating and Waterways:

Subjects: Water Safety/grades K-12 105,000 classroom
 General 22,000 home study course

In addition, the U.S. Coast Guard operates a Boating Safety Hotline that dispenses information and references local classes. The Hotline number is 1-800-368-5647.

Participation in the above programs is voluntary. The Enforcement Subcommittee should determine if a more focused mechanism can be developed to give the boating public increased exposure to this important safety information.

Education programs should be designed to alert waterway users to safe navigation as well as inform them about spill prevention and the work of the Harbor Safety Committee.

RECOMMENDATIONS

17. Expand the distribution of existing educational pamphlets available from the U.S. Coast Guard. These pamphlets provide information regarding the above-mentioned courses and the phone number for the Boating Education Hotline at 1-800-336-2628 which would provide information regarding the scheduling of these classes.

Distribute these educational pamphlets by: enclosing them in the boat registration renewal notices sent to boat owners by the Department of Motor Vehicles in the State of California (A follow-up mailing might also be considered to remind boat owners of these courses); enclosing them in local boat marina mailings to slip renters; requesting marinas to offer a one-time slip rental rebate for completion of a safe boater course.

18. Encourage vessel operators to document and report violations of the Rules of the Road to the local U.S. Coast Guard office. This would include a direct request to the San Francisco Bar Pilots to assist in this reporting effort.

19. Make public by publishing punitive action taken against offenders by the U.S. Coast Guard. This information should be distributed to local yachting and boating magazines and marina newsletters. In addition, the California Department of Motor Vehicles should distribute a summary of punitive activities to registered boat owners.

20. Encourage the ongoing efforts of the local U.S. Coast Guard Auxiliary and Power Squadron organizations in their boating education and safety effort.

21. A representative(s) of the Harbor Safety Committee should meet with representatives of the San Francisco Boardsailing Association to promote safer navigation in the Bay by discussing such issues as boardsailing race schedules, race course locations, Inland Steering and Sailing Rule 9 requirements, characteristics of large vessels and tug/barge operations in the Central Bay in relation to boardsailors, and possible education efforts such as posting signs at areas frequented by large numbers of boardsailors (e.g. Crissy Field and Rio Vista) to warn of vessel traffic dangers.

V. VEHICULAR BRIDGE MANAGEMENT

The San Francisco Bay Area is crossed by a number of bridges for automotive and rail traffic. The vast majority of shipping traffic works in areas covered by suspension or fixed bridges with substantial vertical clearance.

Geographic Boundaries. The boundaries of the area in this chapter are set in the West by the Colregs Demarcation Line (Between Pt. Bonita and Mile Rocks), and in the East to include the Rio Vista Highway bridge in the Sacramento River and the Antioch Highway bridge in the San Joaquin River. The Eastern boundary exceeds the boundary set by SB 2040, ch 7.4, section 8670.3(h), which defines the marine waters and which sets the boundary as a line running North and South through a point where the Contra Costa, Sacramento and Solano Counties meet.

The decision to extend the boundary further to the East was made in order to include in this project the Antioch and Rio Vista bridges, as both bridges are encountered by ocean going vessel traffic bound for Stockton and Sacramento.

A. Schedule of Bridge Openings

Bay Area bridges that open or swing do not do so on a fixed schedule. Swinging bridges are normally used for railroads and are maintained in the open position. They are only closed for the passing of a train, then return to the open position. These bridges are usually found in tributaries to the bay and are not involved in primary ship traffic routes. The bascule (a counterweighted drawbridge) or vertical lift bridges are tended and may be opened by contacting the bridgekeeper on VHF radio.

Oceangoing vessels may transit under two vertical lift bridges, the Martinez, Southern Pacific RR bridge and the Rio Vista Highway bridge. Both bridges are manned 24 hours a day and open for vessel traffic upon request. Approximately 30 minutes notice is required and the bridges may be contacted by VHF or telephone.

Bridge	VHF channels	Phone #
Martinez-S.P. RR	13	(510) 228-5943
Rio Vista	9, 13, 16	(707) 374-2134

B. Adequacy of Ship to Bridge Communications

Ship to bridge communications takes place via VHF radio on designated channels. These include channels 9, 13, 16, 17, and 65A. Communications are considered to be adequate by the local pilots.

C. Physical Characteristics of Bridges

All bridges over navigable waterways are equipped with lights marking the channel, the center of the bridge, and in the case of drawbridges, the closed or fully open positions. Most are equipped with sound producing devices which are used during periods of reduced visibility. Descriptions of the lights and sound signals are readily available on the charts or the Light List, published by the USCG.

The Carquinez Strait Bridge is equipped with racons marking the center of the North and South channels. A racon is a radar sensor that sends out a distinctive radar emission that shows up as a distinctive mark on ship's radar scope.

Racons are presently budgeted for and scheduled for installation on the following bridges:

<u>Bridge</u>	<u>Remarks</u>
Benicia-Martinez Highway	Mid-span
SF-Oakland Bay Bridge	C-D span
SF-Oakland Bay Bridge	G-H span
SF-Oakland Bay Bridge	Spare: span to be determined
Richmond-San Rafael Br.	Main channel
Richmond-San Rafael Br.	East channel
San Mateo-Hayward Bridge	Mid-span
Antioch Bridge	Mid-span

D. Bridge Clearances (in feet)

Area/Bridge	Type	Clearance: Horiz. Vert. (MHHW)	
<u>San Francisco Bay</u>			
Golden Gate	Suspension	4,028	225
North Tower			213
South Tower			211
<u>San Francisco-Oakland Bay Bridge</u>			
Piers A - B	Suspension	2,229	174/217
Piers B - C	Suspension	1,072	217/220
Piers C - D	Suspension	2,210	220/218
Piers D - E	Suspension	1,079	218/175
Piers G - H	Truss	1,330	184
San Mateo-Hayward	Fixed	500	135

Richmond- San Rafael

Main Channel	Fixed	1,000	185
East Span	Fixed	970	135

Oakland Inner Harbor Tidal Canal

Park Street	Bascule	240	15
Fruitvale Ave (RR)	Vertical Lift	200	13/135
Fruitvale Ave	Bascule	95	15
High Street	Bascule	240	16

Channel Street (S.F.)

Third Street	Bascule	103	01
Fourth	Bascule	75	01

Islais Creek (S.F.)

Third Street	Bascule	97	04
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Carquinez Strait

Carquinez Bridge	2 Fixed Bridges	998	
North Tower			146
South Tower			134

Benicia-Martinez	Fixed	440	135
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South. Pacific RR	Lift Bridge	291	70/135
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San Joaquin River

Antioch Bridge	Fixed	400	138
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Sacramento River

Rio Vista (Rt 12)	Lift Bridge	270	138
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A complete list of bridges encountered by oceangoing and small vessels may be found in Appendix J.

RECOMMENDATIONS

The following recommendations are made to improve the safe transit of vessels under bridges:

22. Install energy absorbing fendering systems, vice wood pilings or liners on steel structures, particularly narrow ones.
23. Bridge clearance gauges should be installed where needed, particularly drawbridges.
24. Water level gauges should be installed at approach points to bridges.
25. Request the Golden Gate Bridge Highway and Transportation District to install a racon (radio beacon) to mark the center of the channel between the towers of the Golden Gate Bridge to better serve the mariner, particularly during periods of restricted visibility and heavy seas.
26. Request the Department of Transportation (Caltrans) to install racons on the D-E span of the San Francisco-Oakland Bay Bridge (instead of the G-H span), and the A-B span because the spans vary in height and width and currents can reach considerable velocities running parallel to the towers.
27. When transiting under bridges at night there have been reports of floodlights causing problems with night vision by shipboard personnel. Request the Department of Transportation (Caltrans) and the Golden Gate Bridge Highway and Transportation District to shield bridge floodlights to reduce glare for ships.

VI. AIDS TO NAVIGATION

A. Navigation Marks

The waters of the San Francisco Bay Area are marked to assist navigation by the U.S. Aids to Navigation System. This system encompasses buoys and beacons conforming to the International Association of Lighthouse Authorities. The U.S. Aids to Navigation System is intended for use with nautical charts. The exact meaning of a particular aid to navigation may not be clear to an individual unless the appropriate nautical chart is consulted. Additional important information supplementing that shown on charts is contained in the Light List, Coast Pilot, and Sailing Directions. Recommendations regarding navigation marks are found at the end of Chapter V.

A complete listing of the navigational aids in the Bay Area is contained in the 1991 edition of the Light List, Pacific Coast and Pacific Islands (U.S. Coast Guard publication COMDTPUB P16502.6).

B. San Francisco Vessel Traffic Service

Generally the existing Vessel Traffic Service - San Francisco (VTS-SF) is an effective harbor traffic management system, but the current equipment is not state-of-the-art and could beneficially be upgraded. The current U.S. Coast Guard (USCG) administration and operation of this twenty-year-old facility is functioning well and it should be maintained and expanded as needed to implement the recommendations in the San Francisco Harbor Safety Plan. The Coast Guard is in the process of developing final National Vessel Traffic Service regulations which will incorporate a variety of harbor-specific rules for ports around the country including San Francisco Bay.

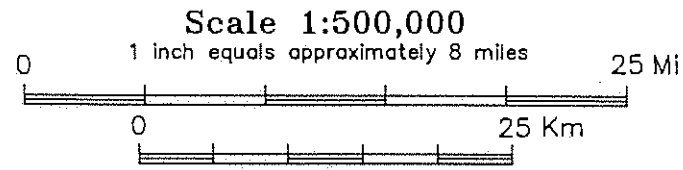
The U.S. Coast Guard's VTS for the San Francisco area has three components: a position reporting system, traffic routing within the Bay and anchorage monitoring, and communications and surveillance gear. The geographic area served by VTS-SF includes San Francisco Bay; its seaward approaches; and tributaries as far as Stockton and Sacramento (Map 3). Participation in the San Francisco VTS is currently voluntary. For a detailed discussion of current VTS practice, see the Vessel Traffic Service User's Manual (Appendix K).

1. VTS Position Reporting Requirements. Vessel position reporting requirements vary according to location within the VTS Service Area: offshore, in the Bay Area within VTS radar-surveillance capability, and in the Bay Area beyond VTS radar coverage.

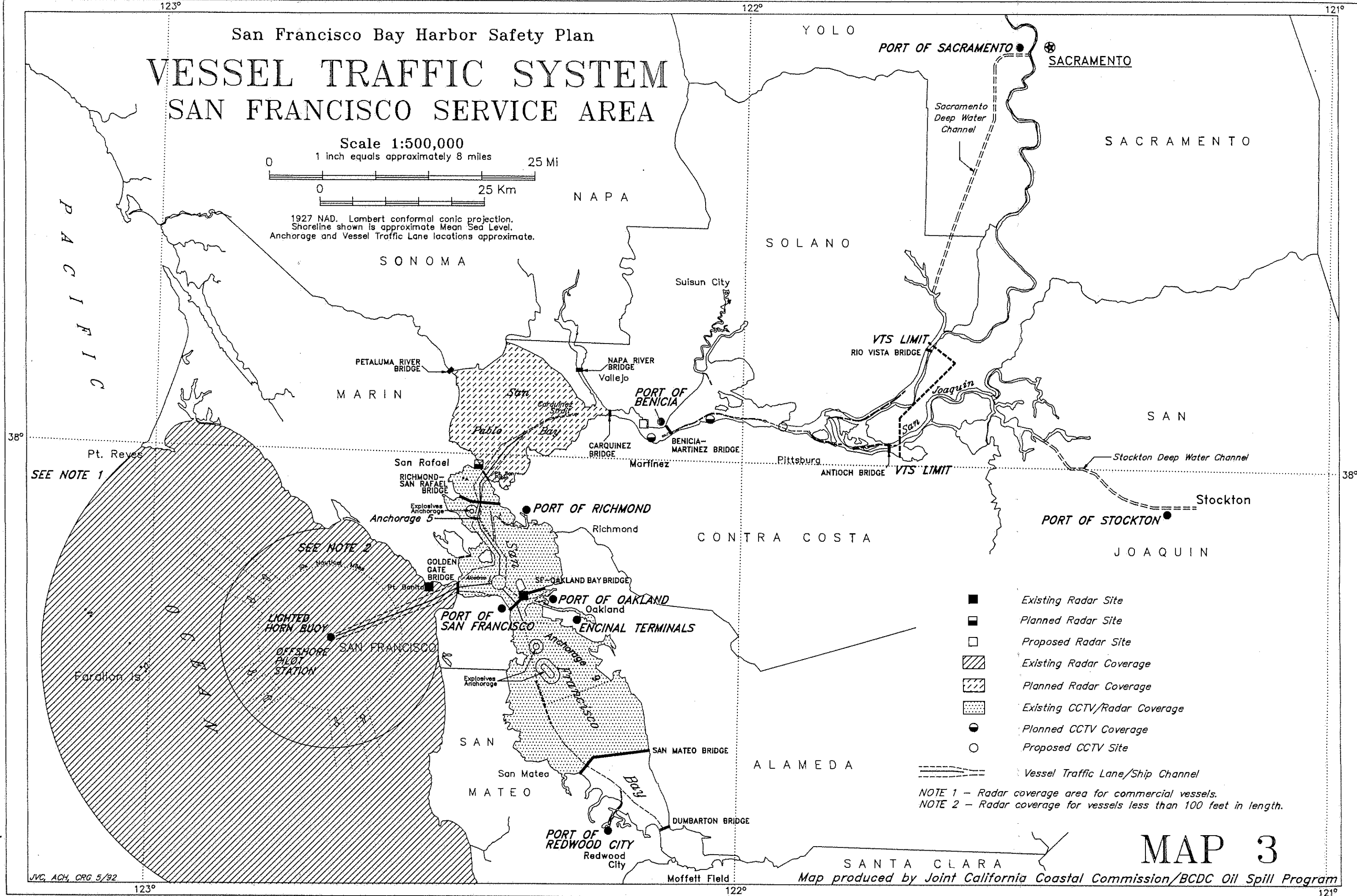
San Francisco Bay Harbor Safety Plan

VESSEL TRAFFIC SYSTEM

SAN FRANCISCO SERVICE AREA



1927 NAD. Lambert conformal conic projection.
Shoreline shown is approximate Mean Sea Level.
Anchorage and Vessel Traffic Lane locations approximate.



SEE NOTE 1

SEE NOTE 2

- Existing Radar Site
- ▣ Planned Radar Site
- Proposed Radar Site
- ▨ Existing Radar Coverage
- ▩ Planned Radar Coverage
- ▤ Existing CCTV/Radar Coverage
- Planned CCTV Coverage
- Proposed CCTV Site
- Vessel Traffic Lane/Ship Channel

NOTE 1 - Radar coverage area for commercial vessels.
NOTE 2 - Radar coverage for vessels less than 100 feet in length.

MAP 3

Map produced by Joint California Coastal Commission/BCDC Oil Spill Program

Offshore. Vessels are asked to make radio reports when entering or exiting the offshore VTS reporting area which extends from the Golden Gate 29 nautical miles (nm) on the southern approach, 29 nm on the western approach and 41 nm on the northern approach to San Francisco. This roughly coincides with VTS offshore radar-surveillance capability. Inbound vessels are asked to report when entering the seaward boundary of this area. Vessels report a second time upon entering the Traffic Separation Scheme (TSS) lanes, approximately halfway through their transit to the Golden Gate. Outbound vessels are asked to report at the Golden Gate, at the end of the TSS lanes and at the seaward boundary of the offshore service area. Radio reports include the name and type of vessel, route, speed, position, draft, pilot changes and estimated time of arrival at the sea buoy if inbound or the boundary of the offshore area when outbound. The Vessel Traffic Center (VTC) broadcasts a traffic report every 30 minutes.

Within the Bay. VTS radar surveillance capability extends from Treasure Island north to Point San Pablo and south to the San Mateo Bridge depending on weather conditions. Vessels report upon getting underway, docking, mooring, anchoring or departing this area. Reports are to be made when passing a bridge, at a pilot change, when intending to deviate from traffic lanes, and in emergencies. Ferries operating on a scheduled route report upon departure and arrival.

Within the Bay and beyond radar coverage. VTS lacks radar-surveillance capability for areas north of Point San Pablo, including Carquinez Strait, and for the South Bay. To help compensate for the lack of radar coverage, vessels operating within the Bay and beyond VTS radar coverage must make radio reports to VTS at specified points. A position report is required when passing Pt. San Pablo, Carquinez Bridge, Southern Pacific RR bridge, New York Point, Antioch Bridge and additional points inland; passing Petaluma River Channel, Mare Island Strait in San Pablo Bay; passing San Mateo Bridge and Hunters Point in the South Bay. Vessel reports include pilot changes and draft.

2. Traffic Routing within San Francisco Bay. The Traffic Routing System within the Bay designates traffic lanes, precautionary areas and limited traffic areas. The primary shipping lanes within the Bay call for eastbound and westbound vessels to pass south of Alcatraz into a precautionary area. However, the TSS was established in 1972 and no longer accurately reflects current traffic patterns or volume in the area off the San Francisco waterfront. Vessel movements contrary to the TSS in this area exist for three reasons:

- o Geography confines deep draft vessels to pass east of Blossom Rock and proceed south in the northbound traffic lane

passing under the C-D or D-E span of the San Francisco-Oakland Bay Bridge.

- o Maneuvering characteristics make it much safer for vessels bound for Oakland to cross the traffic lanes and pass under the C-D or D-E spans of the bridge to facilitate "shaping-up" for the Oakland Bar Channel.

- o Ferries and vessels arriving and departing berths on the waterfront cross the traffic lanes as a matter of necessity. the number of ferry transits has significantly increased over the years - from 20,986 in 1974 to 58,343 in 1990.

Effective August 3, 1992, Coast Guard regulations established new regulated navigation areas (narrow channels), traffic separation schemes, precautionary areas, deep water routes, and vessel operating requirements. These regulations resolved many of the problems recognized by the VTS subcommittee. A summary of these concerns and the changes to regulations are listed in Appendix L.

3. Communications and Surveillance. The USCG VTC at Yerba Buena Island is the communications center for the VTS-SF. Radar installations are at Pt. Bonita and Yerba Buena Island. Two closed-circuit television cameras on Yerba Buena Island provide visual coverage of the central Bay. There are four VHF radio installations. Currently VTS operates on Channel 13, also designated for bridge-to-bridge communication. Offshore traffic reports are broadcast every 30 minutes on the quarter hour on Channel 12. Traffic advisories and summaries are provided as needed for vessels operating in the VTS service area. Uniformed and civilian personnel monitor the traffic situation. At any time, there are three people in the operations room: one operator at the offshore radar position, one operator at the in-bay radar position, and a supervisor. In conditions of fog or restricted visibility a fourth operator is assigned to assist in monitoring vessel traffic.

4. VTS Training. The VTS Training Program is structured as follows:

Vessel Traffic Service Controller trainees will spend 14 weeks in training. This will include:

- o Classroom: 5 weeks total
- o Offshore Operator Qualification (on-the-job training): 2 weeks
- o Inshore Operator Qualification (on-the-job training): 7 weeks

Watch Supervisor trainees complete the training above and, in addition, complete 10 days of Watch Supervisor on-the-job training.

Qualification Process. All trainees are certified by each Watch Supervisor; pass a 75-question written exam on VTS operations; pass a 25-question written exam on Rules of the Road; and pass an oral exam administered by a board comprised of the Commanding Officer, Executive Officer, Training Coordinator, Operations Officer and one or more Watch Supervisors. A trainee that successfully completes the training program is issued a letter of certification that must be renewed every 12 months.

Recertification requirements include:

- o Pass a 75-question exam on VTS operations
- o Pass a 25-question Rules of the Road exam
- o Be recommended by a Watch Supervisor for recertification
- o Complete all required shiprides
- o Be recertified in writing by the Commanding Officer

RECOMMENDATIONS

With regard to the San Francisco Bay Vessel Traffic Service, the Harbor Safety Committee recommends the following policies and urges the appropriate authorities to:

28. Scope of coverage

a) Develop standard VTS traffic management procedures for U.S. ports that conform to international standards. The Committee supports the U.S. Coast Guard rulemaking underway at the national level as expressed in a Notice of Proposed Rule Making, Federal Register, August 1, 1991 (Appendix M).

b) Make mandatory for civilian and military vessels the current voluntary participation in VTS and extend required participation to include vessels certified to carry 49 passengers or more (i.e. ferries).

c) Incorporate the provisions of International Rule 10 in the federal regulations regarding VTS (Appendix N).

d) Expand the area of sensor coverage by VTS-SF to monitor the navigable waters of San Pablo Bay north of the San Rafael-Richmond bridge and east of the Carquinez Straits to New York Point and Antioch. It is anticipated by this committee that San Pablo Bay may be covered by radar surveillance alone while television monitors, in addition to radar, may be needed in the area of the Strait where continuous change of heading could make radar monitoring alone difficult. Sensor coverage expansion has been repeatedly requested.

29. Changes in VTS operations and requirements

a) Adopt a dedicated VHF working frequency, Channel 14, for the exclusive use of VTS-SF ship/shore communication system. Channel 13 should continue to be monitored and used for ship/ship communications.

b) Adopt pre-designated anchorage areas within the existing general anchorages throughout the VTS-SF area as defined in Section A, and in particular within general anchorage No. 9 so that safer and more disciplined anchoring practices may be managed by VTS-SF with due consideration for pilot and vessel master concerns.

c) Upgrade the current equipment used by VTS-SF to include state-of-the-art technology (as described in Appendix O), U.S. Coast Guard, Port Needs Study: Vessel Traffic Services Benefits, Volume I: Study Report and Volume II, Appendices, Part 2.

VII. COMMUNICATIONS

A. Navigational Bridge Management

Consideration of harbor safety should include the transit of the vessel from the sea buoy to the anchorage or dock. In such a situation involving the services of a pilot, the assumptions are:

(1) Captains have the best knowledge of their vessel characteristics, and

(2) Pilots are hired for having the best knowledge on local conditions.

To safely navigate when underway requires the integration of such skills with other members of the bridge watch. Teamwork is therefore necessary in order to best utilize the respective skills and equipment. This is all the more important to avoid one-person errors and impact the trend in statistics which confirm that a high percentage of casualties occur in restricted or pilotage waters.

Important elements in bridge management which should be considered are:

(1) Preplanning of the transit by the bridge team using all available reference sources.

(2) Information exchange with the pilot. This would include transit plan and pertinent details of vessel characteristics and equipment, especially any mechanical limitations.

(3) Monitoring the vessel position and actions of the pilot to ensure compliance with the passage plan.

(4) Recording relevant and important information.

(5) Traffic management.

(6) Communications within the bridge team as well as externally, consistent with protocols.

For more detailed information, reference should be made to the American Petroleum Institute publication titled "Guidelines for Developing Bridge Management Teams" and International Chamber of Shipping, "Bridge Procedures Guide."

B. Radio Communications

Existing communication systems for the maritime community in the San Francisco Bay Area are almost exclusively on marine VHF (very high frequency) radio. The level of usage is variable with periodic time spans of saturation as recreational boaters and fishermen utilize the frequencies. Additional communication modes include telex and cable to agents/pilots; and as the VHF frequencies become more congested, the increasing use of cellular telephones.

1. Current Usage.

A. Marine use of VHF channels:

<u>Channel</u>	<u>Use</u>
16	Distress/Safety
06	Intership safety purposes, not for non-safety matters
12	Offshore Vessel Movement Reporting System. Used from Pilot Boarding Precautionary Area to system outer limit (41 mi N, 29 mi W & S)
13, 12, 18A 21A, 22A	Vessel Traffic System (VTS), Bridge-to-bridge navigation and safety channel for commercial ships
22A	U.S. Coast Guard, communications between USCG stations, vessels & aircraft after contact on Channel 13 or 16
10	San Francisco Bar Pilots
10, 18	San Francisco Marine Exchange
7A, 8, 9, 10, 11, 18A, 19A, 79A, 80A, 88A	Port Operations - Commercial intership and ship to coast working channels. Commercial vessel business and operational needs.
9, 68, 69, 71, 72, 78A	Port Operations - non-commercial working channel. Supplies, repairs, berthing, yacht harbors/marinas.

Marine Radio Telephone Operators

26, 84, 87	San Francisco
27, 28, 86	Sacramento, Stockton, Delta

25-28	North - Bodega Bay to Ft. Bragg & 50 miles out
28	South - Santa Cruz to Pt. Sur & 50 miles out
14, 12, 20, 65A, 66A, 73, 74	USCG Port Operations - traffic advisory for use by agencies directing movements of vessels in or near ports. Offshore Vessel Movement Reporting System.
18A	Sacramento, Stockton Port Operations

Tug Boat/Towing Channels

18A	American Navigation Co.
18A	Bay & Delta Towing Co. Brusco Tug & Barge Co. Chevron Shipping Co.
10	Crowley Maritime Corp. Exxon Shipping Co.
14, 18A	Oscar Niemeth Towing Sacramento Tugboat Co.
18A	Sanders Towboat Inc.
18A	Seaway Towing Co., Inc.
19	Tweed Towing, Inc.
9	Westar Marine Services

B. Coverage. Present coverage of the Bay Area by VHF radio is considered adequate by both VTS and the S.F. Bar Pilots. There is a blind zone in the Carquinez Strait in the area of Dillon Point and Crockett where VHF signals are masked to the Vessel Traffic System in certain atmospheric conditions (usually during periods of "tule fog"). This does not affect ships within the strait for ship-to-ship communications. In cases where VTS or the pilots can not reach a ship in the "blind zone" there is adequate capability to have messages relayed to it.

2. Existing Equipment

A. San Francisco Vessel Traffic System. The VTS communications suite consists of four identical systems. The one located at the primary site on Yerba Buena Island is manned. The other sites are relay systems and are unmanned. The relay sites

are located at Point Bonita (including the "offshore" radar antennas), Mount Tamalpais in Marin County, and TV Hill near Concord.

- (1) (2) Aerotron transceivers and 4 guard receivers with Motorola control panels
- (2) Linkage via Bay Area Communication System (BACS), a USCG Microwave Network
- (3) Diesel or propane fueled automatic starting emergency generator (60KW)
- (4) Motorola MCX 1000 transceiver (Yerba Buena site only)

B. San Francisco Bar Pilots. The S.F. Bar Pilots headquarters is located at the East end of Pier 9. The antenna for the primary system is located on Mount Tamalpais.

- (1) Primary net is a Motorola 50 watt transceiver on channel 10
- (2) Standard Horizon/International transceiver w/ local antenna
- (3) Telex terminal (Procom) SF PILOT 371-5595
- (4) FAX (415) 393-0456
- (5) There is presently no emergency generator installed, backup capabilities are the pilot boats.
- (6) Pilot Boat CALIFORNIA
 - a) Raytheon 78 Transceiver
 - b) Standard Horizon Transceiver
 - c) Motorola monitor (ch. 13)
 - d) Cellular phone/FAX
- (7) Pilot Boat SAN FRANCISCO
 - a) Motorola Modar Transceiver
 - b) Icom Transceiver
 - c) Motorola monitor
 - d) Cellular phone/FAX
- (8) Pilot Boat DRAKE
 - a) Motorola Modar Transceiver
 - b) Icom Transceiver
 - c) Motorola monitor

- d) Cellular phone/FAX
- (9) Pilot Boat OAKLAND
 - a) Standard Horizon Transceiver
 - b) Icom Transceiver
- (10) Pilot Boat PITTSBURG
 - a) Icom Transceiver
 - b) Icom Transceiver

C. San Francisco Marine Exchange. Located at Fort Mason Center, Building B. The Marine Exchange shares a Mount Tamalpais antenna with the Bar Pilots and several other Bay Area shipping companies.

- (1) Motorola 50 watt transceiver on channel 10
- (2) Collins transceiver w/ local antenna monitoring ch. 13/18A
- (3) No emergency generator or backup power source

RECOMMENDATIONS

30. Due to increasing congestion on channel 13, the USCG is proposing to shift the primary VTS channel to channel 14. This is likely to be included in the Federal regulations making participation in the VTS program mandatory and is presently targeted for a late 1993 implementation. The Harbor Safety Committee endorses the Coast Guard's efforts to improve the existing system.

31. The Harbor Safety Committee recommends the acquisition of adequate backup power supplies for the San Francisco Bar Pilots and San Francisco Marine Exchange communications systems. At a minimum, portable diesel generators obtainable commercially should be procured and arrangements made to provide means of powering minimal lighting and communications circuits.

VIII. TUG ESCORTS

The Oil Spill Prevention and Response Act of 1990 (OSPR) requires examination of the advisability of developing a Tug Escort Policy for tankers in the San Francisco Bay Region. The statutory requirement to examine this issue is based on the legislative finding that there is a navigational safety advantage of tug escorts. Tug escorts can improve tanker safety in at least two ways. Tug escorts can serve as emergency maneuvering aids in the event of loss of steering or propulsion. A tug escort may also assist as an independent aid in the navigation of a tanker.

In 1990 the Final Report of the States/British Columbia Oil Spill Task Force concluded that the risk of an oil spill could be reduced by 8 to 11% with the mandatory use of tug escorts. That report, endorsed by the State of California, suggested that the escorts be highly maneuverable, have speed complementary to the tanker with sufficient power to control tanker direction, and that the power and number of escort tugs should be proportionate to the deadweight tonnage of the tanker.

The full Committee established a Tug Escort Subcommittee which considered these issues, held public workshops and then recommended a set of Tug Escort Interim Guidelines. The Interim Guidelines were adopted by the full committee on March 12, 1992 and submitted to the State Office of Oil Spill Prevention and Response. The Committee, in recognition that it will be a number of months before interim regulations are adopted by OSPR, requested that OSPR solicit voluntary compliance by the industry with the interim tug escort guidelines as soon as OSPR determines the interim guidelines are acceptable.

The standards contained in the Interim Guidelines should be considered a starting point. The committee has initiated a process to develop permanent tug escort guidelines by the end of 1992. The tug escort subcommittee intends to examine issues associated with tug escort policies, conduct a series of public workshops, solicit written comments and propose permanent guidelines at the end of October 1992. The full committee will then be in a position to vote on permanent guidelines in November and forward those recommendations to the state in December 1992.

RECOMMENDATION

32. An annotated set of guidelines now under review by the State is set forth below.

ANNOTATED INTERIM GUIDELINES

A. Geographic Scope

o A set of six zones shall be established. The use of zones allows the most effective use of tugboat assets, according to the operational environment in which they will be working. For example, an escort tug working in the inland area of Carquinez Strait requires different specifications than a tug working in the open turbulent waters outside the Golden Gate. The zones are described as follows (see Map 4):

1. From the offshore Pilot Station, eastward to the Golden Gate Bridge.
2. From the Golden Gate Bridge, south to a line between the southern tip of Bay Farm Island and the southeastern tip of Point San Bruno Peninsula to one mile north of the San Mateo Bridge.
3. From the south end of Zone 2 to one mile north of the San Mateo Bridge.
4. From one mile north of and to one mile south of the San Mateo Bridge.
5. From Point San Pablo to the western approaches of the Carquinez Bridges at Light 15.
6. From Light 15, through the Carquinez Strait, north on the Sacramento Ship Channel to one mile beyond the Ryer Island Ferry Terminal and east on the San Joaquin River to one mile beyond the Antioch Bridge.

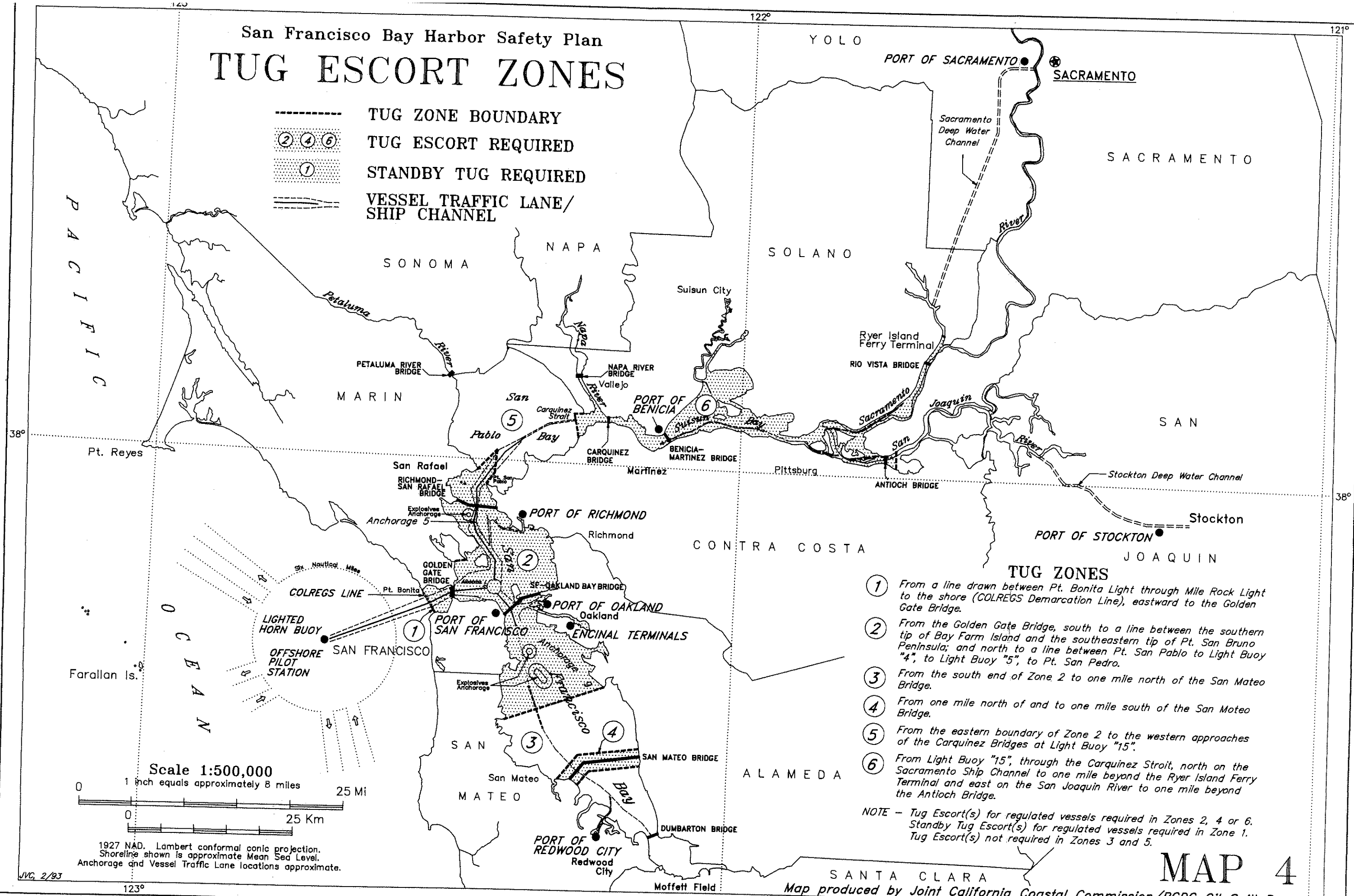
o Tug Escort(s) shall be required when a Regulated Vessel is in Zone 2, 4, or 6. These are zones with major hazards (bridges, islands, submerged rocks, etc.) and congested traffic patterns.

o Standby Tug Escort(s) shall be required to be on standby status (manned and ready for immediate use) within an area three miles east of the Golden Gate Bridge when a Regulated Vessel is in Zone 1. Standby Tug Escort(s) shall meet all U.S. Coast Guard requirements necessary to operate in Zone 1, which includes offshore sea and weather conditions.

o Tug Escort(s) shall not be required in Zones 3, 5, or areas outside of Zones 1-6. These areas do not have significant hazards and have mud bottoms. The hazard of a grounding due to machinery failure was not considered great enough to require an escort.

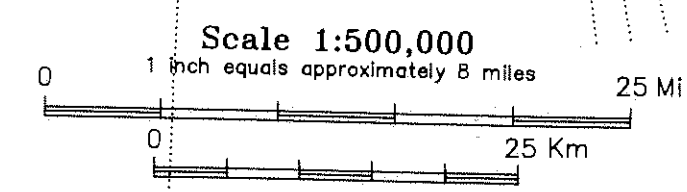
San Francisco Bay Harbor Safety Plan TUG ESCORT ZONES

- TUG ZONE BOUNDARY
- ② ④ ⑥ TUG ESCORT REQUIRED
- ① STANDBY TUG REQUIRED
- ==== VESSEL TRAFFIC LANE/
SHIP CHANNEL



- ### TUG ZONES
- ① From a line drawn between Pt. Bonita Light through Mile Rock Light to the shore (COLREGS Demarcation Line), eastward to the Golden Gate Bridge.
 - ② From the Golden Gate Bridge, south to a line between the southern tip of Bay Farm Island and the southeastern tip of Pt. San Bruno Peninsula; and north to a line between Pt. San Pablo to Light Buoy "4", to Light Buoy "5", to Pt. San Pedro.
 - ③ From the south end of Zone 2 to one mile north of the San Mateo Bridge.
 - ④ From one mile north of and to one mile south of the San Mateo Bridge.
 - ⑤ From the eastern boundary of Zone 2 to the western approaches of the Carquinez Bridges at Light Buoy "15".
 - ⑥ From Light Buoy "15", through the Carquinez Strait, north on the Sacramento Ship Channel to one mile beyond the Ryer Island Ferry Terminal and east on the San Joaquin River to one mile beyond the Antioch Bridge.

