SAN FRANCISCO, SAN PABLO AND SUISUN BAYS HARBOR SAFETY PLAN

Pursuant to the
California Oil Spill and Prevention Act of 1990

Submitted by the
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INTRODUCTION AND MEMBERSHIP OF THE HARBOR SAFETY COMMITTEE

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 (SB 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 original Harbor Safety Plan for San Francisco , San Pablo and Suisun Bays was adopted on August 13, 1992. SB 2040 mandates that the Harbor Safety Committee must annually review its previously adopted Harbor Safety Plan and recommendations and submit the annual review to the OSPR Administrator for comment.

The full committee of the Harbor Safety Committee holds regular monthly public meetings. The committee chairman appoints a series of subcommittees to review the mandated components of the Harbor Safety Plan and timely issues. All committee and subcommittee meetings are noticed to the public. Public comments are received throughout discussions of the various issues, which results in full public participation in developing the Harbor Safety Plan recommendations of the San Francisco Bay Region

The San Francisco Bay Harbor Safety Plan encompasses a series of connecting bays, including the San Francisco, San Pablo, 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 semicircular 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 on San Francisco Bay and Tributaries." The 1992 recommended guidelines are currently being updated and revised by the Bar Pilots Association. The guidelines are sent to members of the shipping industry, and are based on a general consensus among pilots as to recommended navigation practices.

The natural harbor of the Bay serves the shipping and fishing industries. There are eight ports, twenty-one marine terminals, and naval facilities at Concord Naval Weapons Station and Moffet Field. Military and contract commercial vessels move explosives to the Concord Naval Weapons Station along the Contra Costa/Solano County shoreline. 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. In addition, an expanding ferry system annually makes over 71,000 (1997) trips, mainly to and from San Francisco in the central part of the Bay. As highway congestion increases, ferry traffic substantially increased in the Bay. Because much 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.

Thus, vessel traffic in the Bay consists of a complex variety of inbound and outbound vessels, wholly in-Bay vessel movements, tugs, government 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.

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

The following is a list as of June 1998 of the 15 voting and 4 non-voting members of the Committee:

Port Authorities (4):

Gary C . Hallin..... Port of Oakland

Ronald W. Kennedy ..... Port of Richmond

Charles Mitchell ..... Port of San Francisco

Joseph Gaidsick ..... Benicia Industries

Tanker Operators (2):

Brian Dorsch ..... Chevron Shipping Company

Stuart McRobbie ..... SeaRiver Maritime

Pilot Organization (1):

Captain Larry Teague ..... San Francisco Bar Pilots

Dry Cargo Vessel Operators (2):

Captain Lynn Korwatch ..... Matson Navigation

Captain J. Grant Stewart ..... American Ship Management

Commercial Fishing or Pleasure Boat Operator (1):

Margot Brown ..... National Boating Federation

Non-profit Environmental Organization (1):

Werner Chabot ..... Center for Marine Conservation

San Francisco Bay Conservation and Development Commission (1):

Will Travis ..... BCDC

Labor (1):

Gunnar Lundeberg ..... Sailors' Union of the Pacific

Barge Operators (1):

Scott Merritt ..... Foss Maritime

Tug Operators (1):

Mary McMillan ..... Westar Marine Services

Non-Voting Members (3):

U.S. Coast Guard ..... Captain Harlan Henderson Capt. of the Port

U.S. Coast Guard VTS ..... Commander Danny Ellis

U.S. Army Corps of Engineers ..... To be announced

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

Chair.....Captain Lynn Korwatch
Matson Navigation Company

Vice Chair.....Scott Merritt
Foss Maritime Company

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

Harbor Safety Committee Work Groups

Tug Escort Work Group
Chair: Gary Hallin
Port of Oakland

Navigation Work Group
Chair: Captain Larry Teague
San Francisco Bar Pilot Association

Underwater Work Group
Chair: Rich Smith
Westar Marine Services

Human Factors Work Group
Chair: Scott Merritt
Foss Maritime Company

Prevention through People Work Group
Chair: Margot Brown
National Boating Federation

EXECUTIVE SUMMARY

The Harbor Safety Committee, through its work groups adopted the following recommendations to reduce the risk of oil spills in the San Francisco Bay Region. Each Chapter of the Harbor Safety Plan contains the complete text, background and status of each recommendation. Recommendations which have been implemented are noted by an asterisk (∴).

I. Geographical Boundaries

No recommendations.

II. General Weather, Tides and Currents

1. The Harbor Safety Committee supports the efforts to increase funding to NOAA. In light of congressional initiatives that would reduce the NOAA's funding or dissolve the agency entirely by eliminating, privatizing or transferring its functions to other agencies, Harbor Safety Committee members and interested members of the public should continue to request federal and state funding for PORTS to insure system support after the demonstration period. The Committee urges that the OSPR Administrator support PORTS as a high priority and that OSPR continue to seek and allocate funds to maintain the system once it is installed. The Harbor Safety Committee recommends that the Marine Exchange of the San Francisco Bay Region be designated as the non-profit entity to operate, maintain and market the uses of the PORTS program following conclusion of the federal demonstration project. The Committee further requests that NOAA expedite the update of tide and current data using the latest technology available and publish the water level and current atlases to replace the tidal current charts recalled because of inaccuracies.

2. For the San Francisco main ship channels from the COLREGS Demarcation Line to and between the southern tip of Bay Farm Island and the Southern Pacific Railroad Bridge: a) The maximum speed for all power driven vessels of 1,600 or more gross tons shall not exceed 15 knots through the water from the COLREGS Demarcation Line to and between the southern tip of Bay Farm Island and Southern Pacific Railroad Bridge; and b) Power driven vessels of 1,600 or more gross tons shall in any case have their engines ready for immediate maneuver and shall not operate in control modes or with fuels that prevent an immediate response to any engine order ahead or astern or preclude stopping their engines for an extended period of time. ∴

III. Aids to Navigation

No recommendations.

IV. Anchorages

Adopt pre-designated anchorage areas within the existing general anchorages throughout the VTS–SF area and in particular within general anchorage No. 9 so that safer and more disciplined anchoring practices may be managed by VTS–SF. ∴

V. Harbor Depths, Channel Design, and Dredging

1. Facility owners/operators should conduct 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. ∴

2. 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. Such areas would include shoaling areas east of Alcatraz and west of the Oakland Harbor.

3. The Committee further recommends that NOAA update its charts in a timely fashion to reflect survey information from NOAA, COE and independent sources. 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.

4. 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.

The Harbor Safety Committee requests the U.S. Army Corps of Engineers to: further refine the Initial Cost Estimates for the Removal of Harding, Arch, Shag, and Blossom Rocks, an Unnamed Rock and Alcatraz Shoal; re-examine East Alcatraz Shoal; evaluate the forty-foot shoal south of the Bay Bridge; and survey the position of two charted wrecks one located near Blossom Rock and the other near the Bay Bridge.

In order to provide funds to match federal funds for lowering the rocks off Alcatraz Island, the Harbor Safety Committee supports a state appropriation as the local match as this project would reduce the risk of oil spills in the Bay which is of substantial benefit to the general public and to the environment.

5. 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.

VI. Contingency Routing

1. 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.

2. OSPR should request Caltrans, railroads, and various counties owning bridges for advance notice of work which would temporarily or permanently reduce bridge clearances. Advance notice should be provided as far in advance as possible through the Local Notice to mariners to assure that vessels are alerted to these hazards.

VII. Vessel Traffic Patterns

1. 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. The committee adopted a definition of a reportable 'Near Miss' situation to standardize reporting along the California Coast.

VIII. Communication

1. Due to increasing congestion on Channel 13, the USCG is proposing to shift the primary VTS channel to Channel 14. The Harbor Safety Committee endorses the Coast Guard's efforts to improve the existing system. ∴

2. 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. ∴

IX. Bridges

1. OSPR should request Caltrans and other bridge operators such as the Golden Gate Bridge and Southern Pacific Railroad to install energy-absorbing fendering, instead of wooden or plastic fendering, on all area bridges when replacing damaged fenders and for all new construction.

2. Bridge clearance gauges should be installed where needed, particularly drawbridges. ∴

3. Water level gauges should be installed at approach points to bridges. ∴

4. 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. ∴

5. 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. ∴

6. Request Caltrans and the Golden Gate Bridge District to shield bridge floodlights to reduce the glare for ships. ∴

X. Small Vessels

1. A meeting should be convened by the Harbor Safety Committee with the state OSPR, Fish and 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 and Game mailers to the fishermen informing them of spill prevention concerns, or other actions. ∴

2. 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 form the competitors' level. **∴**

3. Race officials and other interested parties should be invited aboard a large tanker while underway to get the pilot's perspective of racing vessels. ∴

4. 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. ∴

5. 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. ∴

6. 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. ∴

7. 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. ∴

8. 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. ∴

9. Make public by publishing punitive actions 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. ∴

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

11. 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.

12. Place Additional Emphasis on Recreational Boater Education and Law Enforcement on the Waterways as follows:

1) OSPR should put additional emphasis on boater education and law enforcement on the waterways. This can be addressed by the Outreach Program, developed in 1994 and coordinated through the State Department of Boating and Waterways.

2) Educational target areas should be identified such as marinas and boat ramps. Boat rental establishments, including personal water craft (jet skis), should also be targeted for an educational thrust, as inexperienced boaters in rental boats are a continuous source of problems.

3) The Coast Guard's "Sea Partners Program," a marine environmental protection outreach initiative, should be utilized, in conjunction with the Coast Guard Auxiliary, to disseminate boater safety materials to recreational boaters in the Bay area.

4) Kayakers should be approached in the same manner as board sailors were previously approached to promote safer navigation in the Bay. Kayakers have become a problem for vessel traffic due to reckless operation by some individuals.