NOTE - Tug Escort(s) for regulated vessels required in Zones 2, 4 or 6.
Standby Tug Escort(s) for regulated vessels required in Zone 1.
Tug Escort(s) not required in Zones 3 and 5.



1927 NAD. Lambert conformal conic projection.
Shoreline shown is approximate Mean Sea Level.
Anchorage and Vessel Traffic Lane locations approximate.

MAP 4
Map produced by Joint California Coastal Commission/BCDC Oil Spill Program

B. Environmental Conditions

o The subcommittee feels that there is no need to increase escorting requirements because of prevailing currents, wind and visibility.

C. Regulated Vessels

o Vessels carrying five thousand metric tons or more of oil or other petroleum products (as defined in S.B. 2040) as cargo shall be considered "Regulated Vessels." Double hull vessels, which are so certified by the U.S. Coast Guard, shall be exempted from these guidelines. Five thousand metric tons equals 35,450 barrels of Alaska crude. Barrels per ton vary depending on the grade of the product. Five thousand tons was chosen to differentiate between a vessel in ballast and a laden one, while providing for bunkering to be accomplished with non-regulated vessels.

o Regulated Vessels shall engage Tug Escort(s) as required by these regulations.

o When a Regulated Vessel is self-propelled, it shall have sufficient and qualified line-handling-capable crew members standing by available to immediately receive lines from each Tug Escort(s) and it shall comply with 33 C.F.R. 164.22 relating to anchor readiness.

o When a Regulated Vessel is not self-propelled, a barge, it shall have sufficient and qualified line-handling-capable crew members standing by available to receive lines from each Tug Escort(s). In the interest of crew safety, when entering or leaving Zone 2 bound to or from sea (the Golden Gate Bridge), crew transfers may occur in the vicinity of Alcatraz Island.

o Regulated Vessels shall have sufficient and qualified direct supervision of line-handling-crew operations. Said supervision shall have direct radio communication capability with the self-propelled Regulated Vessel's bridge, or in the case of a barge, with the bridge of the attending tug.

o Regulated Vessels at sea shall not enter Zone 1 until the required Standby Tug Escort(s) is on standby status as described in Section 1.

o Regulated Vessels at anchor within Zones 2, 4 or 6 shall not change their positions unless attended by the required Tug Escort(s).

o In the event of an emergency, the master or pilot of a Regulated Vessel is authorized to override these Tug Escort

guidelines. An example of such an emergency might be a fire at a terminal requiring a vessel to shift off berth for the sake of safety. Any such event shall be reported immediately to the OSPR and to the Clearing House which shall report the occurrence to the Harbor Safety Committee at its next regular meeting.

D. Speed Limit

o Tug escorting regulations will not include a specific speed limit, however, Regulated Vessels in Zones requiring Tug Escorts shall not exceed the speed at which their Tug Escort(s) can render assistance.

E. Minimum Requirements for Escort Tugs

o Escort Tugs shall meet prescribed minimum equipment standards which shall be established. For the purpose of this report, no minimum requirements are established.

o Escort Tugs shall maintain a station-keeping distance of no more than one-half mile from their Regulated Vessel while engaged in escort activity.

o Escort Tugs shall have their static bollard pull measured, inventoried and published by the Central Clearing House. The American Bureau of Shipping shall certify compliance with the measuring standards established by the Harbor Safety Committee.

o Escort Tugs shall be manned by crews meeting prescribed minimum requirements (see Item F).

F. Minimum Requirements for Escort Tug Crews

o Tug Escort operators shall be duly licensed Operators of Uninspected Towing Vessels as per 46 CFR Ch.1 Section 10464.

o Tug Escort crews shall have a minimum of two Certified deck hands. Due to the high level of equipment readiness for escort tugs, the engineer may not be included as a deck hand. This requirement does not preclude additional deck hands who are gaining experience for certification.

o Tug Escort deck hands shall be documented seamen pursuant to USCG regulations.

o Tug Escort Operators and deck hands shall be Certified by the Department of Fish and Game.

o Certification shall include a minimum of 120 days of experience on board tug boats followed by successful completion of an education program covering safety awareness and emergency

response to regulated vessel groundings, allisions or collisions, the loss of steering or propulsion by a regulated vessel, communication systems, basic fire fighting skills and early response procedures to oil spills. Tug boat company training programs may be accepted as a basis for this Certification if such program meets the minimum requirements herein.

G. Formula for Matching Tugs to Vessels

o "Tug Escorts shall be capable of providing a total ahead static bollard pull in pounds equal to not less than the Regulated Vessel's deadweight tonnage. For example, a Regulated Vessel of 80,000 dead weight tons shall require Tug Escort(s) with a minimum of 80,000 pounds (40 short tons) bollard pull." This formula doubles a standard derived from a 1979 U.S. Coast Guard Proposed Rule Making.

o A naval architecture consultant was retained in June 1992 to develop a scientific formula for linking tug escort bollard pull to the dead weight tonnage of tankers and identify minimum tug equipment standards specific to the escort function. The report, completed in July 1992, contained extensive analysis and recommendations by the consultant.

H. Central Clearing House

o A Central Clearing House shall be established which shall be responsible for the following:

1) Be the organization to which any Regulated Vessel shall be required to present itself.

2) Be the organization which shall measure and publish tug boat bollard pull. The American Bureau of Shipping shall certify the results of the measurements.

3) Be the organization which shall maintain an inventory of Escort Tugs as well as their real-time availability.

4) Be the organization which shall monitor and document compliance with Tug Escorting regulations and report violations to the Department of Fish and Game and U.S. Coast Guard.

I. Bow Thrusters

o No reduction in the requirements of these guidelines will be granted to vessels with bow thrusters.

J. Technological Improvements

o Future consideration will be given to technical designs that otherwise meet or exceed the intent of these requirements.

K. Analysis of Reportable Accidents and Potential Effect of Tug Escorts

o An analysis of reportable accidents in the Bay Area over a three-year period was made by a maritime consultant on contract to the Department of Fish and Game. The purpose of this analysis was to determine if there was a pattern of accident locations and, on a case by case basis, evaluate whether the presence of an escort tug would have prevented or mitigated the accident. U.S. Coast Guard investigations of each case were reviewed in detail in making this analysis. It was found that of the fifteen reportable accidents in the time period considered one may have benefitted from tug escort (but it was unlikely to have altered the outcome of the accident), and two others had the potential if casualties escalated beyond the actual circumstance to have benefitted from escort; this, however, was beyond the scope of the study. Cases studied are listed in Appendix P.

See Appendix Q for a complete inventory of San Francisco Bay Region tug boats as of February 1992.

IX. PILOTAGE

The San Francisco Harbor Safety Committee appointed a subcommittee in April 1992 to study the important issue of pilotage as it relates specifically to the region. The State Office of Oil Spill Prevention and Response is required to prepare a study evaluating pilotage issues statewide. According to Sec. 8670.24(a) of the Act, the state "evaluation must include all of the following:

- 1) The effectiveness of the state licensing program.
- 2) The policies and procedures for investigating pilot incidents by either the Coast Guard or the State Board of Pilot Commissioners for the Bays of San Francisco, San Pablo and Suisun.
- 3) The feasibility and desirability of applying a surcharge in addition to other fees for pilotage for the purposes of providing expanded pilot training.
- 4) The administrator will contact the various pilotage groups, the Coast Guard and the maritime industry as part of his or her evaluation process."

Pilotage is an extremely important issue to Bay shipping because of complex local conditions consisting of narrow navigation channels, many bridges, swift tides and currents, variable weather patterns, and large numbers of ships and small vessels. For over one hundred and forty years, the state has regulated pilotage over the Golden Gate bar by creating the State Board of Pilot Commissioners in 1850 to regulate pilotage.

The U.S. Coast Guard scheme for endorsement as first class pilot on other Coast Guard issued licenses, U.S. federal Pilotage Statutes, and all state piloting programs are currently under intense study by the Committee on Advances in Navigation Technology and Piloting, Marine Board, National Research Council, National Academy of Sciences. This national study is due to be completed and findings and recommendations published in mid-1993. The Harbor Safety Committee intends to utilize the recommendations and information derived from that comprehensive report to formulate recommendations for strengthening the San Francisco Bay region's piloting services in future Harbor Safety Plan updates.

Currently a variety of pilot systems operate within the geographic boundaries of the Bay Harbor Safety Plan, depending upon the type of vessel and area of service. The following is a general description of the pilot systems.

Federal Pilots: Federal pilots are licensed by the U.S. Coast Guard to handle American flag vessels engaged in intra- and interstate commerce along the coast of the United States. Only a few federal pilots operate within the Bay. One shipping company employs masters to pilot their own vessels who have federal pilot licenses.

Navy Pilots: The U.S. Navy employs civilian pilots on Navy ships in the Bay Region. Currently five pilots operate in the Bay, all of whom have federal pilot licenses. The Navy requires a federal license to pilot and maintains published standards for experience and training.

Inland Pilots: An inland pilot is required to have both a state license and a federal license to advise vessels solely inside of the Golden Gate. The state has not authorized any new inland pilots since 1985. Two pilots continue to operate as inland pilots, one on a regular basis. The State Board of Pilot Commissioners regulates inland pilots.

Pilots: This category of pilots is also referred to as Bar Pilots. A state license is required for a pilot to handle vessels entering the Bay and operating inside the Bay. A federal pilot's license is also required. The State Board of Pilot Commissioners regulates the number, licensing, training and disciplining of pilots for the Bays of San Francisco, San Pablo and Suisun. Sixty-two pilots are authorized but only sixty are appointed at this time.

Pilotage for the Ports of Stockton and Sacramento: The Ports of Stockton and Sacramento have separate pilotage authority from the Board of Pilot Commissioners. In practice, these ports use both inland and (bar) pilots licensed by the state.

Docking Pilots: Section 1179 of the Harbors and Navigation Code allows shipping companies who expressed their intent to the Board of Pilot Commissioners before July 1, 1983 to have their own employees used as pilots in lieu of (bar) pilots. In the Bay, one shipping company uses its own employee(s) as pilots for docking who are not subject to State Board of Pilot Commission regulations. The employee has a federal pilot's license.

The subcommittee will review the following issues in more detail and will make further recommendations if warranted to be included in future updates of the Harbor Safety Plan:

- o federal and state pilot licensing requirements;
- o training requirements for initial licensure and training requirements for renewal of state and federal licenses;

- o disciplinary procedures by state and federal licensing agencies; and
- o review of procedures of assigning pilots to ships.

The San Francisco Harbor Safety Committee appointed a subcommittee in April 1992 to study and develop recommendations for the following three topics required for Safety Plan submittal.

X. PROJECT FUNDING

S.B. 2040 Sec. 802(b)(10)(A). Each plan shall provide recommendations for funding VTS systems and other projects; and (B) Consider the imposition of user fees and assess existing billing mechanisms as potential funding sources. The VTS and Tides and Currents sections of the plan address funding issues. However, this section will address all aspects of the San Francisco Harbor Plan in a broader context. The subcommittee will look at funding considerations specifically.

XI. COMPETITIVE ASPECTS OF THE PLAN

S.B. 2040 Sec. 802(b)(11)(A). Each plan must identify and discuss the potential economic impacts of implementing the provisions of the harbor safety plans; and (B) Describe the significant differences in the restrictions that could vary from port to port within the harbor area. Sec. 800(f) of the plan regulations defines competitive aspects as

"the cost of materials, labor, services, property or other necessities required to carry out a recommendation of a harbor safety committee when compared to other alternative costs for same or similar requirements. Competitive aspects shall be addressed in any economic feasibility report or study made part of any such recommendation."

XII. PLAN IMPLEMENTATION AND ENFORCEMENT

The Oil Spill Prevention and Response Act of 1990 charges that the Harbor Safety Committee ensure that the provisions of the plan be fully and regularly enforced. Traditionally, the Coast Guard has been responsible for the regulation of vessel movements and inspections through the authority vested with the Captain of the Port. Within the geographic boundaries of the Harbor Safety Plan, almost all oil terminals are privately operated and outside of the jurisdiction of local port authorities, with the exception of Pacific Gas & Electric power plant terminal at pier 70 in the Port of San Francisco, Penzoil tank farm at Encinal Terminal in Alameda, and Gibson Oil Terminal at the Port of Redwood City. Therefore, the Coast Guard has been the mainstay of enforcement within the plan boundaries, and it is expected that the Coast Guard will continue in this role.

Under the Act, the State Lands Commission and the Department of Fish and Game have dramatically increased roles and enforcement responsibilities. The State Lands Commission, along with facilities inspection, will inspect vessels that are moored alongside the above-mentioned privately operated terminals, and monitor the cargo transfer operation. In the event of a violation, and depending upon the nature of the violation, the appropriate state or federal agency will be notified. The Department of Fish and Game is charged with the enforcement of state regulations under the Act and will initiate vessel inspections similar to that which the Coast Guard is already doing, and has the power to impose criminal and civil penalties for violations.

Tug Escort shall be monitored by the Clearing House. The Clearing House will confirm that all applicable tankers are escorted by an appropriate tug, and that the escort tug is on station prior to the movement of the vessel. In the event that the tug is not on station, the Clearing House will contact the pilot, the master of the vessel, and the shipping company and/or agent and advise them accordingly. The vessel will not move until the escort tug is on station. The Clearing House will notify the Department of Fish and Game if the vessel moves without escort. In the event that the tug breaks down during an escort, the master and the pilot will determine the safest course of action, whether to stop, to return, or to proceed.

Plan Review shall take place on or before July 31st of each year. At this time, all aspects of the Harbor Safety Plan can be assessed and the findings and recommendations for improvements be sent to the Administrator. Annual review will help ensure full, regular, and uniform enforcement.

RECOMMENDATION

33. The Committee recommends that the Coast Guard and the State Department of Fish and Game coordinate policies and procedures to the greatest extent possible with each other and with other federal, state and local agencies. Cooperation and coordination between agencies will minimize redundant activities such as vessel inspections and maximize enforcement of all federal, state and local regulations. This cooperation is essential since, relative to the Harbor Safety Plan, the Coast Guard is the primary enforcement agency for federal regulations, and the State Department of Fish and Game is the primary enforcement agency for state regulations.

APPENDIX A

SAN FRANCISCO BAR PILOTS

PORT SAFETY GUIDELINES
FOR THE MOVEMENT OF VESSELS
ON SAN FRANCISCO BAY AND TRIBUTARIES

May 6, 1992
Revision of Publications Dated May 6, 1987, and February 21, 1990

May 6, 1992

To Our Valued Customers:

The members of the San Francisco Bar Pilots are charged under the laws of the State of California with providing a safe and efficient pilot service. To accomplish these goals, we have identified certain operational procedures which we ask that you assist us in adhering to when scheduling our services. For all movements we request that you provide the following information when ordering a pilot:

1. date and time the pilot will be required; for arrivals the request for a pilot should be made a minimum of 24 hours in advance with a 12 hour update; for sailings the request should be made a minimum of 4 hours in advance;
2. vessel's arrival draft, and for vessels going above SPRB, fresh water draft;
3. berth(s) and side to;
4. the name of the company and the tug boats that will be supplied;
5. length, breadth and air draft of vessel; any reference to PANAMAX Class means a vessel of about 750' loa and 106' beam (a vessel's trim can significantly affect the air draft and masters/agents must be alert to this); and
6. any special requirements or problems affecting the vessel.
7. Flat tows/dead ship tows must be provided with a master and riding crew.

Recommendations for tug/horsepower requirements.

Some terminals define power requirements for tugboats being used to assist vessels moving to or from their facilities.

We have experienced some confusion when specific horsepower requirements are defined in terms such as "small", "medium", and "large". Further, "horsepower" figures do not necessarily clearly define the power of a tugboat. "Bollard pull" is a better measure of a tug's dynamic power (see appendix). We will, therefore, use the following terms to define tugboat requirement:

<u>TERM</u>	<u>BOLLARD PULL IN LONG TONS</u>
CLASS 1	10 tons or less
CLASS 2	above 10 tons to 20 tons
CLASS 3	above 20 tons to 30 tons
CLASS 4	above 30 tons to 40 tons
CLASS 5	above 40 tons

In order not to be unduly inflexible regarding tug requirements, it is impossible to set rigid rules in most cases. Previous experience and practices should be one of the guidelines. The Operations Pilot should be consulted in the cases where the draft is more than usual, in cases of unusual or severe weather or where strong tidal current may adversely affect the operation.

Tugs within a class are not necessarily the same and, occasionally, specific tugs may be requested due to their particular design, deck machinery or number of propellers. Thrusters should be considered an aid and do not necessarily replace a tug whether it is due to lack of horsepower or other inherent limitations.

In addition, we have set forth a number of recommendations which you should employ for long term and general planning purposes. Under most circumstances, any problems with implementing these recommendations can be resolved by prior consultation with the Operations Pilot. However, since the pilot to whom the vessel is assigned is responsible to advise the master of the vessel and must evaluate each move considering the circumstances at a particular time, it may be necessary for the Operations Pilot to refer you to that pilot or another familiar with the area to respond to your request. In any event, you should notify the Operations Pilot of any potential problems as soon as possible to avoid misunderstandings or delays.

DISCLAIMER

IMPORTANT: READ CAREFULLY

These guidelines are intended for planning purposes only. They have been developed to assist dispatchers and vessel agents in planning for local vessel movements. These guidelines are not intended, nor should they be construed, as a representation of minimum or maximum requirements or a warranty that, if the recommendations outlined in the guidelines are met, an operation can be successfully performed. **IN ANY EVENT, NO REPRESENTATION OR WARRANTIES OF ANY SORT ARE MADE OR INTENDED BY THE SAN FRANCISCO BAR PILOTS OR ANY OF ITS MEMBER PILOTS BY THESE GUIDELINES NOR UNDER ANY ARRANGEMENTS THAT MAY BE AGREED TO.**

In each instance, the individual pilot who is assigned to the vessel will determine whether the planned operation can be successfully completed with the resources allocated. Please note that actual conditions may preclude the performance of the movement as planned. For those reasons, it is the vessel agent's responsibility to contact the pilot office, the operations pilots and the pilot assigned to the vessel to determine whether in his or her opinion the resources provided will be satisfactory and also to be prepared to assist the pilot with additional resources if needed.

In addition, each vessel has its own peculiar handling characteristics. Some vessels, because of their handling limitations, will need additional tugs or other resources, and in some instances, will not be able to be moved under all conditions. The vessel agent should provide complete details to the pilot office and to the pilot assigned of the vessel's handling characteristics in order to assist both in planning and the performance of actual piloting operations.

A. SAN FRANCISCO BAR AND BAY

1. General

- a. Situations requiring special considerations should be discussed beforehand with the Operations Pilot, and if necessary, the pilot involved.
- b. As a rule, no down-tide landings are recommended, therefore, the vessel's ETA should be adjusted in order to dock into the current.
- c. Negative trim adversely affects vessel handling and is discouraged. In the event that it is necessary to move a vessel that has a negative trim the Operations Pilot or the pilot involved should be notified in advance as it may be necessary to time the movement to insure favorable tide/current, etc.

2. Deep Draft Vessels

- a. Ships arriving with a draft of over 45 feet should arrive at the pilot station one hour prior to high water at the Golden Gate Bridge.
- b. Ships sailing from Anchorage 9 with a draft of over 45 feet should be scheduled to sail two hours before high water at the Golden Gate Bridge.

3. Vessels Carrying Hazardous Materials

- a. Movements of all vessels carrying hazardous materials should comply with all applicable Coast Guard regulations.

4. San Francisco Bay, Pier 80

- a. It is recommended that arriving vessels bound for Pier 80-C use two tug boats due to the proximity of the sewer outfall located seaward of the pier.

5. San Francisco Bay, Piers 94 and 96

- a. In line with the general recommendation discouraging down-tide landings, we advise against the practice for large and deep draft vessels.

6. Richmond Standard Oil Long Wharf

- a. It is recommended that vessels docked port side to at Berth One, 40K DWT and above, and 80K DWT and above docked port side to at all other berths, sail on flood currents only.
- b. Standard Oil Long Wharf minimum tug requirements will be applied to all routine ship movements.
- c. It is recommended that vessels docking with a draft of 38 feet or greater use a minimum of three tugs, two Class 5 and the third of

Class 3 or above.

7. Richmond Terminal 5 (size limitation)

- a. Present channel configuration limits the size of a vessel able to use 5B to a maximum 650 feet in length and 106 feet in beam. The vessel's draft will be controlled by it's size and the depth of water available.
- b. Movements to or from Berth 5B are precluded when vessels are berthed at Berth 5A or Gypsum Dock (Richmond 15).
- c. Movement of vessels to or from the Gypsum terminal or Texaco may be precluded if a vessel is occupying 5A or a vessel occupying 5B is protruding into the channel. In this event the Operations Pilot or the pilot involved must be consulted.

8. Terminal 4 Richmond

- a. It is recommended that the arrival and departure of vessels with drafts greater than 30 feet be coordinated with the pilot office.
- b. Under certain conditions, deep draft vessels should arrive and/or depart during flood current.

9. Pacific Refining

- a. It is recommended that vessels 80 DWT and above docked port side to at this terminal sail on flood current only.

10. Wickland/Selby

- a. Recommendation for tug assistance: starboard side to dockings require a minimum of two Class 5 tugs; port side dockings require one Class 5 and one Class 2 or above.
- b. Port side to undockings on an ebb require a minimum of one Class 5 and one Class 3 tug.

11. Ozol

- a. It is recommended that movements at this terminal be made during slack water and flood currents only.

12. Amorc

- a. It is recommended that vessels starboard side to at this terminal sail on an ebb current only. The vessel should be ready to sail no later than one and one-half hour prior to slack water before flood at the dock. Vessels docked port side to should sail on flood current only or use three (3) tugs, two (2) Class 5 and one (1) Class 2 or larger.

13. Anchorage 23

- a. Vessels in Anchorage 23 must comply with the general and specific regulations as contained in Code of Federal Regulations Title 33, paragraph 110.224.
- b. As the deep water portion of the anchorage is limited, drafts of most vessels will be limited to less than 30 feet. Specific circumstances, however, may permit greater drafts for a limited time.

14. Port of Benicia

- a. It is recommended that vessels be docked into the current only, due to hazards posed by adverse currents and the proximity of the bulk loader. In addition, car carriers docking at the east berth must have a 2 degree list away from the berth.
- b. Those vessels using EXXON TERMINAL FACILITIES should comply with all of the regulations of that facility.

Additionally, we recommend vessels port side to undock during ebb current only.

15. Southern Pacific Railroad Bridge

- a. During average tidal conditions vessels can normally pass without time restrictions if the air draft is no higher than 132 feet.
- b. Any vessel of PANANMAX Class or larger or with air draft of more than 132' must coordinate with the Operations Pilot.

16. Tosco/Avon and Wickland/Martinez Terminal

- a. Loaded tankers should dock starboard side to on the ebb.
- b. Vessels in ballast should be turned and docked port side to.
- c. Loaded vessels that will backload should be turned port side to during the period in which the vessel's draft will permit this to be safely done at optimum stage of the tide and current.

17. Diablo Pittsburg

- a. Vessels of Panamax size should dock starboard side to during daylight hours. These vessels should sail during daylight hours.
- b. Vessels loading to deep draft should be turned to berth port side to if the dock can accommodate port side to.

B. SACRAMENTO AND STOCKTON

1. Please refer to enclosures (1) and (2) for information on recommended drafts, night transits, etc.

2. **Size Limitations**

a. The channels may, as a practical matter, limit the size of the vessels to the PANAMAX class. That is to say, about 750 feet in length and about 106 feet beam. Agents should clear the movements of vessels in this category with the Port Agent at least 48 hours prior to the scheduled time.

3. **Minimum Air Draft Clearance**

a. Adequate clearance to all overhead obstructions is required.

b. The air draft limit for an unrestricted passage during an average tidal cycle is 132 feet.

4. **November 15 Through March 15, Fog Season**

a. Frequent periods of severely restricted visibility occur during this period. Transits therefore should be scheduled as expeditiously as possible, taking into consideration, such factors as weather conditions, vessel size, draft, condition of radars, etc.

Please feel free to contact the pilot office for clarification of any of the foregoing procedures. It is our hope that, by implementing these procedures, we can improve our service to you.

We are anxious to respond to your needs and will work with you whenever special circumstances arise which need further consideration.

Yours truly,

Captain Arthur J. Thomas
Port Agent

APPENDIX B

Name	Flag	LOA	DWT	Total Arrivals
ADMIRALTY BAY	AM	247	82,069	7
AL BADIYAH	KU	183	35,081	1
ALLIANCE SPIRIT	BS	235	91,500	1
ALTER	MA	207	60,840	1
AMERICAN TRADER	AM	249	80,735	7
ARCO ANCHORAGE	AM	269	122,249	11
ARCO FAIRBANKS	AM	269	122,520	16
ARCO INDEPENDENCE	AM	335	266,585	1
ARCO JUNEAU	AM	269	122,249	4
ARCO PRUDHOE BAY	AM	247	71,873	5
ARCO SAG RIVER	AM	247	71,507	4
ARCO TEXAS	AM	274	91,393	8
ASIA MARINE	MA	207	60,814	1
ASPEN	AM	247	81,862	6
ASTRAMAR II	BS	188	30,616	1
ATIGUN PASS	AM	276	176,162	12
BOW FIGHTER	NO	174	34,982	1
BOW FORTUNE	NO	171	27,954	1
BP ADVOCATE	BS	182	39,538	1
BREGEN	MA	243	67,980	1
BRIGITTE JACOB	GE	176	42,861	1
BRILLIANCY	LI	242	90,986	2
BT NESTOR	BR	247	69,903	1
BT NIMROD	BR	247	69,903	1
BUM DONG	KO	136	17,303	5
BUM JU	KO	136	17,248	5
CATHAY SPIRIT	LI	243	83,338	1
CHESAPEAKE TRADER	AM	201	50,920	8
CHEVRON ARIZONA	AM	198	39,836	1
CHEVRON CALIFORNIA	AM	247	71,339	10
CHEVRON COLORADO	AM	198	39,842	18
CHEVRON LOUISIANA	AM	199	39,795	22
CHEVRON MISSISSIPPI	AM	247	71,339	10
CHEVRON OREGON	AM	198	39,847	23
CHEVRON PACIFIC	LI	179	39,847	5
CHEVRON SKY	LI	280	133,604	4
CHEVRON SUN	LI	280	156,304	2
CHEVRON WASHINGTON	AM	199	39,795	23
CHRISHOLM	LI	228	59,999	1
COAST RANGE	AM	201	40,631	37
COASTAL CORPUS CHRISTI	AM	226	52,800	6
COASTAL NEW YORK	AM	220	42,721	39
CORONADO	AM	210	39,973	1
CREATION	LI	175	37,615	1
DAN FRIGG	DA	166	29,998	2
DAY STAR	PA	151	18,566	1
DELAWARE TRADER	AM	201	50,860	24
DESTINY	SG	171	37,560	1
EAGLE	GR		54,044	1
EITRHEIM	NO	174	40,158	1
ETERNITY	BS	186	39,834	2

Name	Flag	LOA	DWT	Total Arrivals
EXXON BATON ROUGE	AM	247	76,813	5
EXXON BAYTOWN	AM	237	58,643	8
EXXON BENICIA	AM	276	175,547	19
EXXON GALVESTON	AM	171	27,726	4
EXXON JAMESTOWN	AM	218	41,528	8
EXXON LONG BEACH	AM	301	211,469	18
EXXON NEW ORLEANS	AM	244	72,655	8
EXXON NORTH SLOPE	AM	276	175,305	20
EXXON PHILADELPHIA	AM	247	77,382	7
EXXON SAN FRANCISCO	AM	247	76,813	12
FANTASY L.	GR	194	42,742	1
FINESSE L.	GR	194	39,344	2
FLYING CLOUD	LI	247	79,070	2
FRONTIER SPIRIT	LI	245	106,668	1
FUJIGAWA	PA		16,980	2
FUJIHOSHI	PA	135	14,667	2
FUKUSHIN	PA		9,103	1
GLACIER BAY	AM	247	82,267	4
GOLAR PERTH	LI	229	69,500	1
GOLDEN GATE	AM	223	63,141	41
GOLDEN SUNRAY	SG	242	89,665	1
GOLDEN UNICORN	BS	133	10,987	1
GRAZIA	LI	164	19,950	1
GREEN KING	PA	184	36,981	1
GYOKO MARU	JA	243	96,539	3
HARUKAZE	PA	151	18,592	1
HATAKAZE	PA	150	16,554	1
HAWAIIAN KING	PA	242	91,007	2
HAWAIIAN MONARCH	LI	242	90,992	2
HELLESPONT TATINA	GR	243	96,550	1
HIGHSEAS	LI	178	40,000	2
HIGHTIDE	LI	178	45,092	1
IRON GIPPSLAND	AU	233	85,863	2
IVER HAWK	NO	171	32,046	1
IVER KATANA	LI	151	15,982	2
IVER LUNDINA	NO	210	57,372	1
JAMAC	LI	170	24,243	1
JO ROWAN	NO	175	38,500	2
JOHN YOUNG	LI	275	152,402	3
JUDITH PROSPERITY	LI	241	89,725	2
KAEDE	JA	156	21,481	1
KAKUKO MARU	JA	245	89,467	1
KENAI	AM	265	125,089	7
KENNETH T.DERR	BS	179	35,587	1
KEYSTONE CANYON	AM	276	176,162	9
KEYSTONER	AM	168	18,720	12
KIHO	PA	250	81,276	1
KOBE SPIRIT	BS	182	38,384	2
KOYAGI SPIRIT	LI	222	95,000	1
LA ESPERANZA	PA		13,500	3
LIBERTY BELL VENTURE	LI	225	61,375	1
LIMBAZHI	CY	192	46,825	1

Name	Flag	LOA	DWT	Total Arrivals
LION OF CALIFORNIA	AM	157	16,451	31
LONDON SPIRIT	BR	219	62,094	12
LOTUS M.	PA	172	29,999	1
LUCY	LI	230	64,000	1
MAASSLOT	DU	172	38,039	1
MAERSK JUNO	BR	212	59,650	1
MANTINIA	GR	126	8,472	1
MARIETTA C.	GR	183	45,574	1
MARY ANN	LI	229	64,239	1
MATSUKAZE	JA	150	16,682	2
MIHARA SPIRIT	PA	258	103,584	1
MINT PROSPERITY	LI	242	90,855	2
MORNING GLORY I	LI	229	61,728	1
NAGASAKI SPIRIT	LI	222	94,474	1
NAKATA BREEZE	LI	182	39,016	1
NAMSAN SPIRIT	LI	244	104,986	2
NAPO	EO	177	31,543	1
NEAPOLIS	GR	229	60,525	1
NEPTUNE	LI	185	40,085	2
NEPTUNE LEO	SG	243	86,351	1
NEPTUNE PISCES	SG	236	104,499	2
NEW YORK SUN	AM	187	31,382	2
NICOPOLIS	LI	229	60,525	2
NISSOS SERIFOS	GR	229	59,020	1
NORDIC CHALLENGER	NO	244	68,139	1
NORITA	PA	229	83,930	1
NORTANK OCEANIC	NO	182	39,793	2
NORTANK PACIFIC	NO	170	37,270	1
OMI COLUMBIA	AM	271	138,340	5
OMI DYNACHEM	AM	192	49,530	7
OMI HUDSON	AM	192	41,819	3
OMI STAR	AM	201	37,000	2
OMI WILLAMETTE	AM	201	38,460	11
ONOZO SPIRIT	BS	245	100,020	7
ORCHID B.	BR	182	38,629	1
OVERSEAS ALASKA	AM	223	62,005	6
OVERSEAS ALICE	AM	201	38,421	1
OVERSEAS BOSTON	AM	261	123,692	1
OVERSEAS CHICAGO	AM	273	92,091	1
OVERSEAS JUNEAU	AM	269	122,409	15
OVERSEAS NEW ORLEANS	AM	201	43,643	22
OVERSEAS OHIO	AM	273	92,017	1
OVERSEAS VALDEZ	AM	201	38,421	1
OVERSEAS VIVIAN	AM	201	38,421	1
PACIFIC CHALLENGER	LI	182	41,570	2
PACIFIC SPIRIT	LI	244	104,984	3
PALM MONARCH	LI		81,282	2
PALMSTAR POPPY	BS	234	98,444	3
PALMSTAR THISTLE	BS		100,289	1
PANAM CARIBE	PA	108	6,653	1
PETROBULK JAGUAR	BE	172	46,100	1
PETROBULK TIGER	BE	172	46,100	1

Name	Flag	LOA	DWT	Total Arrivals
PETROS	LI	173	39,600	1
PHILADELPHIA SUN	AM	187	34,000	1
PHILLIPS MEXICO	LI	208	51,000	1
PHILLIPS VENEZUELA	LI	209	54,054	2
PIONEER SPIRIT	LI	244	104,987	1
PORT AU PRINCE	FR	184	38,549	1
PORT ROYAL	FR	188	44,999	1
PRIMA MAERSK	DA	183	47,803	1
PRINCE WILLIAM SOUND	AM	268	123,936	14
ROWAN	LI		44,000	2
RYVINGEN	CY	242	58,157	1
SAMUEL H.ARMACOST	AM	180	35,607	5
SAMUEL L.COBB	AM	187	33,122	2
SANKO HONOUR	SG	243	96,550	1
SANKO PEARL	LI	242	96,127	2
SANKO PIONEER	LI		96,144	1
SANSINENA II	AM	247	71,589	24
SCOTLAND	BS	204	40,794	1
SEA FALCON	BR		97,114	1
SEA SWAN	PA	181	30,060	1
SEAFALCON	BR		97,114	2
SEALIFT ANTARCTIC	AM	179	27,660	7
SEALIFT ARCTIC	AM	179	27,648	10
SEALIFT ATLANTIC	AM	179	27,648	7
SEALIFT CHINA SEA	AM	179	27,648	3
SEAMASTER	LI	242	101,134	2
SEAPANTHER	MA	239	66,803	1
SETOKAZE	BS	151	18,566	4
SHILLA SPIRIT	LI	244	105,000	1
SHOSHONE SPIRIT	LI	247	104,999	1
SHOUN HOPE	PA	108	6,704	1
SIERRA MADRE	AM	200	40,631	28
SKAW PRINCESS	NO	210	57,372	2
SOGNSVANN	NO	107	7,018	1
SOLIMAR	PV	225	61,335	1
ST.MICHAELIS	GE	183	45,574	1
STAR GEORGIA	AM	184	26,755	4
STAR MASSACHUSETTS	AM	184	26,971	11
STAR MISSISSIPPI	AM	190	26,588	1
STAR MONTANA	AM	184	26,547	9
STAR OREGON	AM		39,994	1
STAR RHODE ISLAND	AM	184	26,972	31
STAVANGER PRIDE	NO	184	29,993	1
STOLT AQUAMARINE	LI	177	38,729	1
STOLT PRIDE	LI	177	31,438	1
SUN ARONIA	PA	246	87,797	3
SUNRISE	LI	258	102,719	1
SUZANNE	LI	230	64,000	1
SYOSSET	AM	195	31,816	17
TAGASAN	PA	243	81,220	1
TAMAGAWA	PA	123	12,681	3
TEAM CARRIER	NO		40,490	1

7/29/92

Total tanker arrivals for 1991 in San Francisco Bay

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Name	Flag	LOA	DWT	Total Arrivals
TEAM HADA	SG	186	45,831	1
TEEKAY VIGOUR	BS	245	87,271	1
TENACITY	JA	208	55,144	1
TEXAS TRADER	AM		41,283	4
TOKYO SPIRIT	BS	172	38,384	1
TONSINA	AM	265	124,751	3
TORM HERDIS	LI	186	39,777	1
TOYOKAZE	PA	161	19,917	3
TRADE RESOLVE	PA	226	59,925	1
UMM SAID	QT	235	97,112	2
VEGA	GR	171	32,907	1
WEST STAR	MA	108	5,725	1
WILLIAM E. MUSSMAN	LI	232	81,273	2
WORLD BRIDGE	PA	177	48,531	1
YUHEI	PA	181	37,642	2
YUYO MARU	JA	232	81,245	1

Total Arrivals for 1991 - 1,011

APPENDIX C

RESOLUTION

Support for Accurate Current Predictions in San Francisco Bay

WHEREAS, the State of California has affirmed that California coastal waters, estuaries, bays and beaches are treasured environmental and economic resources which must be protected against undue risk from oil spills; and

WHEREAS, San Francisco, San Pablo, Suisun Bays and all their tributaries sustain important economic and natural resources that depend upon maintaining a high environmental quality; and

WHEREAS, the safe navigation of all vessels, but in particular, tankers and other oil carrying vessels is essential to maintaining high environmental quality in these waters through spill prevention; and

WHEREAS, all vessels navigating San Francisco Bay and tributaries require reliable up-to-date knowledge of currents, water levels, and weather information; and

WHEREAS, reliable current, water level and weather information is necessary for effective response to oil spills to eliminate or reduce environmental damage; and

WHEREAS, the National Oceanographic and Atmospheric Administration's (NOAA), National Ocean Service (NOS) uncertainties in the "Tidal Current Charts - San Francisco Bay" exceed their reliability standards and withdrew the charts from further distribution in October, 1991, after issuing a Notice to Mariners; and

WHEREAS, NOS was informed of mariner's concerns about the reliability of information for San Francisco Bay in the annual publication, "Tidal Current Tables - Pacific Coast of North America and Asia", and issued a cautionary Notice to Mariners in October, 1991; and

WHEREAS, NOS and the local maritime community have identified the need to replace the tidal current charts with a computer model-generated circulation and water level atlas and to update the tidal current tables with more accurate information; and

WHEREAS, NOS's present information includes data collected between 1923 and 1954 over very short time periods, using instruments and techniques that are crude by today's standards, a resurvey of San Francisco Bay with state-of-the-art equipment, improved analysis techniques, and application of computers is required for a new circulation and water level atlas and updated tidal current tables; and

WHEREAS, NOS has developed and demonstrated the science and technology for measuring and disseminating highly reliable current, water level, and wind data in real-time to account for the nontidal effects of winds and river flow; and

WHEREAS, the combination of a new circulation and water level atlas, updated tidal current predictions, and installation of a physical oceanographic real-time system (PORTS) will provide information that is essential for safe navigation, hazardous material and oil spill prevention and response, search and rescue, environmental management, and safety of the citizens in the San Francisco Bay region; and

WHEREAS, NOS is without financial resources necessary to accomplish the

APPENDIX D

Harbor Safety Committee

of the San Francisco Bay Region

Mandated by the California Oil Spill Prevention and Response Act of 1990

February 28, 1992

Mr. Peter Bontadelli
Administrator
California Department of Fish and Game
Office of Oil Spill Prevention and Response
P. O. Box 944209
Sacramento, CA 94244-2090

Dear Mr. Bontadelli:

As you are aware, all segments of the maritime community, including environmental organizations, are concerned about NOAA's withdrawal of tidal current charts from circulation and their publicized statements concerning the questionable reliability of tidal current tables for San Francisco Bay.

Section 8670.23(c) of SB 2040 states, "Each harbor safety committee shall be responsible for planning for the safe navigation and operation of tankers, barges, and other vessels within each harbor." It is in response to this mandate that we take action.

By unanimous decision, on February 12, 1992, the members of the Harbor Safety Committee for the San Francisco Bay Region voted to support a resolution requesting (1) the California Congressional Delegation to seek funding for NOAA's NOS to conduct a circulation survey, apply a computer hydrodynamic model, install a PORTS for real-time current, water level, and wind data in San Francisco Bay, and produce improved information products; (2) the State of California Office of Oil Spill Prevention and Response (OSPR) to allocate funds of approximately \$250 to \$400 thousand per year beginning FY 1995 for the ongoing maintenance and operation of the San Francisco Bay PORTS; and (3) that OSPR enter into a cooperative agreement with NOS and other parties as may be appropriate to accomplish the above.

The basis for a consensus that there is a proven need and that PORTS fills this need is outlined in the first twelve paragraphs of the resolution. The resolution is enclosed and we ask that you forward it to the California Congressional Delegation.

Section 8670.37 empowers you, the Administrator, to "carry out studies with regard to improvements to contingency planning and oil spill response equipment and operations." This section further provides for reimbursement "for all costs incurred in carrying out the studies under this section from the Oil Spill Prevention and Administration Fund."

Mr. Peter Bontadelli
February 28, 1992
Page 2

8670.40(e)
Oil Spill
Prevention and Administration Fund

Section 8670.40(e) designates implementing "research into prevention and control technology" and "studies which may lead to improved oil spill prevention and response" as two of the purposes the fund was created to finance.

The first step will be for NOS to perform an initial study. Because Sections 8670.37 and 8670.40(e) specifically state the who, what and how by which such a study is to be carried out and funded, it was further passed by a unanimous vote to forward to you for emergency action, this request for the funding of \$50,000, to be drawn from the Oil Spill Prevention and Administration Fund, to finance an initial Q & A study by NOS which will validate the need for the full circulation study, application of a computer hydrodynamic model and the installation of PORTS and will also identify the geographical areas to be addressed.

Representatives from the pilots, the maritime industry, environmental groups, and the Coast Guard are all agreed that installation of a physical oceanographic real-time system (PORTS) will provide information that is essential for safe navigation, hazardous material and oil spill prevention and response, search and rescue, environmental management, and safety of the citizens in the San Francisco Bay region. We, therefore, ask that you expedite the funding of the initial study and support the resolution for accurate current predictions in San Francisco Bay.

NOS is prepared to begin the initial study as early as March, 1992, and we stand ready to provide you with any assistance or background information you may need to proceed.

Yours truly,



Captain J. Thomas
Chairman

APPENDIX E

SAN FRANCISCO BAY ANCHORAGES

San Francisco Bay:

(1) Anchorage No. 4. When Explosives Anchorage No. 13 is activated by the Captain of the Port, it and the forbidden anchorage zone surrounding it are excluded from Anchorage No. 4. When sustained winds are in excess of 25 knots each vessel greater than 300 gross tons using this anchorage shall maintain a continuous radio watch on VHF channel 13 (156.65 MHz) or, if available, VHF channel 16 (165.80 MHz). This radio watch must be maintained by a person who fluently speaks the English language.

(2) Anchorage No. 5, Southampton Shoal.

(3) Anchorage No. 6.

(4) Anchorage No. 7, Treasure Island. This anchorage is primarily for use by vessels requiring a temporary anchorage waiting to proceed to pier facilities or other anchorage grounds. This anchorage may not be used by vessels for the purpose of loading any dangerous cargoes or combustible liquids unless authorized by the Captain of the Port. Each vessel using this anchorage may not remain for more than 12 hours unless authorized by the Captain of the Port. Each vessel using this anchorage shall be prepared to move within one hour upon notification by the Captain of the Port.

(5) Anchorage No. 8.

(6) Anchorage No. 9.

(7) Anchorage No. 10.

(8) Anchorage No. 12. The maximum quantity of explosives that may be on board a vessel using this anchorage shall be limited to 3,000 tons.

(9) Anchorage No. 13. Each vessel using this anchorage shall be prepared to move within one hour upon notification by the Captain of the Port. The maximum total quantity of explosives that may be on board a vessel using this anchorage shall be limited to 50 tons except that, with the written permission of the Captain of the Port, each vessel in transit, loaded with explosives in excess of 50 tons, may anchor temporarily in this anchorage provided that the hatches to the holds containing explosives are not opened.

(10) Anchorage No. 14. The maximum total quantity of explosives that may be on board a vessel using this anchorage shall be limited to 3,000 tons. Each vessel using this anchorage will be assigned a berth by the Captain of the Port on the basis of the maximum quantity of explosives that will be on board the

vessel.

San Pablo Bay:

(11) Anchorage No. 18.

(12) Anchorage No. 19. See 204.215 of this title establishing a target practice area in San Pablo Bay adjacent to the westerly shore of Mare Island for use of the Mare Island Navy Yard.

(13) Anchorage No. 20.

(14) Anchorage No. 21.

(15) Anchorage No. 24. Each vessel using this anchorage shall promptly notify the Captain of the Port, upon anchoring and upon departure.

(16) Anchorage No. 25. Each vessel using this anchorage shall promptly notify the Captain of the Port, upon anchoring and upon departure.

(17) Anchorage No. 26. See 162.270 of this title establishing restricted areas in the vicinity of the Maritime Administration Reserve Fleet.

(18) Anchorage No. 27.

San Joaquin River:

(19) Anchorage No. 28.

(20) Anchorage No. 30.

Sacramento River:

Sacramento River, Decker Island Restricted Anchorage for Vessels of the U.S. Government. No vessel or other craft except those owned by or operatin under contract with the United States may navigate or anchor within 50 feet of any moored Government vessel in the area. Commercial pleasure craft shall not moor to buoys or chains of Government vessels, nor may they, while moored or underway, obstruct the passage of Government or other vessels through the area.

[Note. The Corps of Engineers also has regulations dealing with this section in 33 C.F.R. 207.]

General Regulations for Anchorages. The following

regulations apply to the preceding Anchorages Nos. 4 through 30, inclusive. The Decker Island Restricted Anchorage description includes its regulations.

(1) Within the navigable waters of San Francisco Bay, San Pablo Bay, Carquinez Strait, Suisun Bay, New York Slough, San Joaquin River Deep Water Channel between Suisun Bay and the east end of the West Sacramento Turning Basin, and connecting waters, anchoring is prohibited outside of designated anchorages except when required for safety or with the written permission of the Captain of the Port. Each vessel anchoring outside an established anchorage area shall immediately notify the Captain of the Port of her position and reason for anchoring.

(2) No vessel may permanently moor in areas adjacent to the San Joaquin River Deep Water Channel except with the written permission of the Captain of the Port.

(3) Each vessel anchoring for safety reasons in the San Joaquin River Deep Water Channel, the Sacramento River Deep Water Ship Channel, or the Stockton or West Sacramento Turning Basins shall be positioned as near to the edge of the channel or turning basin as possible so as not to interfere with navigation, or obstruct the approach to any pier, wharf, slip, or boat harbor and shall move as soon as the reasons for anchoring no longer exists or when notified to move by the Captain of the Port.

(4) No vessel may anchor within a tunnel, cable, or pipeline area shown on a Government chart.

(5) No vessel may moor, anchor, or tie up to any pier, wharf, or other vessel in such a manner as to extend into an adjacent channel or fairway.

(6) No vessel in such a condition that it is likely to sink or otherwise become a menace or obstruction to navigation or anchorage of other vessels may occupy an anchorage, except when unforeseen circumstances create conditions of imminent peril to personnel and then only for such period as may be authorized by the Captain of the Port.

(7) Each vessel carrying explosives shall only anchor in an explosives anchorage except as authorized by paragraph (1) or (17) of this section.

(8) No vessel other than a vessel under Federal supervision may go alongside or in any manner moor to any Government-owned vessel, mooring buoy, or pontoon boom, their anchor cables, or any of their appendages. No vessel other than a vessel under Federal supervision may obstruct or interfere in any manner with the mooring, unmooring, or servicing of vessels owned by the United States.

(9) The Captain of the Port may require any vessel in a designated anchorage area to moor with two or more anchors.

(10) Each vessel that will not have sufficient personnel on board to weigh anchor at any time shall anchor with two anchors with mooring swivel, unless otherwise authorized by the Captain of the Port.

(11) Deep-draft vessels shall take precedence over vessels of lighter draft in the deeper portions of all anchorages. Light-draft barges and vessels shall anchor away from the deeper portions of the anchorages so as not to interfere with the anchoring of deep-draft vessels. Should circumstances warrant, the Captain of the Port may require lighter draft vessels to move to provide safe anchorage, particularly in Anchorages 7 and 9, for deep-draft vessels.

(12) Barges towed in tandem to any anchorage shall nest together when anchoring.

(13) Each vessel that is notified by the Captain of the Port of his authorized representative to shift her position shall promptly shift her position.

(14) No person may use these anchorages for any purpose other than the purpose stated in these anchorage regulations.

(15) Where these regulations require that a vessel notify the Captain of the Port, the operator of the vessel shall transmit such report to the San Francisco Vessel Traffic Service.

[Note. Vessel Traffic Service guards VHF-FM Channel 13 (156.65 MHz) and Channel 16 (156.8 MHz).

(16) Nothing in this section may be construed as relieving any vessel or the owner or person in charge of any vessel from the penalties of law for obstructing or interfering with range lights or for not complying with the laws relating to lights, day signals, and fog signals and other navigation laws and regulations.

(17) The District Engineer, Corps of Engineers, may issue written permission for anchoring a single barge carrying explosives in quantities considered by the District Engineer as safe and necessary in the vicinity of work being done directly under the District Engineer's supervision or under a Department of the Army permit. When issuing such a permit, the District Engineer shall prescribe the conditions under which the explosives must be stored and handled and shall furnish a copy of the permit and a copy of the rules and regulations for storing and handling to the Captain of

the Port.

Naval Anchorages. In addition to the preceding General Regulations, the following regulations apply to each naval anchorage described in this section.

(1) Naval anchorages are intended for public vessels of the United States, but may be used by other vessels when not required for use by public vessels.

(2) Other vessels using a naval anchorage shall promptly notify the Captain of the Port upon anchoring and upon departure and shall be prepared to move within one hour upon notice should the anchorage be required for public vessels.

Explosive Anchorages. In addition to the General Regulations, the following regulations apply to each explosives anchorage described in this section.

(1) Explosives anchorages and, where established, surrounding forbidden anchorage zones, are temporarily activated as needed by the Captain of the Port. When not activated, explosives anchorages and surrounding forbidden anchorage zones become part of the general anchorage which encompasses them or, if not located within the boundaries of a general anchorage, become available for general navigation.

(2) Notice of activation and deactivation of explosives anchorages will be disseminated by Coast Guard Broadcast Notice to Mariners.

(3) Each vessel which anchors in an explosives anchorage or surrounding forbidden anchorage zone while such anchorage is not activated shall be prepared to move within one hour if the anchorage is activated.

(4) Unless otherwise authorized by the Captain of the Port:

(i) No vessel may anchor in an activated explosives anchorage except vessels loaded with, loading, or unloading explosives.

(ii) No vessel may enter or remain in an activated explosives anchorage except (a) vessels loaded with, loading or unloading explosives, (b) lighters or barges delivering cargo to or from such vessels, or (c) a tug authorized by paragraph (7)(iii) of this section.

(iii) No vessel carrying explosives or on which explosives are to be loaded may enter or remain in an activated explosives anchorage without written permission from the Captain of the Port. Such a permit must be obtained before entering the anchorage and may be revoked at any time.

(iv) No vessel may anchor in the forbidden anchorage zone surrounding an activated explosives anchorage.

(5) Each vessel loaded with, loading or unloading explosives, while within an explosives anchorage, shall display by day at her masthead, or at least 10 feet above the upper deck if the vessel has no mast, a red flag at least 16 square feet in area.

(6) Each passing vessel shall reduce speed as necessary so as to ensure that its wake does not interfere with cargo transfer operations aboard any vessel displaying a red flag in an explosives anchorage.

(7) The Captain of the Port may:

(i) Issue permission to any vessel carrying flammable solids, oxidizing materials, corrosive liquids, flammable liquids, compressed gases or poisonous substances to occupy a berth in an activated explosives anchorage. Such a permit must be obtained before entering the anchorage and may be revoked at any time.

(ii) Require any person having business on board a vessel which is loaded with, loading or unloading explosives to have a document that is acceptable to the Coast Guard for identification purposes and to show that document to the Captain of the Port.

(iii) Require a non-self-propelled vessel, or a self-propelled vessel that is unable to maneuver under its own power, that occupies an activated explosives anchorage to be attended by a tug.

APPENDIX F

Report Date 03-27-92

UCSG (G-MMI-3)
 COMMERCIAL VESSEL CASUALTIES, SAN FRANCISCO BAY, 1988-1992
 [1991-1992 Data Is Incomplete]

DATE	CASE	VESSEL NAME	SER	DSGN	OFFICIAL NUMBER	PRIMARY NATURE	PRIMARY CAUSE	GROSS TONS	ADC	FLAG	LATITUDE	LONGITUDE	LOCATION
YRMMDD	NUMBER												
1988:													
880108	MC88006500	CINCHONA	FRT	CONV	L8602555	ALLIS	POPERER	11031	C	PN	N 38 01.2	W 121 49.	San Joaquin River, Antioch
881215	MC90000479	BASALT 17	FRT	BRGE	0286811	BRGBUY	VFLDMOT	89	B	US	N 37 58.0	W 122 26.	San Pablo Point, Richmond
880110	MC88000160	ARCO JUNEAU	TNK	CONV	D556666	COLBDG	PFALPOS	57692	U	US	N 38 03.8	W 122 13.	Carquinez Strait at Carquinez Bridge
880208	MC88002403	LOLA LOU	PLEZ	CONV	CF416BF8	COLCRS	PFALKPL	4	B	US	N 37 52.5	W 122 23.	East of Angel Island
880208	MC88002403	MISS NATALIE II	FISH	CONV	D902575	COLCRS	PFALKPL	12	C	US	N 37 52.5	W 122 23.	East of Angel Island
880523	MC88005595	EX GAMBETTA	FISH	BRGE	CG018246	COLDOC	PINATT	8	B	US	N 38 04.1	W 122 15.	Carquinez Strait near Mare Island
880523	MC88005595	SOUTH BAY	TOW	CONV	D276382	COLDOC	PINATT	81	C	US	N 38 04.1	W 122 15.	Carquinez Strait near Mare Island
880202	MC88001297	SAN FRANCISCO	PASS	CONV	D586350	COLSUD	EUNWCHZ	99	C	US	N 37 56.5	W 122 30.	Larkspur Ferry Terminal
880509	MC88007190	ANDREW J HIGGIN	TNK	CONV	CG005357	DISABL	VFLWME	2572	C	US	N 37 48.2	W 122 19.	Dakland Inner Harbor
880827	MC89001954	SIREN	PASS	CONV	CF1973YB	FIRNEC	PINAWSP	43	C	US	N 38 14.0	W 121 36.	Howard Island Ferry
881106	MC89007241	PIHUY QUV	FISH	CONV	CF9607HZ	FLODNG	PIWSP	U	U	US	N 37 49.0	W 122 42.	In Pilot (Dean) Precautionary Area
881122	MC89000110	ELCIE M	TOW	CONV	D278459	FNDNRG	POPERER	33	B	US	N 37 49.0	W 122 30.	Between Point Bonita and GG Bridge
880210	MC89005694	PROVIDENCE	FRT	CONV	L7530602	GRNDGA	ESHOL	22000	C	JA	N 38 02.0	W 122 9.	Carquinez Strait off Martinez
880618	MC88003592	OMI DYNACHEM	TNK	CONV	D638899	GRNDGA	PERRJOG	32328	C	US	N 38 01.3	W 121 50.	San Joaquin River near Antioch
881011	MC88006024	ORIENTAL KING	FRT	CONV	L8122050	GRNDGA	POPERER	22324	C	PN	N 38 02.8	W 121 50.	Channel off Pittsburg
880405	MC88007043	COOP GRAIN	FRT	CONV	L75330D8	GRNDGA	POPERER	31368	C	LI	N 38 01.0	W 121 50.	San Joaquin River near Antioch
880703	MC88006343	ASPEN	TNK	CONV	O535357	MATBOL	VFLDME	37784	B	US	N 37 55.4	W 122 24.	Chevron Long Wharf, Richmond
880504	MC89000021	USNS ANDREW J H	TNK	CONV	CG005357	MATECS	VFLDMEL	25742	C	US	N 37 48.2	W 122 19.	Dakland Outer Harbor
880504	MC89000020	USNS ANDREW J H	TNK	CONV	CG005357	MATECS	VFLDMEL	25742	C	US	N 37 48.2	W 122 19.	Dakland Outer Harbor
880501	MC88003195	CAPT HOOK	FISH	CONV	D562527	MATFOS	EDEBRIS	23	B	US	N 37 43.4	W 122 47.	In Pilot Precautionary Area
880718	MC88005079	ASPEN	TNK	CONV	D535357	MATHST	VFLDMST	37784	B	US	N 37 55.2	W 122 23.	Near Chevron Long Wharf
880120	MC89001266	AMADOLU KOPARAN	FRT	CONV	L7329596	MATHEN	PINATT	35014	C	TU	N 37 55.0	W 122 20.	Near Chevron Long Wharf
880822	MC88007291	ANTONIO J BERNU	FRT	CONV	L8301199	MATHEN	UNKNOVN	4499	B	MX	N 37 50.0	W 122 45.	In Pilot Precautionary Area
880603	MC88006915	ASTRO COACH	FRT	CONV	L0009583	MATHEN	VFLDME	16644	B	JA	N 37 47.0	W 122 48.	In Pilot Precautionary Area
880908	MC89005492	OCEAN COMMANDER	FRT	CONV	L7203211	MATHEN	VFLDME	22647	B	PN	N 37 45.0	W 122 40.	In Pilot Precautionary Area
880624	MC88006527	FRANCES K	FISH	CONV	D222277	MATHEN	VINFUEL	12	B	US	N 37 47.1	W 122 37.	In Pilot Precautionary Area
880422	MC88005652	PRINCESS	FRT	CONV	L8311077	SSFCCS	UNKNOVN	24632	C	LI	N 37 48.0	W 122 30.	Near Point Bonita
880509	MC88004457	RAIDER III	OTH	CONV	CF2741HS	SSFCCS	VFLDME	3	B	US	N 38 06.9	W 122 3.	Grizzly Bay
880504	MC89000016	USNS ANDREW J H	TNK	CONV	CG005357	SSFNEC	MFLTDSG	25742	B	US	N 37 48.2	W 122 19.	Oakland Inner Harbor
880305	MC88001340	SEA OTTER	PASS	CONV	D519144	SWAMP	EADVCRT	14	B	US	N 37 48.0	W 122 35.	Nr Approach In GG Channel(Outside Pt. Bonita)
880701	MC88005974	MARIN	PASS	CONV	D5781D3	SWAMP	POPERER	99	C	US	N 37 56.5	W 122 30.	Larkspur Ferry Terminal Approach
880615	MC88004840	UNNAMED	PLEZ	CONV	CF0658GR	WAKDNG	POPERER	5	C	US	N 37 59.5	W 121 24.	River
880615	MC88004840	UNNAMED	PLEZ	CONV	CF0450GM	WAKDNG	POPERER	5	B	US	N 37 59.5	W 121 24.	River
880615	MC88004840	UNNAMED	PLEZ	CONV	CF8511GS	WAKDNG	POPERER	5	C	US	N 37 59.5	W 121 24.	River
880615	MC88004840	OCEAN GRACE	FRT	CONV	L7930474	WAKDNG	POPERER	12967	C	PN	N 37 59.5	W 121 24.	River

DATE	CASE NUMBER	VESSEL NAME	SER	DSGN	OFFICIAL NUMBER	PRIMARY NATURE	PRIMARY CAUSE	GROSS TONS	ABC	FLAG	LATITUDE	LONGITUDE	LOCATION
YYMMDD													
1989:													
890414	MC89002183	OVERSEAS JUN	TKK	CONV	D553137	COLDOC	PFALSPD	57701	C	US	N 37 55.0	W 122 25.	Chevron Long Wharf
891028	MC89005860	STANDARD #4	TOM	CONV	D276863	COLDOC	POPERER	18	C	US	N 37 55.1	W 122.24.	Chevron Long Wharf
891028	MC89005860	CHEVRON OILER	TKK	BRGE	D510568	COLDOC	POPERER	1285	C	US	N 37 55.1	W 122.24.	Chevron Long Wharf
891113	MC89006588	HONCHO	TOM	CONV	D565026	COLDOC	POPERER	180	C	US	N 38 03.4	W 122 16.	Approach to Carquinez Strait
891113	MC89006588	ROUGE	TKK	CONV	D652757	COLDOC	POPERER		C	US	N 38 03.4	W 122 16.	Approach to Carquinez Strait
891010	MC90001907	BELL 157	FRT	BRGE	D280702	COLSUD	ESUBDDJ	945	0	US	N 38 10.0	W 122 15.	Napa River
891010	MC90001907	JOHNNY PETERSO	TOM	CONV	D296618	COLSUD	ESUBDDJ	60	8	US	N 38 10.0	W 122 15.	Napa River
891220	MC90000330	ARCO JUNEAU	TKK	CONV	D566666	OTISABL	VFLDME	57692	8	US	N 37 46.1	W 122 41.	Pilot Precautionary Area
890716	MC890004955	YAMATO SPIRIT	TKK	CONV	L7379199	EXPNEC	PCRLSNS	42619	U	PN	N 37 46.0	W 122 21.	Anchorage 9
891026	MC890006130	GOLDEN BEAR	TKK	CONV	D239932	FIRFUR	PIMPSPF	7987	C	US	N 38 04.0	W 122 13.	East of Carquinez Bridge in Strait
890722	MC890006246	MOAMA PACIFIC	FRT	CONV	L7636547	FILDING	PIMPNT	13251	C	DA	N 37 45.0	W 122 22.	Off Army Street Terminal, San Francisco
890510	MC890005690	ADMIRAL	PASS	CONV	D546138	FDRNG	PPVTMT	26	A	US	N 38 10.0	W 121 38.	Sacramento River, Grand Island
891211	MC90000335	SEA BRAVES	TKK	CONV	L8007987	GRNDGA	ESHQAL	12671	C	LI	N 37 56.0	W 121 44.	Near Chevron Long Wharf, Richmond
890816	MC890004387	GULF MAJESTY	TOM	CONV	D574996	GRNDGA	EUNCHZ	181	C	US	N 38 01.4	W 121 25.	San Joaquin River
890816	MC890004387	ENERGY FREEDOM	FRT	BRGE	D639499	GRNDGA	EUNCHZ	14319	C	US	N 38 01.4	W 121 44.	San Joaquin River
890219	MC89002181	BRILLIANCE	TKK	CONV	L7377816	GRNDGA	PERRDDG	44698	8	LI	N 37 45.8	W 122 20.	Anchorage 9
890519	MC90003428	EXXON GOLDEN ST	TOM	CONV	D564373	GRNDGA	PERRDDG	173	C	US	N 38 02.0	W 122 10.	Carquinez Strait off Ozol
890519	MC90003428	EXXON BARGE 502	TKK	BRGE	D571538	GRNDGA	PERRDDG	7912	C	US	N 38 02.0	W 122 10.	Carquinez Strait off Ozol
890614	MC91001860	MARINE CHEMIST	TKK	CONV	D529399	GRNDGA	PERRDDG	20239	C	US	N 38 01.6	W 121 50.	Stockton Channel near Antloch
891014	MC89001161	CENTURY LEADER	FRT	CONV	L8309098	GRNDGA	PFALATR	20439	8	JA	N 37 59.0	W 122 24.	Anchorage 20, Richmond
890818	MC89004389	TRIDENT VENTURE	FRT	CONV	L8300585	GRNDGA	PIMPLOD	17210	C	GR	N 38 09.0	W 121 41.	Sacramento River, Rio Vista
890119	MC89000596	CROWN CONFIDENC	TKK	CONV	L8106070	GRNDGA	POPERER	25692	C	LI	N 38 03.1	W 122 5.	Off Avon Dock, Contra Costa
891213	MC90000074	JENICO SPIRIT	TOM	CONV	D259926	GRNDGA	POPERER	122	C	US	N 38 03.8	W 122 3.	Navigation Channel near Port Chicago
890723	MC90000790	CRYSTAL REY	FISH	CONV	D545765	GRNDGA	VFLEDMT	16	D	US	N 37 50.0	W 122 20.	East of Treasure Island near Emeryville
890816	MC890007063	YANPOL	FRT	CONV	D8412132	GRNDGA	VSTRFAL	24636	C	UR	N 38 01.5	W 121 45.	San Joaquin River near Sherman Island
891126	MC890007103	CHEVRON ARIZONA	FRT	CONV	D580320	MATECS	VFLEDMT	16941	D	US	N 37 50.0	W 122 27.	West of Shag Rock, near Alcatraz
891226	MC890007116	HINDAI NO. 102	FRT	CONV	L8417998	MATECS	VFLEDMT	38874	C	KS	N 38 03.0	W 122 8.	Carquinez Strait near Benicia
890414	MC890001951	STOLT VINCITTA	TKK	CONV	L7424839	MATECS	VFLEDMT	16867	8	LI	N 37 57.1	W 122 25.	Off Point San Pablo, Richmond
890918	MC90001899	MERCURY CAPE	FRT	CONV	L7204370	MATECS	VFLEDMT	9282	B	US	N 37 46.1	W 122 23.	Port of San Francisco
890516	MC89005661	SHIRLEY J	FISH	CONV	D604399	MATMEN	VFLEDMT	13	B	US	N 37 49.3	W 122 28.	East of GG Bridge in Navigation Lane
890809	MC890004481	USNS WALTER S D	FRT	CONV	CG013382	MATMEN	VFLEDMT	20706	C	US	N 37 48.1	W 122 19.	Oakland Outer Harbor
891210	MC890007107	PAORE ISLAND	IND	CONV	D639291	MATMEN	VFLEDMT	2464	D	US	N 37 44.0	W 122 21.	Near China Basin-Expt. Anchorage
891128	MC90001909	PIRAN	FRT	CONV	L8511524	MATGN	VFLEDMT	16794	C	US	N 38 04.0	W 122 4.	Suisun Bay Channel
891125	MC890007101	GREEN BAY	FRT	CONV	D907989	MATGN	VFLEDMT	16794	C	US	N 37 55.0	W 122 22.	Richmond Inner Channel
890623	MC90001285	ULLA	FRT	CONV	L8309725	MATNEC	VFLEDMT	17228	C	US	N 38 03.0	W 121 56.	Suisun Channel by Chippis Island
891110	MC90001184	WAR CLOUD	FISH	CONV	D534542	MATSF	PPVTMNT	25	B	US	N 37 48.5	W 122 23.	Between Treasure Island and San Francisco
891107	MC890007051	ROYAL PRINCE	PASS	CONV	D288705	OTHER	UNKNOAN	98	C	US	N 37 48.0	W 122 24.	Near Alcatraz
890912	MC90001896	AMERICAN RIVER	TOM	CONV	D207201	SSFCSS	VFLEDMT	134	B	US	N 37 54.0	W 122 27.	In Shipping Lane East of Tiburon Peninsula
890912	MC90001896	DARGE 157	TOM	CONV	DN519123	SSFCSS	VFLEDMT	588	B	US	N 37 54.0	W 122 27.	In Shipping Lane East of Tiburon Peninsula

DATE	CASE	VESSEL NAME	SR	OSGN	OFFICIAL NUMBER	PRIMARY NATURE	PRIMARY CAUSE	GROSS TONS	ABC FLAG	LATITUDE	LONGITUDE	LOCATION	
YMMDD	NUMBER				NUMBER		CAUSE	TONS					
890905	MC90001895	EXCEL	TKK	CONV	L6622264	SSFCSS	VFLDMOT	13334	C	LI	N 38 01.0	W 121 30.	Stockton Ship Channel
890410	MC89002175	JOSEPH SAUSE	TOM	CONV	D566610	SSFRAS	VFLDMOT	149	B	US	N 37 54.3	W 122 21.	Near Richmond Harbor
890410	MC90002175	I-51	TKK	BRGE	D578521	SSFRAS	VFLDMOT	4233	B	US	N 37 54.3	W 122 21.	Near Richmond Harbor
1990:													
901102	MC91001536	BARGE 18	TKK	BRGE	D278346	COLMTG	PERRJDG	3179	C	US	N 38 03.2	W 122 16.	Approach to Carquinez Strait West of Bridge
901102	MC91001536	SEA LARK	TOM	CONV	D548701	COLMTG	PERRJDG	196	C	US	N 38 03.2	W 122 16.	Approach to Carquinez Strait West of Bridge
900902	MC90006061	CURLEM	PLEZ	CONV	D219915	DISABL	VFLDME	14	B	US	N 37 49.0	W 122 32.	Point Bonita Rocks
901026	MC90006497	SONOMA	PASS	CONV	D578765	FIRMSC	PDPAFL	99	C	US	N 37 50.2	W 121 23.	River
900507	MC90003286	OAKLAND	PASS	CONV	D631031	FIRMSC	VFLDME	21	U	US	N 37 50.0	W 122 20.	Off Emeryville
900323	MC90002066	ANNA FOSS	TOM	CONV	D528087	FIRMSC	VFLDMOT	121	C	US	N 38 02.0	W 122 10.	Carquinez Strait off D201
900409	MC90004274	SEAMORTHY	FISH	CONV	D247363	FNDRNG	VFLDMST	45	A	US	N 37 47.5	W 122 39.	In Precautinary Area near Main Ship Channel
900201	MC90002408	IKAN TANOA	FRT	CONV	L7914975	GRNDGA	EADYVTH	10320	C	SN	N 38 33.2	W 121 34.	Sacramento Ship Channel near Sacramento
900301	MC90002353	CORNUCOP1A	TKK	CONV	D590414	GRNDGA	ESHODL	21668	C	US	N 38 10.5	W 121 40.	Sacramento Ship Channel near Sacramento
900319	MC90002463	SANKO SPENDOUR	FRT	CONV	L8400529	GRNDGA	ESHODL	16582	C	PN	N 38 03.4	W 122 4.	In Suisun Channel near Port Chicago
900904	MC90005542	GOLD BOND CONVE	FRT	CONV	L7353834	GRNDGA	PERRJDG	14941	C	LI	N 38 03.2	W 122 4.	In Suisun Channel near Port Chicago
900327	MC90001797	JUSSARA	TKK	CONV	L5422667	GRNDGA	POPERER	9111	C	GR	N 38 03.1	W 122 6.	In Suisun Channel near Avon
900413	MC90002427	CORNUCOP1A	TKK	CONV	D590414	GRNDGA	POPERER	21668	C	US	N 38 03.0	W 122 3.	In Suisun Channel near Port Chicago
900803	MC90004639	BEAU GRACE	FRT	CONV	L7916117	GRNDGA	POPERER	12928	C	PN	N 38 03.4	W 122 3.	In Suisun Channel, near Port Chicago
900716	MC91002847	ZIM TOKYO	FRT	CONV	L7120471	MATBOL	VFLDME	25830	B	IS	N 37 46.0	W 122 22.	Anchorage 9
900715	MC90004455	REGINA DEL MARE	PASS	CONV	D593217	MATFOS	VFLDME	96	C	US	N 37 49.0	W 122 23.	Near Treasure Island
900814	MC90007407	CATAMARIN	PASS	CONV	D682580	MATFOS	VSTRFAL	99	B	US	N 38 05.0	W 122 15.	Near Treasure Island
900612	MC90005037	EXXON PHILADELP	TKK	CONV	D526792	MATFOS	VFLDMST	34266	C	US	N 37 48.0	W 122 20.	Oakland Outer Harbor
901217	MC91001676	OVERSEAS BOSTON	TKK	CONV	D526792	MATFOS	VFLDMST	34266	C	US	N 37 45.0	W 122 20.	Anchorage 9
900827	MC91001676	PACIFIC SUCCESS	FRT	CONV	D630050	MATFOS	VSTRFRA	61213	B	US	N 37 45.0	W 122 20.	Anchorage 9
900824	MC90006860	YAMAHA MARU	FRT	CONV	D630050	MATFOS	VSTRFRA	24920	B	PN	N 38 02.3	W 121 52.	New York Slough, Stockton Channel
901221	MC91001523	GOLDEN GATE	PASS	CONV	L8707355	MATMEN	VFLDMEL	41786	C	PN	N 37 48.5	W 122 20.	Oakland Outer Harbor
900625	MC90006856	GOLDEN GATE	PASS	CONV	D522572	MATMEN	VFLDME	97	B	US	N 37 47.0	W 122 17.	Alameda Island (Bay side)
900831	MC90006899	LOBO	TOM	CONV	D293814	MATMEN	VFLDME	197	C	US	N 37 54.0	W 122 25.	Southampton Channel
900723	MC90007409	SAN FRANCISCO	PASS	CONV	D586350	MATMEN	VFLDME	99	C	US	N 37 49.5	W 122 25.	South of Alcatraz
901216	MC91000287	STAR GRINDANGER	FRT	CONV	L8507212	MATMEN	VFLDME	27972	C	LI	N 37 47.5	W 122 20.	Oakland Outer Harbor
900423	MC90003188	ELCIE M	TOM	CONV	D278459	MATMEN	VFLDMOT	33	C	US	N 37 49.4	W 122 25.	South of Alcatraz
900821	MC90006855	KATHLEEN PEARCY	FRT	CONV	D642140	MATMEN	VFLDMOT	3805	C	US	N 38 02.0	W 122 9.	Carquinez Strait
900821	MC90006855	NAKMAN SPIRIT	TKK	CONV	D5815825	MATMEN	VFLDMOT	59289	B	US	N 38 03.5	W 122 14.	Carquinez Strait, West of Carquinez Bridge
901227	MC91000781	GOLDEN GATE	TKK	CONV	L896722	MATMEN	VFLDMEL	27899	B	US	N 38 03.0	W 122 7.	Suisun Channel East Benicfa-Martinez Bridge
900622	MC90004481	CATAMARIN	PASS	CONV	D682900	MATMEN	VFLDME	99	C	US	N 37 51.3	W 122 27.	Northwest of Alcatraz Island
900309	MC90002460	PAVELEN	FISH	CONV	D603105	MATRED	VFLDME	45	B	US	N 37 49.0	W 122 33.	Off Point Bonita
901017	MC90006785	TAURUS	TOM	CONV	D243998	MATRED	VFLDME	139	C	US	N 37 48.0	W 122 19.	Oakland Outer Harbor