5) The public school system should be encouraged to include Boater Education in the curriculum.

Consideration should be given to providing funds dedicated specifically for increased law enforcement on the waterways.

XI. Vessel Traffic Service

1. Scope of Coverage

a. Develop standard VTS traffic management procedures for U.S. ports that conform to international standards. ∴

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. ∴

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. ∴

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

3. The Harbor Safety Committee supports continued federal funding for VTS–San Francisco in order to ensure navigational safety in the San Francisco Bay Area. ∴

XII. Tug Escort / Assist for Tank Vessels

Over a period of five years, the Harbor Safety Committee took the following steps to establish tug escorting in the Bay:

1) Adopted Interim Tug Escort Guidelines in 1992.

2) Adopted Permanent Tug Escort Guidelines in 1993.

3) Adopted Revised Permanent Tug Escort Guidelines in 1995.

4) Amendments to Revised Permanent Guidelines Adopted January, 1996 (Revised tug escort regulations effective January 1, 1997).

5) Recommended establishing a technical pilotage committee to review waterways specific maneuvers of tankers and tugs.

XIII. Pilotage

1. Amend the California Harbor and Navigation Code to require that shipping company employees eligible to pilot vessels in the Bay area must hold a Master's license with pilotage endorsement and have made at least 20 trips as pilot trainee or observer on vessels over the routes to be piloted within a one-year period.

2. Amend Coast Guard regulations for pilotage to adjust the limit to 10,000 gross tons for tank barges carrying oil or other petroleum products as cargo to 5,000 gross tons.

3. To prevent unlicensed persons from performing pilotage, it is recommended that the California Harbors and Navigation Code be amended to increase the penalty for acting as a pilot while not holding a pilot license from the maximum penalty for a misdemeanor of $1,000 to a maximum penalty of $25,000. ∴

XIV. Underkeel Clearance and Reduced Visibility

1. The Committee recommended guidelines for underkeel clearances of tank vessels carrying oil or petroleum products as cargo.

2. 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. ∴

3. 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. ∴

XV. Economic and Environmental Impacts

No recommendations.

XVI. Plan Enforcement

The Coast Guard and the State Department of Fish and Game should coordinate policies and procedures to the greatest extent possible with each other and with other federal, state, and local agencies. ∴

XVII. Other: Substandard Vessel Inspection Program

Support the U.S. Coast Guard vessel inspection program of targeting substandard vessels in the Bay. ∴

I. GEOGRAPHICAL 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:

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

Vehicular Bridge Management: 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.

Tug Escort: 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. Tug escort zones are described in Chapter XII.

II. GENERAL WEATHER, TIDES AND CURRENTS

San Francisco Bay is the largest harbor on the Pacific Coast of the United States. 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, 31st Ed., 1997*. 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.

- 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.

- 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.

- 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.

ν 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.

WEATHER

1. Winds.

Bay area weather is seasonably variable with three discernible 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 to 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 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 Pressure System. 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.

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.

(See Chapter XIV. Underkeel Clearance and Reduced Visibility.)

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.

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.

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.

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.

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 semi-diurnal 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 2.4 feet below mean lower low water datum.

Safety Issues Associated with Current and Tide Conditions. In late 1991, the National Oceanic and Atmospheric Administration (NOAA) stopped publishing 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.

PORTS has been installed to give near-real time tide and current information on a six-minute basis. This is one of the more modern systems in the nation. PORTS is managed by the Marine Exchange with funding from OSPR and technical assistance from NOAA/NOS.

Recommendations

II.1. Physical Oceanographic Real-Time System (PORTS). The Harbor Safety Committee supports the efforts to increase funding to NOAA. In light of congressional initiatives that would reduce the NOAA's funding or dissolve the agency entirely by eliminating, privatizing or transferring its functions to other agencies, Harbor Safety Committee members and interested members of the public should continue to request federal and state funding for PORTS to insure system support after the demonstration period. The Committee urges that the OSPR Administrator support PORTS as a high priority and that OSPR continue to seek and allocate funds to maintain the system once it is installed. The Harbor Safety Committee recommends that the Marine Exchange of the San Francisco Bay Region be designated as the non-profit entity to operate, maintain and market the uses of the PORTS program following conclusion of the federal demonstration project. The Committee further requests that NOAA expedite the update of tide and current data using the latest technology available and publish the water level and current atlases to replace the tidal current charts recalled because of inaccuracies. (May 1999) The committee submits that this recommendation is still valid.

> **STATUS.** The Physical Oceanographic Real-Time System continues to be of great benefit to recreational boaters, commercial shippers, vessel masters and pilots in providing accurate knowledge of winds, currents and other environmental parameters used by the San Francisco maritime community.
>
> The P.O.R.T.S. information hub, called the InfoHub, was installed in April 1997 and provides many value-added, user-friendly website screens that display the P.O.R.T.S. data in various modes and scales. Data to the information hub is first quality-controlled at the Data Acquisition System (DAS) located in Vallejo.
>
> The data is the quality-controlled automatically and in much greater detail on a 24-hour/7-day per week basis under a program called the Continuous Operating Real-Time Monitoring System or CORMS. CORMS employs knowledgable oceanographers at NOAA'' National Ocean Service headquarters in Siler Spring, Marylandthat monitor data quality and sensor performance using data quality control tests and remote sensor and

DAS diagnostics. Bad data is not posted but is replaced by the most current correct value.

Management of the P.O.R.T.S., including administrative, firld maintenance and repair and the information hub was handed over to the Marine Exchange of the San Francisco Bay Region, located at Lower Fort Mason Center in San Francisco. Funding for the system is assured until July 1, 1999. The PORTS Advisory Committee has made a recommendation to request general state funding to continue operating the system.

Access to PORTS information may be obtained by logging onto the website at http://www.sfms.org. The same information may be obtained by contacting the voice response number *(707) 642-4337.*

SPEED OF VESSELS

The San Francisco region is well known for occurrences of dense fog. In the February, 1994 issue of *Professional Mariner*, an article entitled *"Fog: Making Life Murky for Mariners"* stated that San Francisco had an average of 60 to 70 foggy days per year when visibility was less than one half mile. Of the major ports in the United States, the Bay has the highest number of foggy days. In contrast, San Diego Harbor experiences fog an average of 24 days a year. In addition to hazards created by weather, tide and current, and depth conditions, vessels must transit under a number of major bridges. In the Central Bay, where vessel traffic is heaviest, vessels must make abrupt movements to navigate around Alcatraz Island or transit under the Bay Bridge to the Port of Oakland.

The Coast Guard Marine Safety Office San Francisco Bay proposed that maximum speed limits be set for vessels in the Bay to improve safe navigation. The Vessel Traffic Service (VTS), in a two-week survey in 1993, noted three large commercial vessels traveling at speeds between 18 to 20 knots within the Central Bay, which was considered excessive, taking into consideration the narrow confines of the shipping lanes, the distance required for large vessels to stop, the many hazards and the number of other vessels generally present such as commercial ships, ferries, recreational boaters, tugs, etc. In May, 1993, VTS tracked the speed of 206 vessels inbound and outbound within the Central Bay, which included tankers, ships and tugs with tow. From this sample, it was concluded that the vast majority of vessels were traveling 15 knots or less.

The Captain of the Port approached the Harbor Safety Committee and requested that the Committee formally comment. After a number of public meetings, the Committee agreed that maximum speed limits should be established for the main ship channels based on the operating characteristics of ships transiting in the Bay. For example, industry related that lower speeds, such as a 12 knot limit, would unnecessarily restrict the maneuverability of some ships in swift currents. Also certain ships can operate only in ranges of full speed and ahead half which may not coincide with an upper speed limit. Taking this information into consideration, the Harbor

Safety Committee endorsed the 15 knot speed limit. In addition, the committee recommended that all vessels be in a response mode that would not delay an immediate reaction to an engine order. It was agreed the speed proposed was the maximum speed of an independently operated vessel. Vessels required to be escorted would still be governed by the speed at which assistance could be rendered as outlined in the tug escort regulations.

Recommendations

II.2. Maximum Speed. For the San Francisco main ship channels from the COLREGS Demarcation Line to and between the southern tip of Bay Farm Island and the Southern Pacific Railroad Bridge:

1) The maximum speed for all power driven vessels of 1,600 or more gross tons shall not exceed 15 knots through the water from the COLREGS Demarcation Line to and between the southern tip of Bay Farm Island and Southern Pacific Railroad Bridge.

2) Power driven vessels of 1,600 or more gross tons shall in any case have their engines ready for immediate maneuver and shall not operate in control modes or with fuels that prevent an immediate response to any engine order ahead or astern or preclude stopping their engines for an extended period of time.

> **STATUS.** Federal regulation 33 CFR Parts 162 and 165 became effective May 3, 1995, limiting vessel speed to 15 knots for power driven vessels of 1,600 or more gross tons within the main ship channels (Regulated Navigation Areas) of San Francisco Bay. This also applies to a tug with a tow of 1,600 or more gross tons. The regulation implements the Harbor Safety Committee recommendation of setting a maximum speed limit on vessels to improve safe navigation within the congested areas of the Bay where the ability of a vessel to maneuver in the event of an emergency is severely constrained. No further action is necessary.

III. AIDS TO NAVIGATION

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*.

In 1992 the Coast Guard, working with the Harbor Safety Committee, thoroughly reviewed the layout and marking of the main ship channels. This review, known as the Waterway Analysis and Management System Study (WAMS), was conducted under the auspices of the Marine Safety Office and involved pilots and industry representatives. As a result of this review, the layout of the main ship channels was significantly changed by the substitution of precautionary areas for the pre-existing two way Traffic Separation Scheme (TSS) in may parts of the Bay. The traffic routing scheme was originally established in 1972. The revised routing scheme reflects current traffic patterns and corrects the problems of contrary vessel movements noted in the Harbor Safety Plan.