DATE YMWKD	CASE NUMBER	VESSEL NAME	SER	DSGN	OFFICIAL NUMBER	PRIMARY NATURE	PRIMARY CAUSE	GROSS TONS	ABC	FLAG	LATITUDE	LONGITUDE	LOCATION
901216	MC90007296	DOLPHIN	PASS	CONV	D902663	MATRED	VFLDMME	96	C	US	N 37 59.0	W 122 26.	San Pablo Shp Channel
901226	MC90002349	TEXACO RHODE IS	TNK	CONV	D296380	SSFCS	VFLDMME	16584	C	US	N 37 55.5	W 122 26.	Anchorage 5 (2 miles N. Chevron Long Wharf)
900813	MC90006802	USNS MERCY	PASS	CONV	CG003748	SSFCS	VFLDMOT	54367	C	US	N 37 47.0	W 122 18.	Sacramento River
901211	MC91000161	YAKIMA	TOW	CONV	D299201	SSFRAS	VFLDMOT	165	C	US	N 38 03.8	W 122 1.	Sufsun Channel near Port Chicago
900404	MC90005491	ELLEN GAY	TOW	CONV	D524822	WTRDM	EADWTH	27	C	US	N 37 36.0	W 122 13.	Near San Mateo Bridge
1991:													
910329	MC91001915	HOP SANG	FISH	CONV	CF23081V	COLSUO	ESUB08J	10	B	US	N 37 48.5	W 122 29.	Almost under Golden Gate Bridge
910108	MC91000786	CHECHA	FISH	CONV	D655145	FIRCFU	VFLDMME	13	B	US	N 37 48.5	W 122 25.	South of Alcatraz
910316	MC91002306	DUTRA DARGE #5	FRT	CONV	CG032246	GRNDGA	PFLALTR	1751	C	US	N 37 46.3	W 122 19.	East of Anchorage 9
910112	MC91000968	OVERSEAS NEW OR	TNK	CONV	D656742	GRNDGA	POPERER	21446	C	US	N 37 54.3	W 122 21.	Richmond Harbor
910121	MC91001529	OREDEGE MONARCH	IND	CONV	CG079788	GRNDGA	POPERER	600	C	US	N 38 04.0	W 121 56.	East of Chippis Island
910410	MC91002256	SEA-LAND RELIAN	FRT	CONV	D628873	MATFOS	VFLDMME	29965	B	US	N 37 48.0	W 122 21.	Oakland Outer Harbor Entrance
910110	MC91001241	EXXON NEW ORLEA	TNK	CONV	D298216	MATHST	VCGOROS	32035	U	US	N 37 48.0	W 122 25.	South of Alcatraz
910130	MC91001935	ASPEN	TNK	CONV	D535357	MATHST	VFATFRA	37784	B	US	N 37 45.6	W 122 22.	Near Anchorage 9
910124	MC91001938	GLACIER BAY	TNK	CONV	D526588	MATHST	VFATFRA	30684	B	US	N 37 45.6	W 122 22.	Near Anchorage 9
910131	MC91001908	EXXON NORTH SLO	TNK	CONV	D600477	MATHST	VFLDMST	75272	B	US	N 37 45.6	W 122 25.	Near Anchorage 9
910309	MC91002090	NAIAD	PASS	CONV	D274774	MATHST	VFLDMME	49	B	US	N 37 48.6	W 122 25.	Off Alcatraz
910111	MC91002465	DANIELLA	FRT	CONV	L8718873	MATHEN	VFLDMME	5818	B	US	N 37 46.1	W 122 38.	In Precautinary Area @ Approach to GGB Chm
910410	MC91002548	RANDI	TOW	CONV	D505304	MATHEN	VFLDMME	55	C	US	N 38 03.4	W 122 10.	Carguinez Strait near Benicta
910423	MC91002547	SS MANULANI	TNK	CONV	D528400	MATNEC	VFLDMME	23785	C	US	N 37 49.0	W 122 20.	Oakland Outer Harbor
910429	MC91002649	MARIN MIST	TNK	BRGE	D282618	SSFRAS	VFLDMST	1406	B	US	N 37 49.0	W 122 21.	East of Treasure Island
910429	MC91002649	MARIN TWILIGHT	TOW	CONV	D614861	SSFRAS	VFLDMST	165	B	US	N 37 49.0	W 122 21.	East of Treasure Island

NOTE: * Location: The defined location was not provided from Coast Guard casualty reports, but added by Joan Lundstrom, Harbor Safety Committee member, based upon review of navigational charts.

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APR 14 1992
CALIFORNIA
COASTAL COMMISSION

INHOUSE

CASMAIN Data Dictionary

January 1992

Office of Marine Safety, Security and Environmental Protection

MARINE INVESTIGATION DIVISION
Marine Safety Evaluation Branch
G-MMI-3

WIND DIRECTION

CODE

DATA LIMIT

WIND DIRECTION	CODE	DATA LIMIT
"North (000.0 Deg)"	"N"	"WIND"
"North northeast (022.5 Deg)"	"NNE"	"
"Northeast (045.0 Deg)"	"NE"	"
"East northeast (067.5 Deg)"	"ENE"	"
"East (090.5 Deg)"	"E"	"
"East southeast (112.5 Deg)"	"ESE"	"
"Southeast (135.0 Deg)"	"SE"	"
"South southeast (157.5 Deg)"	"SSE"	"
"South (180.0 Deg)"	"S"	"
"South southwest (202.5 Deg)"	"SSW"	"
"Southwest (225.0 Deg)"	"SW"	"
"West southwest (247.5 Deg)"	"WSW"	"
"West (270.0 Deg)"	"W"	"
"West northwest (292.5 Deg)"	"WNW"	"
"Northwest (315.0 Deg)"	"NW"	"
"North northwest (337.5 Deg)"	"NNW"	"
"Variable"	"VAR"	"

NATURE OF CASUALTY

CODE

DATA LIMIT

NATURE OF CASUALTY	CODE	DATA LIMIT
"Allision"	"ALLIS"	"NATURE1+"
"Barge Breakaway"	"BRGBWY"	"
"Capsizing"	"CAPSIZ"	"
"Collision, Meeting"	"COLMTG"	"
"Collision, Crossing"	"COLCRS"	"
"Collision, Overtaking"	"COLOTK"	"
"Collision, Special circumstance"	"COLSPC"	"
"Collision, w/ice"	"COLICE"	"
"Collision, w/aid to navigation"	"COLATN"	"
"Collision, Submerged object"	"COLSUO"	"
"Collision, Floating object"	"COLFLO"	"
"Collision, Bridge"	"COLEBDG"	"
"Collision, Pier/Dock"	"COLDOC"	"
"Collision, Offshore drlng unit"	"COLMOD"	"
"Collision, Fixed object NOC"	"COLFNC"	"
"Collision, NEC"	"COLNEC"	"
"Collision, Unknown"	"COLUNK"	"
"Collision, w/dike, lock or dam"	"COLLDM"	"
"Disappearance, w/trace"	"GONETR"	"
"Disappearance, wo/trace"	"GONENT"	"
"Explosion, Cargo - no fire"	"EXPCGN"	con't

NATURE OF CASUALTY	CODE	DATA LIMIT
"Explosion, Mach space - no fire"	"EXPMSN"	"NATURE1+"
"Explosion, Pressure val-no fire"	"EXPPVN"	"
"Explosion, Pumproom-no fire"	"EXPPRN"	"
"Explosion, Boiler-no fire"	"EXBPNF"	"
"Explosion, Fuel-no fire"	"EXPFUN"	"
"Explosion, Cargo-fire"	"EXPCGF"	"
"Explosion, Mach space-fire"	"EXPMSF"	"
"Explosion, Pressure val-fire"	"EXPPVF"	"
"Explosion, Pumproom-fire"	"EXPPRF"	"
"Explosion, Boiler-fire"	"EXPBOF"	"
"Explosion, Fuel-fire"	"EXPFUF"	"
"Explosion, NEC"	"EXPNEC"	"
"Explosion, Unknown"	"EXPUNK"	"
"Fire, Vessel furnishing"	"FIRFUR"	"
"Fire, Vessel cargo, freight"	"FIRCFT"	"
"Fire, Machinery space"	"FIRMCS"	"
"Fire, Pumproom"	"FIRPMR"	"
"Fire, Vessel structure"	"FIRSTR"	"
"Fire, Vessel fuel"	"FIRVFU"	"
"Fire, Electrical"	"FIRELC"	"
"Fire, Vessel cargo, fuel"	"FIRCFU"	"
"Fire, Vessel cargo, HAZMAT"	"FIRCHZ"	"
"Fire, NEC"	"FIRNEC"	"
"Grounding, accidental"	"GRNDGA"	"
"Grounding, Intl w/damage-hazard"	"GRNDGI"	"
"Matl Failure, main eng/motor"	"MATMEN"	"
"Matl Failure, boiler"	"MATBOL"	"
"Matl Failure, main steam sys"	"MATMSS"	"
"Matl Failure, aux steam sys"	"MATASS"	"
"Matl Failure, feed and condens sys"	"MATFCS"	"
"Matl Failure, cooling water sys"	"MATCWS"	"
"Matl Failure, fuel oil supply"	"MATFOS"	"
"Matl Failure, lube oil supply"	"MATLOS"	"
"Matl Failure, main generator"	"MATMGN"	"
"Matl Failure, aux generator"	"MATAGN"	"
"Matl Failure, elec control systems"	"MATECS"	"
"Matl Failure, elec dis sys"	"MATEDS"	"
"Matl Failure, hyd contl sys"	"MATHCS"	"
"Matl Failure, phuem contl sys"	"MATPCS"	"
"Foundering, sinking"	"FNDRNG"	"
"Flooding, w/out sinking"	"FLDING"	con't

CAUSE OF CASUALTY

CODE DATA LIMIT

CAUSE OF CASUALTY	CODE	DATA	LIMIT
"Unknown"	"UNKNOWN"	"CAUSE1+"	
"Unknown"	"PUNKNOW"		
"P Bypassed avail safety devices"	"PBPSASD"		"
"P Inattention to duty"	"PINATT"		"
"P Intoxication (Alcohol/Drugs)"	"PDRUNK"		"
"P Calculated risk"	"PCALRSK"		"
"P Carelessness"	"PCRLSNS"		"
"P Error in Judgment"	"PERRJDG"		"
"P Lack of Knowledge"	"PLCKKNO"		"
"P Lack of Training"	"PLCKTNG"		"
"P Lack of Experience"	"PLCKEXP"		"
"P Operator Error"	"POPERER"		"
"P Fatigue"	"PTIRED"		"
"P Smoking"	"PSMOKD"		"
"P Open Flame"	"POPNFL"		"
"P Stress"	"PSTRESS"		"
"P Physical Impairment"	"PPHYSIM"		"
"P Psychological Impairment"	"PPSYCHO"		"
"P Failed comple w/rule, reg, pro"	"PFALRUL"		"
"P Inadequate Supervision"	"PINADSP"		"
"P Improper Casualty Control pro"	"PIMCCP"		"
"P Improper safety precautions"	"PIMPSFP"		"
"P Failed to acct for crnt/wx"	"PFALACW"		"
"P Failed to acct for tide/riv sg"	"PFALATR"		"
"P Failed to ascertain position"	"PFALPOS"		"
"P Failed to use avail nac equip"	"PFALANE"		"
"P Failed to use charts and pubs"	"PFALCAP"		"
"P Failed to use radiotelephone"	"PFALRTE"		"
"P Relied on floating ATON"	"PRELFAN"		"
"P Failed to yield right of way"	"PFALTY"		"
"P Failed to est passing agreement"	"PFALEPA"		"
"P Failed to keep to right of chnl"	"PFALKRC"		"
"P Failed to proceed at safe speed"	"PFALSPD"		"
"P Failed to stop"	"PFALSTP"		"
"P Failed to keep proper lookout"	"PFALKPL"		"
"P Improper/faulty lights/shapes"	"PIMPFLT"		"
"P Improper/missing whistle signals"	"PIMPMWS"		"
"P Improper maintenance"	"PIMPMT"		"
"P Used defective equipment"	"PDEFEQT"		"
"P Design creteria exceeded"	"PDSGCEX"		"
"P Service conditions exceeded"	"PSVCCEX"		con't

CAUSE OF CASUALTY

CODE DATA LIMIT

CAUSE OF CASUALTY	CODE	DATA LIMIT
"P Preventive maint not done"	"PPVTMNT"	"CAUSE1+"
"P Improper loading"	"PIMPLOD"	"
"P Improper cargo stowage"	"PIMPCGS"	"
"P Improper securing/rigging"	"PIMPSCR"	"
"P Improper mooring/towing"	"PIMPOT"	"
"V Inadequate lighting"	"VINADLT"	"
"V Inadequate improper NAV equip 8/14/91"	"VINADNE"	"
"V Inadequate stability"	"VINADST"	"
"V Inadequate lifesaving equip"	"VINADLE"	"
"V Inadequate firefighting equip"	"VINADFF"	"
"V Inadequate/missing guarding"	"VINADMG"	"
"V Inadequate controls"	"VINADCT"	"
"V Inadequate displays"	"VINADDS"	"
"V Inadequate horsepower"	"VINHRSP"	"
"V Faulty NAV (Running) lights"	"VFLTNLT"	"
"V Insufficient fuel"	"VINFUEL"	"
"V Failed materials, electrical"	"VFLDMEL"	"
"V Failed materials, mechanical"	"VFLDMME"	"
"V Failed materials, structural"	"VFLDMST"	"
"V Failed materials, other"	"VFLDMOT"	"
"V Failed fastenings"	"VFLDFST"	"
"V Improper riveting"	"VIMPRIV"	"
"V Improper welding"	"VIMPWEL"	"
"V Brittle fracture"	"VBRIFRA"	"
"V Fatigue fracture"	"VFATFRA"	"
"V Stress fracture"	"VSTRFRA"	"
"V Auxiliary power failure"	"VAUXFAL"	"
"V Temperature stress"	"VTMPSTR"	"
"V Corrosion"	"VCORROS"	"
"V Vibration"	"VVIBRAT"	"
"V Normal wear"	"VNORMLW"	"
"V Static electricity"	"VSTATEL"	"
"V Inadequate lubrication"	"VINALUB"	"
"V Steering failure"	"VSTRFAL"	"
"V Propulsion failure"	"VPROFAL"	"
"V Fouled propeller"	"VFOUPRO"	"
"V Cargo shift"	"VCGOSHF"	"
"V Dragging anchor"	"VDRGANC"	"
"E Adverse weather"	"EADVWTH"	"
"E Adverse current/sea condition"	"EADVCR"	con't

CAUSE OF CASUALTY	CODE	DATA LIMIT
"E Debris"	"EDEBRIS"	"CAUSE1+"
"E Suction bank/bottom/vsl"	"ESUCBBV"	"
"E Ice"	"EICE"	"
"E Lightning"	"ELITNIN"	"
"E Shoaling"	"ESHOAL"	"
"E Submerged object"	"ESUBOBJ"	"
"E Channel not maintained"	"ECHNMNT"	"
"E Uncontrollable channel hazard"	"EUNCCHZ"	"
"E Unmarked channel hazard"	"EUNMCHZ"	"
"E Hzrdus bridge/dock/pier lctn"	"EHZBDPL"	"
"E Hzrdus bridge/dock/pier config"	"EHZBDPC"	"
"E Inadequate bridge/dock/pier ID"	"EINBDPI"	"
"E Inadequate equip available"	"EINADEA"	"
"E Inadequate reg, rule, proc, plcy"	"EINADGP"	"
"M Inadequate equip available" 8/14/91	"MINADEA"	"
"M Inadequate WX info avail" 8/14/91	"MINADWI"	"
"M Inadequate manning" 8/14/91	"MINADMN"	"
"M Faulty design"	"MFLTDSG"	"
"M Sys maint functions improper"	"MSYSMNT"	"
"M Improper AID location"	"MIMADLO"	"
"M Inadequate AID display/type"	"MINAIDD"	"
"M Inadequate AID maintenance"	"MINAIDM"	"
"M Inadequate statutory/reg rgmnts"	"MINREGS"	"
"M Inadequate owner/op safety prog"	"MINSFT"	"
"Not elsewhere classified"	"NEC"	"
"Result of previous nature"	"PREVNAT"	"
"Vandalism"	"NVANDAL"	"

SEA CONDITIONS	CODE	DATA LIMIT
"Calm 0-1' "	"CALM"	"SEACON"
"Choppy 1-3' "	"CHOP"	"
"Moderate 4-12' "	"MOD"	"
"Heavy 12-20' "	"HVY"	"
"Very Heavy ... 20-40' "	"VHVY"	"
"Precipitous .. GT-40' "	"PREC"	"
"Strong current"	"SCRT"	"
"Freshet/Flooding"	"FRFL"	"
"Flood tide"	"FLTD"	"
"Ebb tide"	"EBBT"	"
"Ice"	"ICE"	"
"Not specified"	"NA"	"
"Unknown"	"UNK"	"

APPENDIX G

Summary by J. Lundstrom from U.S. Coast Guard Records: Tanker/Barge Casualties, San Francisco Bay Region, 1988/1991

(NOTE: Includes Military Accidents; Data for 1991 is Incomplete)

1988:

<u>Location</u>	<u>Primary Nature</u>	<u>Primary Cause</u>
Carquinez Br. Tanker: 57,692 Gross Tons	Allision w. bridge	Failure to ascertain position
Oakland Harbor Tanker: 2,572 Gross Tons	Disabled	Mechanical failure
San Joaquin River Tanker: 32,328 Gross Tons	Accidental grounding	Personal judgement
Chevron Long Wharf Tanker: 37,784 Gross Tons	Boiler failure	Mechanical failure
Oakland Harbor Navy Tanker: 25,742 Gross Tons	Electrical & steering systems failure	Electrical failure, inadequate firefighting equipment
Chevron Long Wharf Tanker: 37,784 Gross Tons	Hull failure	Structural failure
Sacramento River Tanker: 21,668 Gross Tons	Accidental grounding	Shoaling
<u>1989:</u>		
Chevron Long Wharf Barge: 1,285 Gross Tons	Collision with dock	Operator error
Carquinez Strait Tanker	Collision with dock	Operator error
Ocean: Pilot Area Tanker: 57,692 Gross Tons	Disabled	Mechanical failure
Anchorage 9 Tanker: 42,619 Gross Tons	Explosion-NEC	Carelessness
Chevron Long Wharf Tanker: 12,671	Accidental grounding	Shoaling
Anchorage 9 Tanker: 44,698 Gross Tons	Accidental grounding	Error in judgement
Carquinez Strait Barge; 7,912 Gross Tons	Accidental grounding	Error in judgement

4

Sacramento River
Tanker: 16,584 Gross Tons

Shaft system failure

Mechanical failure

1991:

Richmond Harbor
Tanker: 21,446 Gross Tons

Accidental grounding

Operator error

Alcatraz
Tanker: 32,035 Gross Tons

Hull failure

Corrosion

Anchorage 9
Tanker: 37,784 Gross Tons

Hull failure

Fatigue fracture

Anchorage 9
Tanker: 30,684 Gross Tons

Hull failure

Fatigue fracture

Anchorage 9
Tanker: 75,272 Gross Tons

Hull failure

Structural failure

Port San Francisco
Tanker: 27,899 Gross Tons

Hull failure

Normal wear

Oakland Harbor
Tanker: 23,785 Gross Tons

Material failure-NEC

Mechanical failure

Treasure Island
Barge: 1,406 Gross Tons

Failure- rudder/shaft

Structural failure

5835N

APPENDIX H

April 19, 1992
Information on San Francisco Bay Bridge/Vessel Accidents for Past Ten Years (1981-91)

Golden Gate Bridge: No vessel accidents since the bridge was constructed.

Benicia-Martinez Bridge:

11-30-81 Navy Vessel Damaged superstructure of the bridge including bridge bracing. \$204,450 damage to bridge structure.

12-14-81 Tug with Six Barges Major damage to bridge piles, including below water level. \$662,000 damage to bridge structure.

12-27-85 Barge Struck bridge fender, damaging pilings. \$300,000 damage to bridge structure.

Carguinez Bridge:

1-10-88 Arco Juneau, Tanker Crashed into piling, creating 200 ft. wide hole in hull and splitting open several empty oil tanks which had carried Alaska crude. \$200,000 damage to bridge structure.
NOTE: Caltrans RACON on the bridge after this accident.

11-28-90 Navy Tug, Shoshone Towing four barges. \$60,000 damage to bridge structure.

Richmond-San Rafael Bridge:

12-15-88 Drifting Barge Hit four piers, \$20,000 damage to bridge structure.

1-4-90 Oil Barge Jovalan Struck bridge fender. \$50,000 damage to bridge structure.

Bay Bridge:

1990 Unknown Vessel Hit fender. \$20,000 damage to bridge structure.

San Mateo-Hayward Bridge:

12-3-82 Two PG&E Work Barges ... Hit trestle span. \$172,000 damage to bridge structure.

2-92 Unknown Vessel Hit pier fender. \$10,000 damage to bridge structure.

APPENDIX I

ACCIDENTS AND NEAR MISSES DURING CALENDAR YEARS 1989 THROUGH 1991**RECEIVED**

MAY 04 1992

CALIFORNIA
COASTAL COMMISSION**SINKINGS:**

Merchant Ships: 0
 Other: 1 (A small barge)

GROUNDINGS:

Merchant Ships: 22
 Other: 5 (Barges and an excursion vessel)
 (This does not include four reported incidents of vessels
 "touching bottom" where the vessel grounded momentarily,
 but did not lose headway.)

COLLISIONS:

Between Merchant Ships: 0
 Between Merchant Ships and Small Craft: 3

RAMMINGS:

Merchant Ships: 3
 Tugs: 4
 Other: 0

NEAR MISSES:

Between Ships and/or Tugs: 12
 Between Ships or Tugs and Other Vessels: 5

SINKINGS:

5/14/90: An accommodation barge (for ferries to load passengers from) sunk off Pier 26 while being towed by the tug MUD HEN. The barge was never raised.

GROUNDINGS:

2/19/89: The vehicle carrier CENTURY LEADER: 1 dragged anchor in Anchorage 22 and grounded. The grounding was discovered when a pilot boarded the vessel to shift the ship to its berth in Benicia. The pilot summoned tug assistance and was able to free the ship in about 45 minutes.

2/19/89: The tanker CROWN CONFIDENCE reported itself aground off the Avon Terminal in Martinez. The vessel was unable to free itself, even with tug assistance and shifting ballast. The vessel was refloated at the next high tide and docked at the Shell Terminal in Martinez without further incident.

2/19/89: The tanker BRILLIANCY set aground while anchored in Anchorage 9. The tanker refloated on the next high tide and was able to get underway under its own power for sea.

VESSEL ACCIDENTS AND NEAR MISSES

Compiled By USCG Vessel Traffic Service San Francisco

13 April 1992

The attached is a list of vessel accidents and near misses reported to, or observed by, Coast Guard Vessel Traffic Service San Francisco during the calendar years 1989, 1990 and 1991. The list is not necessarily complete since it does not contain unreported incidents which occurred beyond VTS's surveillance area.

The category of "Near Misses" lists those occasions where VTS deemed a distinct danger of collision or ramming existed. However, VTS's proactive approach in issuing traffic advisories has likely prevented many other situations from becoming "Near Misses."

The term "collision" refers to moving vessels which collide. The term "ramming" refers to a moving vessel that collides with a stationary vessel (e.g., moored or anchored) or structure (e.g., pier or bridge).

5/14/89: The tanker MARINE CHEMIST grounded off Antioch Point while in ballast. The vessel was refloated, after deballasting, with tug assistance about three hours later.

5/19/89: The tug EXXON GOLDEN STATE, with a loaded oil barge in tow, "touched bottom" while adjusting tow off Benicia. The tug anchored and sounded tanks. No evidence of damage or leakage was found.

5/21/89: The tug MARINE TWILIGHT pushing a barge loaded with 25,000 barrels of fuel oil reported the barge had grounded north of the Oakland Bar Channel. No pollution resulted and the barge was refloated on the next tide.

7/21/89: The tanker NORTH SEA "touched bottom" off Pt. Molate while approaching its berth at Orient Pt.

7/25/89: The bulk carrier NORMAN QUEEN reported grounding in New York Slough. The vessel was able to immediately back off and turn around. It then transited to Antioch to anchor and await more favorable tides.

8/16/89: The M/V YAMPOL grounded on the San Joaquin River in the Vicinity of New York Point as the result of a steering casualty. The vessel was able to free itself and, after restoring steering, anchor off New York Point for inspection.

8/16/89: The integrated tug GULF MAJESTY and the barge ENERGY FREEDOM grounded near Sacramento River Buoy 17 while downbound from Sacramento with a load of wheat. The tug broke from the barge and attempted to free the barge. The barge came free, but before the tug could get control of it, it grounded again. The tug waited for the next high tide and obtained additional tug assistance before freeing the barge and continuing downbound.

8/18/89: The M/V ANGELIC SPIRIT reported it had been aground on the San Joaquin River between Lights 28 and 29 for about an hour and a half. The vessel had freed itself and continued upbound for Stockton.

8/18/89: The bulk carrier TRIDENT VENTURE grounded just south of the Rio Vista Bridge on the Sacramento River. The vessel was carrying a load of rice and was not damaged. It was refloated at the next high tide.

10/6/89: The bulk carrier SUN ROSE reported grounding in New York Slough on the edge of the channel. The ship was freed with the assistance of three tugs and anchored off New York Point to inspect for damage. None was evident.

11/28/89: The bulk carrier PIRAN grounded near Suisun Bay Light 10 while downbound from Sacramento with a load of grain. The vessel was freed with tug assistance about 45 minutes later and continued to sea without further incident.

12/13/89: The tug JERICO SPIRIT, pushing a loaded sand dredge, reported its barge aground near Suisun Bay Channel Buoy 12. At the time, visibility in the area was reported as less than 200 feet. The JERICO SPIRIT waited for the next high tide, freed the barge, and continued its transit.

12/22/89: VTS received third-hand information (from a Marine Exchange dispatcher, who had heard it from a tug operator) that the bulk carrier BAHIA MAGDALENA with a load of gypsum was aground off its berth at Domtar Antioch for as much as an hour due to shoaling near the pier.

2/23/90: The M/V LUZON went aground in the vicinity of Suisun Bay Buoy 10. The ship refloated under its own power.

3/7/90: The tanker JUSSARA went aground off Suisun Bay Buoy 7. No pollution resulted and the ship was refloated without damage.

3/15/90: The tug TD-64 with an empty flat barge went aground near San Joaquin River Daymark 57. The tug was still afloat, but the barge was hard aground. The barge was refloated at the next high tide.

3/19/90: The bulk carrier SANKO SPLENDOR went aground in the vicinity of Suisun Bay Light 10. The ship grounded well within the channel, evidently due to uncharted shoaling.

4/14/90: The liquid anhydrous ammonia tanker CORNUCOPIA "touched bottom" near the Avon Terminal in Martinez.

6/8/90: The bulk carrier PITTSBURG went aground briefly in New York Slough. The vessel was aground for 7 minutes and refloated without further incident.

6/25/90: The bulk carrier BAHIA MAGDALENA "touched bottom" in the east end of New York Slough.

8/3/90: The bulk carrier BEAU GRACE grounded in the vicinity of Suisun Bay Buoy 12. The grounding partially obstructed the channel, but other vessels were able to safely navigate the area. The vessel was refloated with tug assistance about 12 hours later, and grounded again briefly before completing its transit.

9/4/90: The bulk carrier GOLDBOND CONVEYOR grounded off Suisun Bay Buoy 9. The vessel was refloated with tug assistance.

4/4/91: The bulk carrier VITORIA went aground near in the Sacramento Deep Water Ship Channel near Light 67 as a result of an engine failure. About 20 minutes later repairs were made, the ship freed itself and continued downbound.

7/28/91: The bulk carrier ELLEAIR TAIO grounded in the vicinity of Suisun Bay Buoy 10. The vessel was refloated with tug assistance about a half hour later.

9/3/91: The tanker CHEVRON COLORADO "touched bottom" near Pt. Potrero in the Richmond Inner Harbor. The ship did not lose headway and moored without incident at Time Oil in Richmond.

10/29/91: The excursion vessel COMMODORE HORNBLOWER, returning from a dinner cruise with no passengers aboard, grounded near the Berkeley Pier. The COMMODORE HORNBLOWER refloated about two hours later.

11/7/91: The bulk carrier ENTERPRISE I grounded near San Joaquin River Light 29. After deballasting, the ship freed itself about two hours later without tug assistance.

12/11/91: Tanker SEA BRAVES with a load of coconut oil went aground off Pt. Molate. The vessel was freed with tug assistance.

12/18/91: The bulk carrier ORAVA grounded on the east bank of the Sacramento Deep Water Ship Channel near Light 75. The vessel was refloated about an hour later with tug assistance.

COLLISIONS/RAMMINGS:

10/28/89: The tug STANDARD IV with an oil barge in tow lost control while approaching its berth at the Richmond Long Wharf. The barge struck the pier, destroying a catwalk and parting the bow lines of the tanker OVERSEAS JUNEAU. The tanker's bow began to swing away from the pier. The tanker dropped an anchor and hailed a passing light tug. The tug held the tanker's bow against the dock while it made preparations to get underway. The tanker transited to anchorage without further incident. The barge suffered minor damage. There was no damage to the tug.

7/9/89: The bulk carrier BAHIA MAGDALENA reported a 14-foot skiff had collided with the ship's port bow. The skiff had been noted making several passes close under the ship's bow a short time before. Another vessel had gone to the skiff's assistance and no injuries seemed evident.

3/29/90: The tug ELLEN pushing a loaded sand dredge rammed the Fruitvale Bridge in Alameda when the bridge's toe locks jammed, delaying the bridge's opening. The bridge suffered structural damage and the dredge suffered minor damage.

6/25/90: The container ship CALIFORNIA LUNA was forced out of the Oakland Bar channel by a sailboat and nearly grounded. The sailboat ended up colliding with the ship and suffering cosmetic damage. The sailboat operator was cited for negligence and failure to obey the Rules of the Road.

9/24/90: The M/V VALERIE C reported its mast had struck the underside of the Highway 680 Benicia-Martinez Bridge and Southern Pacific Railroad Bridge. One of the radar antennae was damaged. There was no significant damage to either bridge.

10/7/90: An unknown small power boat collided with the vehicle carrier ASTRO COACH while it was turning off Pt. Potrero in Richmond. Evidently the boat's operator was not paying attention and did not notice the ship's presence until the collision was imminent. When attempting to back away at high speed, the boat's outboard failed. All POB jumped overboard before the collision and were picked up by another small craft. The boat scraped down the ship's side suffering minor damage.

11/28/90: The Navy tugboat YTS-830, while towing the USNS SHOSHONE to the Mare Island Naval Shipyard, struck the center pier of the Carquinez Bridge. The tug was not damaged. The bridge suffered moderate damage to its wooden fenders, but no structural damage.

3/5/91: While going alongside for lightering in Anchorage 9, the tanker DESTINY struck the tanker WILLIAM E. MUSSMAN at very low speed. The DESTINY suffered minor damage. There was no pollution.

11/8/91: The container ship CHOYANG CHANCE struck the pier while docking at Berth 24, Oakland. The vessel sustained a large gash in her bow and had to be repaired in a shipyard before departing for sea.

11/8/91: The tug SEA KING rammed the dock at Richmond Parr 3 while assisting the tanker OMI DYNACHEM dock at Texaco Richmond. The tug suffered no damage, the dock suffered moderate damage.

NEAR MISSES:

5/5/89: USS WICHITA, outbound for sea in the Main Ship Channel, risked collision with the bulk carrier BRILLIANT ACE during heavy fog. The USS WICHITA was evidently aware of the BRILLIANT ACE's presence, but did not respond to radio hails from either VTS or the BRILLIANT ACE.

5/27/89: The USS MARS called VTS and reported it had just narrowly missed colliding with the fishing vessel BLUE FIN west of Southeast Farallon Island.

5/30/89: The bulk carrier REGENT SEA, departing Pier 35 San Francisco for sea, risked colliding with the tug ELEFANTE GRANDE towing a loaded oil barge. The ship made arrangements with the tug to pass port to port. It then changed course with out notice and passed the tug starboard to starboard.

8/22/89: The sailing vessel NORD contacted VTS on channel 12 and reported having nearly been hit by a merchant ship in heavy fog off Point San Pedro. Based on vessels in the area, the merchant ship involved most likely was the container ship ANGELIC SPIRIT. VTS informed the NORD of a second ship, the container ship DA MOSTO A, so the two vessels could make passing arrangements.

12/14/89: The container ship MICRONESIAN INDEPENDENCE had to make a radical maneuver to avoid colliding with a fishing vessel between Mile Rocks and the Golden Gate Bridge.

4/20/90: The tanker ARCO TEXAS was forced to avoid a close quarters situation with the cable-laying ship DOCK EXPRESS by increasing speed as the DOCK EXPRESS transited across the Western Traffic lanes at a shallow angle. Repeated attempts to hail the DOCK EXPRESS on channels 13 and 16 were unsuccessful.

4/21/90: The container ship ERLANGEN EXPRESS was forced to make radical course changes to avoid a sailboat transiting the Oakland-Alameda Estuary under power. The sailboat refused to give way even after the ship blew the danger signal. The ship was forced to maneuver unsafely close to several piers.

5/7/90: The bulk carrier POLLUX closed to within 1/4 NM of the tug HENRY SAUSE towing a loaded asphalt barge near Southeast Farallon Island. The bridge watch on the POLLUX was not able to speak English well enough to understand the HENRY SAUSE's proposed passing arrangements.

12/11/90: The tug YAKIMA pushing a loaded sand dredge narrowly missed hitting the CGC PT BROWER while the PT BROWER was moored to a mooring buoy off the Concord Naval Weapons Station. The PT BROWER was engaged in Desert Storm security operations and the mooring buoy was located within a closed security zone.

2/2/91: The container ship HAKONE MARU and the roll-on, roll-off carrier KAIMKU, both inbound at the Pilot Area, nearly collided with each other at night. Evidently, the ships were unaware of each other's intentions.

4/18/91: The bulk carrier POLLUX nearly collided with the tug MIKI HANA with an empty asphalt barge in tow off Pt. Reyes. The MIKI HANA repeatedly attempted to make passing arrangements with the POLLUX, but the bridge watch on the POLLUX evidently did not speak English well enough to understand them. The POLLUX passed between the tug and its barge. The tow cable's catenary was enough for the POLLUX to clear.

8/30/91: The USS KANSAS CITY risked collision with the tanker OVERSEAS JUNEAU by overtaking the tanker on its port side while passing under the Golden Gate Bridge. Due to its draft the tanker was required to pass north of Harding Rock and Alcatraz Island, leaving little sea room for the KANSAS CITY to pass. The KANSAS CITY did not inform the tanker of its intentions until it

was already committed to the maneuver. The tanker was able to slow sufficiently to avoid a close quarters situation.

10/11/91: The loaded oil tanker COASTAL NEW YORK and the ammunition-laden USS MT HOOD met in the Pinole Shoal Channel. (Though not a near miss, COTP Notice 8-90 recommends tankers and hazardous materials vessels not meet in the channel).