The revised traffic routing scheme established a deep water traffic lane, a precautionary area between the main ship channel traffic lanes and the deep water and Central Bay traffic lane, and expanded the Central Bay precautionary area. The northern traffic lanes were redesignated (narrow) channels and the separation zones in the channels deleted. The Coast Guard established Regulated Navigation Areas for San Francisco Bay and the ship channels of Oakland Harbor, Richmond Harbor/South Hampton Shoal, Pinole Shoal Channel and the channel under the Southern Pacific Railroad Bridge in the Carquinez Strait.

In April of 1997 the hull size of San Francisco Bay Channel Lighted Horn Buoy 4 (LLNR 5400) was increased by the Coast Guard. Additionally, six buoys in Oakland Outer Harbor were renumbered to provide a continuous numbering system and were relocated to mark the edge of the channel (three of the buoys were previously positioned 100 feet outside the channel to facilitate dredging operations).

San Pablo light 7 and 9 (LLNR 5900 and 5910, respectively) were knocked down in February of 1998 and were replaced by lighted buoys. The aids in this portion of the channel have a long history of sustaining damage by transiting vessels due to the challenging currents presented by this narrow channel. The Coast Guard Eleventh District Aids to Navigation Branch met with waterways users to determine a more efficient way to mark the channel; consequently, an aid request will be submitted to establish a visual range in San Pablo Channel for the leg between Aids 7 and 12.

Major hazards to navigation in the Bay as previously described in the plan are bridges and rocks, both above and below the water. There are twelve racons on bridges in the Bay Region. This is of major importance because racons are invaluable for precise radar navigation particularly in fog which is common to the Bay. Racons appear on radar screens as large coded signals extending in an arc behind the racon position. When placed on the center span of bridges, the mariner can align the ship directly under the center of the span, even in limited visibility. The Harbor Safety Committee emphasized the importance of racons on bridges (See Chapter IX, Bridges, for recommendations on racons).

Most of the rocks in the Bay are marked by a light. Harding Rock, a submerged rock near a main shipping area off Alcatraz Island, is marked by a lighted buoy and a racon. Harding Rock is the submerged rock nearest the deep draft shipping lane to the west of Alcatraz Island. Arch and Shag Rocks, which are submerged near Harding Rock, are unmarked. The Coast Guard determined it was not necessary to mark these rocks as they are well outside the shipping channel. In 1987 a container ship sustained extensive damage to its hull by passing over Arch Rock. In September 1996, the Coast Guard established San Francisco Bay North Channel Lighted Buoy 1 in position 37–49.9N, 122-24.5W to mark the shoal east of Alcatraz Island for deep draft vessel traffic. (Reference Local Notice to Mariners #38/96.)

As a result of the tragic accident on Big Bayou Canot in the southern United States, where a barge caused a railroad bridge to collapse, the Federal Department of Transportation directed the Coast Guard to inspect bridge navigation lights and fendering systems on all bridges that commercial vessels can reach. In the San Francisco Bay/Delta, 106 bridges were inspected. Almost two-thirds had some discrepancy, primarily minor navigation light outages. Almost all discrepancies have been corrected.

IV. ANCHORAGES

Because of the extent of the Bay, a number of federally designated anchorages have been established in the San Francisco, San Pablo, and Suisun Bays and the San Joaquin and Sacramento Rivers. The *Coast Pilot,* 31st Edition, 1997, lists the area's anchorages and limitations.

Within the Anchorage 9 area, where lightering of tankers and bunkering of vessels occurs, few marine casualties and near-misses have been reported. Most incidents involved mechanical failure, and groundings.

Because of the number of active military bases that were situated around the Bay, the Coast Guard established several explosive anchorages, primarily within Anchorages 5 and 9 (see Map 1). Explosive Anchorage 14, within General Anchorage 9, was realigned in 1997 to provide deeper water for vessels with drafts of 38 feet or greater, laden with explosives, to safely anchor. This also minimized potential overcrowding of vessels anchored within General Anchorage 9. 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.

Recommendation

IV.1. Adopt pre-designated anchorage areas within the existing general anchorages throughout the VTS–SF area 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.

> **STATUS.** Anchorage No. 9 has been divided in two areas: the western side has been designated for deep draft vessels and the eastern side for lighter draft vessels. In addition, current instructions require that vessels not anchor closer than 750 yards from one another. In response to users' requests, VTS–San Francisco issued revised instructions to increase the distance between vessels at anchor to about 1,000 yards as general practice, but in no case less than 750 yards. This safe distance would also be maintained by vessels transiting through, or close by, anchorage No. 9.
>
> No further action is necessary.

V. HARBOR DEPTHS, 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 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.

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.

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. 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.

Surveys. Specific areas with high interest levels are surveyed on a frequent basis. 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 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 Coastal 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.

Recommendations

V.1. Operators Surveys. 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.

STATUS. No further action is necessary.

V.2. Surveys. 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 two feet from NOAA charts. Such areas would include shoaling areas east of Alcatraz and west of the Oakland Harbor. The Committee urges that NOAA permanently assign a field survey schedule of areas identified by pilots as subject to shoaling.

V.3. Charts. 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.

STATUS OF SURVEYS AND CHARTS. Charts 18645, 18649,18650, 18653, 18654 , 18655 and 18657 have beendesignated for priority maintenance by NOAA in 1997 (Figure 1). These charts were placed on an accelerated updating and publication schedule (every 6 to 12 months) at that time. See Figure 1 for a schedule of the updated editions.

SAN FRANCISCO BAY NOAA NAUTICAL CHARTS

FIGURE 1.

	CHART NUMBER	CHART EDITION	CHART DATE	DATE NEXT EDITION	CHART SCALE	CHART TITLE
1	18640	23	22-Mar-97	***	1:207,840	San Francisco to Point Arena
2	18645	23	26-Apr-97	***	1:100,000	Gulf of the Farallones
3	18649	59	26-Apr-97	1-Dec-99	1:40,000	Entrance to San Francisco Bay
4	18650	47	5-Apr-97	1-Jun-00	1:20,000	S.F. Bay: Candlestick Pt. to Angel Island
5	18651	40	29-Jul-95	***	1:40,000	S.F. Bay: Southern Part
6	18652	29	16-Aug-97	1-Apr-00	1:80,000	Small Craft Chart: S.F. Bay to Antioch
7	18653	8	17-Jul-99	***	1:20,000	S.F. Bay: Angel Island to Pt. San Pedro
8	18654	39	28-Sep-96	1-Nov-99	1:40,000	San Pablo Bay
9	18655	55	26-Oct-96	1-Jul-00	1:10,000	Mare Island Strait
10	18656	50	8-Aug-92	***	1:40,000	Suisun Bay
11	18657	17	3-Jul-99	***	1:10,000	Carquinez Strait
12	18658	29	13-Mar-99	***	1:10,000	Suisun Bay: Roe Island and Vicinity
13	18659	12	3-Feb-96	1-Oct-99	1:10,000	Suisun Bay: Mallard Island to Antioch
14	18660	1	25-Sept-99	***	1:40,000	San Joaquin River, Antioch to Medford I
15	18661	24	17-Jan-98	1-Oct-99	1:40,000	Sacramento and San Joaquin Rivers
16	18662	18	23-May-92	1-Nov-99	1:40,000	Sacramento River
17	18663	3	25-Jul-92	1-Oct-99	1:20,000	Stockton Deep Water Channel
18	18664	11	4-Jul-92	1-Apr-00	1:20,000	Sacramento to Colusa
19	18680	28	5-Jul-97	1-Jun-00	1:210,668	Point sur to San Francisco

*** Not in the FY2000 chart plan. The FY2000 chart production plan calls for printing 222 new editions.

NOAA's Office of Coast Survey (CS) has designed this chart maintenance plan to provide support for the nation's largest commercial ports and trade routes. Selection of these ports and routes is based upon the tonnage and value of goods moving through them. NOAA's increased budget will permit the compilation, printing and distribution of 360 new editions in Fiscal Year 1998 and 360 new editions in Fiscal Year 1999. Annual production of 400 new editions is necessary to maintain NOAA's entire national suite of nautical charts in a state of currency. Under previous manual chart compilation methods, a typical chart was compiled in about 30 weeks. Automation has reduced this time requirement to around 8 weeks per chart.

Raster Chart Products: NOAA has been active in developing electronic charts products. NOAA's entire suite of 1,000 nautical charts are available in raster format from nautical chart agents. Over 1.2 million electronic charts have been sold since their release in 1996. There are 75 software developers that have produced 25 different navigational software applications utilizing these raster chart images.

Print-on-Demand Charts (POD): POD charts are just around the corner pending the establishment of regional printing locations for the first phase of the project. The POD allows CS to update charts immediately and electronically transmit the updated information to users. A means to update raster charts by the user is still in the works. The user will be able to download *Notice to Mariner* corrections and other chart corrections from the internet website or bulletin board that can be merrged with the existing file (on CD-ROM or other media) using a "rasterr-differencing" application that in essence performs a piel-by-pixel comparison between the xisting chart and corrections to produce an updated chart version. Beta testing of this experimental process is still in progress.

Vector-Based Charts: NOAA is building a data base to produce an accurate and detailed vector electronic navigational chart (ENC) for major U.S. ports and shipping lanes. The vector charts will include "active" information on navigationally significant features such as aids to navigation, bridges, anchorages, obstructions, wrecks, rocks, cables, tarffic separation schemes, pipelines, platforms, cautionary and dredged arreas. NOAA has created a prototype vectorr-based chart for the area of Sault Ste. Marie, in the Great Lakes and is working on the areas of the Mississippi River.

CS plans to complete the data collection process for majorr U.S. ports and shipping lanes by the end of 1998. Plans are still in the works for producing several ENC's in San FranciscoBay.