11/19/91: The tankers SHILLA SPIRIT, HAMAKAZE and TEXAS TRADER were in risk of collision in the vicinity of Alcatraz Island due to confusion and inappropriate maneuvers on the part of the HAMAKAZE.

12/6/91: The USS ARKANSAS made close passage with the ships GYOKO MARU and ALAM TEGAS passing the vicinity of the Pilot Area at night during heavy fog. There was apparent confusion between the vessels as to each other's intentions.

APPENDIX J

1. 11/11/11

VEHICULAR BRIDGE MANAGEMENT

BRIDGES ENCOUNTERED BY PLEASURE AND SMALL COMMERCIAL VESSELS

<u>BRIDGE NAME AND LOCATION</u>	<u>TYPE</u>	<u>CLEARANCES (Horiz/Vert.MLLW-MHW)</u>	<u>REMARKS</u>
1. Jersey Isl. Contra Costa County, Ca.	F	17 / 19-15	
2. Bethel Isl. Contra Costa County, Ca.	F	36 / 19-15	
3. Skagg Isl. Napa Slough, Vallejo, Ca.	F	65 / 24-19	
4. Blackpoint Petaluma river,	F	140 / 76-70	
5. US 101, (Twin) Petaluma river,	F	100 / 76-70	
6. Richardson Bay, US 101. Sausalito, Ca.	F	56 / 45-39	
7. San Francisco-Oakland Bay Bridge, Easterly Reach.	F		
Span G-H, Pier G		1330 / 190-184	
Pier H		1330 / 190-184	
Span H-I, Pier H		436 / 189-183	
Pier I		436 / 184 178	
Span I-J, Pier I		445 / 184-178	
Pier J		445 / 177-171	
Span J-K, Pier J		441 / 176-170	
Pier K		441 / 171-165	
Span K-L, Pier K		441 / 171-165	
Pier L		441 / 161-155	
Span L-M, Pier L		441 / 161-155	
Pier M		441 / 147-141	
Span M-N, Pier M		445 / 147-141	
Pier N		445 / 133-127	
8. Dumbarton Bridge San Mateo, Ca.	F	332 / 92-85	
9. State Route 92 San Mateo Slough	F	40 / 19-15	
10. State Route 92 San Mateo Slough	F	87 / 22-18	

11. Hillsdale Blvd.
Foster City

F 48 / 20-15

12. Sonoma Creek, SR 37
Vallejo, Ca.

F 60 / 30-24

NOTES:

- + Listed above are fixed bridges with a vertical clearance at MHW of 15 feet or more.
- + For bridges with less vertical clearance, see USCG publication COMDTPUB P16590.4, Bridges over the Navigable waters of the U.S., Pacific Coast.

VEHICULAR BRIDGE INVENTORY

VEHICULAR BRIDGE MANAGEMENT

BRIDGES ENCOUNTERED BY OCEAN GOING VESSELS

BRIDGE NAME and LOCATION	TYPE	CLEARANCES (Horiz/Vert.MLLW-MHW)	REMARKS
1. Golden Gate Bridge, San Francisco Bay	SUS	4028 / 238-232	
2. San Francisco-Oakland San Francisco Bay, Westerly Reach.	SUS		1
Span A-B, Pier A		2229 / 180-174	
Pier B		2229 / 223-217	
Span B-C, Pier B		1072 / 224-218	
Pier C		1072 / 227-221	
Span C-D, Pier C		1079 / 226-220	
Pier D		1079 / 224-218	
Span D-E, Pier D		2210 / 224-218	
Pier E		2210 / 181-175	
Span E-YB Isl, Pier E	F	870 / 176-170	
3. RICHMOND-SAN RAFAEL San Francisco Bay	F		
Main Channel, Center Span		1000 / 190-185	
Left and Right span		480 / 173-168	
East Cahannel, Center Span		465 / 123-118	
4. CARQUINEZ Carquinez Strait, Vallejo.	F		2
Upstream Bridge:			
South (left) Span, South Pier		998 / 141-135	
South (left) Span, North Pier		998 / 151-145	
North (right) Span, South Pier		1000 / 152-146	
North (right) Span, North Pier		1000 / 157-151	
Downstream Bridge:			
South (left) Span, South Pier		1030 / 140-134	
South (left) Span, North Pier		1030 / 150-144	
North (right) Span, South Pier		1030 / 153-147	
North (right) Span, North Pier		1030 / 162-156	
5. MARTINEZ, Highway Bridge Martinez/Benicia.	F	440 / 141-135	
6. MARTINEZ, SP RR Martinez/Benicia, Raised	VL	291 / 140-135	3
Lowered		291 / 76-70	
7. ANTIOCH Antioch, Ca. San Joaquin River	F	400 / 142-135	

8. RIO VISTA

Rio Vista, Ca. Sacramento River

Raised position

270 / 149-146

Lowered position

270 / 24-21

9. San Mateo-Hayward Bridge

F

660 / 142-135

REMARKS:

1. Easterly Reach spans are not used by Large Commercial Vessels.
2. Both the North and South Spans of the Carquinez Bridge are equipped with Racons, marking the center of the channels.
3. The Martinez/Benicia Southern Pacific RR Bridge is manned at all times. It requires approx. 30 minutes notice for opening. Communications are effected via VHF radio (Ch. 13,16). Emergency communications can be effected by telephone (415-228 5943). Delays in opening may be encountered if a train is transiting the bridge or in case of power outage. (Starting the Emergency Generator to operate the Bridge may require approx. 15 minutes.)
4. The Rio Vista Bridge is manned at all times and opens on request. Communications can be effected via VHF radio (Ch. 13,16). Emergency communications can be effected by telephone (707-3742134).

NOTE: For regulations regarding the operations of California Drawbridges, See the USCG California Drawbridge Regulations, published in 1986, with attached errata sheet dated 4/17/89.

TYPE OF BRIDGES LEGEND

- SUS: Suspension
- VL: Vertical Lift
- F: Fixed

APPENDIX K

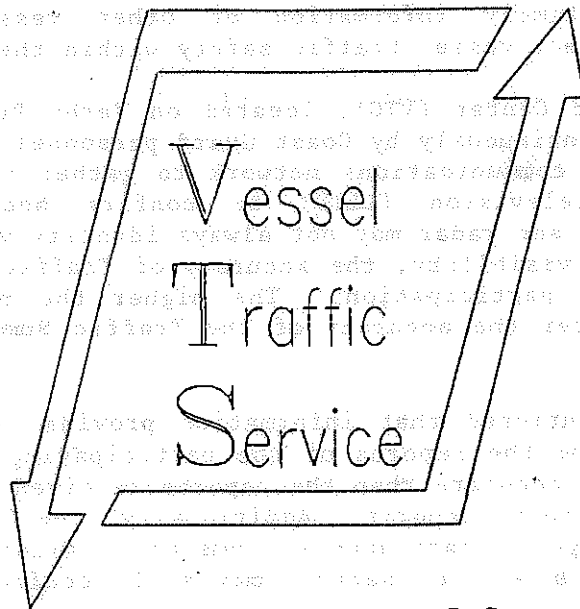
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COAST GUARD



SAN FRANCISCO

USERS MANUAL

(Voluntary)

APRIL 1991

VTS SAN FRANCISCO USER'S MANUAL

SECOND EDITION, APRIL 1991

INTRODUCTION

This manual is intended to provide the user with information necessary to participate in the voluntary San Francisco Vessel Traffic Service. It replaces the VTS User's Manual, First Edition, July 1984, which should be discarded.

The San Francisco Vessel Traffic Service is an information gathering, processing, and disseminating system operated by the Coast Guard. Its goal is to improve vessel transit safety and efficiency. This is done by providing participating vessels timely information of other vessel movements and conditions which may affect vessel traffic safety within the VTS Area.

The Vessel Traffic Center (VTC), located on Yerba Buena Island in San Francisco, is staffed continuously by Coast Guard personnel. The service uses a radiotelephone VHF-FM communications network to gather information; radar, and low-light level television (LLTV) to confirm and supplement this information. Since LLTV and radar may not always identify vessels, especially during times of reduced visibility, the accuracy of Traffic Summaries depends upon the level of user participation. The higher the percentage of user participation, the greater the accuracy of the Traffic Summaries provided by VTS.

The mariner is cautioned that information provided by the VTC, to an extent, is generated from the reports of the participating vessels. Traffic Summaries can be no more accurate than the reports received and the ability of VTS equipment to verify these reports. Additionally, the Coast Guard may not have first hand knowledge of hazardous circumstances existing in the Vessel Traffic Service Area. Unreported hazards may still confront the mariner at any time.

All mariners should read this manual prior to participating in the VTS. Also, mariners should keep a copy of this manual readily available when transiting the VTS Area.

The Coast Guard solicits the cooperation of the marine community and welcomes suggestions that may improve this manual or the San Francisco Vessel Traffic Service. Suggestions and/or comments may be sent to:

Commanding Officer
Vessel Traffic Service
Yerba Buena Island
San Francisco
California 94130

(415) 556-2950

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PART I

GENERAL

I. PURPOSE

Vessel Traffic Service San Francisco exists to facilitate the safe transit of vessel traffic in San Francisco Bay, its seaward approaches and tributaries to prevent collisions, rammings, groundings and environmental damage. VTS provides assistance to other Coast Guard units in the accomplishment of their missions, such as search and rescue, maritime law enforcement, and aids to navigation.

II. VTS AREA

The Vessel Traffic Service Area includes San Francisco Bay; its seaward approaches; and tributaries as far as Stockton and Sacramento (see map, pages 12 and 13). In cooperation with the VTS, the Port of Sacramento exercises co-jurisdiction over vessel movements between Sacramento and Light 51 on the Sacramento Channel. Similarly, the Port of Stockton exercises co-jurisdiction over vessel movements between Stockton and Prisoners Point on the San Joaquin River. Both port authorities have issued regulations pertaining to their areas of interest.

III. DESCRIPTION

- a. A traffic routing system comprised of traffic lanes, separation zones, precautionary areas, and limited traffic areas is intended to promote safety by directing traffic through common segregated routes. The routing system is depicted where it exists on all charts covering the VTS Area.
- b. Where traffic lanes converge or cross, precautionary areas are established. A circular area west of the Golden Gate and another east of Alcatraz Island are designated precautionary areas.
- c. A Limited Traffic Area is located just south of Yerba Buena Island. It includes the Oakland Bar Channel, Inner and Outer Harbor Entrance Channels, and Oakland Outer Harbor. Within this area vessel movement is normally restricted to one-way traffic. VTS will monitor and assist vessels in coordinating their movements through this area.

IV. DEFINITION OF TERMS

- a. "Vessel Traffic Center" (VTC) means the shore based facility that operates the San Francisco Traffic Service.
- b. "Traffic Routing System" means the network of traffic lanes, separation zones, and precautionary areas.

IV. DEFINITION OF TERMS

- c. "Traffic Lane" means an area in which all vessels normally proceed in the same direction.
- d. "Precautionary Area" means an area where two or more waterways converge.
- e. "Limited Traffic Area" means an area within which additional safety precautions are being observed.
- f. "Deep-draft Vessel" describes a vessel which cannot safely adhere to the traffic routing system because its draft exceeds the water depth along the prescribed route.
- g. "Participant" describes those vessels for whom the VTS was primarily designed to serve. They include:
- (1) Each vessel of 300 or more gross tons that is propelled by machinery;
 - (2) Each vessel of 100 or more gross tons that is carrying one or more passengers for hire;
 - (3) Each commercial vessel of 25 feet or over in length engaged in towing another vessel astern, alongside, or pushing ahead;
 - (4) Each dredge or floating plant.

PART II

STANDARD OPERATING PROCEDURES

I. CONCEPT OF OPERATIONS

- a. It is not the purpose of VTS to attempt to maneuver vessels from the shore but to enhance the ability of mariners to exercise control of their vessels more effectively and safely.
- b. The primary role of the VTC is to INFORM participants of other vessels, hazards to navigation, discrepant aids to navigation, and other items of concern. This is done either at the participant's request or when such information is considered beneficial.
- c. At certain times the VTC will RECOMMEND action be taken by a participant to prevent a potentially dangerous situation. Such recommendations are offered to assist the participant in avoiding hazardous situations well before they would otherwise occur. For example, a modest change in speed now could prevent a hazardous meeting situation later in a narrow channel.
- d. The ultimate responsibility for safe navigation of a vessel remains with the master or person in charge. At no time is that person relieved by the VTC of responsibilities assigned by the applicable Navigation Rules and other pertinent federal laws in effect.
- e. VTS San Francisco derives much of its information from the voluntary reports of participants and cannot know of all hazards within the service area. Consequently, the participant may be confronted at any time with situations not known to the VTC. Any conflicting circumstances should be reported to the VTC immediately in order to allow it to make informed evaluations resulting in the safest possible service. The relationship between the participant and the VTC must be based upon a mutual concern for the safety of all vessels.

II. TRAFFIC ROUTING SYSTEM

- a. All vessels should adhere to the traffic routing system. Any decision to deviate from the traffic lanes must be made by the master, pilot, or person in charge. All intentions to proceed contrary to the traffic system should be made known to the VTC as soon as possible to permit dissemination of necessary warnings to other participants. The following procedures are recommended:
 - (1) All vessels, except commuter ferries, should navigate within the traffic lanes.
 - (2) Vessels should keep the separation lane to port.

II. TRAFFIC ROUTING SYSTEM

- (3) Vessels should avoid crossing traffic lanes whenever possible. If it is necessary to cross a lane, this should be done at as close to a right angle as practicable.
 - (4) Except when joining, leaving, crossing, or navigating in a traffic lane vessels should stay clear of the lanes and precautionary areas by as wide a margin as practicable.
 - (5) Vessels should join and leave traffic lanes at precautionary areas or at the ends of the lanes. If a vessel must join or leave a lane at some other point it should do so at as small an angle as practicable.
- b. The traffic lanes radiating seaward from the offshore precautionary area constitute a Traffic Separation Scheme (TSS) adopted by the International Maritime Organization (IMO). COLREGS Rule 10 applies to vessels in or near this TSS. See Appendix A, Section E. for procedures which apply in the Offshore Vessel Movement Reporting System.
 - c. Participants within the traffic lanes who cannot comply with these procedures due to an emergency should complete whatever maneuvers are required to minimize that emergency. Notify the VTC as soon as possible.
 - d. Participants should notify the VTC in advance of each non-emergent deviation from the traffic lanes to allow for coordination with other vessels.
 - e. Common practice has identified four situations wherein a vessel, in the interest of safety, may consider proceeding contrary to the traffic routing system as follows:
 - (1) Vessels inbound to Oakland (or Anchorage 8) may desire to use the D-E span of the Bay Bridge to facilitate "shaping up" for the Oakland Bar Channel.
 - (2) Vessels proceeding inbound whose draft is greater than 35 feet may desire to use the deep-draft route. This route is a radical deviation from the traffic pattern and frequently alarms recreational boaters. Once past the Golden Gate Bridge the deep-draft vessel (proceeding to A-9) crosses over into the outbound traffic lane, passing north of Harding Rock and Alcatraz Island, leaving Blossom Rock to starboard and using C-D or D-E span of the Bay Bridge.
 - (3) Vessels departing Piers 27-45 on the San Francisco waterfront may initially proceed outbound in the "wrong" lane passing south of Alcatraz Island. Once west and clear of Alcatraz they will cross over into the proper lane and continue outbound.

II. TRAFFIC ROUTING SYSTEM

- (4) Vessels departing Piers 30-50 on the San Francisco waterfront may initially proceed outbound in the "wrong" lane using A-B or B-C span of the Bay Bridge. Once clear of the bridge they will cross over into the proper lane, leaving Blossom Rock to port and continue outbound.
- f. The recreational boating public is generally aware of the traffic routing system. They have a legitimate expectation that ships will adhere to it. Therefore, particularly near Alcatraz Island (where many boats are often present), the hazards of deviating from the routing system are very pronounced. Therefore, VTS will recommend adherence whenever a proposal to deviate from the lanes is based only on convenience. When a contrary move does occur, VTS will make a safety broadcast on Channels 16 and 22A VHF-FM to warn the boating public.
- g. Excursion boats and ferries should notify VTS of their intended route upon departure and during transit if their route is changed. The VTC should again be notified upon completion of the movement. Ferry and tour boats should comply with the traffic lanes as closely as their routes allow.
- h. Recreation areas should be avoided by commercial vessels.
- i. Regattas occur in the San Francisco Bay Area throughout the year. The VTC is normally in contact with regatta officials. Pertinent information will be passed to affected VTS participants.

III. LIMITED TRAFFIC AREA (LTA) PROCEDURES

- a. The Captain of the Port recommends that deep draft vessels (in excess of 20 feet) carrying any of the dangerous cargoes listed in 33 CFR 160.203 or bulk petroleum products and tank vessels in ballast, limit their transits of Pinole Shoal Channel in San Pablo Bay to one way traffic. Vessels intending to transit Pinole Shoal Channel should coordinate the passage with the VTC.
- b. The LTA south of Yerba Buena Island should be used only by one vessel at a time or by vessels proceeding generally in the same direction.
- c. Vessels 300 gross tons or over intending to transit this area should notify the VTC at least 15 minutes before entering the area. Vessels should not enter the LTA if another vessel (300 gross tons or over) is proceeding in the opposite direction.

IV. COMMUNICATIONS PROCEDURES

- a. VTS maintains a continuous radiotelephone watch on Ch. 13 (156.65 MHz) and Ch. 16 (156.80 MHz). The call sign is "San Francisco Vessel Traffic Service." After communications are established, the abbreviated call sign "TRAFFIC" may be used. If communications on Ch. 13 is lost, call TRAFFIC on Ch. 16 and be prepared to shift to either Ch. 12 (156.60 MHz) or Ch. 18A (156.90 MHz). All reports should be in English and use the 24 hour clock system.
- b. Nothing in these procedures contravenes or modifies the Vessel Bridge-to-Bridge Radiotelephone Regulations.
- c. Since Ch. 13 serves as both bridge-to-bridge and VTS frequency, participants are not excused from the requirement set forth in 47 CFR 83.224, to monitor Ch. 16, the national distress, safety, and calling frequency.

V. RADAR COVERAGE AREA PROCEDURES

- a. The VTS Area is separated into two parts. The portion covered by radar is referred to as the "Radar Area" and procedures therein are explained below:

- (1) Initial Reports. Participants should report to the VTC upon entering the approach traffic lanes from seaward or upon getting underway from within the Radar Area, giving the following information:

- VESSEL NAME
- POSITION OR LOCATION
- DESTINATION
- ROUTE
- ANTICIPATED PILOT CHANGE (if applicable)
- PILOT DESIGNATION
- DESCRIPTION OF TOW (if applicable)
- DEEPEST DRAFT (if greater than 300 tons)

EXAMPLES:

"TRAFFIC, THIS IS NANCY LYKES ENTERING THE NORTHERN APPROACH TRAFFIC LANE, ETA PILOT AREA 2100, BOUND FOR CRESENT ALAMEDA, DEEP DRAFT 32 FEET, OVER"

"TRAFFIC, THIS IS THE OJI MARU, UNIT QUEBEC PILOTING, AT THE PILOT AREA BOUND FOR SACRAMENTO WITH A PILOT CHANGE OFF THE FRONT, DEEP DRAFT 26 FEET, OVER"

"TRAFFIC, THIS THE CHEVRON FRANKFURT, UNIT 61 PILOTING, PREPARING TO DEPART RICHMOND LONG WHARF, BOUND FOR SEA VIA SOUTHAMPTON SHOAL CHANNEL WITH A PILOT CHANGE OFF THE DOCK, DEEP DRAFT 28 FEET, OVER"

V. RADAR COVERAGE AREA PROCEDURES

"TRAFFIC, THIS THE TUG NAPA RIVER, DEPARTING PIER 70, BOUND FOR BENICIA VIA D-E SPAN BAY BRIDGE AND WEST SPAN RICHMOND-SAN RAFAEL BRIDGE, WITH A LOADED OIL BARGE IN TOW, OVER"

- (2) Follow-up Reports should be made:
 - (a) when passing under any bridge; (This allows confirmation of the radar target's identity.)
 - (b) after pilot change, departure of pilot, or other change in person directing the movement of the vessel;
 - (c) when previously reported conditions or intentions change;
 - (d) when intending to deviate from the traffic lanes;
 - (e) in emergency situations, as soon as practicable;
 - (f) to report any condition considered to be a hazard to navigation.

- (3) Final Report. Upon docking, anchoring, mooring or departing the Radar Area, report the place and time to the VTC.

VI. VESSEL MOVEMENT REPORTING SYSTEM (VMRS) PROCEDURES

a. The VMRS is in effect where there is no radar coverage in the VTS Area. It is served solely by radiotelephone reports from participants. These reports are recorded and movements tracked by the VTC. Information gained from these reports is available to all participants, but its value is completely dependent upon three essential factors:

- (1) Full participation
- (2) Timeliness, and
- (3) Accuracy

b. Neglect by one participant of any or all of these factors greatly magnifies the potential for disaster to all other participants. For this reason, in areas where information cannot be directly verified, the VTC will inform participants of the source of this information. VTS encourages every master, pilot or person in charge of a vessel to participate fully in these procedures.

- (1) Initial Reports. Participants should make initial reports to the VTC upon preparing to get underway from within the VMRS Area, giving the same information prescribed for initial reports in the Radar Area.

VI. VESSEL MOVEMENT REPORTING SYSTEM (VMRS) PROCEDURES

- (2) Follow-up Reports should be made:
- (a) when actually underway;
 - (b) when passing the following points;
 - (1) Point San Pablo
 - (2) Carquinez Bridge
 - (3) Southern Pacific Railroad Bridge
 - (4) New York Point
 - (5) Rio Vista Bridge
 - (6) Light 51
 - (7) Sacramento
 - (8) Antioch Bridge
 - (9) Prisoners Point
 - (10) Stockton
 - (c) entering or departing Petaluma River Entrance Channel or Mare Island Strait;
 - (d) when passing the following points;
 - (1) Hunters Point
 - (2) San Mateo Bridge
 - (e) when previously reported conditions or intentions change;
 - (f) when intending to deviate from normally traveled routes;
 - (g) in emergency situations, as soon as practicable;
 - (h) to report any condition considered to be a hazard to navigation.
- (3) Final Report. Upon docking, anchoring, mooring or departing the VMRS Area the place and time should be reported to the VTC.
- c. All reports should include the time of the event.
 - d. In the event of radar failure, the Radar Area will be declared a VMRS and participants will be advised by the VTC what interim reports to make. All other reporting procedures remain the same.
 - e. Read-back Reports. The VTC will acknowledge receipt of reports by "reading back" the information received. The vessel can then confirm the accuracy of that information. If the VTC believes the report to be incomplete or in error, the vessel will be requested to repeat the report.

VII. ANCHORAGES

- a. VTS administers the anchorages for the Captain of the Port. Anchorage regulations for the service area are found in Title 33, Code of Federal Regulations, Section 110.224. These regulations describe the bounds of designated anchorage areas, impose certain restrictions on anchoring and require various reports from vessels anchoring both within and without the designated anchorages. Vessels which have notified VTS of their actions will be considered in compliance with the reporting requirements of 33 CFR 110.224.
- b. Anchorage regulations prohibit the anchoring of vessels in the navigable waters of San Francisco Bay or San Pablo Bay outside established anchorage areas except when unforeseen circumstances create conditions of imminent peril, or with the written permission of the Coast Guard Captain of the Port. Each vessel anchoring in imminent peril or heavy fog is required by 33 CFR 110.224 to immediately inform the Coast Guard Captain of the Port of her position and reason for anchoring.
- c. A vessel anchoring outside an established anchorage area for reason of imminent peril or heavy fog should be positioned outside the vessel traffic lanes insofar as practicable. If necessary to anchor within a traffic lane, the vessel should be positioned as near the boundary line of the lane as practicable.
- d. When the wind force is above 20 knots all vessels anchored in San Francisco Bay must maintain a continuous radiotelephone watch on Channel 13 (156.65 MHz). Should the vessel be unable to maintain the watch on Channel 13, the watch should be maintained on Channel 16 (156.80 MHz). The watch must be maintained by a person who can speak the English language.
- e. Vessels anchoring in any anchorage are required to reserve the deeper portions of the anchorage for vessels of deeper draft. This becomes particularly important in Anchorage 9. Therefore, the VTC advises vessels anchoring in Anchorage 9 to anchor as far east as safety will allow. This will ensure the western side of the anchorage will be available for deep draft tankers of 40 to 50 foot draft. Shallow draft vessels may be required to move if the area in which they are anchored is needed by a vessel of deeper draft.

VIII. NARROW CHANNELS OR FAIRWAYS

- a. Rule 9 in both the International and Inland Rules of the Road contains definitive language regarding the responsibilities of sailboats, vessels engaged in fishing and power boats of less than 20 meters in length when operating in or near narrow channels or fairways. CAPTAIN OF THE PORT SAN FRANCISCO PUBLIC NOTICE 1-82, defines the following areas as "Narrow channels or fairways" for the purpose of enforcing the International and Inland Rules of the Road:
- (1) All one-way traffic lanes and precautionary areas in San Francisco Bay eastward of the San Francisco Approach Lighted Horn Buoy SF (LLNR 53).
 - (2) South San Francisco Bay Channels between the termination of the Traffic Separation Scheme in the vicinity of San Francisco Bay South Channel Lighted Buoy "1" (LLNR 648) and Redwood Creek Entrance Light "2" (LLNR 680).
 - (3) Redwood Creek between Redwood Creek Entrance Light "2" (LLNR 680) and Redwood Creek Daybeacon "23".
 - (4) Pinole Shoal Channel in San Pablo Bay between the termination of the Traffic Separation Scheme at San Pablo Bay Channel Light "7" (LLNR 767.10) and the Carquinez Strait Highway Bridge.
 - (5) Carquinez Strait between the Carquinez Strait Highway Bridge and the Benicia-Martinez Highway Bridge.
 - (6) Suisun Bay Channels between the Benicia-Martinez Highway Bridge and Suisun Bay Light "34" (LLNR 881).
 - (7) New York Slough between Suisun Bay Light "30" (LLNR 868) and San Joaquin River Light "2" (LLNR 885).
 - (8) San Joaquin River from San Joaquin River Light "2" (LLNR 885) to the Port of Stockton.
 - (9) Sacramento River Deep Water Ship Channel from Suisun Bay Light "34" (LLNR 881) to the Port of Sacramento.
 - (10) Oakland Outer and Inner Harbor Entrance Channels.
 - (11) Alameda Naval Air Station Channel.
 - (12) Southampton Shoal Channel
 - (13) Richmond Harbor Entrance.
 - (14) Mare Island Strait between Mare Island Strait Light "2" (LLNR 793) and Mare Island Causeway Bridge.

IX. CERTAIN DANGEROUS CARGOES

a. The following guidelines apply to all vessels transporting "Certain Dangerous Cargoes" as defined in 33 CFR 160.203.

(1) The Coast Guard Captain of the Port, San Francisco Bay, has published a Public Notice concerning movement of explosives or cargoes of particular hazard. Some movements will be escorted by a Coast Guard boat. At times, a representative of the Coast Guard Captain of the Port, trained in safety measures related to the type of cargo, will accompany the escort. Other movements of explosives or cargoes of particular hazard will not be escorted. Need for an escort is determined by the Coast Guard Captain of the Port after considering many factors including net explosive content and amount of hazardous material on board.

(2) The Pilot, Master, or person in charge of any vessel containing explosives or cargo of particular hazard, whether or not an escort has been provided, should:

(a) Report that fact to the VTC prior to entering or getting underway from within the VTS Area.

(b) Comply with Coast Guard Captain of the Port directives applicable to the situation.

(c) Proceed with regard to other vessels in such a manner as to limit passing and meeting situations to those which are unavoidable.

(d) Make the special nature of the cargo the overriding factor in all decisions relating to the safety of the movement.

(e) Adhere to the traffic routing system whenever it exists along the vessel's route unless otherwise specified by the Captain of the Port directive or the VTC.

APPENDIX A

A. GEOGRAPHICAL DESCRIPTIONS

The VTSSF Area consists of the ocean waters within a 38 nautical mile radius of Mount Tamalpais (37°55.8'N, 122°34.6'W). This distance measured outward from the LNB -- Large Navigation Buoy (San Francisco Approach Lighted Horn Buoy; Coast Guard Light List No. 360; 37°45'N., 122°41.5'W.) along each of the three charted Traffic Separation System lanes are: Northward, 41 n. miles; Westward, 29 n. miles; and Southward, 29 n. miles. The VTS Area also includes the navigable waters of the United States which comprise the Bays of San Francisco, San Pablo, and Suisun, from the Port of Redwood City to the Ports of Sacramento and Stockton.

B. SEPARATION ZONES

Separation zones are 150 yards wide. The boundaries of each zone are parallel to its centerline. No part of any separation zone is contained in a precautionary area. The centerline of separation zones connect the following geographical points:

- (1) Between the LNB precautionary area eastward to the Alcatraz Island precautionary area;
 - (i) 37°45'56"N 122°38'00"W
 - (ii) 37°47'00"N 122°34'20"W
 - (iii) 37°48'08"N 122°31'00"W
 - (iv) 37°49'12"N 122°28'42"W (mid span GGB)
 - (v) 37°49'36"N 122°25'18"W (Alcatraz Light)
- (2) Between the Alcatraz Island precautionary area northward to Pinole Shoal Channel in San Pablo Bay;
 - (i) 37°50'12"N 122°24'24"W
 - (ii) 37°51'48"N 122°24'24"W (North Channel LB "A")
 - (iii) 37°54'06"N 122°26'36"W (North Channel LB "B")
 - (iv) 37°54'48"N 122°26'54"W (North Channel LB "C")
 - (v) 37°56'06"N 122°26'36"W (mid-span Richmond-San Rafael Bridge West)
 - (vi) 37°57'36"N 122°26'42"W
 - (vii) 38°00'36"N 122°24'06"W (San Pablo Bay LB "E")
 - (viii) 38°01'48"N 122°22'18"W
- (3) Between the Alcatraz Island precautionary area southward almost to Anchorage 9;
 - (i) 37°49'06"N 122°24'12"W (Blossom Rock LBB "BR")
 - (ii) 37°47'54"N 122°22'36"W (Pier C, SF-Oakland Bay Bridge)
 - (iii) 37°46'36"N 122°22'W

C. TRAFFIC LANES

Traffic lanes extend to but do not enter precautionary areas. Directional lanes are located on both sides of a separation zone.

- (1) EASTBOUND SAN FRANCISCO BAY TRAFFIC LANE: from the LNB precautionary area to the Alcatraz Island precautionary area between the separation zone and a line connecting the following geographical points:

(i)	37°45'48"N	122°37'42"W	(SF Main Ship Channel LWB "2")
(ii)	37°47'50"N	122°30'45"W	
(iii)	37°48'52"N	122°28'36"W	(GGB south pier)
(iv)	37°48'50"N	122°26'14"W	
(v)	37°48'42"N	122°25'06"W	(Pier 45)

- (2) WESTBOUND SAN FRANCISCO BAY TRAFFIC LANE: from the LNB precautionary area to the Alcatraz Island precautionary area between the separation zone and a line connecting the following geographical points:

(i)	37°46'12"N	122°37'54"W	(SF Main Ship Channel LBB "1")
(ii)	37°46'54"N	122°35'18"W	(SF Main Ship Channel LBB "7")
(iii)	37°49'30"N	122°28'36"W	(Lime Point)
(iv)	37°50'36"N	122°27'06"W	(Raccoon Strait LB "1")
(v)	37°51'06"N	122°24'54"W	

- (3) NORTHBOUND SAN FRANCISCO BAY TRAFFIC LANE: from the Alcatraz Island precautionary area to Pinole Shoal Channel in San Pablo Bay between the separation zone and a line connecting the following geographical points:

(i)	37°50'N	122°23'42"W	(North Channel LB "2")
(ii)	37°51'42"N	122°23'42"W	(North Channel LBB "6")
(iii)	37°54'06"N	122°26'06"W	(North Channel LBB "10")
(iv)	37°56'06"N	122°26'30"W	(East pier Richmond-San Rafael Bridge)
(v)	37°57'18"N	122°26'24"W	(North Channel LB "16")
(vi)	37°57'36"N	122°26'18"W	(North Channel Buoy "18")
(vii)	38°01'42"N	122°22'18"W	(San Pablo Bay Channel LB "8")

- (4) SOUTHBOUND SAN FRANCISCO BAY TRAFFIC LANE: from the Alcatraz Island precautionary area to Pinole Shoal Channel in San Pablo Bay between the separation zone and a line connecting the following geographical points:

(i)	37°51'06"N	122°24'54"W	
(ii)	37°51'48"N	122°24'54"W	
(iii)	37°54'12"N	122°27'24"W	
(iv)	37°56'06"N	122°26'42"W	(West pier Richmond-San Rafael Bridge)
(v)	37°57'30"N	122°27'18"W	(North Channel Light "17")
(vi)	38°00'48"N	122°24'42"W	
(vii)	38°01'54"N	122°22'24"W	(San Pablo Bay Channel Light "7")

(5) OUTBOUND LANE (Lower Bay): from Anchorage 8 to the Alcatraz Island precautionary area between the separation zone and a line connecting the following geographical points:

- (i) 37°47'N 122°21'30"W
- (ii) 37°48'20"N 122°22'12"W (Pier E, SF-Oakland Bay Bridge)
- (iii) 37°49'24"N 122°23'44"W

(6) INBOUND LANE (Lower Bay): from the Alcatraz Island precautionary area to Pt. Avisadero between the separation zone and the shore.

D. PRECAUTIONARY AREAS

Precautionary areas consist of:

- (1) LNB Precautionary Area. A circle with a radius of 6 miles centered on San Francisco Approach Lighted Horn Buoy "SF" (37°45.0'N., 122°41.5'W.) with the traffic lanes fanning out from its periphery.
- (2) Alcatraz Island Precautionary Area. A circular area of radius 1200 yards centered at 37°49'39"N., 122°24'25"W., excluding that portion east of 122°23'44"W. which is part of Anchorage 7.

E. OFF-SHORE VESSEL MOVEMENT REPORTING SYSTEM (OVMRS)

The Off-Shore Vessel Movement Reporting System (OVMRS) consists of that part of the VTS area outside of the Precautionary Area of the San Francisco Approach Lighted Horn Buoy SF (LNB) (37°45'N., 122°41.5'W.) and within a radius of 38 nautical miles from Mount Tamalpais (37°55.8'N., 122°34.6'W.). The distances this radius encloses from the LNB are:

- (1) Northward 41 nautical miles to Bodega Head (38°15'N.);
- (2) Westward 29 nautical miles to 123°14'W.; and
- (3) Southward 29 nautical miles to Pescadero Point (37°17'N.).

Before entering the OVMRS area from sea or from San Francisco Bay, power-driven vessels of three hundred gross tons and upward shall call the VTC on VHF-FM Channel 12. The vessel reports its type, name, position, route, speed, and estimated time of arrival at either the LNB if the vessel is inbound, or the seaward radius of the OVMRS if the vessel is outbound. VTS will rebroadcast this report. Upon reaching the seaward end of one of the TSS lanes, approximately halfway in the transit, the vessel will report an update of its progress to VTS. VTS will rebroadcast the status of all transiting deep-draft vessels on Channel 12 at minute 15 and 45 each hour.

F. RECREATIONAL AREAS

Two recreational areas have been established and charted in San Francisco Bay. They are intended primarily for use by recreation vessels. Vessels 300 gross tons or more shall not utilize these areas for passage or any other purpose except in case of emergency or special circumstance.

(1) Presidio Shoals Recreation Area is bounded by the northern shoreline of San Francisco and a line connecting the following points:

- (i) 37°48'52"N 122°28'36"W (South tower GGB)
- (ii) 37°48'50"N 122°26'14"W
- (iii) 37°48'42"N 122°25'06"W (Pier 45)

(2) Raccoon Strait Recreation Area includes all of Richardson Bay and Raccoon Strait bounded by the Marin Peninsula and Tiburon Peninsula and a line connecting the following points:

- (i) 37°49'30"N 122°28'36"W (Lime Point)
- (ii) 37°50'36"N 122°27'06"W (Raccoon Strait LB*1")
- (iii) 37°51'06"N 122°24'54"W
- (iv) 37°51'50"N 122°24'55"
- (v) 37°53'40"N 122°26'54"W (Point Chauncy)

APPENDIX L

4. 点云数据预处理

(3) **Richmond Harbor:** the channel area between Richmond Harbor Channel Lighted Buoy "3" and Richmond Harbor Channel Light "12";

(i) when a vessel of draft 20 feet or more is therein.