Hydrographic Surveys: NOAA began contract hydrographic surveys in the Bay in Aprill 1999. The areas to be surveyed include three areas in Carquinez Strait, the south bay--Anchorage 9 and a re-survey of the areas shoaling northeast of Alcatraz Island. Survey priorities are typically identified through the HSC Navigation Work Group.

Section V continued on next page ⇒

V.4. Underwater Rocks. 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.

The Harbor Safety Committee requests the U.S. Army Corps of Engineers to:

- further refine the Initial Cost Estimates for the Removal of Harding, Arch, Shag, and Blossom Rocks, an Unnamed Rock and Alcatraz Shoal;
- re-examine East Alcatraz Shoal;
- evaluate the forty-foot shoal south of the Bay Bridge; and
- survey the position of two charted wrecks one located near Blossom Rock and the other near the Bay Bridge.

In order to provide funds to match federal funds for lowering the rocks off Alcatraz Island, the Harbor Safety Committee supports a state appropriation as the local match as this project would reduce the risk of oil spills in the Bay which is of substantial benefit to the general public and to the environment.

STATUS. In 1992, the Harbor Safety Committee recommended that the submerged rocks off Alcatraz Island should be lowered to a minimum of 55 feet MLLW to reduce the risk of a major oil spill from tankers. At the request of the Committee and the Coast Guard, the U.S. Army Corps of Engineers undertook an initial study of the feasibility of lowering the rocks. The report, entitled *Rock Removal Interim Report, Initial Appraisal, April, 1994* analyzed the economic feasibility, the operational considerations, and the probable environmental impacts which might result from the lowering of the rocks to -55 feet MLLW. The Corps report focused on the lowering of Harding, Shag, Arch, and Blossom Rocks, an unnamed rock west of Arch Rock and a portion of Alcatraz Shoal, which were identified as major hazards to navigation, especially to deep draft oil tankers. Approximately 20% of the inbound tankers have drafts in excess of 38 feet. Harding, Arch, and Shag Rocks rise to within approximately 35 feet of the surface of the water. However, the Harbor Safety Committee decided to pursue the matter further because the rocks are dangerously close to the narrow routes traveled by the deepest draft tankers and ships (See Appendices for the location and isometric profile of the rocks). If a loader tanker became disabled close to the underwater rocks, a tug escort may be ineffective in keeping the vessel off the rocks.

An Underwater Rocks Work Group was appointed by the chair of the Harbor Safety Committee consisting of representatives of the Coast Guard Marine Safety Office, San Francisco Bar Pilots, Vessel Traffic Service (VTS), tanker companies, dry cargo operators, U.S. Army Corps of Engineers, and the San Francisco Bay Conservation and Development Commission (BCDC). The group's goal is to identify navigational safety and environmental issues, refined costs, construction alternatives, funding sources and

possibly recommending a prioritized list of lowering the rocks according to risk and benefit.

- **Navigation Safety Issues.** Commander Dennis Sobeck, VTS and Captain James Shanower, San Francisco Bar Pilot prepared a report entitled *San Francisco Central Bay Rock Removal Navigation Safety Issues, April, 1996* which outlines the potential navigational benefits of lowering each rock with the pros and cons of alternate scenarios. Five alternatives were presented and discussed. (See Appendix H for a summary of the alternatives.) The San Francisco Bar Pilots and SeaRiver Maritime polled their members as to which alternative would best enhance navigational safety. Alternatives 3 and 5 appeared to offer the greatest benefits in reducing the risk of vessel accidents.

  The Underwater Rocks Subcommittee did not make a recommendation as to which alternative would best enhance navigational safety. Upon the recommendation of the subcommittee, the Harbor Safety Committee requested the Corps of Engineers refine previous cost estimates of lowering the rocks by evaluating various engineering scenarios, obtaining better information about the material composition of the rocks and shoals, evaluating removal of rock fragments versus leaving the material in the Bay as habitat, and re-assessing the Corps policy to consider the risk of an oil spill when determining the benefit of a project. When a Corps reconnaissance study is completed, the subcommittee intends to make a recommendation on a preferred alternative for rock removal.

- **Construction Alternatives.** Several alternative methods of lowering the rocks were discussed, some of which may be more environmentally sensitive than others. A powerful marine excavator, described as an ‘underwater back hoe,’ could possibly be used. Drilling into hard rock is another potential as well as using explosives which could be placed at various intervals, possibly in small grid patterns. The type of construction method will depend in part upon the relative hardness of the rocks which are described as sandstone. Additional information on the composition of the rocks must be gathered by the Corps in order to decide how the rocks might be lowered.

- **Environmental Issues.** The Subcommittee on Underwater Rocks invited representatives of federal and state environmental agencies to identify environmental issues that might be raised by lowering the Alcatraz rocks. Biologists from the State Department of Fish and Game, National Marine Fisheries, the Golden Gate National Recreation Area, and the San Francisco Bay Conservation and Development Commission expressed their view points at a subcommittee meeting. The following concerns were identified:
  - the rocks are a popular fishing spot for sports fishermen;
  - the fish serve as food for extensive bird colonies on Alcatraz Island;
  - the potential risk of a spill should be examined in relation to the short and long term environmental impacts of lowering the rocks and the effects of an oil spill;

- fish migration in the Central Bay must be taken into consideration.

Should the project be considered in the future, an extensive Environmental Impact Study (EIS) must be prepared, examining these concerns.

In addition, the subcommittee noted that permits would be needed from most of the following agencies: U.S. Army Corps of Engineers; San Francisco Bay Conservation and Development Commission (BCDC); State Department of Fish and Game; and Regional Water Quality Control Board.

v **Funding Sources.** In October 1996, an oil spill occurred in central San Francisco Bay from a ship in drydock at Pier 70, San Francisco, Over 8,000 gallons of oil spilled and spread by a winter storm, fouled marinas, piers, and beaches mainly along the San Francisco waterfront. The spill killed or injured scores of water birds in the Central Bay. Known as the Cape Mohican Spill, clean-up over a two-month period cost $10 million — for a relatively minor amount of oil on the water.

The spill, visible to many thousands of people around the Bay and widely publicized in the media, lead to renewed public interest in preventing vessel accidents that might cause oil spills in the Bay. The hazardous underwater rocks off Alcatraz Island were compared to the rocks in Prince William Sound which ruptured the tanker, Exxon Valdez, with well known, catastrophic results to the environment. As a result of this focus, in late February 1997, Congressman George Miller from Contra Costa County proposed federal legislation to lower the rocks to 55 feet below the low tide mark. Miller's legislation, called the San Francisco Bay Shipping and Fisheries Enhancement Act, or Bay SAFE, is based on initial studies by the U.S. Army Corps of Engineers, the U.S. Coast Guard, and on the Underwater Rocks subcommittee report on Navigation Safety Issues.

The bill (HR 882) authorizes 100% federal funding for a Corps of Engineers $100,000 reconnaissance study of the rocks; a $2 to $3 million feasibility and engineering study which is dependent upon local matching funds of at least 25% of the study; and $28 million for construction and mitigation which is also dependent upon local matching funds of 25%. The 'local' match could be local and/or state funds. Federal funds have not been allocated for the feasibility and engineering study or construction and mitigation.

Congressman Miller's office requested that the work group help identify potential sources of local matching funds for the project. The work group discussed what group or groups might benefit from lowering the rocks off Alcatraz. It was estimated by the Captain of the Port that a sizable spill at this location would result in closure of the Central Bay to all vessels for five to seven days. Vessels that would be impacted include tankers and cargo vessels, passenger ships, ferry boats, tourist boats, fishermen, recreational boaters and boardsailors, and government vessels. Potential on-shore impacts would be adverse environmental damage to marshes, water birds, marine mammals and

fish; cost of clean-up of beaches, marinas, piers and rip-rap; possible closure of refineries; and loss of tourist business. After discussing these potential impacts, the work group concluded that lowering the rocks is of benefit to the public as a whole and not to any single group or groups. Since the impacts would be wide spread, the work group recommended that the Harbor Safety Committee support a state appropriation as the local match since this project would reduce the risk of oil spills in the Bay which is of substantial benefit to the general public and to the environment.

- **Army Corps of Engineers Reconnaissance Study.** In 1998, Geoff Chatfield, project Manager for the Corps of Engineers, reported that the Corps is beginning their six- to twelve-month Reconnaissance Study of the Alcatraz Rocks. By the end of summer, 1998, the Corps intends to produce a fact sheet which will outline the potential benefits of the project and whether it is in the federal interest to lower the rocks. The Corps agreed that the Underwater Rocks subcommittee will review the fact sheet before it is finalized.

  At this time the Corps will update, but not refine, cost estimates for lowering the rocks. The subcommittee requested that the Corps provide much better cost estimates as part of its study to have a better idea of the construction method for lowering the rocks in order to help determine the best navigational alternative. The Corps will identify the environmental issues raised by the project, but will not undertake any field studies at this time. Until this time Corps of Engineers guidelines could not allow for consideration of reducing the risk of accidents, even a catastrophic oil spill, to be a benefit-to-cost analysis. The change in policy to consider 'risk and uncertainty' could allow a project such as this to qualify for Corps funding, which is critical because of the high price tag of this project.

Recommendation

V.5. Dredge Dog Leg at Buoy "C". 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.

STATUS. In 1993, the Harbor Safety Committee deleted the recommendation to dredge the dog leg at buoy "C" of the San Rafael main ship channel, but retained the statement that: "This recommendation, along with all others in this Plan, should be the subject of a complete environmental analysis and examination of alternatives before implementation."

The Coast Guard has eliminated traffic lanes. Re-analysis of this recommendation indicates there is no substantial danger to vessels in retaining the dog leg configuration. Pilots must make passing arrangements in order to use the deep-draft portion of the

channel. The Corps of Engineers concluded that the bend serves to direct vessels away from the Tiburon Peninsula, reducing the danger of grounding and increasing the maneuvering room for multiple vessel movements.

VI. 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, major projects to deepen the Baldwin Ship Channel and various ports have taken place to accommodate the modern deep draft vessels. 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, a new Carquinez Bridge, and a new parallel Bay Bridge span is proposed. 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.

Recommendations

VI.1. Contingency Routing. 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.

STATUS. In order to reduce chances of accidents and catastrophes occurring during construction of harbor, dredging and waterway modification projects, the long standing permitting procedures of the San Francisco Bay Conservation and Development Commission, the U.S. Army Corps of Engineers, the U.S. Environmental Protection Agency, and the San Francisco Bay Regional Water Quality Control Board should be specifically referenced as mandates. Contractors should be responsible for informing the U.S. Coast Guard in advance of their planned and actual construction so that the Coast Guard may advise and establish Safety Zones and/or provide cautionary notices and/or rerouting orders to mariners. A Safety Zone is a directive concerning a water area, a shoreline area, or a combination thereof to limit access to authorized vessels. The Captain of the Port is authorized to establish temporary safety zones. Planning for alternate contingency routing during a construction project is not the responsibility of the Harbor Safety Committee.

Project planning and engineering are underway for seismic retrofitting of various major bridges in San Francisco Bay. Consistent with this recommendation, close coordination has occurred between the Coast Guard, Caltrans, project contractors, the San Francisco Bar Pilots, and representatives of the Harbor Safety Committee to ensure safety of navigation.

Seismic retrofit work is occurring, or will soon occur, at almost all major highway bridges. The activities will affect mariners on a daily basis for several years. The Coast Guard, with input from the Harbor Safety Committee, has worked with the bridge owners and contractors to develop guidelines for construction activity at those bridges. The Coast Guard Marine Safety Office will review the plans for mooring construction equipment at bridge sites to insure a safe path for navigation. The Coast Guard Vessel Traffic Service will be in communication with contractors so they can pass information about the location of construction equipment or other restrictions on vessel movements. The Coast Guard Bridge Section will provide information about construction activities in the Local Notice to mariners, and is exploring other ways to provide the information to mariners as expeditiously as possible. Some of the more notable seismic projects are as follows:

- The San Francisco–Oakland Bay Bridge will have seismic retrofit work at the piers west of Yerba Buena Island, and that work will involve tugs and barges and their mooring systems which will have an impact on navigation. The interim work east of the island will have only a minor effect on navigation, but the entire eastern part of the bridge is slated for replacement within the next seven years, which will be a major undertaking.

- The San Mateo–Hayward Bridge retrofit has begun, but work in the main channel will be minimal. Marine construction equipment is moored in charted anchorages east of the Federal Navigation Channel, north of the San Mateo–Hayward Bridge.

- The Richmond–San Rafael Bridge will have seismic retrofit work at piers 34 and 35, 47, and 48. Substantial horizontal clearance reductions are likely from marine construction equipment in the main and secondary navigation channels, as well as the side channels commencing in summer or fall, 1999.

- The Carquinez Bridge will have seismic retrofit work at the piers. This work would also reduce horizontal clearances in the north channel (used by large commercial vessels due to slightly increased vertical clearances) and south channel. Much of the in-water work is expected to commence December 1, 1998, through March 31, 1999, due to constraints on endangered species habitats. Other out-of-water work employing marine construction equipment, however, is expected in following seasons.

- The Benicia–Martinez Highway Bridge will have seismic retrofit work at the piers. Time frames are similar to those addressed for the Carquinez Bridge.

- The Rio Vista Bridge will have seismic retrofit work at the piers. This effort will commence during the summer of 1998. There will be eight 4-hour closures of the lift span required during this period but the exact dates are as yet unknown.

- The Golden Gate Bridge retrofit will not involve any impacts on navigation.

Three new major bridges are in the process of obtaining Coast Guard permits. As they reach construction phase in the coming years, they will have an impact on navigation and will require careful coordination between the bridge owners, the contractors, the Coast Guard, and the Harbor Safety Committee.

The new Carquinez Bridge will be a suspension bridge providing clearances similar to the existing bridges, and the 1926 southbound bridge will be removed.

VI.2. Construction Changes in Bridge Clearances. OSPR should request Caltrans, railroads, and various counties owning bridges for advance notice of work which would temporarily or permanently reduce bridge clearances. Advance notice should be provided as far in advance as possible through the Local Notice to mariners to assure that vessels are alerted to these hazards.

STATUS. OSPR and the Coast Guard continue to encourage Caltrans, railroads, and various counties owning bridges to provide advance notice to the Eleventh Coast Guard District Bridge Section about any work which would temporarily or permanently reduce bridge clearances (e.g., using scaffolds, work barges, pile drivers, etc.). Owners should immediately call the Coast Guard Bridge Section at (510) 437-3514 during normal business hours (or the Marine Safety Office San Francisco Bay at (510) 437-3073 at all other times), for any incidents involving vessel–bridge allisions, drawbridge operating malfunctions, unplanned clearance alterations, bridge navigation light outages, or other hazards to navigation. Broadcast Notices to Mariners will be issued immediately, and are normally broadcast three times a day. In addition, for non-emergent changes the Coast Guard expects bridge owners to submit information at least two weeks in advance for the Local Notices to Mariners to assure that mariners are alerted to clearance reductions or other events that could impact navigation.

On major bridges, painting, and other maintenance activities may be almost continuous. Typically, scaffolds in use at most major bridges encroach about 8 feet into the navigation opening, but only occupy about 10 feet of horizontal space in that opening. Vessel masters desiring full clearance may request that the scaffolding be moved next to the pier for the vessel transit. Such scaffold movements require 30 minutes advance notice to accomplish. Scaffolds must display flashing red lights if left in the navigation opening during periods of darkness. Work barges must show the lights required by the Navigation Rules and any special requirements established by the Coast Guard.

VII. VESSEL TRAFFIC PATTERNS

Ship Traffic.

A wide variety of commercial, military, and government 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. 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. The primary type of military vessels are ammunition ships, occasionally surface combatants, naval auxiliaries such as oil tankers, supply ships, and submarines make calls in this harbor. Government vessels include Coast Guard and N.O.A.A. ships.

The precise amount of oil shipped annually into and within the Bay is difficult to determine. 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. In comparison, Los Angeles/Long Beach Harbor 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.

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. Lightering operations take place monthly at Anchorage 9, primarily by SeaRiver Maritime. Companies such as SeaRiver Maritime 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.

For calendar year 1997 the Marine Exchange reported a total of 2,897 vessel arrivals in the Bay, which represented a 6% decrease from the prior year. The total number of tanker arrivals also continued to decline. Seven hundred nineteen (719) tankers arrived in the Bay in 1997, representing a 7% decline from the previous year. (See Appendices for a summary of vessel traffic totals for 1997 and a list of all tanker arrivals as provided by the Clearing House.) The number of inter-Bay shifts of tankers also declined from the prior year by 11%.

Military and government vessel movements are not tracked by the Marine Exchange, but are tracked by the U.S. Coast Guard Vessel Traffic Service (VTS). Note: a direct comparison cannot be made between the vessel traffic figures reported by the Marine Exchange and VTS because the Marine Exchange figure is for total commercial vessel arrivals, while the VTS total for government vessels includes arrivals, inter-Bay movements, and departures. VTS reported a total of 2,561 governmental vessel movements for 1997 which was a 10% decrease from the prior year. This reflects the closure of the majority of military bases in the Bay Area.

History and Types of All Accidents and Near Accidents.

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.

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. Possible near-accidents may not be reported outside VTS boundaries as well as accident occurrences within the VTS area. 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. (See Appendices for current VTS Incident Report Summary.)

Analysis and Actions Taken to Alleviate Re-occurrences

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.

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 in a separate chapter.

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:

> "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 re-occurrence 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 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 re-occurrences 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.

Recommendation

VII.1. Coast Guard/VTS Accident and Near Accident Reporting System. 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. The committee adopted a definition of a reportable 'Near Miss' situation to standardize reporting along the California Coast.

STATUS. In 1992 the Harbor Safety Committee recommended that the Coast Guard and VTS devise a more consistent system of reporting accidents and near accidents, standardized with other areas and analyze the statistics on an annual basis with recommendations for improvements. This recommendation has been essentially accomplished for San Francisco Bay.

As part of this effort, the Harbor Safety Committee worked for adoption of a statewide definition of 'near-miss.' The following definition was adopted by the five California Harbor Safety Committees:

> "A reportable 'Near Miss Situation' is an incident in which a pilot, master, or other person in charge of navigating a vessel, successfully takes action of a non-routine nature to avoid a collision with another vessel, structure, or aid to navigation, or grounding of the vessel, or damage to the environment."

The Committee also participated in establishing a system for voluntary reports of 'near miss' situations to the Coast Guard in order to prevent vessel accidents. A voluntary reporting form was adopted and included in the Vessel Traffic Service San Francisco, June, 1995, User's Manual. In addition the Captain of the Port included the report form in the Marine Safety Office newsletter and the San Francisco Bar Pilots Association made the report form available to its members.

However, due to the Freedom of Information Act (FOIA), the Coast Guard determined that anonymity could not be provided to persons making reports. Subsequently, in 1996 no written reports of 'near misses' were received by the Coast Guard Marine Safety Office or by VTS.

The 3 near misses reported in 1997 are a substantial reduction from 19 reported in 1996. Unfortunately the MSO was unable to obtain enough information to process a civil penalty case on any of these three incidents. Several civil penalty cases from near misses in 1996 were closed with payment made by the offending party during 1997. The education program on Rule 9 of the Rules of the road seems to be working. The MSO will continue its educational efforts.