(4) **Pinole Shoal Channel:** the area of Pinole Shoal Channel between San Pablo Bay Channel Light "7" and San Pablo Bay Channel Light "15";

(i) when a vessel carrying certain dangerous cargoes as denoted in 160.203 of this subchapter, bulk petroleum products, or a tank vessel in ballast, is therein.

Note: Additional regulations in 33 CFR 162.205(a) may also apply. (b) Vessels of 1600 gross tons or more shall not cross, meet or overtake another nor navigate therein if visibility is less than 2000 yards in the following waterway:

(1) **Benicia-Martinez Bridge:** the channel area between the western end of Suisun Point Reach and Suisun Bay Channel Lighted Buoy "7".

(c) A vessel, eastbound of draft 45 feet or more or if westbound of draft 28 feet or more, shall use the San Francisco Bay Deepwater Route to navigate north of Harding Rock.

(1) Vessels required to navigate therein shall not meet, cross, nor overtake each other.

(2) A vessel shall not impede the safe passage of a vessel required to navigate therein.

A circular area with a radius of 6 miles centered on the San Francisco Lighted Horn Buoy "SF" (37°45'00"N 122°41'50"W) with the traffic lanes fanning out from its periphery;

(2) Central Bay precautionary area:

An area confined by the shore and a line connecting the following positions: 37°48'41"N 122°25'13"W (End of Pier 45); north to 37°49'32"N 122°25'13"W (E edge of Alcatraz Is.). Then by an arc with a radius of 1200 yards centered at: 37°49'39"N 122°24'30"W; extending clockwise to, 37°49'53"N 122°23'44"W (NW edge of Anchorage 7); south to, 37°49'22"N 122°23'44"W (W edge of Anchorage 7); southeast along Anchorage 7 to, 37°48'20"N 122°22'12"W ("E" tower of SF/Oakland Bay Bridge); east to, 37°47'26"N 122°21'45"W (W edge of Anchorage 8); southwest to, 37°47'09"N 122°23'04"W (SE end of Pier 32).

(i) The recommended direction of traffic flow within this precautionary area is counter-clockwise; whenever practicable vessels shall keep the centerline of the area to port.

(3) Deep Water Route:

The route is bounded on the north by the traffic lane boundary line and on the south by a line connecting the following points:

(1) 37°49'35" N 122°27'48" W

(2) 37°50'21" N 122°26'49" W

(3) 37°50'25" N 122°26'22" W

D. Section 165.1117 San Francisco Bay Region, California - vessel operating requirements:

(a) Vessels of 1600 gross tons or more shall not cross meet or overtake another in the following waterways during the specified condition(s):

(1) Oakland Harbor: the area bounded on the west by the Central Bay precautionary area; on the north by a line drawn from the "E" tower of the San Francisco/Oakland Bay Bridge to the northwest corner of the Oakland Harbor Bar Channel and then by the northern edges of the Oakland Bar and Outer Harbor Entrance channels; and on the south by a line drawn from the western edge of Anchorage 8 and the precautionary area to the southwest corner of the Oakland Bar Channel and then by the southern edges of the Oakland Bar and Inner Harbor Entrance channels;

(i) when a vessel of draft 20 feet or more is therein.

(2) Southampton Shoal Channel: the channel area between South Hampton Shoal Channel Lighted Buoy "1" and the northern limit of the channel project, east to the Standard Oil Long Wharf;

(i) south of Southampton Shoal Lighted Buoy "4": when a vessel of draft 30 feet or more, vessels carrying bulk petroleum products or a tank vessel in ballast is therein.

(ii) north of Southampton Shoal Channel Lighted Buoy "4": when a tank vessel is therein.

Bay between the separation zone and a line connecting the following geographical positions:

37°51'06"N	122°24'54"W
37°51'48"N	122°24'54"W
37°54'12"N	122°27'24"W
37°56'06"N	122°26'42"W (West pier Richmond/San Rafael Bridge)
37°57'30"N	122°27'18"W (North Channel Light "17")
38°00'48"N	122°24'42"W
38°01'54"N	122°22'24"W (San Pablo Bay Channel Lt "7")

(5) Northbound lane (lower bay):

From the Central Bay precautionary area to 37°47'00"N 122°21'30"W between the separation zone and the western edge of Anchorage 8.

(6) Southbound lane (lower bay):

From the Central Bay precautionary area to Pier 50 between the separation zone and the shore.

(b) Separation zones:

Separation zones are 150 yards wide. The boundaries of each zone are parallel to its center line. No part of any separation zone is contained in a precautionary area. The center line of separation zones connect the following geographical positions:

(1) Between the "SF" buoy precautionary area eastward to the Central Bay precautionary area:

37°45'56"N	122°38'00"W
37°47'00"N	122°34'20"W
37°48'08"N	122°31'00"W
37°49'12"N	122°28'42"W (mid-span GGB)
37°49'36"N	122°25'18"W (Alcatraz Light).

(2) Between the Central Bay precautionary area northward almost to Pinole Shoal Channel in San Pablo Bay:

37°50'12"N	122°24'24"W
37°51'48"N	122°24'24"W (North channel LB "A")
37°54'06"N	122°26'36"W (North channel LB "B")
37°54'48"N	122°26'54"W (North channel LB "C")
37°56'06"N	122°26'36"W (mid span Richmond-San Rafael Bridge West)
37°57'36"N	122°26'42"W
38°00'36"N	122°24'06"W (San Pablo Bay LB "E")
38°01'33"N	122°22'47"W

(3) From the Central Bay precautionary area southward almost to Anchorage 9:

37°47'18"N	122°22'25"W
37°46'36"N	122°22'04"W

(c) Precautionary areas:

(1) "SF" buoy precautionary area:

- (h) A vessel engaged in fishing shall not impede the passage of any other vessel required to follow the routing scheme;
- (i) A vessel shall, if the circumstances of the case admit, avoid anchoring in a routing scheme or in areas near its terminations;
- (j) A vessel restricted in her ability to maneuver when engaged in an operation for the maintenance of safety of navigation there in may not adhere to operating rules to the extent necessary to carry out the operation.

C. Section 167.202 San Francisco Bay Region Traffic Separation Scheme
The following waterways comprise the San Francisco traffic separation scheme and precautionary areas:

- (a) Traffic lanes. Traffic lanes extend to but do not enter precautionary areas. Directional lanes are located on both sides of a separation zone.

(1) Eastbound San Francisco Bay traffic lane:

From the "SF" buoy precautionary area to the Central Bay precautionary area between the separation zone and a line connecting the following geographical positions:

- 37°45'48"N 122°37'42"W (Main Ship Channel LWB "2")
- 37°47'50"N 122°30'45"W
- 37°48'52"N 122°28'36"W (GGB south pier)
- 37°48'50"N 122°26'14"W
- 37°48'41"N 122°25'13"W (End of Pier 45)

(2) Westbound San Francisco Bay traffic lane:

From the "SF" buoy precautionary area to the Central Bay precautionary area between the separation zone and a line connecting the following geographical positions:

- 37°46'12"N 122°37'54"W (Main Ship Channel LBB "1")
- 37°46'54"N 122°35'18"W (Main Ship Channel LBB "7")
- 37°49'30"N 122°28'36"W (Lime Point)
- 37°50'36"N 122°27'06"W (Raccoon Strait LB "1")
- 37°51'06"N 122°24'54"W

(3) Northbound San Francisco Bay traffic lane:

From the Central Bay precautionary area to Pinole Shoal Channel in San Pablo Bay between the separation zone and a line connecting the following geographical positions:

- 37°50'00"N 122°23'42"W (North Channel LB "2")
- 37°51'42"N 122°23'42"W (North Channel LBB "6")
- 37°54'06"N 122°26'06"W (North Channel LBB "10")
- 37°56'06"N 122°26'30"W (East Pier Richmond/San Rafael Bridge)
- 37°57'18"N 122°26'24"W (North Channel LB "16")
- 37°57'36"N 122°26'18"W (North Channel LBB "18")
- 38°01'42"N 122°22'18"W (San Pablo Bay Channel LB "8")

(4) Southbound San Francisco Bay traffic lane:

From the Central Bay precautionary area to Pinole Shoal Channel in San Pablo

- (d) the Carquinez Strait highway bridge.
- (d) Carquinez Strait between the Carquinez Strait highway bridge and the Benicia-Martinez highway bridge.
- (e) Suisun Bay Channels between Benicia-Martinez highway bridge and Suisun Bay Light "34".
- (f) New York Slough between Suisun Bay Lighted "30" and Point Beemar Light.
- (g) San Joaquin River from Point Beemar Light to the Port of Stockton.
- (h) Sacramento River Deep-water Ship Channel from Suisun Bay Light "34" to the Port of Sacramento.
- (i) Alameda Naval Air Station Channel in its entirety.
- (j) Mare Island Strait between Mare Island Strait Light "2" and Mare Island Causeway Bridge.
- (k) Oakland Bar Channel in its entirety
- (l) Oakland Outer Harbor including the Outer Harbor Entrance Channel.
- (m) Oakland Inner Harbor Entrance Channel to, and including, the Brooklyn Basin South Channel.
- (n) Southampton Shoal Channel in its entirety.
- (o) Richmond Harbor Entrance Channel in its entirety.
- (p) Point Potrero Reach and Turn in its entirety.
- (q) Richmond Harbor Channel in its entirety.
- (r) Sante Fe Channel in its entirety.
- (s) Deep-water route north of Harding Rock.

B. Description of Traffic Separation Schemes and Precautionary Areas within a Vessel Traffic Service Area. (All geographic positions are based on North American Datum of 1983)

Section 167.200 Operating Rules.

A vessel shall:

- (a) proceed in the appropriate direction of traffic flow in that lane or as established;
- (b) so far as practicable keep clear of a traffic separation line or separation zone;
- (c) normally join or leave a traffic lane at the termination of the lane, but when joining or leaving from either side shall do so at as small an angle to the general direction of traffic flow as practicable.
- (d) A vessel other than a crossing vessel or a vessel joining or leaving a lane shall not normally enter a separation zone or cross a separation line except:
 - (1) in cases of emergency to avoid immediate danger;
 - (2) to engage in fishing within a separation zone.
- (e) A vessel navigating in areas near the terminations of traffic separation schemes shall do so with particular caution.
- (f) A vessel not using a traffic separation scheme shall avoid it by as wide a margin as is practicable.
- (g) A vessel of less than 20 meters (65.6 feet) in length or a sailing vessel shall not impede the passage of a vessel which can safely navigate only within the routing scheme.

HARBOR SAFETY COMMITTEE VTS SUBCOMMITTEE CONCERNS AND
AUGUST 3, 1992 REGULATIONS

DISCUSSION: A review of the TSS noted it was established in 1972 and does not reflect current traffic patterns or the volume of traffic in the area off the San Francisco waterfront.

Vessel movements contrary to the TSS in this area exist for three reasons:

(1) Geography confines deep draft vessels to pass east of Blossom Rock and proceed south in the northbound traffic lane passing under the C-D or D-E span of the San Francisco-Oakland Bay Bridge.

(2) Maneuvering characteristics make it much safer for vessels bound for Oakland to cross the traffic lanes and pass under the C-D or D-E spans of the bridge to facilitate "shaping-up" for the Oakland Bar Channel.

(3) Ferries and vessels arriving and departing berths on the waterfront cross the traffic lanes as a matter of necessity. The number of ferry transits has significantly increased over the years - from 20,986 in 1974 to 58,343 in 1990.

The result is the TSS in the vicinity of the San Francisco waterfront does not reflect the actual traffic patterns. This problem has been recognized for some time and is being addressed with the implementation of new regulations that become effective on August 3, 1992. Specific changes are being made in sections of 33 Code of Federal Regulations, Subchapter P- Ports and Waterways Safety.

Sections of these changes of direct interest to the Harbor Safety Committee follow:

A. Section 165.1116 San Francisco Bay Region, California - regulated navigation area (narrow channels).

The following waterways are designated narrow channels or fairways where Rule 9, International Regulations for Preventing Collisions at Sea, 1972 (72 COLREGS)/ Inland Navigation Rules as amended applies:

- (a) South San Francisco Bay Channels between the termination of the Traffic Separation Scheme in the vicinity of San Francisco Bay South Channel Lighted Buoy "1" and Redwood Creek Entrance Light "2".
- (b) Redwood Creek between Redwood Creek Entrance Light "2" and Redwood Creek Daybeacon "21".
- (c) Pinole Shoal Channel in San Pablo Bay between the termination of the Traffic Separation Scheme at San Pablo Bay Channel Light "7" and

APPENDIX M

VTS 161.22 1

Thursday
August 1, 1991

1/1

NOTICE
REGULATIONS

Part II

**Department of
Transportation**

Coast Guard

**33 CFR Part 161
National Vessel Traffic Services
Regulations; Proposed Rule**

DEPARTMENT OF TRANSPORTATION

Coast Guard

33 CFR Part 161

[CGD 90-020]

RIN 2115-AD58

National Vessel Traffic Services Regulations

AGENCY: Coast Guard, DOT.
ACTION: Notice of proposed rulemaking.

SUMMARY: The Oil Pollution Act of 1990 directed the Coast Guard to require appropriate vessels to participate in VTS systems. To accomplish this, the Coast Guard proposes requiring participation for vessels using the San Francisco, Houston/Galveston, and Louisville VTS systems, which are currently operated on a voluntary basis. The Coast Guard also proposes to simplify existing Vessel Traffic Service (VTS) regulations by promulgating standard national vessel traffic management and reporting procedures. The effect of this rulemaking would result in consolidated national VTS regulations, supplemented as necessary with local VTS rules. The rules for the Juan de Fuca Cooperative Vessel Traffic Management System (CVTMS) and Mississippi River would be independent and not a component of the National VTS rules, but are included in this part because of their vessel traffic management functions. These proposed rules are intended to enhance safe vessel movement by reducing the potential for groundings and collisions, and to minimize the risk of environmental harm resulting from collisions and groundings.

DATES: Comments must be received on or before September 30, 1991.

ADDRESSES: Comments may be mailed to the Executive Secretary, Marine Safety Council (G-LRA-2/3408), (CGD 90-20), U.S. Coast Guard Headquarters, 2100 Second Street SW., Washington, DC 20593-0001, or may be delivered to room 3408 at the above address between 8 a.m. and 3 p.m., Monday through Friday, except Federal holidays. The telephone number is 202-4177.

The Executive Secretary maintains the public docket for this rulemaking. Comments will become part of this docket and will be available for inspection or copying at room 3400, U.S. Coast Guard Headquarters.

FOR FURTHER INFORMATION CONTACT: Bruce Riley, Project Manager, Navigation Safety Systems Special Projects Staff, Tel. (202) 207-0412.

SUPPLEMENTARY INFORMATION:

Request for Comments

The Coast Guard encourages interested persons to participate in this rulemaking by submitting written data, views, or arguments. Persons submitting comments should include their names and addresses. Identify this rulemaking (CGD 90-020) and the specific section of this proposal to which each comment applies, and give a reason for each comment. Persons wanting acknowledgment of receipt of comments should enclose a stamped, self-addressed postcard or envelope.

The Coast Guard will consider all comments received during the comment period. It may change this proposal in view of the comments.

The Coast Guard plans no public hearing. Persons may request a public hearing by writing to the Marine Safety Council at the address under "ADDRESSES." If it determines that the opportunity for oral presentations will aid in this rulemaking, the Coast Guard will hold a public hearing at a time and place announced by a later notice in the Federal Register.

Drafting Information

The principal persons involved in drafting this document are Bruce Riley, Project Manager, and Nicholas Grasselli, Project Counsel, Office of Chief Counsel.

Background and Purpose

Currently, VTS Puget Sound, the Juan de Fuca Region Cooperative Vessel Traffic Management System, VTS Prince William Sound, VTS Berwick Bay, VTS St. Marys River and VTS New York require vessels, by regulation, to participate in their VTS systems. However, VTS San Francisco, VTS Houston/Galveston and VTS Louisville operate traffic systems with voluntary participation, and rely upon the cooperation and support of the marine community for their success. Although participation in the present voluntary systems is high, marine industry support is not sufficiently reliable when considering the potential for catastrophe.

Each existing VTS regulation was promulgated under a separate section in the Code of Federal Regulations (CFR) and therefore, much of the wording in each section is duplicative. This proposal would consolidate existing regulations for U.S. VTSs thereby eliminating duplication and create one national VTS regulation, modified or supplemented with local rules to address individual VTS operations. The Juan de Fuca Cooperative Vessel Traffic Management System and the Mississippi

River regulations will remain as previously written, except for minor editorial changes, and will stand alone.

Local rules, requiring participation in VTS San Francisco, VTS Houston/Galveston and VTS Louisville, have been developed and are included in proposed subpart B.

Discussion of Proposed Amendments

Part 161 is being largely rewritten and completely reorganized.

Subpart A would contain uniform national regulations generated from existing regulations, which would be applicable to all VTS areas. In these VTS areas, vessels would be required to: (1) Communicate with the VTC on certain designated frequencies in clear and unbroken English; (2) ensure that a copy of the regulations are on board; (3) provide the VTC with required movement and status reports; and (4) adhere to the prescribed traffic separation scheme.

Subpart B would contain local rules. The local rules include items of special interest to each VTS such as specific reporting points, operating frequencies, and area descriptions. The local rules for VTS Puget Sound, VTS Prince William Sound, VTS New York, VTS St. Marys River and VTS Berwick Bay were taken from existing rules. Local rules for required participation have been developed in cooperation with local mariners for VTS San Francisco, VTS Houston/Galveston, and VTS Louisville.

Subpart C would contain rules for the Juan de Fuca Region Cooperative Vessel Traffic Management System (CVTMS) and for portions of the Mississippi River. These rules have been amended for editorial purposes only.

Regulatory Evaluation

This proposal is not major under Executive Order 12291 and is not significant under the Department of Transportation Regulatory Policies and Procedures (44 FR 11040; February 20, 1979).

The Coast Guard expects the economic impact of this proposal to be so minimal that a Regulatory Evaluation is unnecessary since the vast majority of vessel owners or operators affected by this rulemaking either participate voluntarily in existing VTSs or are required to participate in these VTSs by the present regulations.

Small Entities

Under the Regulatory Flexibility Act (5 U.S.C. 601 et seq.), the Coast Guard must consider whether this proposal will have significant economic impact on a substantial number of small entities.

"Small entities" include independently owned and operated small businesses that are not dominant in their field and that otherwise qualify as "small business concerns" under section 3 of the Small Business Act (15 U.S.C. 632).

The types of present users of VTSs would not change significantly because of this proposal. The modification of radio equipment, if necessary, would only affect a very small number of vessel owners or operators and would not incur a substantial cost. The Coast Guard expects that no vessel will be required to purchase new radio equipment.

Because it expects the impact of this proposal to be minimal, the Coast Guard certifies under 5 U.S.C. 605(b) that this proposal, if adopted, will not have a significant economic impact on a substantial number of small entities.

Collection of Information

The portions of this proposed rulemaking requiring the collection of information under the Paperwork Reduction Act and 5 CFR part 1320, have been approved by a blanket OMB approval for 33 CFR part 161 (approval number 2115-0540). New information collection requirements would be added for VTS San Francisco, VTS Houston/Galveston and VTS Louisville, but will also be covered.

The voice reports required by these proposed rules are considered to be operational communications and transitory in nature, and therefore do not constitute the collection of information under the Paperwork Reduction Act.

Federalism

The Coast Guard has analyzed this proposal in accordance with the principles and criteria contained in Executive Order 12812, and has determined that this proposal does not have sufficient federalism implications to warrant the preparation of a Federalism Assessment.

Environment

The Coast Guard considered the environmental impact of this proposal and concluded that under section 2.B.2. of Commandant Instruction M18475.1B, this proposal is categorically excluded from further environmental documentation. Since this action is aimed primarily at regulatory action requiring the Master, Pilot, or person directing the movement of the vessel to continue participating in the VTS systems, no effect on the environment is expected. While the Coast Guard also recognizes that this rulemaking may also have a positive effect on the

environment by minimizing the risk of environmental harm resulting from collisions and groundings, the impact is not expected to be significant enough to warrant further documentation. A Categorical Exclusion Determination is available in the docket for inspection or copying where indicated under "ADDRESSES."

List of Subjects in 33 CFR Part 161

Harbors, Navigation (water), Vessels, Waterways.

For the reasons set out in the preamble, the Coast Guard proposes to revise part 161 of title 33 CFR and its authority citation as follows:

PART 161—VESSEL TRAFFIC MANAGEMENT

Subpart A—National Vessel Traffic Services General Rules

Sec.	Purpose.
161.10	Purpose.
161.11	Applicability.
161.12	Definitions.
161.13	Vessel operation.
161.14	Other laws and regulations.
161.15	VTC directions.
161.16	Requirement to carry regulations.
161.17	Authorization to deviate from these rules.

Traffic Separation Scheme (TSS) Rules

161.20	Purpose of the TSS.
161.21	Vessel operation in the TSS.

Communications Rules

161.30	Radiotelephone required.
161.31	English language.
161.32	Time.
161.33	Designated frequencies.

Vessel Movement System Reporting Rules

161.40	Reports.
161.41	Initial report.
161.42	Underway report.
161.43	Follow-up reports.
161.44	Report of emergency deviation.
161.45	Final report.
161.46	Report of impairment to the operation of the vessel.
161.47	Miscellaneous reports.

Descriptions and Geographic Coordinates

161.50	VTS Areas.
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Subpart B—Local Requirements

Vessel Traffic Service New York (VTSNY)

161.101	Designated frequencies.
161.102	Reporting points.
161.103	VTS New York Area.
161.104	VTS New York Users Manual.

Vessel Traffic Service Louisville (VTSLS)

161.201	Description of operations.
161.202	Applicability.
161.203	Designated frequencies.
161.204	Reporting points.
161.205	Emergencies.
161.206	VTS Louisville Area.
161.207	VTS Louisville Users Manual.

Vessel Traffic Service Houston/Galveston (VTS11/G)

Sec.	
161.821	Designated frequencies.
161.822	Initial report.
161.823	Follow-up reports.
161.824	Special operation.
161.825	Ferry reports.
161.826	Reporting points.
161.827	VTS Houston/Galveston Area.
161.828	VTS Houston/Galveston Users Manual.

Vessel Traffic Service Berwick Bay (VTSBD)

161.841	Applicability.
161.842	Definitions.
161.843	Designated frequency.
161.844	Radiotelephone equipment failure.
161.845	Means of reporting.
161.846	Initial report.
161.847	Follow-up report.
161.848	Reporting points.
161.849	High water towing limitations.
161.850	Precautionary notices.
161.851	Visual displays when limitations are in effect.
161.852	Notice of when limitations are in effect.
161.853	Operational limitations.
161.854	Horsepower limitations.
161.855	VTS Berwick Bay Area.
161.856	VTS Berwick Bay Users Manual.

Vessel Traffic Service St. Marys River (VTSSMR)

161.901	Applicability.
161.902	Designated frequency.
161.903	Vessel movement reporting.
161.904	Reporting points.
161.905	Seasonal or temporary reporting points.
161.906	Transit of Canadian waters.
161.907	Ferry reports.
161.908	One-way traffic—normal conditions.
161.909	Meeting or overtaking in channels.
161.910	Winter navigation.
161.911	Anchorage—general.
161.912	Emergency anchoring.
161.913	Unauthorized anchorage.
161.914	Anchoring of dredging, construction or wrecking plants in channels.
161.915	Shifting anchorage under direction of the VTC.
161.916	Order of departure from anchorage.
161.917	Maximum speed limits.
161.918	Temporary speed limits.
161.919	Minimum speed limit through dredged channels.
161.920	Rules for towing vessels.
161.921	Channel closure and special rules.
161.922	VTS St. Marys River Area.
161.923	VTS St. Marys River Users Manual.

Vessel Traffic Service San Francisco (VTS SF)

161.1101	Designated frequencies.
161.1102	Reporting points.
161.1103	Separation zones.
161.1104	Traffic lanes.
161.1105	Precautionary areas.
161.1106	Standard route deviations.
161.1107	Narrow channels or fairways.
161.1108	Safety procedures for vessels carrying certain dangerous cargoes in San Francisco Bay.
161.1109	VTS San Francisco Area.

Sec.
161.1110 VTS San Francisco Users Manual.
Vessel Traffic Service Puget Sound (VTSPS)

- 161.1301 Applicability.
161.1302 Navigation requirements.
161.1303 Cooperative Vessel Traffic Management System (CVTMS).
161.1304 Designated frequencies.
161.1305 Initial report.
161.1306 Underway report.
161.1307 Follow-up reports.
161.1308 Ferry reports.
161.1309 Local harbor reports.
161.1310 Separation zones.
161.1311 Traffic lanes east of Port Angeles.
161.1312 Precautionary areas east of Port Angeles.
161.1313 Rosario Strait and Guemes Channel Rules.
161.1314 Before entering Rosario Strait or Guemes Channel.
161.1315 Entering and transiting Rosario Strait or Guemes Channel.
161.1316 Passing arrangements in Rosario Strait or Guemes Channel.
161.1317 VTS Puget Sound Area.
161.1318 VTS Puget Sound Users Manual.

Vessel Traffic Service Prince William Sound (VTSPWS)

- 161.1701 Designated frequency.
161.1702 Initial report.
161.1703 Follow-up report.
161.1704 Reporting points.
161.1705 Traffic lanes.
161.1706 Separation zone.
161.1707 One-way traffic in Valdez Narrows.
161.1708 Entering Valdez Narrows.
161.1709 Communications in Valdez Narrows.
161.1710 Tank ships in the VTS Area.
161.1711 Tug assistance for tank ships.
161.1712 Special circumstances.
161.1713 VTS Prince William Sound Area.
161.1714 VTS Prince William Sound Users Manual.

Subpart C—Other Vessel Traffic Management Systems

Juan De Fuca Region Cooperative Vessel Traffic Management System (CVTMS)

General Rules

- 161.2000 Purpose.
161.2001 Applicability.
161.2002 Vessel exemptions.
161.2003 Definitions.
161.2004 Vessel operation in the CVTMS Area.
161.2005 CVTMC directions.
161.2006 Requirement to carry regulations.
161.2007 Laws and regulations not affected.
161.2008 Authorization to deviate from these rules; equivalent procedures.
161.2010 Emergencies.

Communications Rules

- 161.2012 Radio listening watch.
161.2014 Use of designated frequencies.
161.2016 Time.
161.2018 English language.
161.2020 Radiotelephone equipment failure.
161.2022 Report of radio failure.
161.2024 Report of impairment to the operation of the vessel.
161.2026 Miscellaneous reports.

Vessel Movement Reporting System (VMRS) Rules

- Sec.
161.2027 Local harbor report.
161.2028 Initial report.
161.2031 Underway report.
161.2032 Zone boundary and calling-in-point report.
161.2034 Follow-up report.
161.2036 Final report.

Traffic Separation Scheme (TSS) Rules

- 161.2052 Vessel operation in the TSS.

Descriptions and Geographic Coordinates

- 161.2054 CVTMS Area.
161.2056 Tofino zone.
161.2058 Seattle zone.
161.2060 Vancouver zone.
161.2062 Separation zones.
161.2064 Traffic lanes.
161.2066 Precautionary areas.

Mississippi River

- 161.2101 Purpose and applicability.
161.2102 Vessel operation.

Authority: 33 U.S.C. 1231; 49 CFR 1.46.

Subpart A—National Vessel Traffic Services

General Rules

§ 161.10 Purpose.

These rules are intended to enhance safe vessel movement by reducing the potential for ramming, groundings and collisions, and to minimize the risk of environmental harm resulting from those events.

§ 161.11 Applicability.

(a) General rule § 161.15, TSS rule § 161.21, and the Communications rule in § 161.33(e) apply to all vessels.

(b) Unless otherwise stated, the rules in subparts A and B of this part, apply to the operation of:

- (1) Each manned vessel of 300 gross tons or more;
- (2) Each commercial vessel of 26 feet or more in length engaged in towing astern, alongside, or by pushing ahead;
- (3) Each vessel of 100 or more gross tons carrying one or more passengers for hire; and
- (4) Each dredge and floating plant.

§ 161.12 Definitions.

As used in this part:

Captain of the Port (COTP) means the U.S. Coast Guard officer or his authorized representative assigned the duty of enforcing federal regulations within a specific area.

Dead Weight Tons (DWT) means the total loading capacity of a vessel expressed in long tons (2240 pounds).

ETA means estimated time of arrival.

Floating plant means any vessel, other than a vessel underway and making way, engaged in any construction, manufacturing, or exploration operation,

and which may restrict the navigation of other vessels.

Gross tons means a vessel's volume as stated on the vessel's documents.

Length means overall length of a vessel.

Length of tow unless otherwise stated, length of tow when towing with a hawser means the length in feet from the stern of the towing vessel to the stern of the last barge or vessel in tow. When pushing ahead or towing alongside, length of tow means the overall length in feet of the tow including the length of the towing vessel.

Person includes an individual, firm, corporation, association, partnership, or government entity.

Power driven vessel means any vessel propelled by machinery.

Precautionary area means a routing measure comprising an area within defined limits where ships must navigate with particular caution and within which the direction of traffic flow may be recommended.

Separation zone means an area of Traffic Separation Scheme separating the opposing traffic lanes.

Tank ship means any vessel especially constructed or converted to carry liquid bulk petroleum cargo in tanks and propelled by power or sail.

Towing means towing astern, alongside, or pushing ahead.

Traffic lane means an area of the TSS in which all vessels normally proceed in the same direction. Natural obstacles, including those forming separation zones, may constitute a boundary.

Traffic Separation Scheme (TSS) means the routing measure aimed at the separation of opposing streams of traffic by appropriate means and by establishment of traffic lanes.

Users manual means the manual published for a specific VTS and intended to provide the VTS user with information, in addition to the regulations, which will assist the mariner in a transit through the VTS Area.

Vessel means every description of watercraft, including non-displacement craft and seaplanes, used or capable of being used as a means of transportation on water.

Vessel Movement Reporting System (VMRS) means the system used to track the vessel movements. This is accomplished by participating vessels providing position reports to the VTC, by radiotelephone or other means, at predetermined locations.

Vessel Traffic Center (VTC) means the shore based facility that operates the Vessel Traffic Service for the area.

Vessel Traffic Service Area or VTS Area means the geographical area described in these rules depicting a specific VTS's area of responsibility.

§ 161.13 Vessel operation.

(a) No person, except those authorized to do so under § 161.17, may direct or authorize the operation of a vessel in the VTS Area contrary to any rule in subparts A and B of this part.

(b) In subparts A and B of this part, the Master, Pilot, or person directing the movement of the vessel is responsible for ensuring that all actions required of the vessel are carried out.

§ 161.14 Other laws and regulations.

Unless expressly stated otherwise, nothing in these rules is intended to relieve any person or the Master, Pilot, or person directing the movement from complying with any other applicable federal laws or regulations.

§ 161.15 VTC directions.

(a) During conditions of vessel congestion, reduced visibility, adverse weather, or other hazardous circumstances, the VTC may issue directions to control, supervise, or otherwise manage traffic.

(b) The Master, Pilot, or person directing the movement of a vessel shall comply with VTC directions.

§ 161.16 Requirement to carry regulations.

All vessels listed in § 161.11(b) while operating within the VTS Area must have on board a current copy of these regulations.

Note: In addition to the Code of Federal Regulations, these regulations can be found in the United States Coast Pilot and in the VTS User's Manual for the area in which the vessel is operating. The Code of Federal Regulations can be obtained through the U.S. Government Printing Office. The User's Manual can be obtained free-of-charge by writing to the Commanding Officer of the VTS in which you are interested. VTS addresses are contained in subpart B of this part.

§ 161.17 Authorization to deviate from these rules.

(a) The Commander of the Coast Guard District in which a vessel is operating, may upon written request, issue a written authorization to deviate from these rules for an extended period of time, if the proposed deviation provides a level of safety beyond that provided by the required procedure, or is a maneuver with an operational necessity that can be conducted safely. An application for an authorization must state the need for the deviation and describe the proposed alternative operation.

(b) The VTC may, upon request, authorize a deviation from these rules for a voyage, or part of a voyage, if the proposed deviation provides a level of safety equivalent to or beyond that provided by the required procedure.

(1) The deviation request must be made well in advance to allow the requesting vessel and the VTC sufficient time to assess the safety of the proposed maneuver; and

(2) The requesting vessel and the VTC must exchange relevant information on vessel handling characteristics, traffic density, radar contacts, and environmental conditions, and must otherwise cooperate to promote a safe transit.

(c) In an emergency, the Master, Pilot, or person directing the movement of the vessel may deviate from these rules to the extent necessary to avoid endangering persons, property, or the environment, and shall report the deviation to the VTC as soon as possible.

(d) The Master, Pilot, or person directing the movement of the vessel remains responsible for the safe navigation and maneuvering of the vessel under all circumstances.

Traffic Separation Scheme (TSS) Rules

§ 161.20 Purpose of the TSS.

The TSS is the system of separation zones, traffic lanes, and precautionary areas, intended to promote safety by directing traffic through common, segregated routes. The TSS is depicted where it exists on all Naval Oceanographic Service (NOS)/Defense Mapping Agency (DMA), U.S. Department of Commerce, and National Oceanographic and Atmospheric Administration navigation charts covering the VTS Area.

§ 161.21 Vessel operation in the TSS.

(a) Participating vessels must use the TSS whenever an established TSS coincides with the intended transit route of the vessel.

(b) Vessels not using a TSS should avoid it by as wide a margin as practicable.

(c) All vessels should keep the center of circular precautionary areas and all TSS buoys to port when practical.

Communications Rules

§ 161.20 Radiotelephone required.

(a) When underway, anchored, or moored to a buoy, the Master, Pilot, or person directing the movement of a vessel in the VTS Area shall monitor the appropriate VTS frequency continuously, except when transmitting on that frequency, and shall respond

promptly to all calls from the VTC. Refer to the local rules in subpart B of this part for the appropriate frequency.

(1) All communications and reports required by these rules must be made from the navigational bridge of the vessel, or in the case of a dredge, from its main control station.

(2) The radio listening watch required in paragraph (a) of this section may be maintained in a location other than the navigational bridge of the vessel when the vessel is anchored or moored to a buoy.

(b) A vessel subject to these rules, when properly monitoring the VTS and the bridge-to-bridge radiotelephone frequencies, is exempted from the requirement to maintain a listening watch on channel 16 (156.8 MHz) in accordance with 47 CFR 80.305.

(c) Whenever radiotelephone capability is required by this part, a vessel's radiotelephone equipment must be maintained in effective operating condition. If the radiotelephone required ceases to operate, the Master, Pilot, or person directing the movement of the vessel shall ensure it is restored to operating condition as soon as possible. The failure of a vessel's radiotelephone equipment while the vessel is underway, will not in itself constitute a violation of these rules, nor will it obligate the vessel to moor or anchor. However, the loss of radiotelephone capability will be considered as a factor in navigating the vessel, and required reports must be made by other means, if possible.

(d) A vessel that cannot simultaneously meet the radiotelephone requirements of this part, and the bridge-to-bridge radiotelephone rule in part 20 of this chapter, may not get underway without permission from the VTC.

(e) Unless otherwise indicated, all references to "channels" in §§ 161.31 through 161.47, refer to VHF/FM marine radio channels.

§ 161.31 English language.

(a) All communications and reports required by this part must be made in clear, unbroken English language.

(b) No vessel may enter or transit within the VTS Area unless there is at least one person on the bridge capable of conducting clear, unbroken, two-way radio communications using the English language.

§ 161.32 Time.

Where a report required by these rules includes time, the time must be specified using the local zone time in effect and the 24 hour clock system.

§ 161.33 Designated frequencies.

(a) No person shall transmit on VTS designated frequencies for any purpose other than the passing of information and reports to and from the VTC or necessary navigational safety information between vessels. Routine passing arrangements between vessels shall be conducted on the vessel bridge-to-bridge radiotelephone frequency (channel 13).

(b) All transmissions to the VTC must be initiated on low power. High power may be used only if low power communications are unsuccessful.

(c) Refer to the local rules in subpart B for the appropriate VTS frequency.

Vessel Movement System Reporting Rules**§ 161.40 Reports.**

All reports and communications required of vessels by this part must be made promptly by radiotelephone, except as otherwise provided, to the appropriate VTC on its designated frequency.

§ 161.41 Initial report.