Progress has been slow in standardizing marine accident reports with other areas because of the problems of guaranteeing anonymity for someone making a voluntary report and protecting against legal liability or penalties. The issue of how to establish a system for voluntary reports of near misses continues to be explored elsewhere, both on the West Coast through the SMART Forum in Washington State and nationally by the Coast Guard.

VIII. COMMUNICATION

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: Captains have the best knowledge of their vessel characteristics, and 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) 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."*

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

CHANNEL	USE
SAN FRANCISCO BAY COMMON FREQUENCY USAGE	
06	Intership safety. Also often used for non-distress traffic between USCG and other vessels.
10	San Francisco Bar Pilots Pilot Boats Agents San Francisco Marine Exchange
12	Vessel Traffic System San Francisco off-shore traffic. Used between outer limit of Offshore Precautionary Area and VTS outer limit (38 nautical mile radius from Mt. Tamalpais)
13	Bridge to bridge navigation
14	Vessel Traffic System San Francisco in-shore traffic. Use from outer limit of Offshore Precautionary Area, throughout San Francisco Bay, up to Stockton and Sacramento.
16	Hailing/distress/safety
21A	U.S. Coast Guard reserved working frequency between USCG units only
22	Notice to Mariners
23A	U.S. Coast Guard reserved working frequency for communications between USCG units and other vessels
7A, 11, 18A, 19A	Common tug working frequencies
79A, 80A, 88A	Commonly used by fishing vessels
7A, 8, 9, 11, 18A, 19A	Port Operations — Commercial intership and ship to shore working channels. Commercial vessel business and operational needs.
9, 68, 69, 71, 72, 78A	Port Operations — Non-commercial; supplies repairs, berthing, yacht harbors/marinas.

CHANNEL	USE
TUG COMPANY CHANNELS	
7A	Chevron Shipping
9	Westar Marine Services
10	Crowley Maritime SeaRiver Maritime
18A	American Navigation Bay & Delta Towing Brusco Tug & Barge Oscar Niemeth Towing Sacramento Tugboat Company Sanders Towboat Seaway Towing Company Tweed Towing
MARINE OPERATORS	
26, 84, 87	San Francisco
27, 28, 86	Sacramento, Stockton, Delta
VESSEL TRAFFIC SERVICE RADIO COVERAGE	
Present coverage of the Bay Area by VHF–FM radio is considered adequate for communicating with VTS.	

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 and has an emergency generator in the event of a commercial power outage. The second site is located at Point Bonita in the Marin Headlands area. This site is remotely controlled at the Vessel Traffic Center via a Spread Spectrum T1 microwave circuit between Point Bonita and Yerba Buena Island. This site has an emergency generator in the event of a commercial power outage. The other two remote sites are located at Mount Tamalpais in Marin County and Bay Point near Concord. Currently, both of these sites are remotely controlled at the Vessel Traffic Center via the Bay Area Communications System (BACS) analog microwave network. This site has an emergency generator maintained by the Army Corps of Engineers in the event of a commercial power outage. Since the Bay Point site has no commercial electric power, it obtains power from a Solar

power system and a Wind-powered generator which charge the existing batteries at the site. In the event the batteries lose their charge, the Vessel Traffic Center notifies a Murietta Circuits electronics technician who will respond to the outage and provide power via a portable generator. The following are more detailed descriptions of the type of equipment provided at these sites:

1) Each of the above sites has two 50-watt Intech VHF–FM transceivers and two Intech VHF–FM guard receivers. These are remotely controlled by VTS operators using a touch pad in the Traffic Center.

2) The Yerba Buena Island, Point Bonita, and Mount Tamalpais sites have diesel fueled automatic starting emergency generators. Both Yerba Buena Island and Point Bonita emergency generators have an output of 50 kilowatts and are maintained by the Coast Guard. The Mount Tamalpais site has a 130-kilowatt emergency generator and is maintained by the Army Corps of engineers.

3) Motorola MCX-1000 25-watt VHF–FM transceiver is installed at Yerba Buena Island and is available for usage.

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

All pilot boats have GPS. The **Pittsburg** has a GPS receiver. The **Drake** has a DGPS receiver. The **California**, **San Francisco**, and **Golden Gate** have LEICA GPS Navigators.

The **California**, **San Francisco**, **Drake**, and **Golden Gate** have PC-based electronic chart systems with nobeltek software and rastor charts.

The **California**, **San Francisco**, and **Golden Gate** have AIS equipment (auto identification system) and wireless Ricochet modem technology.

C. **San Francisco Marine Exchange.** The Exchange is 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) Standard transceiver with local antenna monitoring Channels 13/14/18a.

Recommendations

VIII.1. VTS Channel. Due to increasing congestion on Channel 13, the USCG is proposing to shift the primary VTS channel to Channel 14. The Harbor Safety Committee endorses the Coast Guard's efforts to improve the existing system.

> **STATUS.** The VTS operating channel was changed to Channel 14 VHF–FM on August 15, 1994. The decision to change to Channel 14 was based on recommendations made by the Quality Action Team (QAT), consisting of persons from various maritime organizations within the San Francisco Bay Area. The change has significantly reduced the amount of radio traffic on Channel 13. No further action is necessary.

VIII.2. Back-up Power Systems. 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.

> **STATUS.** The San Francisco Bar Pilots have backup power generators on their pilot boats which can serve as an auxiliary power source in case of power outage at the communications headquarters on the dock and an emergency generator onsite with back-up capabilities to run the entire pilot station operation.
>
> The San Francisco Marine Exchange, a non-profit agency which serves as the Clearing House for tug escorting of regulated tankers and barges, purchased and installed a backup generator for its communications system, as recommended by the Harbor Safety Committee. Public and private funding sources to maintain and expand the communications system, including backup power, will be further explored by the Marine Exchange. No further action is necessary.

IX. BRIDGES

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 the Ports of Stockton and Sacramento.

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. The bascule (a counter-weighted drawbridge) for 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 NUMBER
Martinez–Southern Pacific RR	13	(510) 228-5943
Rio Vista	9, 13, 16	(707) 374-2134

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.

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 Bay/Delta area now has twelve racons on bridges, which represents the majority of racons placed on bridges in the United States. The racons are justified because the harbor has the highest number of foggy days in the nation where visibility is less than one-half mile together with a high volume of vessel traffic transiting under the bridges.

A racon is a radar sensor that send out a distinctive radar emission that shows up as a distinctive mark on ship's radar scope. Racons are on the following bridges:

Benicia–Martinez (1)
SF–Oakland Bay Bridge (3)
Richmond–San Rafael Bridge (2)
San Mateo–Hayward Bridge (1)
Antioch Bridge (1)
Rio Vista Bridge (1)
Golden Gate Bridge (1)

To complete the system of racons on Bay/Delta bridges, the Rio Vista Bridge Racon was installed and tested on February 24, 1998 and is now in service. The Racon displays the Morse character "T". Now that racons have been installed on the major bridges, the Coast Guard is considering eliminating or reducing the range of fog signals at bridges. The Coast Guard believes the fog signals are used now primarily by recreational boaters and the few commercial vessels that do not have radar (e.g., small commercial fishing boats), and is soliciting mariner comments through May 15, 1998.

Bridge Clearances

(See Appendices for most recent list of bridge clearances.)

Union Pacific Railroad Bridge

To improve navigational safety for all vessels sailing through the relatively narrow opening of the Railroad Bridge at Benicia, the Coast Guard has completed a number of initiatives:

1. Established a Regulated Navigation Area at the bridge which prohibits deepdraft transits when visibility is less than one-half mile (with some exceptions).

2. Will install four white lights on the main channel piers to better identify the primary navigation channel. The white pier lights recommended for installation on the main channel piers have provided better visibility in foggy conditions and have been made permanent.

3. Asked the railroad to change the working frequency of the bridge radiotelephone to VHF–FM Channel 14, to again be consistent with the VTS working frequency. The railroad has agreed and has applied for a change to its FCC license.

4. Investigated some recent bridge malfunctions and are discussing/evaluating some UPRR repair plans to improve bridge reliability.

5. Had Caltrans make modifications to the racon on the adjacent highway bridge which has improved the signal to downbound vessels.

6. Are investigating the obstructive character of the bridge under the Truman–Hubbs Act of 1940. If increasing bridge clearances will provide benefits to navigation greater than the costs of modifying the bridge, the Coast Guard will recommend the bridge be altered.

Some recommended bridge improvement items remain to be completed by the new bridge owner, Union Pacific Railroad (UPRR). UPRR has installed a new auxiliary power system including new generators and transformers, along with a new signal system. Future enhancements in 1998 and 1999 include replacement of the bridge lift motors and installation of a computerized system to monitor train locations and track conditions.

To address problems that had been occurring with the operation of the UPRR bridge, industry, the pilots and Coast Guard continue to interface with the bridge owners. At the request of USS/Posco, the Coast Guard, UPRR, and representatives of the marine industry have formed a working group to address problems at the bridge and develop solutions. The working group will be a standing committee, and in its first meeting several Coast Guard commands, the San Francisco Bar Pilots, the Masters, Mates and Pilots, Port of Stockton, Reserve Fleet Suisun Bay, USS/Posco and others brought their concerns to UPRR. The working group is developing a formal training program for bridge operators and reviewing maintenance accomplishments and future plans. For instance: vessel rides have been offered to UPRR bridge operators for familiarization and training purposes; mariners will provide feedback when potential or near-miss situations occur and endeavor to jointly investigate causes and solutions for such

incidents; and the group is evaluating the system of aids to navigation on the bridge and in the immediate vicinity.

Recommendations

IX.1. Energy-Absorbing Fenders for Bridges. OSPR should request Caltrans and other bridge operators such as the Golden Gate Bridge and Southern Pacific Railroad to install energy-absorbing fendering, instead of wooden or plastic fendering, on all area bridges when replacing damaged fenders and for all new construction.