At least 15 minutes, but not more than 45 minutes, before a vessel enters or intends to begin to navigate within an area covered by these rules, the vessel must report the following to the VTC:

- (a) Name and type of vessel (if a tow, configuration of the tow and cargoes), and whether a pilot is aboard;
- (b) Maximum draft;
- (c) Location of the vessel;
- (d) Estimated time of entering or beginning to navigate;
- (e) Destination and route;
- (f) Anticipated speed;
- (g) Any planned maneuvers that may impede traffic;
- (h) Whether any dangerous cargo defined in part 160 of this chapter is on board the vessel or its tow; and
- (i) Any impairments to the operational capability of the vessel, including those described in § 161.46.

§ 161.42 Underway report.

As soon as a vessel enters or begins to navigate in the VTS Area, the Master, Pilot, or person directing the movement of the vessel shall report the name and location of the vessel to the VTC.

§ 161.43 Follow-up reports.

(a) A Master, Pilot, or person directing the movement of the vessel shall report the following to the VTC:

- (1) Any information that has changed since the previous report including speed, destination, route, etc.;
- (2) Intent to cross, join or depart a TSS, at least 10 minutes (for tows, at

least 30 min) before crossing, joining or departing the TSS; and

(3) Intent to enter a separation zone while following a TSS lane, as far in advance as possible.

(b) Whenever directed to do so by the VTC or when passing a designated reporting point as specified in the Special Local Rules, a Master, Pilot, or person directing the movement of the vessel shall report the following:

- (1) Vessel name; and
- (2) Vessel location.

§ 161.44 Report of emergency deviation.

A Master, Pilot, or person directing the movement of the vessel shall report each emergency deviation from these rules to the VTC as soon as it is safe to do so.

§ 161.45 Final report.

After a vessel anchors in, moors in, or departs the VTS Area, the Master, Pilot, or person directing the movement of the vessel shall report the place and time of anchoring, mooring or departure from the VTS Area to the VTC.

§ 161.46 Report of impairment to the operation of a vessel.

A Master, Pilot, or person directing the movement of the vessel shall report to the VTC as soon as possible:

- (a) Any condition of the vessel which impairs its navigation, such as defective propulsion machinery, defective steering equipment, defective radar, defective gyrocompass, defective depth sounding device, or similar defects;
- (b) Any difficulties in a towing operation;
- (c) Any on board emergency such as fire, flooding, explosion, or similar occurrence;
- (d) Any involvement in a grounding, collision, or ramming of a fixed or floating object; and
- (e) Any impairment to the radiotelephone equipment capability required by this part.

§ 161.47 Miscellaneous reports.

A Master, Pilot, or person directing the movement of the vessel shall report to the VTC when aware of any of the following circumstances:

- (a) Another vessel in apparent difficulty or involved in a casualty;
- (b) Any obstruction which is hazardous to navigation;
- (c) Any aid to navigation which is malfunctioning, damaged, missing, or off-station;
- (d) Any pollution of the marine environment;
- (e) Any vessel which is creating a hazard to vessel traffic;
- (f) Adverse weather; and
- (g) Reduced visibility.

Descriptions and Geographic Coordinates**§ 161.50 VTS Areas.**

(a) A description of each VTS Area is contained in the Local Rules contained in subpart B of this part.

Note: Geographic coordinates expressed in terms of latitude, longitude, or both, are not intended for plotting on maps or charts whose reference datum is the North American Datum of 1983 (NAD 83), unless such geographic coordinates are expressly labeled NAD 83. Geographic coordinates without the NAD 83 reference may be plotted on maps or charts referenced to NAD 83 only after application of the appropriate corrections that are published on the particular map or chart being used.

Subpart B—Local Requirements**Note: Local Rules:**

The following local rules supplement or modify the rules in subpart A of this part:

Vessel Traffic Service New York (VTSNY)**§ 161.101 Designated frequencies.**

The following frequencies must be used when communicating with the VTC:

- (a) Primary frequencies: 158.550 MHz (channel 11), 158.800 MHz (channel 12), and 158.700 MHz (channel 14).
- (b) Secondary frequency (to be used if communications is not possible on a primary frequency): 158.850 MHz (channel 13).
- (c) Vessels must communicate with the VTC on the designated frequencies, as directed by the VTC.
- (d) The voice call for VTSNY is "NEW YORK TRAFFIC."

§ 161.102 Reporting points.

All vessels in the VTSNY Area must report to the VTC when passing the following reporting points:

Name	Geographic location
Verrazano-Narrows Bridge	Upper New York Bay.
Brooklyn Bridge	East River.
Holland Tunnel Ventilation	Hudson River.
Statue of Liberty	Upper New York Bay.
Red Hook	Buttermilk Channel.
Constable Hook	Kill Van Kull.
Bayonne Bridge	Kill Van Kull.
AK Railroad Bridge	Arthur Kill.
Lerigh Valley Draw Bridge.	Newark Bay.
Texaco Bayonne Facility	Newark Bay.

§ 161.103 VTS New York Area.

The VTSNY Area consists of the navigable waters of the United States bounded by the Verrazano-Narrows Bridge to the south, the Brooklyn Bridge to the east, and to the north along a line

Light) to the south, to 40°38'42" N (Ile Parisienne Light) to the north, except the waters of the St. Marys Falls Channel. The waters of the VTS Area are delineated to the east, from Potagannissing Bay and Worsley Bay by a line from La Pointe to Sims Point.

§ 181.923 VTS St. Marys River Users Manual.

To obtain copies of the VTSSMR Users Manual free-of-charge, write to: Commander, U.S. Coast Guard Group Sault Ste. Marie, Sault Ste. Marie, MI 49783-9501.

Vessel Traffic Service San Francisco (VTSSF)

§ 181.1101 Designated frequencies.

(a) VTSSF uses a three-frequency communications system consisting of channels 12 (158.800 MHz), 14 (158.700 MHz), and 18A (158.900 MHz). Vessels must communicate with the VTC on the primary frequencies, as directed by the VTC.

(b) Channel 16 (158.800 MHz) is the secondary frequency for channel 12. Channel 13 (158.85 MHz) is the secondary frequency for channels 14 and 18A.

(c) The voice call for VTSSF is "SAN FRANCISCO TRAFFIC."

§ 181.1102 Reporting points.

All vessels in the VTSSF Area must report to the VTC when passing the following reporting points:

- (a) Abeam buoy "SF" or after a Pilot has embarked;
- (b) Abeam Main Ship channels buoys "1" and "2" if outbound;
- (c) *Abeam Main Ship channels buoys "7" and "8";
- (d) Passing under the Golden Gate Bridge;
- (e) *Abeam Harding Rock inbound using the deep draft route;
- (f) *Abeam Alcatraz Island;
- (g) Passing under the San Francisco-Oakland Bay Bridge;
- (h) *Abeam Oakland Inner Harbor buoys "5" and "6";
- (i) Abeam Hunters Point;
- (j) Passing under the San Mateo Bridge;
- (k) Entering Redwood Creek or departing Redwood City;
- (l) Passing under the Dumbarton Bridge;
- (m) Entering Southampton Shoal Channel;
- (n) *Passing Ferry Point, entering Richmond Inner Harbor;
- (o) *Passing Point Potrero, leaving Richmond Inner Harbor;

(p) Passing under the Richmond San Rafael Bridge;

(q) Abeam the Brothers Light;

(r) Abeam San Pablo Bay Lighted Buoy "E";

(s) Entering Petaluma Channel;

(t) Entering Mare Island Strait;

(u) Passing under the Mare Island Causeway Bridge;

(v) Passing under the Carquinez Bridge;

(w) Passing under the SP Railroad Bridge at Benicia;

(x) Abeam Concord Naval Weapons Station;

(y) Passing New York Point;

(z) Passing under the Rio Vista Bridge;

(aa) Passing Sacramento Deep Water Ship Channel Light 51;

(bb) Entering/departing port of Sacramento;

(cc) Passing under the Antioch Bridge;

(dd) Passing Prisoners Point; and

(ee) Entering/departing the Port of Stockton.

Note: Those locations marked with an asterisk are required reporting points only when visibility is one mile or less.

§ 161.1103 Separation zones.

Separation zones are 150 yards wide. The boundaries of each zone are parallel to its center line. No part of any separation zone is contained in a precautionary area. The center line of separation zones connect the following geographical points:

(a) Between the SF buoy precautionary area eastward to the Alcatraz Island precautionary area:

(1) 37°45'58" N 122°38'00" W;

(2) 37°47'00" N 122°34'20" W;

(3) 37°48'08" N 122°31'00" W;

(4) 37°49'12" N 122°28'42" W (mid-span GGB); and

(5) 37°49'38" N 122°25'18" W (Alcatraz Light).

(b) Between the Alcatraz Island precautionary area northward to Pinole Shoal Channel in San Pablo Bay:

(1) 37°50'12" N 122°24'24" W;

(2) 37°51'48" N 122°24'24" W (North channel LB "A");

(3) 37°54'00" N 122°26'38" W (North channel LB "B");

(4) 37°54'48" N 122°26'54" W (North channel LB "C");

(5) 37°58'00" N 122°26'36" W (mid span Richmond-San Rafael Bridge West);

(6) 37°57'30" N 122°20'42" W;

(7) 38°00'30" N 122°24'00" W (San Pablo Bay LB "E"); and

(8) 38°01'40" N 122°22'18" W.

(c) Between the Alcatraz Island precautionary area southward almost to Anchorage 9:

(1) 37°49'00" N 122°24'12" W

Blossom Rock LBB "BR");

(2) 37°47'54" N 122°22'30" W (Pier C,

Bay Bridge); and

(3) 37°40'30" N 122°22'00" W.

§ 161.1104 Traffic lanes.

Traffic lanes extend to but do not enter precautionary areas. Directional lanes are located on both sides of a separation zone.

(a) *Eastbound San Francisco Bay traffic lane.* From the SF buoy precautionary area to the Alcatraz Island precautionary area between the separation zone and a line connecting the following geographical points:

(1) 37°45'48" N 122°37'42" W (Main Ship Channel LWB "1");

(2) 37°47'50" N 122°30'45" W;

(3) 37°48'38" N 122°22'00" W (GGB south pier);

(4) 37°48'50" N 122°28'14" W; and

(5) 37°48'42" N 122°25'06" W (Pier 45).

(b) *Westbound San Francisco Bay traffic lane.* From the SF buoy precautionary area to the Alcatraz Island precautionary area between the separation zone and a line connecting the following geographical points:

(1) 37°46'12" N 122°37'54" W (Main Ship Channel LWB "1");

(2) 37°48'54" N 122°35'18" W (Main Ship Channel LWB "7");

(3) 37°48'38" N 122°22'00" W (GGB south pier);

(4) 37°49'30" N 122°28'38" W (Lime Point);

(5) 37°50'38" N 122°27'06" W (Raccoon Strait LB "1"); and

(6) 37°51'06" N 122°24'54" W.

(c) *Northbound San Francisco Bay traffic lane.* From the Alcatraz Island precautionary area to Pinole Shoal Channel in San Pablo Bay between the separation zone and a line connecting the following geographical points:

(1) 37°50'00" N 122°23'42" W (North Channel LB "2");

(2) 37°51'42" N 122°23'42" W (North Channel LB "8");

(3) 37°54'00" N 122°26'00" W (North Channel LB "10");

(4) 37°58'06" N 122°28'30" W (East pier Richmond/San Rafael Bridge);

(5) 37°57'18" N 122°28'24" W (North Channel LB "16");

(6) 37°57'36" N 122°26'18" W (North Channel LB "18"); and

(7) 38°01'42" N 122°22'18" W (San Pablo Bay Channel LB "8").

(d) *Southbound San Francisco Bay traffic lane.* From the Alcatraz Island precautionary area to Pinole Shoal Channel in San Pablo Bay between the separation zone and a line connecting the following geographical points:

(1) 37°51'00" N 122°24'54" W;

(2) 37°51'48" N 122°24'54" W;

(3) 37°54'12" N 122°27'24" W;

(4) 37°56'06" N 122°26'42" W (West pier Richmond/San Rafael Bridge);

(5) 37°57'30" N 122°27'18" W (North Channel Light "17");

(6) 38°00'48" N 122°24'42" W; and

(7) 38°01'54" N 122°22'24" W (San Pablo Bay Channel Light "7").

(e) *Outbound lane (lower bay).* From Anchorage 8 to the Alcatraz Island precautionary area between the separation zone and a line connecting the following geographical points:

(1) 37°47'00" N 122°21'30" W;

(2) 37°48'20" N 122°22'12" W (Pier E, SF/Oakland Bay Bridge); and

(3) 37°49'24" N 122°23'44" W.

(f) *Inbound lane (lower bay).* From the Alcatraz Island precautionary area to Point Avisadero between the separation zone and the shore.

(g) *Point Avisadero between the separation zone and the shore.*

(h) *Point Avisadero between the separation zone and the shore.*

§ 161.1105 Precautionary areas.

The precautionary areas consist of:

(a) SF buoy precautionary area. A circular area with a radius of 8 miles centered on the San Francisco Lighted Horn Buoy "SF" (37°45'00" N 122°41'50" W) with the traffic lanes fanning out from its periphery; and

(b) Alcatraz Island precautionary area. A circular area with a radius of 1200 yards centered at 37°49'39" N 122°24'25" W excluding that portion east of 122°23'44" W which is part of Anchorage 7.

§ 161.1106 Standard route deviations.

In the VTS Area there are established safety-related reasons for not adhering to the TSS. Common practice has identified four "STANDARD" deviations wherein it is recognized that safety may require that a vessel deviate from the TSS upon authorization of the VTC as prescribed by § 161.17(b), as follows:

(a) Vessels proceeding eastward to the port of Oakland (or Anchorages 8 and 9) may desire to use the C-D or D-E span of the San Francisco-Oakland Bay Bridge to facilitate "shaping up" for the Oakland Bar Channel or anchorages.

(b) Vessels arriving from sea proceeding eastward, whose draft is greater than 35 feet, may use the deep-draft route. In such cases, the vessel sets a course from the Golden Gate to pass west and north of Harding Rock Lighted Buoy "HR", thence east until north of Alcatraz Island, thence to selected anchorage or other destination.

(c) Vessels proceeding westward to sea, departing from any berth between Pier 25 and Pier 47 on the San Francisco waterfront may initially proceed outbound in the Eastbound Lane passing south of Alcatraz Island. Once west and clear of Alcatraz, they will cross over

into the proper Westbound Lane and continue to sea.

(d) Vessels proceeding northward departing from any berth between Pier 52 and the San Francisco-Oakland Bay Bridge may initially proceed in the Southbound Lane (Lower Bay) using A-B or D-E span of the San Francisco Bay Bridge. Once clear of this bridge, they will cross over into the Northbound Lane leaving Blossom Rock Lighted Bell Buoy "BR" to their port and continue to their destination.

WHAT ABOUT "C" TO PORT BEHIND BAY
 § 161.1107 Narrow channels or fairways.

The following areas are considered to be narrow channels or fairways for the purpose of enforcing the International and Inland Rules of the Road.

(a) All limited traffic areas and precautionary areas in San Francisco Bay east of the San Francisco Approach Lighted Horn Buoy "SF."

(b) South San Francisco Bay channels between the termination of the TSS in the vicinity of San Francisco Bay South Channel Lighted Buoy "1" and Redwood Creek Entrance Light "2."

(c) Redwood Creek between Redwood Creek Entrance Light "2" and Redwood Creek Daybeacon "21."

(d) Carquinez Strait between the Carquinez Strait highway bridge and the Benicia-Martinez highway bridge.

(e) Suisun Bay Channels between Benicia-Martinez highway bridge and Suisun Bay Light "34."

(f) New York Slough between Suisun Bay Light "30" and Point Beemer Light.

(g) San Joaquin River from Point Beemer Light to the Port of Stockton.

(h) Sacramento River Deep Water Ship Channel from Suisun Bay Light "34" to the Port of Sacramento.

(i) Alameda Naval Air Station Channel.

(j) Richmond Harbor Entrance Channel.

(k) Mare Island Strait between Mare Island Strait Light "2" and Mare Island Causeway Bridge.

§ 161.1108 Safety procedures for vessels carrying certain dangerous cargoes in San Francisco Bay.

(a) Owners and operators of vessels transporting any of the following dangerous cargoes within San Francisco Bay, as defined in § 80.1142 of this chapter, shall comply with the procedures outlined in paragraph (b) of this section:

(1) Vessels laden with more than 100 short tons of Class A explosives;

(2) Barges laden with more than 50 short tons of Class A explosives;

(3) All vessels carrying more than 200 short tons of oxidizing materials or blistering agents;

SUBS? UNUSUAL?
 (4) All vessels carrying large quantities of radioactive materials as defined in § 160.203 of this chapter; and

(5) All vessels carrying in bulk any of the cargoes listed in § 160.203(e) of this chapter.

(b) Vessels carrying the commodities described in paragraph (a) of this section shall:

(1) Comply with the arrival and departure notification and waiver provisions as described in § 160.211 of this chapter.

(2) Participate in the VTS and adhere to the charted TSS except as directed by the VTS or COTP San Francisco.

(3) Transit the San Francisco Bay area only when visibility is 1 mile or greater. A decrease in visibility must be immediately reported to the VTC.

(4) Limit speed to 12 knots or less. Requests to exceed the 12-knot limit shall be made to the VTC.

(c) The COTP may require that vessels described in paragraph (a) of this section be escorted by a Coast Guard vessel. When unusual navigational difficulties or hazards are anticipated, the COTP will consider requests for escorts from other vessels. Escorts will be conducted as follows:

(1) Escorts for vessels entering port will begin at the Golden Gate Bridge. The escort vessel will normally station itself 500 to 1,000 yards ahead of the escorted vessel.

(2) Continuous communications must be maintained between the vessel and its escort on channel 13. Secondary communications must be on channel 22. If necessary, emergency communications may be conducted on channel 16.

(3) Escorted vessels may depart from the TSS only with the approval of the escort vessel and the VTC.

§ 161.1109 VTS San Francisco Area.

The VTSSF Area includes San Francisco Bay; its seaward approaches south of 38°00' N; east of 123°07' W; and north of 37°27' N; and its tributaries as far north as Petaluma River Entrance Lights "1" and "2", and the Mare Island Causeway Bridge, as far east as the port of Stockton on the San Joaquin River, as far north as the port of Sacramento on the Sacramento River and as far south as Redwood City.

§ 161.1110 VTS San Francisco Users Manual.

To obtain copies of the VTS San Francisco Users Manual free-of-charge, write to: Commanding Officer, U.S. Coast Guard Vessel Traffic Service San Francisco, Yerba Buena Island, San Francisco CA 94130-5013.

Vessel Traffic Service Puget Sound (VTSPS)

§ 161.1301 Applicability.

The rules in subpart A of this part also apply to the operation of each small passenger-carrying vessel certificated in accordance with 46 CFR parts 175 through 187 (subchapter T) when carrying more than six passengers for hire.

§ 161.1302 Navigation requirements.

(a) Tank ships larger than 125,000 deadweight tons bound for a port or place in the United States may not operate in waters of the United States east of a line extending from Discovery Island Light to New Dungeness Light, and all points in the Puget Sound area north and south of these lights.

(b) Participating vessels are exempt from the requirement in § 161.21(c) to keep the center of precautionary "RB" to port.

§ 161.1303 Cooperative Vessel Traffic Management System (CVTMS).

(a) The United States and Canada signed a formal Agreement in 1979 to establish the Cooperative Vessel Traffic Management System (CVTMS). The purpose of the CVTMS is to promote safe and efficient movement of vessel traffic, while minimizing the risk of pollution to the waters covered by the Agreement.

(b) To this end, the VTSPS Area, described in § 161.1318, is divided into three Zones: the Tofino Zone, the Vancouver Zone, and the Seattle Zone. Vessel traffic in each Zone is managed by the governing VTC. By the Agreement, these rules grant each VTC traffic management authority within its Zone. Additional information is contained in subpart C of this part.

(c) The Tofino Zone comprises that portion of the VTSPS Area west of 124°04'00" W. All vessels must conduct communications with "Tofino Traffic" on channel 74 (156.725 MHz) upon entering or while operating in this area.

(d) The Vancouver Zone comprises that portion of the VTSPS Area north of line drawn from the tip of Church Point on the Canadian shoreline to position 48°17'04" N 123°14'51" W; thence northeasterly to Hein Bank Lighted Bell Buoy; thence northeasterly to Cattle Point Light on San Juan Island; thence along the shoreline to Lime Kiln Light; thence to Kelleet Bluff Light on Henry Island; thence to Turn Point Light on Stuart Island; thence to Skipjack Island Light; thence to Sucia Island Daybeacon "1"; thence along the shoreline of Sucia Island to a point at 48°46'1" N 122°53'3"

APPENDIX N

Excerpts From the International and Inland Navigation Rules

The following pages contain pertinent navigation rules as apply in specific areas of the San Francisco Bay Region and that are referred to in the Plan.

The International Regulations for Prevention of Collision at Sea, 1972 (72 COLREGS) are effective outside, or seaward, of the "COLREGS Demarkation Line", a straight line drawn from Point Bonita Light through Mile Rocks Light to the shore. Inside this line, the Inland Navigation Rules (effective 1981) apply.

The two sets of rules have become more similar over the years but there are still significant differences between them. These rules apply to all vessels operating in the Bay Region ranging from boardsailers and rowboats up to the largest tankers and aircraft carriers. The vessels and individuals operating them are bound by the rules whether they are aware of them or not.

A full reading and understanding of the applicable rules is recommended for anyone operating a vessel of any sort in the Bay Region but it is recognized that this may not happen in the non-professional marine community. Since the Navigation Rules as quoted, contain references and words or phrases that may need elaboration the following notes are provided:

Notes

1. A narrow channel or fairway in addition to obvious examples such as the Sacramento River Deep Water Ship Channel also includes buoyed deep water channels surrounded by wide open areas of shallow but navigable water for small craft such as the Pinole Shoal Channel in San Pablo Bay
2. The Secretary, when referred to, is the Secretary of the Department that the U.S. Coast Guard is operating. It is normally the Secretary of Transportation, but in wartime shifts to the Secretary of Defense.
3. A major difference between the International and Inland rules is signaling. The International sound signals are ones of action ("I am making this maneuver"). The Inland signals are of intent and reply ("I propose this maneuver and am waiting on your response").
4. This Rule refers to power driven vessels, in sight of each other visually, and meeting or crossing within a half mile of each other. Maneuvering signals are a single short (one second) blast on whistle or horn which means "I intend to leave you on my port side"; two short blasts which means "I intend to leave you on my starboard side"; and three short blasts which mean "I am operating astern propulsion".
5. Twenty meters is about sixty five and a half feet.
6. When a vessel is "not to impede" another, it means it will be navigated to avoid developing risk of collision (non-legal translation: stay out of the other vessel's way).
7. The danger signal is at least five short blasts on the whistle or horn. In

Inland waters it is a mandatory signal in that you must sound it if you are doubtful of another ship's intentions. It is sounded by any vessel including non-power driven.

8. Overtaking is a specific situation where one power driven vessel is about to be passed by another going the same direction and coming within a half mile in the process.

9. Overtaking signals are initiated by the vessel which is going to pass the other. One short blast means "I intend to overtake you on your starboard side", two short blasts means "I intend to overtake you on your port side". If the vessel to be overtaken agrees she will sound a similar signal. If in doubt of the maneuver or disagrees with it, the danger signal will be sounded.

10. The "bend signal" is one prolonged (4-6 second) blast on the whistle or horn. It must be sounded by all vessels and if heard by another vessel, must be answered with a prolonged blast.

11. The Traffic Separation Schemes referred to are found in International waters and are only applicable outside the COLREGS Demarkation Line. The comparable Inland Rule leaves much to be desired. The Notice of Proposed Rulemaking found in Appendix I is the Federal proposal to improve the traffic safety in a number of ports, including the San Francisco Bay Region. The thrust of the recommendations are to make participation in the National Vessel Traffic Service mandatory to the majority of commercial vessels in the designated ports.

Additional local rules will reflect the verbage and intent of International Rule 10. These are found in Appendix L.

12. An Inshore Traffic Zone is the area between a Traffic Separation Lane and the coastline. It is an area that two way traffic is permitted in and small craft are encouraged to use. It can be compared to a frontage road paralleling a freeway.

Inland Navigation Rules (1981)

Rule 9

Narrow Channels

(a)(i) A vessel proceeding along the course of a narrow channel or fairway [see note 1] shall keep as near to the outer limit of the channel or fairway which lies on her starboard side as is safe and practicable.

(ii) Notwithstanding paragraph (a)(i) and Rule 14(a)[*head-on situation*], a power driven vessel operating in narrow channels or fairways on the Great Lakes, Western Rivers, or waters specified by the Secretary [see note 2], and proceeding downbound with a following current shall have the right-of-way over an upbound vessel, shall propose [see note 3] the manner and place of passage, and shall initiate the maneuvering signals prescribed by Rule 34(a)(i) [see note 4], as appropriate. The vessel proceeding upbound against the current shall hold as necessary to permit safe passing.

(b) A vessel of less than 20 meters [see note 5] in length or a sailing vessel shall not impede [see note 6] the passage of a vessel that can safely navigate only within a narrow channel or fairway.

(c) A vessel engaged in fishing shall not impede the passage of any other vessel navigating within a narrow channel or fairway.

(d) A vessel shall not cross a narrow channel or fairway if such passage impedes the passage of a vessel which can safely navigate only within that channel or fairway. The latter vessel shall use the danger signal prescribed in Rule 34(d) [see note 7] if in doubt as to the intention of the crossing vessel.

(e)(i) In a narrow channel or fairway when overtaking [see note 8], the vessel intending to overtake shall indicate her intention by sounding the appropriate signal prescribed in Rule 34(c) [see note 9] and take steps to permit safe passing. The overtaken vessel, if in agreement shall sound the same signal. If in doubt shall sound the danger signal prescribed in Rule 34(d).

(ii) This Rule does not relieve the overtaking vessel of her obligation under Rule 13 [*Overtaking*].

(f) A vessel nearing a bend or an area of a narrow channel or fairway where other vessels may be obscured by an intervening obstruction shall navigate with particular alertness and caution and shall sound the appropriate signal prescribed in Rule 34(e) [see note 10].

(g) Every vessel shall, if the circumstances of the case admit, avoid anchoring in a narrow channel.

Rule 10
International Regulations for Preventing Collisions at Sea
(72 COLREGS)

(a) This Rule applies to traffic separation schemes [see note 11] adopted by the Organization (International Maritime Organization).

(b) A vessel using a traffic separation scheme shall:

(i) proceed in the appropriate traffic lane in the general direction of traffic flow for that lane;

(ii) so far as practicable keep clear of a traffic separation line or separation zone;

(iii) normally join or leave a traffic lane at the termination of the lane, but when joining or leaving from the side shall do so at as small an angle to the general direction of traffic flow as practicable.

(c) A vessel shall so far as practicable avoid crossing traffic lanes, but if obliged to do so shall cross on a heading as nearly as practicable at right angles to the general direction of traffic flow.

(d)(i) A vessel shall not use an inshore traffic zone [see note 12] when she can safely use the appropriate traffic lane within the adjacent traffic separation scheme. However, vessels of less than 20 meters in length, sailing vessels and vessels engaged in fishing may use the inshore traffic zone.

(ii) Notwithstanding subparagraph (d)(i), a vessel may use an inshore traffic zone when enroute to or from a port, offshore installation or structure, pilot station or any other place situated within the inshore traffic zone, or to avoid immediate danger.

(e) A vessel other than a crossing vessel, shall not normally enter a separation zone or cross a separation line except:

(i) in cases of emergency to avoid immediate danger;

(ii) to engage in fishing within a separation zone.

(f) A vessel navigating in areas near the terminations of traffic separation schemes shall do so with particular caution.

(g) A vessel shall so far as practicable avoid anchoring in a traffic separation scheme or in areas near its terminations.

(h) A vessel not using a traffic separation scheme shall avoid it by as wide a margin as is practicable.

(i) A vessel engaged in fishing shall not impede the passage of any vessel following a traffic lane.

(j) A vessel of less than 20 meters in length or a sailing vessel shall not impede the safe passage of a power driven vessel following a traffic lane.

(k) A vessel restricted in her ability to maneuver when engaged in an operation for the maintenance of safety of navigation in a traffic separation scheme is exempted from complying with this Rule to the extent necessary to carry out the operation.

(l) A vessel restricted in her ability to maneuver when engaged in an operation for the laying, servicing or picking up of a submarine cable, within a traffic separation scheme, is exempted from complying with this Rule to the extent necessary to carry out the operation.

Inland Navigation Rules (1981)

Rule 10

Vessel Traffic Services

Each vessel required by regulation to participate in a vessel traffic service shall comply with the applicable regulations.

Penalty Provisions
Violations of Inland Navigation Rules and Regulations
(33 U. S. Code 2072)

Sec. 4.(a) Whoever operates a vessel in violation of this Act, or of any regulation issued thereunder, or in violation of a certificate of alternative compliance issued under Rule 1 is liable to a civil penalty of not more than \$5,000 for each violation.

(b) Every vessel subject to this Act, other than a public vessel being used for noncommercial purposes, that is operated in violation of this act, or any regulation issued thereunder, or in violation of a certificate of alternative compliance issued under Rule 1 is liable to a civil penalty of not more than \$5,000 for each violation, for which penalty the vessel may be siezed and proceeded against in the district court of the United States of any district within which the vessel may be found.

(c) The Secretary may assess any civil penalty authorized by this section. No such penalty may be assessed until the person charged, or the owner of the vessel charged, as appropriate, shall have been given notice of the violation involved and an opportunity for a hearing. For good cause shown, the Secretary may remit, mitigate, or compromise any penalty assessed. Upon the failure of the person charged, or the owner of the vessel charged, to pay an assessed penalty, as it may have been mitigated or compromised, the Secretary may request the Attorney General to commence an action in the appropriate district court of the United States for the collection of the penalty as assesses, without regard to the amount involved, together with such other relief as may be appropriate.

(d) The Secretary of the Treasury shall withhold or revoke, at the request of the Secretary, the clearance, required by section 4197 of the Revised Statutes of the United States (46 U.S. C. 91) of any vessel, the owner or operator of which is subject to any of the penalties in this section. Clearance may be granted in such cases upon the filing of a bond or other surety satisfactory to the Secretary.

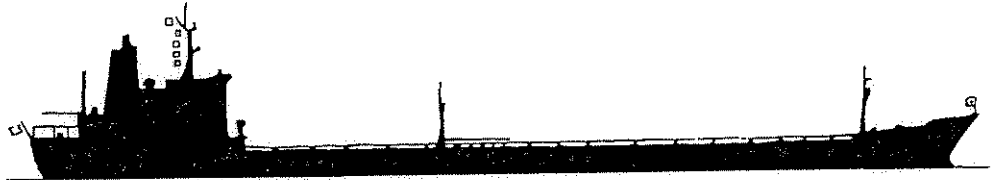
APPENDIX O

DOT-CG-N-01-91-1.2
DOT-VNTSC-CG-91-2.1

Port Needs Study (Vessel Traffic Services Benefits) Volume I: Study Report

Research and Special Programs
Administration
John A. Volpe National
Transportation Systems Center
Cambridge MA 02142-1093

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Service, Springfield, VA 22161

U.S. Department
of Transportation

United States
Coast Guard



Office of Navigation Safety and Waterway Services
Washington DC 20593

7.2 VTS TECHNOLOGY SURVEY

The VTS technology survey concentrates on contact with:

- Government and industry personnel familiar with existing U.S. VTS systems and advanced overseas VTS systems.
- Private sector producers and developers of VTS equipments and systems.
- Segments of the radar, navigation and display industry marketing or producing radar and Dependent Surveillance type systems.
- Segments of the Radio Determination Satellite Service (RDSS), mobile satellite, and cellular telephone industry.

7.3 VTS CANDIDATE DESIGN SYSTEM MODULES

Many types of surveillance sensors are employed or proposed for use in VTS systems. To simplify development of the Candidate VTS Design, the various types of sensors have been divided into several levels of performance and cost called Surveillance Modules. This section describes these modules and provides data on the cost and performance of each one. The major categories of modules are Radar, Automatic Dependent Surveillance (ADS) and Ancillary Surveillance Technologies. They are listed as follows:

● RADAR

- Radar Module 1 - Average Performance, X Band
- Radar Module 2 - Average Performance, S Band
- Radar Module 3 - High Performance, X Band
- Radar Module 4 - High Performance, S Band
- Radar Module 5 - Special Purpose, X Band
- Radar Module 6 - Special Purpose, S Band

7.3 VTS CANDIDATE DESIGN SYSTEM MODULES (Cont.)

- AUTOMATIC DEPENDENT SURVEILLANCE

ADS Module 7 - Active Radar Transponder (Type 1)

ADS Module 8 - Positional Transponder, Small Area, Very High Accuracy (Type 5)

ADS Module 9 - Positional Transponder, Small Area, High Accuracy (Type 6)

- ANCILLARY SURVEILLANCE TECHNOLOGIES

VHF Module 10 - Low Power VHF Transmitting/Receiving Facility

VHF Module 11 - High Power VHF Transmitting/Receiving Facility

Meteorological Module 12 - Air Temperature, Wind Direction and Speed

Meteorological Module 13 - Air Temperature, Wind Direction and Speed, and Visibility

Hydrological Module 14 - Water Temperature and Depth

Hydrological Module 15 - Water Temperature, Depth and Current

VHF/DF MODULE 16 - Line of Position Measurement to 2 Degree RMS

CCTV MODULE 17 - Fixed Focus CCTV via Telephone Lines

CCTV MODULE 18 - Remotely Controllable CCTV via Microwave

7.3.1 Radar Technology In VTS

The study makes certain capability assumptions regarding radar systems. For the purposes of the study, radar systems:

- Detect vessels that are typical to the area monitored at the ranges expected.
- Remove most sea clutter and extraneous target data.
- Eliminate interference by shipboard radars.
- Have a very high degree of reliability.
- Detect the design size target on three out of five scans.
- Display a target continuously, i.e., scan-to-scan integration.
- Display capability which enhances the radar resolution.

Selection of appropriate generic levels of radar performance depends on identifying the major variables in radar equipment that affect radar performance, such as: power output, noise figures, operating frequency, radar video processing, and radar antenna.

- Radar Module 1 - Average Performance

- Can detect a 20-meter vessel at the radar horizon in a relatively open area with average sea clutter (sea state = 1, radar cross section = 10 square meters).
- Horizontal Beam width is assumed to be 0.7 degrees.
- AZ Resolution @ 6nm =
 $(2\pi/360)(6\text{nm})(0.7)(1852)$
= 135.8 meters.
- X Band Radar.
- 12-foot antenna.

7.3.1 Radar Technology In VTS (Cont.)

- Radar Module 2 - Average Performance

- Can detect a 20-meter vessel at the radar horizon in a relatively open area with average sea clutter (sea state = 1, radar cross section = 10 square meters).
- Horizontal Beam width is assumed to be 2 degrees.
- AZ Resolution @ 6 nm = $(2\text{PI}/360)(2)(6\text{nm})(1852) = 388$ meters.
- Enhanced performance in heavy rain over Module 1.
- S Band Radar.
- 12-foot antenna.

- Radar Module 3 - High Performance

- Can detect 5 to 20-meter vessel at 6 miles in relatively open areas (sea state = 1, radar cross section = 5 square meters) or where ships and smaller targets must be tracked in relatively narrow channels (approximately 300+ feet).
- Horizontal Beam width is assumed to be 0.5 degrees.
- AZ Resolution @ 6 nm = 97 meters.
- X Band Radar.
- 18-foot antenna.

7.3.1 Radar Technology In VTS (Cont.)

- Radar Module 4 - High Performance

- Can detect a 5 to 20-meter vessel at 6 miles in relatively open areas (sea state = 1, radar cross section = 5 square meters) or where ships and smaller targets must be tracked in relatively narrow channels (approximately 300+ feet).
- Horizontal Beam width is assumed to be 1.4 degrees.
- AZ Resolution @ 6 nm = 271.5 meters.
- Enhanced performance over Module 3 in heavy rain.
- S Band Radar.
- 18-foot antenna.

- Radar Module 5 - Special Purpose

- Detects the same targets as Module 3 but is also able to track these targets in narrowly confined waterways with obstructions on either or both sides due to the outstanding side/backlobe rejection characteristics.
- Horizontal Beam width is assumed to be 0.5 degrees.
- AZ Resolution @ 6 nm = 97 meters.
- X Band Radar.
- Large size, exceptional performance antenna, low noise installation (special wave guides, etc.).