> **STATUS.** The seismic retrofit of the Richmond–San Rafael Bridge will not include energy-absorbing fenders (like the hydraulic fenders at the Benicia–Martinez Highway Bridge), however the existing fender will be replaced ("in kind") with plastic laminate material which has improved energy absorption. Caltrans will install a similar fendering system on the new Benicia Highway Bridge and on other bridges undergoing seismic modifications. OSPR continues to encourage Caltrans and other bridge owners in the Bay Area to consider energy-absorbing fenders where possible.

IX.2. Bridge Clearance Gauges. Bridge clearance gauges should be installed where needed, particularly drawbridges.

> **STATUS.** Bridge level gauges are already in place at area bridges where needed. It was noted, however, that the bridge level gauges, which are simply numbered wooden boards affixed to a bridge and indicating the clearance between the water and the raised portion of the bridge, are of little use to larger vessels, as the gauges do not become visible before the vessels are committed to making their transit. No further action is necessary.

IX.3. Water Level Gauges. Water level gauges should be installed at approach points to bridges.

> **STATUS.** The PORTS system, currently being installed by NOAA, includes a system of electronic water level gauges located at area bridges, which will indicate the level of the tide at the measured points on a real time basis. No further action is necessary.

IX.4. Golden Gate Bridge Racon. 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.

STATUS. Installation of the racon was completed on April 11, 1995, by the Golden Gate Bridge District. Recreational boaters have indicated that fog signals should be retained in their present configuration as an aid to smaller vessels not equipped with radar. No further action is necessary.

IX.5. Bay Bridge Racons. 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.

STATUS. This has been accomplished. No further action is necessary.

IX.6. Shading Flood Lights on Bridges. Request Caltrans and the Golden Gate Bridge District to shield bridge floodlights to reduce the glare for ships.

STATUS. No further action is necessary. Flood lights were a problem at the Oakland Bay Bridge some years ago in conjunction with the bridge's 50th birthday celebration. This lighting has since been removed. The U.S. Coast Guard Bridge Section received only positive feedback when the Golden Gate Bridge towers were lighted. No additional objections have been noted.

X. 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. 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.

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.

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.

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. The herring fishery is highly competitive because during a short period of time large profits can be realized.

Vessel Traffic Incidents

- **Recreational Boats.** Thousand of recreational boats are concentrated near the major inbound and outbound Bay shipping lanes. While many sailboats and motor boats are on the Bay, particularly on weekends, few near-misses or accidents are reported to the Coast Guard and VTS. A number of reported and unreported 'near-misses' occur which might be prevented by small boats properly yielding the right-of-way to large vessels that cannot change course.

- **Boadsailors.** 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.

- **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.

- **Fishermen.** In 1994 a fatal accident occurred when a fishing vessel collided with an inbound container ship just west of the Golden Gate Bridge. The fishing vessel sank and two lives were lost. 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.

Public Education

Currently, the following boater education programs are available to the boating public in the nine Bay area counties.

	Subjects
U.S. Power Squadrons	Boating Safety Rules of the Road, Basic Rescue (A home video course is available for purchase)
U.S. Coast Guard Auxiliary	Boating Safety Rules of the Road, Basic Rescue
Department of Boating and Waterways	Water Safety/Grades K–12, General

In addition, the U.S. Coast Guard operates a Boating Safety Hotline that dispenses information and reference to local classes.

After reviewing information on licensing of small recreational boat operators, it was agreed that, at this time, emphasis on boater education and enforcement on the waterways would be a more effective approach to deal with unsafe operators rather than instituting the licensing of small boat operators.

Recommendations

X.1. Herring Fishermen. A meeting should be convened by the Harbor Safety Committee with the state OSPR, Fish and 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 and Game mailers to the fishermen informing them of spill prevention concerns, or other actions.

> **STATUS.** OSPR supports continued coordination among federal, state, municipal, and fishing organizations prior to each herring fishing season. No further action is necessary.

X.2. Observation of Sailboat Races. 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 form the competitors' level.

STATUS. In the past the St. Francis Yacht Club invited representatives of the Harbor Safety Committee to observe a sailboat race, but no one attended. No further action is necessary.

X.3. Observation of Boats from a Tanker. Race officials and other interested parties should be invited aboard a large tanker while underway to get the pilots' perspective of racing vessels, if practicable.

STATUS. A tanker operator (SeaRiver Maritime) is willing to permit representatives of the small boat community to observe navigation on a tanker bridge on in-Bay transit. No further action is necessary.

X.4. Annual Racing Schedules. 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.

STATUS. Racing Schedules have been furnished to the Marine Exchange for distribution and will be routinely furnished for future events. No further action is necessary.

X.5. Optional Race Course Information. 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.

STATUS. The Yacht Racing Association has provided and will provide future information to the Marine Exchange regarding optional courses and rounding marks. No further action is necessary.

X.6. Rule 9 Infraction. 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.

STATUS. The Coast Guard reports the following actions were taken. The Coast Guard Auxiliary is prohibited from taking any law enforcement action; it is an educational organization. The Auxiliary conducted 188 Safe Boating Courses in Northern California in 1992 with 1,278 graduates. The Auxiliary changed its Boating Safety Course curriculum to specifically include information on Rule 9, its meaning and the constraints to navigation for larger vessels in the confined shipping channels of the Bay.

With all document renewals the Coast Guard included flyers on Boating Safety Courses and information on obtaining safety pamphlets. The Coast Guard routinely includes information on Rule 9 infractions to applicants for marine parade and regatta permits. Prior to the commencement of a sailboat race, the committee boat must check in with VTS. No further action is necessary.

X.7. Educational Pamphlets. 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.

STATUS. The California Department of Motor Vehicles distributes educational pamphlets in boat registration renewal notices. OSPR has an implementation plan to work with marinas to get their assistance in boater education, such as enclosing educational pamphlets in marine mailings, and requesting marinas to encourage completion of safe boater courses.

No further action is necessary.

X.8. Report Rule 9 Violations. 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.

STATUS. The Eleventh Coast Guard District Commander has encouraged the San Francisco Bar Pilots to report Rule 9 infractions. It is acknowledged there is some difficulty in positively identifying the boat numbers from the bridge of a large vessel.

The Coast Guard Vessel Traffic Service (VTS) includes near miss reporting in the VTS Users' Guide for San Francisco Bay. In 1997, the number of reported Rule 9 incident involving ships and small boats (recreational and fishing vessels) decreased by more than half over the previous year. The reduction in the number of near misses is presumed due to increased awareness of Rule 9 by small boat operators. (See the Appendixes for the list of near miss incidents reports.)

The following is a breakdown of the types of commercial vessels that experienced near misses with small boats in 1997:

3 — Tankers
2 — Container ships
1 — Bulk ship
1 — Tug with tow
1 — Tug without tow

Five incidents occurred involving fishing vessels and three with recreational boats. The number of incidents involving fishing boats increased from 4 in 1996 to 5 in 1997 while recreational boat incidents decreased from 14 to 3. The need for continuing education of small operators is addressed in Recommendation X.12. listed below.

X.9. Publicize Rule 9 Infractions. Make public by publishing punitive actions 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.

STATUS. In 1994, the Office of Oil Spill Prevention and Response (OSPR) initiated an outreach program to coordinate the distribution of boating and waterway safety information to the public. This information is now being distributed by the Department of Motor Vehicles. The educational effort should include the Pacific Inter-Club Yacht Association wording to address Rule 9 infractions in all club race instructions. The Yacht Racing Association should also add a Rule 9 requirement to all their race instructions that the act of interference will result in disqualification.

The Coast Guard has been including information on Rule 9 violation cases in the Marine Safety Office newsletter. This newsletter receives wide distribution among the various groups navigating on the Bay including small boat operators.

X.10. Coast Guard Auxiliary Education Efforts. Encourage the ongoing efforts of the local U.S. Coast Guard Auxiliary and Power Squadron organizations in their boating education and safety effort.

STATUS. A tanker operator (SeaRiver Maritime) is willing to permit members of the Coast Guard Auxiliary to observe navigation of a tanker, from the ship's perspective, during an in-Bay transit. This might help to educate both safe boating course instructors and their students on the hazards of reckless operation of small boats in commercial traffic areas. No further action is necessary.

X.11. Board Sailors. 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.

> **STATUS.** Several years ago a representative of the Harbor Safety Committee met with representatives of the San Francisco Boardsailing Association and the San Francisco Bar Pilots Association to aid in preparing a comprehensive guide to boardsailing in the Bay. A section was included on the hazards of sailing in shipping lanes near large vessels and tugs with barges.
>
> OSPR has an implementation plan to work with the National Park Service to improve the sign at Crissy Field to include more information about the dangers of board sailing in the main shipping lanes by the Golden Gate Bridge.

X.12. Place Additional Emphasis on Recreational Boater Education and Law Enforcement on the Waterways as Follows:

1. OSPR should put additional emphasis on boater education and law enforcement on the waterways. This can be addressed by the Outreach Program, developed in 1994 and coordinated through the State Department of Boating and Waterways.

2. Educational target areas should be identified such as marinas and boat ramps. Boat rental establishments, including personal water craft (jet skis), should also be targeted for an educational thrust, as inexperienced boaters in rental boats are a continuous source of problems.

3. The Coast Guard's "Sea Partners Program," a marine environmental protection outreach initiative, should be utilized, in conjunction with the Coast Guard Auxiliary, to disseminate boater safety materials to recreational boaters in the Bay area.

4. Kayakers should be approached in the same manner as board sailors were previously approached to promote safer navigation in the Bay. Kayakers have become a problem for vessel traffic due to reckless operation by some individuals.