7.3.1 Radar Technology In VTS (Cont.)

- Radar Module 6 - Special Purpose

- Detects the same targets as Module 4 but is also able to track these targets in narrowly confined waterways with obstructions on either or both sides due to the outstanding side/backlobe rejection characteristics.
- Horizontal Beam width is assumed to be 1.4 degrees.
- AZ Resolution @ 6 nm = 271.5 meters.
- Enhanced performance over Module 5 in heavy rain.
- S Band Radar.
- Large size, exceptional performance antenna, low noise installation (special wave guides, etc.).

7.3.2 Automatic Dependent Surveillance (ADS) Technology In VTS

The two levels of accuracy and three levels of range lead to six possible choices for positional type devices. Of these six, the large area, very high accuracy choice is not considered realistic. The remaining five positional type devices plus one radar transponder device leads to six ADS types as follows:

Type 1 = Radar Transponder

Type 2 = Positional Transponder, large area, high accuracy

Type 3 = Positional Transponder, intermediate area, very high accuracy

Type 4 = Positional Transponder, intermediate area, high accuracy

Type 5 = Positional Transponder, small area, very high accuracy

Type 6 = Positional Transponder, small area, high accuracy

7.3.2 Automatic Dependent Surveillance Technology In VTS (Cont.)

Since surveillance requirements and performance are being considered only within one VTS zone, it is not logical to consider large or intermediate area systems. These have much lower data rates and wider area communications requirements than surveillance systems designed to service only one zone (refer to Section 3.0, VTS Technology Survey, Technical Supplement TS-4). Accordingly, only ADS Types 1, 5, and 6 are used as ADS modules. The ADS modules then, become:

- ADS Module 7 - Active Radar Transponder (Type 1)

This device is similar to the radar transponders carried aboard aircraft but must respond to all land based VTS radar frequencies. The device enhances the radar return and provides positive vessel identification. The accuracy provided by this device would be the same as that of the surveillance radar in use.

- ADS Module 8 - Positional Transponder, Small Area, Very High Accuracy (Type 5)

This device is assumed to be a differential GPS (DGPS) receiver, coupled with a VHF communications system. The performance of this device is assumed to be:

- Range = Line of Sight (LOS) from the VHF facilities.
- Accuracy = 5 to 10 meters (2 drms).
- Relative Accuracy = 5 to 10 meters (2 drms).
- Relative accuracy is defined as the accuracy of measurement between vessels.
- Positive Vessel Identification = Yes, if required in the vessel ADS device.

7.3.2 Automatic Dependent Surveillance Technology In VTS (Cont.)

- ADS Module 9 - Positional Transponder, Small Area, High Accuracy (Type 6)

This device is assumed to be a Loran-C receiver coupled with a VHF communications system. The performance of this device is assumed to be:

- Range = Line of Sight (LOS) from the VHF facilities.
- Accuracy = 0.25 nm (2 drms). This accuracy can be increased to at least 0.03 nm by very careful local calibration of the VTS zone coupled with active monitoring of the Loran-C grid with a monitor station located in the VTS zone.
- Relative Accuracy = Better than 0.05 nm. Relative accuracy is equal to the repeatable accuracy of the Loran-C system.
- Positive Vessel Identification = Yes, if required in the vessel ADS device.

7.3.3 Ancillary Surveillance Technologies

7.3.3.1 VHF

VHF communications are employed in all VTS subzones. The major variations are the number of frequencies used and the radiated power output of the installation. Since the existing regulations and the VTS design itself determine the number of frequencies, this is not variable. Radiated power output, however, is a significant choice for the VTS designer. Low power (1-10 watts) facilities are used within subzones when it is desirable to limit the coverage area and reduce interference in other subzones. High power (10 to 50 watts) is used when wider coverage is desired and the resultant interference can be tolerated. This leads to two VHF modules.

7.3.3.1 VHF (Cont.)

- VHF Module 10 - Low power VHF Transmitting/
Receiving Facility
 - Output power = 1-10 watts.
 - Effective range = up to 10 miles, capable of operating on four frequencies simultaneously.
- VHF Module 11 - High power VHF Transmitting/
Receiving Facility
 - Output power = 10-50 watts.
 - Effective range = as required up to LOS, capable of operating on four frequencies simultaneously.

7.3.3.2 Meteorological Sensors

Meteorological sensors in current VTS systems are capable of measuring air temperature, wind speed/direction, and visibility. The measurement of visibility is not always required at remote sensor sites and is employed only when fog presents a significant navigation problem. This leads naturally to two levels of meteorological sensor implementation. All meteorological sensors are assumed to be connected to a general purpose computer that can be interrogated over a telephone line.

- Meteorological Module 12 - Air Temperature, Wind Direction and Speed
 - Air temperature (to ± 1 degree F.).
 - Wind direction (to ± 1 degree).
 - Wind speed (to ± 1 kt.).
- Meteorological Module 13 - Air Temperature, Wind Direction and Speed, Visibility
 - Air temperature (to ± 1 degree F.).
 - Wind direction (to ± 1 degree).
 - Wind speed (to ± 1 kt.).
 - Visibility (to less than $\frac{1}{2}$ nm).

7.3.3.3 Hydrological Sensors

The hydrological sensors employed in modern VTS systems measure one or more of the following: water temperature, current, and water depth. The major division in capabilities for a VTS designer is the choice between measuring either current or depth or both. This leads to a logical choice of two levels of performance. It is assumed that all sensors are interfaced to a general purpose computer that can be interrogated by telephone modem.

- Hydrological Module 14 - Water Temperature and Depth
 - Water temperature (to ± 1 degree F.).
 - Water depth (to $\pm 0.5'$).
- Hydrological Module 15 - Water Temperature, Depth and Current
 - Water temperature (to ± 1 degree F.).
 - Water depth (to $\pm 0.5'$).
 - Current (to ± 0.2 kt.).

7.3.3.4 VHF/DF Sensors

Many VTS systems make use of these radio direction finders. The major technical variable is the accuracy of the measured line of position in degrees. This accuracy varies according to on-site conditions and the aperture of the antenna used. A VHF/DF site furnishes one LOP. If used in conjunction with a radar it can provide positive vessel identification. If it is used alone, two sites are required to locate a vessel. The technical variation is not great enough to justify more than one VHF/DF hardware level. This level assumes complete remote control capability, a wide aperture array of at least 16 dipoles, and a site accuracy of 2 degrees.

- VHF/DF MODULE 16 - Line of position measurement to 2 degree RMS

7.3.3.5 Closed Circuit Television (CCTV) Modules

Many VTS systems use low light level closed circuit television. These devices provide visual surveillance of small areas where specific problems exist that are not solved by other surveillance sensors. Some CCTV installations are also used to identify vessels. Current CCTV installations range from fixed focus, fixed azimuth cameras to cameras with complete remote control of pan, tilt and zoom functions. Video data can be sent to the VTC via telephone lines (delayed in time) or microwave links. Two levels of performance have been selected for CCTV implementation. Both levels are assumed to require a climate controlled, weatherproof housing with window wipers, washers and defogger.

- CCTV MODULE 17 - Fixed Focus CCTV via Telephone Lines

This module consists of two fixed focus cameras. These are not remotely controllable except for camera selection. The data is compressed and transmitted over a 9600 baud modem. The following are performance data for each camera:

- Magnification = 1 camera less than 50 mm.
1 camera greater than 50 mm.
- Minimum scene illumination = 0.01 lux
- Image update rate @ 9600 baud = 10-20 seconds

- CCTV MODULE 18 - Remotely Controllable CCTV via Microwave

This module consists of two independently controllable cameras. Each camera is capable of remotely producing over 50 pre-set scenes under microprocessor control. The computerized control is also capable of producing any programmed sequence of preset scenes, each visible for a selected time period. Video from these cameras is multiplexed and sent to the VTC over a microwave link. The following are performance data for each camera:

- Magnification = 10 to 160 mm.
- Zoom = 10X.
- Minimum scene illumination = 0.01 lux.

7.4 DESIGN APPROACH

Seven on-site study zone surveys produced a set of preliminary requirements for typical subzones used to guide the definition of the Candidate VTS Designs. The study selects the surveillance modules for each subzone from the master list of modules and examines each subzone to determine the minimum number of surveillance modules of each type needed to respond to the requirements identified in the on-site surveys for that subzone. The study then "surveys" the 16 study zones not subjected to on-site visits, using NOAA charts supplemented by information obtained from other published sources, and the knowledge gained from the previous on-site surveys. The published information on the individual port areas provides the needed overview of each study zone and assists in defining subzones in each of these zones analogous to those defined via the on-site visits for the first seven zones.

7.4.1 Study Zone Surveys

The study selects seven study zones, representative of generic classes of waterways, for the on-site surveys. They are: Boston, Puget Sound, Los Angeles/Long Beach, Santa Barbara, Port Arthur, New Orleans, and Chesapeake Bay. A survey report for each of the seven study zones detailing local traffic management considerations is part of the Candidate VTS Design included in the appendices.

The survey team developed and used a standard list of survey questions for each on-site visit to assure the collection of consistent core data from each port. The questions solicited the following:

- A complete set of harbor charts;
- Applicable Light List and Current Tables;
- The Coast Pilot;
- The U.S. Navy Fleet Guide;
- Corps of Engineers publications on Commodity flow;
- Code of Federal Regulations; and
- U.S. Coast Guard Captain of the Port Orders.

7.4.1 Study Zone Surveys (Cont.)

Study of this documentation supplies fundamental knowledge, helps to identify potential traffic problem areas, and provides an initial list of traffic management concerns to be addressed. The appropriate U.S. Coast Guard personnel were interviewed. These interviews supplement landside and waterside surveys of pertinent port waterways. The on-site survey reports contain the initial selection of subzones and a list of specific traffic management problem areas within each subzone. The conclusion drawn is that some subzones require only procedural monitoring, while others require active surveillance of some specific level.

The study "surveys" the 16 study zones not receiving on-site visits, primarily from charts and other published sources. The traffic management problem area templates, developed by the seven on-site surveys guide the development of design considerations for Candidate VTS Designs in the remaining 16.

7.4.2 Developing Candidate Designs for Surveyed Study Zones

The study selects surveillance sensors to achieve the VTS mission which is defined as insuring the safety of navigation and the protection of the environment. In order to accomplish this mission, participation of all vessels greater than 20 meters in length is assumed. Other assumptions made are that the VTC will provide navigational safety advice to all vessels and that the VTS is not employed to facilitate commerce or to offer piloting assistance.

The primary criteria for determining adequate surveillance sensors are:

- Percentage of vessels above 20 meters in the surveillance area;
- Percentage of lost tracks;
- Accuracy of position and track obtained;
- Reliability of the surveillance system;
- Timeliness of the data obtained; and
- Ability to interpret and use the data obtained.

7.4.2 Developing Candidate Designs for Surveyed Study Zones (Cont.)

The secondary criteria are:

- Cost of the VTS System: minimum labor requirement for operations; and
- Expendability: VTS level, responsibility level, geographical area to support other missions.

Active surveillance sensors, including radar, communications, and closed circuit television (CCTV) installations are used where detection and tracking of vessels is paramount to providing safety advice. The selection of modules is such as to assure that the necessary operational criteria identified for each subzone are accommodated.

The study looks at many dependent surveillance techniques ranging from voice radio reporting of required VTS data to automatic position and identification recording devices that can be interrogated from shore (ADS). Some form of position and/or movement dependent surveillance is used in existing VTS systems in regions which do not require active surveillance. To apply ADS technology to a specific subzone, the following criteria are considered:

- The number and class of vessels interacting in the subzone and the identification of interactions that are important to the VTS mission. All vessel classes participating must be appropriately equipped with an ADS device.
- It must be established that additional information obtained from ADS, beyond that obtained from active surveillance, is necessary.
- If the class or group of vessels to be monitored is a "controlled" group, ADS can be more easily implemented and satisfactory operation more readily achieved. A controllable group would be defined as a subset of vessels such as a particular barge company, or vessels carrying specific cargo.
- The number of different vessels in each class of interest that passes through the subzone in question must be determined in order to estimate the cost of selecting this option.

7.4.2 Developing Candidate Designs for Surveyed Study Zones (Cont.)

- A specific ADS solution for one subzone in one zone could affect VTS designs for subzones in other zones.

The study bases the Candidate VTS Design in each study zone on the following set of assumptions:

- As recommended by the IMO, all vessels of 20-meters or more in length would be required to participate. Participation is defined (at a minimum) as monitoring the VTS frequency and reporting as required.
- The software architecture would allow upgrades to process ADS data.

7.5 CANDIDATE VTS DESIGNS

Table 7-1 summarizes the number of surveillance modules selected to represent the integrated Candidate VTS Design for each of the 23 study zones. Maps displaying radar installation locations for each study zone are in the appendices (Volume II). Section 5 defines subzone coverage by VTS level.

DOT-CG-N-01-91-1.3, Pt. 2
DOT-VNTSC-CG-91-2.II, Pt. 2

Port Needs Study (Vessel Traffic Services Benefits) Volume II: Appendices, Part 2

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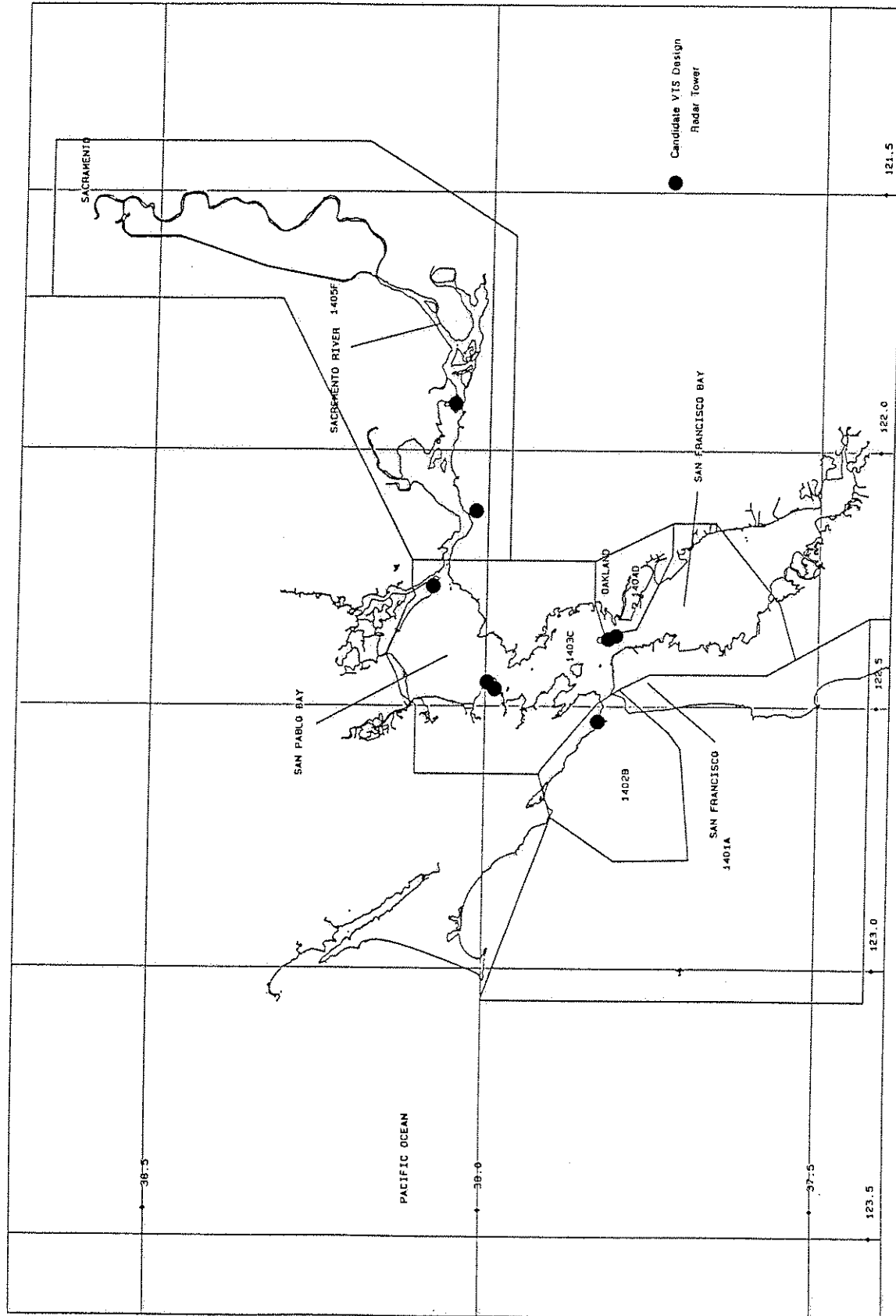
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Office of Navigation Safety and Waterway Services
Washington DC 20593



ZONE 14 - SAN FRANCISCO, CA - CANDIDATE VTS DESIGN RADAR LOCATIONS

VTS capabilities should include provision of position-fixing assistance, if required; and the ability to assist the smooth and safe movement of traffic. This includes queuing ships in- and outbound to and from Oakland and Alameda, if required.

2.7.14 PAI VII-2. Oakland Middle and Inner Harbors

The present VTS commanding officer considers the capability to keep the Inner and Middle harbors of Oakland essential to providing pilots and ships moving within the Port of Oakland properly advised.

Although channels are too narrow for navigational assistance in terms of cross-track location, surveillance will provide the capability to furnish shipping with information necessary to prevent surprise encounters.

3.0 PORT OF SAN FRANCISCO VTS DESIGN

3.1 INTRODUCTION

A detailed survey of the Port of San Francisco is the basis for this design. An approach to costing VTS systems is outlined in Vol. III, Technical Supplement and a method of categorizing surveillance sensors into "modules" has also been developed. These modules are defined in terms of cost and performance and are to be applied to all VTS designs in this study. The applicability of Automatic Dependent Surveillance (ADS) technology is also discussed in this report. The eight sub-zones defined in the harbor survey remain the same.

Traffic management requirements for each sub-zone are developed from PAI analysis. Table 3-1 lists in tabular form a summation of the problems identified and the management required by sub-zone.

The hardware and software selected for this design provide the level of surveillance justified by the problems identified in each sub-zone. A secondary consideration is to locate all VTS assets so that they are sufficient for the sub-zone in question and can contribute to adjoining sub-zones to achieve maximum usage. All specific equipments are then selected based on perceived surveillance requirements and overall VTS system architecture.

TABLE 3-1. SAN FRANCISCO, CA PROBLEM AREA IDENTIFIERS

LOCATION	PROBLEM	MANAGEMENT
Ocean Approaches	Potential vessel interactions	Have real-time knowledge of both participant and non-participant locations and movement. Be able to correlate all movement, provide movement management advice. Identify inbound radar targets.
Gulf of the Farallones	Potential congestions and dissimilar traffic	Same As Above plus provide navigational assistance.
San Francisco Bay	Congestion, random movements, dissimilar traffic and non-participants. Traffic queuing to and from Richmond may be required. Anchorage management required.	Same As Above. Manage anchorages.
San Pablo Bay	Congestion, dissimilar traffic, large numbers of non-participants. Anchorage management required.	Same As II Above.

TABLE 3-1. SAN FRANCISCO, CA PROBLEM AREA IDENTIFIERS (Cont.)

PAI	LOCATION	PROBLEM	MANAGEMENT
V	Carquinez Strait/Suisun Bay	Narrow channels introduce risk of incidents especially during low visibility.	Have real-time knowledge of both participant and non-participant locations and movement. Be able to correlate all movements, provide movement management advice.
VI	Sacramento River	Narrow channels introduce risk of incidents.	Have knowledge of participant movement. Be able to correlate these movements, provide management advice and alerting.
VII	Lower San Francisco Bay	Congestion, random movements, dissimilar traffic and non-participants. Anchorage management required.	Same As V Above plus manage anchorages.
VIII	Redwood Creek	Movements into SZ VII must be introduced into the VTS system.	Same As VI Above.

3.1.1 VTS Design Approach

The choice of surveillance sensors is dependent on the VTS mission. For the purposes of this design, the VTS mission is defined as that which insures the safety of navigation and the protection of the environment. In order to accomplish this mission, mandatory participation of all vessels over 20 meters is essential. The Vessel Traffic Center (VTC) must provide navigation safety advice to all vessels. The VTS in the United States will have no facilitation of commerce role nor will it offer piloting assistance of any kind.

The primary criteria for selection of adequate surveillance sensors are:

- o Percentage of vessels of the desired minimum size detected in designated surveillance areas
- o Percentage of lost tracks
- o Accuracy of the position and track obtained
- o Reliability of the surveillance system
- o Timeliness of the data obtained
- o Ability to interpret and use the data obtained

Secondary criteria are:

- o Cost of the VTS system -- reduction of manpower by the use of technology
- o Expandability -- increased VTS responsibility, area, and/or support of other missions

Active surveillance sensors including radar, communications, and closed circuit television (CCTV) installations are used when detection and tracking of vessels is paramount to providing safety advice. These devices are considered fail safe in that it is known with certainty when they have failed. The performance characteristics of these sensors are known from operational VTS worldwide experience. In this design they are selected to assure that the necessary operational criteria identified for each sub-zone is realized.

Many dependent surveillance techniques are possible. These range from voice radio reporting of required VTS data to automatic position and identification recording devices that can be interrogated from shore known as Automatic Dependent Surveillance (ADS) devices. The position and/or movement reporting form of dependent surveillance is used extensively in existing VTS systems. The major regions of current use are those which do not require

active surveillance. To apply ADS technology to a specific sub-zone within a VTS zone the following additional criteria must be considered:

- o The number and class of vessels interacting in the sub-zone and which of these interactions are important to the VTS mission. Obviously all vessel classes of interest must be appropriately equipped. This requires that all vessels of the classes selected which will ever pass through this sub-zone must be equipped with an ADS device. This requirement to detect so many different vessels argues against the use of ADS. In areas where only one class of vessel is of interest, ADS is more easily implemented.

- o The interactions or transits to be monitored must not demand that the surveillance be fail safe, i.e. positively detecting failures. This type of surveillance is related to position reporting in that it may not always function or be used properly and the VTS has limited control over its operation.

- o It must be determined that if active surveillance is not justified, the additional information obtained from ADS over position reporting is necessary.

- o If the class or group of vessels to be monitored is a "controllable" group, ADS can be easily implemented and satisfactory operation more readily achieved. Controllable means a clearly defined subset of vessels, e.g. a specific barge company; vessels carrying a specific cargo, etc.

- o The number of different vessels in each class of interest that passes through the sub-zone in question must be determined. This number must be known to accurately estimate the cost of selecting this option for this sub-zone.

- o A specific ADS solution for one sub-zone in one harbor may affect all the VTS designs for all the other sub-zones in all the other harbors.

3.1.2 Assumptions

The design of this VTS system starts with a set of assumptions based on the detailed survey and other data. These assumptions are as follows:

- o As recommended by the IMO, all vessels of 20 meters or more in length are required to participate in the VTS. Participation is defined (at a minimum) as monitoring the VTS frequency and reporting as required.

o The VTS system is implemented with the cooperation and assistance of the port authorities, pilots associations, and marine exchange, if any. The existing facilities, services, and procedures established and operated by these organizations are major elements of an integrated VTS system as defined in the IMO VTS Guidelines.

o The life-cycle of all system hardware is ten years.

3.2 DESIGN DECISIONS (FIGURE 3-1)

3.2.1 General

Examination of the traffic levels, geographical features and identified problem areas in this port leads to the following selection and location of sensor hardware.

3.2.2 Hardware Location and Selection

3.2.2.1 Sub-Zone II

Point Bonita Site

1 Module 3 radar
1 Module 4 radar
1 Module 13 MET
1 Module 16 DF

Mt. Tamalpais Site

1 Module 10 VHF
1 Module 11 VHF

3.2.2.2 Sub-Zone III

Richmond Site

1 Module 18 CCTV
1 Module 10 VHF
1 Module 13 MET

3.2.2.3 Sub-Zone IV

Point San Pedro Site

1 Module 1 radar
1 Module 10 VHF
1 Module 13 MET

Mare Island Site

1 Module 1 radar
1 Module 10 VHF
1 Module 11 VHF

Surveillance Modules -Sub Zones	RADAR																		CCTV	COMMENTS
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18		
I																				Required radar/DF coverage also from Sub-zone II
II			1	1						1	1					1				
III							25			1										
IV	2									2	1									
V	2									1										
VI										3	1									
VII	1	1								1	1				1					
VIII										1										

FIGURE 3-1. SAN FRANCISCO, CA SURVEILLANCE SURVEY

3.2.2.4 Sub-Zone V

<u>Martines Site</u>	1 Module 1 radar
<u>Suisun Bay Site</u>	1 Module 1 radar 1 Module 10 VHF 1 Module 13 MET

3.2.2.5 Sub-Zone VI

<u>Rio Vista Site</u>	1 Module 10 VHF
<u>Sacramento Site</u>	1 Module 10 VHF
<u>Vorden Site</u>	1 Module 10 VHF 1 Module 11 VHF

3.2.2.6 Sub-Zone VII

<u>Yerba Buena Site</u>	1 Module 1 radar 1 Module 2 radar 1 Module 10 VHF 1 Module 12 MET 1 Module 14 HYD
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3.2.3 Vessel Traffic Center

The design of the hardware and software should be modern and capable of operating with reduced staff levels and no loss of effectiveness. Two watchstanders and a watch supervisor with integrated data workstations and decision aiding software can effectively manage the activity in this port. This Vessel Traffic Center concept demands that the watchstanders be separated from any other harbor/port information requests. The Center must be structured so that such requests are controlled by a bulletin board type interface. One Commanding Officer, one Executive Officer and one clerk are also required for the proper administration of the facility.

The Vessel Traffic Center is located on Yerba Buena Island in a location with good visual surveillance of the San Francisco Bay. The center is to employ the following equipment:

3.2.3.1 VTS Console

This console provides total data integration from all sensors in all sectors. These data are graphically shown on raster scan, high light level, color displays. A data display is also provided. Console design architecture is general purpose computer based, open architecture, bus organized, allowing operation of the system as a local area network (LAN). Data interchange with other facilities

by modem is provided as well as interface with the U.S. Coast Guard standard terminal. The design allows board level modification and expansion. Features of the software and hardware provided are:

- o Software written in a high level language.
- o Software providing the total integration of data from all VTS sensors.
- o Layering of data in at least four layers to be operator selectable.
- o The ability to sector data including sector to sector handoff of targets.
- o The ability to accept external digital data derived from transmissions of shipboard transponders or other sources and integrate the information with all other sensor data.
- o Automatic and/or manual acquisition of radar targets including automatic tracking and target ID assignments. Guard zones with automatic acquisition of all targets entering the zone.
- o Several warning levels of vessel interaction designed to direct attention to developing situations rather than a simple CPA alarm strategy.
- o Complete vessel monitoring and alarm capability including anchor watch, CPA, TCPA, track history, adjustable target velocity vectors, restricted area penetration and maneuvering monitor is provided. Additional warning and/or alarm features allowed by programming changes in high level language.
- o Complete modern color graphics capability with offset and zoom
- o Complete harbor navigation aid monitoring capability including buoy position, light status, etc.
- o Remote control of all radars and radar interfaces as well as radar data processing including site-to-site integration, clutter suppression, scan conversion and target extraction.
- o Complete track projection capability which can predict and/or analyze future interactions based on current position, destination and velocity.

- o The capability of constructing a complete vessel data base and interfacing it to the real-time data display from the VTS sensors.

3.2.3.2 Communications Console

This console is capable of remotely operating the proposed transmitting/receiving sites and allowing transmission and monitoring on all required frequencies. The console provides three operating positions each to be capable of complete communications control. It is capable of modular expansion if other remote communications sites are added.

3.2.3.3 Supervisor Control and Data Acquisition (SCADA) Equipment

A SCADA capability is provided to the major module level at remote sites so that the watchstander can determine the status of the entire VTS system. A graphic readout is provided in block diagram form indicating operational status of all elements in the system. Security monitoring of remote sites is also included.

3.2.3.4 Recording Equipment

Time synchronized video and audio recording equipment is to be provided. This equipment is capable of recording and playing back the data presented to the VTS watchstander and his reaction to the situation. An extra set of recording equipment is to be installed for redundancy purposes.

3.3 COST ESTIMATES

3.3.1 General

Appendix A discusses a generalized approach to estimating VTS system costs. This approach is based on interviews with system designers and purchasers of recently constructed systems. The cost of this VTS system has been estimated using this approach and is detailed below. The assumptions made in estimating these costs are listed in Paragraph 3.1.2.

APPENDIX P

Analysis of Reportable Accidents and Potential Effect of Tug Escorts

An analysis of reportable accidents in the Bay Area over a three year period was made by a maritime consultant on contract to the Department of Fish and Game. The purpose of this analysis was to determine if there was a pattern of accident locations and on a case by case basis, evaluate whether the presence of an escort tug would have prevented or mitigated the accident. US Coast Guard investigations of each case were reviewed in detail in making this analysis.

The cases involved are as follow:

Jan. 10, 1988 ARCO JUNEAU Carquinez Strait Bridge
An allision with the bridge occured in dense fog. Post accident investigation determined that the ship's radar heading flasher was off by six degrees. The ship was being navigated by radar and this error was sufficient to cause it to sideswipe the bridge pier.

The presence of an escort tug in this case could only have helped the situation but would not guarantee that it could have been prevented. A tug proceeding ahead of the ship as "pathfinder" may have alerted the bridge watch that the flasher was in error, but this is unlikely since the fog would have prevented the master or pilot from visually observing the difference. It should be noted that the tug would also be navigating by radar, with fewer personnel and significantly lower skill level requirements than those of the tanker.

Apr. 28, 1988 ANDREW J. HIGGINS Naval Supply Center, Oakland
The vessel was pierside at Naval Supply Center, Oakland loading diesel cargo fuel. A valve in the deck manifold was opened in improper sequence and a minor discharge of oil occured. A small amount went over the side before it could be secured. Clean up efforts began promptly and the US Coast Guard was notified. A tug escort is not applicable in this case.

June 18, 1988 OMI DYNACHEM 38°-01.3' N, 121°-50.1' W
The vessel went aground in the San Joaquin River due to apparent pilot error. The grounding was "soft" and there was no damage to the ship. Due to the narrow channel, a tug escort would be impractical unless tethered. This would be more likely to cause problems than prevent them over the long run. An untethered tug would have had no effect in this incident.

Jan. 19, 1989 CROWN CONFIDENCE 38°-03.1' N, 122°-05.2' W
The vessel went aground in East Bull's Head Channel due to pilot error. A tug escort would have had no effect.

Feb. 19, 1989 BRILLIANCY 37°-45.8' N, 122°-20.7' W
The vessel was at anchor in Anchorage 9. It was being topped off by barge and grounded at low tide. There was no damage and the vessel floated free at high tide. A tug escort is not applicable in this case.

Dec. 27, 1990 GOLDEN GATE 38°-03.0'N, 122°-07.0'W
The vessel was pierside at Martinez and suffered an electrical casualty.
A tug escort is not applicable in this case.

Jan. 12, 1991 OVERSEAS NEW ORLEANS 37°-54.3'N, 122°-21.5'W
The vessel grounded in the Richmond Harbor Channel due to pilot error. The
forward assist tug was misplaced and the ship swung wide.
A tug escort is not applicable in this case since the ship was using assist tugs.

APPENDIX Q

Harbor Safety Committee
of
The San Francisco Bay Region
Tug Boat Inventory (as of 6-9-92)
(All information provided by individual tugboat companies.)

JUN 10 1992

NRDC-57

American Navigation Co.

tug name	hp(adv.)	est boll pull (tons)	yr built	prop	length	beam	draft
Rebel	5,000		unknown	2	93.8	25.0	11.8
Titan	5,000		unknown	2	79.4	26.5	8.7
Avenger*	5,000		1964	2	109.2	29.2	10.7
Enforcer	4,200		1966	2	125	32	10.4
Renegade*	4,000		1946	1	95.2	24.1	10.5
Kate*	4,000		1941	1	93.8	25	11.8
Raider*	3,000		1944	2	93.5	25	11.5
Hondo*	3,000		1969	2	99	30	9.7
Bobbie Jo	1,500		1945	1	61.3	17.1	7.1
Cascade	1,000		1940	1	60.4	18.0	7.3

(* - Boats American Navigation Co. is running right now.)

Bay & Delta Towing Co., Inc.

tug name	hp(adv.)	est boll pull (tons)	yr built	prop	length	beam	draft
Cart. Jack	4,000	47	RB1987	1	85'	24'	12'-0"
Pt. San Pablo	4,000	42	RB1990	1	100'	25'	14'-6"
Benicia	4,200	44	RB1991	2	95'	26'	11'-6"
Maggie	4,000	42	RB1987	1	107'	28'	15'-0"
Sonja V.	2,500	23	RB1982	1	93'	24'	10'-0"

(RB = Rebuilt)

Brusco Tug & Barge

tug name	hp(adv)	est boll pull (tons)	yr built	prop	length	beam	draft
Terry L. Brusco	1200		1965	2	69.0	23.0	8.2
Mike Brusco Sr.	1200		1952/ 1988	3	60	16.6	5.7
Karen Salbu	1000		1944	2	58	14	6

Chevron Shipping Co.

tug name	hp (adv.)	est boll pull (tons)	yr built	prop	length	beam	draft
Chevron Richmond	4,000	55	1988	2	102.5	34'	13'2"
Standard No. 4	1,800		1956	1	80'8"	26'2"	10'8"

Crowley Maritime Corp.

tug name	hp (adv.)	est boll pull (tons)	yr built	prop	length	beam	draft
Sea King	5,000	58	1974	2	126'	34'	17'
Sea Cloud	5,000	58	1974	2	126'	34'	17'
Sea Duke	2,150	25	1953	1	93'	25'	12'
Sea Lark	2,000	24	1941/ 1976	1	94'	25'	12'
Sea Scout	2,150	25	1952	1	93'	25'	12'
Sea Hawk	2,150	25	1945/ 1978	1	95'	25'	12'
San Joaquin River	1,000	12	1964	2	65'	26'	6'

Exxon Shipping Co.

tug name	hp (adv.)	est boll pull (tons)	yr built	prop	length	beam	draft
Exxon California	7,200	108	1975	2	149'	40'	22'
Exxon Carquinez	3,900	63	1982	2	111'	34'	15'

Marin Tug & Barge, Inc.

tug name	hp (adv.)	est boll pull (tons)	yr built	prop	length	beam	draft
Marin Sunshine	2000	23	1963	2	75	22	10
Marin Twilight	2000		1979	2	73	28	8
Marin Sky	2000		1971	2	56	24	10

Oscar Niemeth Towing

tug name	hp (adv.)	est boll pull (tons)	yr built	prop	length	beam	draft
Silver Eagle	4,000	57.5	1983	2	107'	34'	15'
Sea Eagle	1,800	17.5	1926	2	98'	25'	9'
American Eagle	4,000	52.5	1970	2	117'	34'	16'

Sacramento Tugboat Co.

Tug name	hp (adv.)	est boll pull (tons)	yr built	prop	length	beam	draft
Erica S.	1040			1			
Leif S.	1400			2			
Three Sisters	425			1			

Sanders Towboat Service, Inc.

tug name	hp (adv.)	est boll pull (tons)	yr built	prop	length	beam	draft
Delaware	4,000	60	RB1989	1	107'	28'	15'
Mary Dee Sanders	4,000	59	RB1985	1	100'	25'	13'
Gail L. Sanders	1,500	14	1943	1	100'	25'	13'
Donald D. Sanders	1,500	15	1941	1	100'	25'	13'
Shad W. Sanders	1,000	9.5	RB1970	1	65'	18'	10'

(RB = Rebuilt)

Seaway Towing Co., Inc.

tug name	hp (adv.)	est boll pull (tons)	yr built	prop	length	beam	draft
Polaris	1,000	12.5	1941/ 1991	1	65	17	9.5
Southern Cross	2,000	23	1942	1	82	24	12

Tweed Towing, Inc.

tug name	hp (adv.)	est boll pull (tons)	yr built	prop	length	beam	draft
Pacific Eagle	1,800	22.5	1966	2	100'	27.6	10.6
Pacific Pride	2,250	24	1976	2	95'	28	13.1
Pacific Rose	1,300		1976	2	64'	24	9
Pacific Falcon	4,200	50	1968	2	132	32	15

Westar Marine Services

tug name	hp (adv.)	est boll pull (tons)	yr built	prop	length	beam	draft
Taurus	1,500		1943	1	87'	24'	11.6'
Warrior	1,000		1947	1	65'	19.5'	7'11"
Panther	1,000		1947	1	61.6'	17'	9'
Bearcat	1,000		1965	2	69'	23'	8.9'