5. The public school system should be encouraged to include Boater Education in the curriculum.

6. Consideration should be given to providing funds dedicated specifically for increased law enforcement on the waterways.

   STATUS. OSPR has drafted an implementation plan to address the recommendations to enhance recreational boater education and to encourage greater enforcement of navigational rules and laws on the waterways.

XI. VESSEL TRAFFIC SERVICE

The Coast Guard established the VTS system in 1972 in San Francisco Bay following a serious collision between two tank vessels that resulted in extreme environmental damage to the Bay. The Coast Guard continues to operate the VTS system and monitors about 250 vessel movements per day. The region is considered a difficult navigation area because of its high-traffic density, frequent episodes of fog, and challenging navigational hazards. In 1996 Congress considered reducing the current level of funding for VTS-San Francisco, Because of these initiatives, the Harbor Safety Committee voted to support continued federal funding to maintain VTS-San Francisco at its current level in order to ensure navigational safety in the Bay.

The U.S. Coast Guard's VTS for the San Francisco area has three components: (1) a position reporting system, (2) traffic routing within the Bay and anchorage monitoring, and (3) 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).

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.

Offshore. Vessels are asked to make radio reports when entering or exiting the offshore VTS reporting area which extends approximately 30 miles from the Golden Gate Bridge. This boundary roughly coincides with VTS's offshore Point Bonita radar-surveillance capability. Inbound vessels are asked to report 15 minutes prior to crossing the offshore boundary and again upon entering the respective Traffic Separation Scheme (TSS). Outbound vessels are asked to report once at the San Francisco Sea Buoy, again at the TSS entrance buoy, and the final report comes at the outer boundary. Radio reports include the name and type of vessel, route, course, speed, position, pilotage arrangements and estimated times of arrival to various geographic locations. The Vessel Traffic Center (VTC) broadcasts a traffic report every 30 minutes: at minutes 15 and 45 of the hour.

Within the Bay. VTS radar surveillance extends from the San Mateo Bridge to the Carquinez Bridge, covering most of the South Bay and all of the Central and San Pablo Bays. Vessels report upon getting underway, docking, mooring, anchoring or departing this area. Amplifying reports are made when passing under certain bridges, when pilots change, when emergencies arise, and when deviating from standard procedures. Ferries operating on a scheduled route report only upon departure.

Within the Bay and beyond radar coverage. VTS lacks radar surveillance for areas south of the San Mateo Bridge and east of the Carquinez Bridge as well as geographical "blind spots." 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 the Carquinez Bridge, Union Pacific Railroad Bridge, Port Chicago, New York Point, and additional points through the Sacramento and Stockton Deep Water Ship Channel. Further, vessels must report when departing the VTS area which includes the Dumbarton Bridge, Petaluma River Channel, and Mare Island Strait.

2. Traffic Routing within San Francisco Bay.

On May 3, 1995, the Coast Guard established seven Regulated Navigation Areas (RNAs) to reduce vessel congestion where maneuvering room is limited. These RNAs apply to the waters of the Central Bay, Oakland Harbor, San Pablo Bay, and the Union Pacific Railroad Bridge. The primary shipping lanes within the Bay call for eastbound vessels to pass south of Alcatraz and westbound vessels north of Alcatraz, with a precautionary area at each end of the Central Bay Traffic Lanes. An example of a vessel movement contrary to the standard routing patterns might include:

> Geography confines deeper draft vessels to use the Deep Water Traffic Lane (DWTL). The RNA's preclude any meeting, passing, or overtaking situation if either vessel is a tank vessel or is carrying hazardous materials. Therefore, if an inbound vessel is committed to the DWTL, an outbound vessel may deviate and pass south of Alcatraz in the absence of conflicting traffic.

3. Communications and Surveillance.

San Francisco's VTC, located at Yerba Buena Island is the main communications center. Radar sites are located at: Point Bonita, Yerba Buena Island, Point San Pablo, and Mare Island. There are three closed-circuit television cameras on Yerba Buena Island, one camera at Mare Island and another at the Ozol Dock in Carquinez Strait. These cameras provide visual surveillance throughout the Central Bay up to the Union Pacific Railroad Bridge. There are four VHF radio/communications sites located throughout the Bay which gives VTS full radio coverage. VTS operates on Channel 14 and monitors Channel 13 for inshore traffic and Channel 12 for offshore traffic, and monitors Channel 13 throughout the VTS area.

Staffing. There are approximately 30 Coast Guard and civilian personnel attached to the VTS. The VTC is staffed with four watchstanders rotating on 8 and 12 hour shifts. This includes one supervisor and three controllers. During busy periods of the day, or whenever the supervisor deems it necessary, one controller handles the Offshore and

Delta regions, while two controllers operate the Central Bay. This requirement is reduced to one controller on watch for the Central Bay at all other times.

4. VTS Training Program Overview.

The VTS Training Program is structured as follows:

Vessel Traffic Control Specialist Qualification Training

TRAINING PHASE	HOURS
VTS Indoctrination and Fundamentals • Mission and philosophy of operation. • Federal and local rules and regulations. • Delegation of authority. • In-depth VTS area geography.	80
Using the Vessel Traffic Service System (extensive off-the-air practice) • Surveillance (traffic management) computer system operation. • Traffic Management concepts and procedures. • Communications procedures.	80
On-the-job training (live, on-the-air) • One-on-one coached proficiency training in the VTS operations center.	300
Qualification assessment watches (live, on-the-air) • Closely supervised but un-coached performance assessment.	48

Supervisory Vessel Traffic Control Specialist (SVTCS) Qualification Training

Only personnel who demonstrate superior performance and leadership as Vessel Traffic Control Specialists are considered for supervisory training.

SVTCS candidates complete a minimum of 40 hours of supervisory on-the-job training.

Qualification renewal (maintenance of qualification)

The qualification renewal process consist of the following:

- Written rules and regulations exam.
- Watch supervisor recommendation.
- Completion of annual vessel ride and visit requirements.
- Re-certification by the Commanding Officer.

A trainee that successfully completes the training program is issued a letter of certification that must be renewed every 12 months.

Recertification. Requirements include:

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

The San Francisco Bar Pilots and the U.S. Coast Guard Vessel Traffic Service San Francisco, as well as other members of the maritime community continue to share professional information in order to foster a teamwork approach to the issue of navigation safety within the San Francisco Bay Area. The following outreach and partnership programs have occurred.

VTS-Pilots Issue Committee. Founded in 1995, the work group comprised of VTS CO, Ops and Training Coordinator along with three members of the San Francisco Bar Pilots, meet approximately every month to discuss how to better serve each other. Both agencies might bring in scenarios or view recorded tapes then discuss the transactions from their respective point of view. For example, VTS recommends a pilot not deviate from the San Francisco RNA by transiting west through the Eastbound Lane. The pilots might not understand why this deviation was not granted. With this interaction, VTS can explain the response from a VTS point of view. That is, several marine events were in the process of starting and the radar display was showing a congregation west of Alcatraz that the pilot could not see. Or on the other hand, the pilot members could state, the pilot requesting the deviation was concerned about an outbound tug with a barge astern. Given the situation, it was safer from the pilot's perspective to go contrary to the traffic pattern. Examples of V-PIC issues resolved in 1997 include: the pilots state the vessel's name upon initial check in, assist tugs call VTS that the vessel is underway, allowing the pilot not to lose concentration during critical maneuvering, and the implementation of the "Pilot on Watch." Every Friday a different pilot spends 3 to 6 hours in the Operations Center learning the new VTS Upgrade capabilities and sharing information with the watchstanders.

Monthly Outreach. VTS hosts a monthly gathering of various entities and agencies held at the VTS to offer our customers a first hand look at the Operations Center. In addition to receiving a formal presentation, people have an opportunity to ask questions, make comments, and share ideas. Although VTS has hosted agency specific gatherings, such as Marine Events, participants and

Caltrans engineers, interesting discussions seem to stem from those presentations having a random selection, such as, masters of ships, tug captains, ferryboat operators, agents, and representatives from various foreign consulates.

Fishing Vessel Safety Group. VTS is an active participant in the FVSG which meets every other month and is comprised of local fishermen groups, state agencies, and Coast Guard members. As a new member to this work group, VTS has provided the fisherman of the bay Area a more accurate description of the type of service provided. The Offshore Sector is a valuable resource for the passive user. Every meeting attended, the VTS representative receives total positive feedback from this community. VTS, using Channel 12 or 16, assisted fisherman make passing arrangements with larger vessels, or prevented a serious casualties offshore by VTS being pro-active in sighting possible collisions.

Tour de Marine Event. San Francisco Bay has more marine events than any other port or city in the United States! Beginning last summer, 1997, VTS started a full-court press on reaching out to the boating public. This has not only been educational for the yachtsman, swimmers, and kayakers, but also for VTS. Working in conjunction with Group San Francisco, several marina leaders have met with VTS personnel on a routine basis to establish a better means of sharing information. Boaters are realizing the resource available to them in the VTS providing changes in the vessel traffic situation.

VTS Shipride Program. All VTS personnel are required to conduct approximately 10 shiprides and shore-side visits every year. This, by far, is the best method of direct, person-to-person, interface and the sharing of suggestions. The requirements cover all areas of the maritime community: piloted ships, tugs, and ferryboats, and, VTS visits to other Coast Guard entities.

Recommendations

XI.1. 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.

STATUS. National VTS regulations enacted this standard in 1993, amended the following year to incorporate standard national vessel management rules applicable to VTSs. No further action is necessary.

b. Mandatory Participation in VMRS for Certain Vessels. 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).

STATUS. On October 13, 1994, 33 CFR 161 was amended to make participation in the Vessel Movement Reporting System (VMRS) mandatory for certain classes of vessels. VMRS participation is required for VMRS users defined as a vessel, or an owner, operator, charter, master, or person directing the movement of a vessel required to participate in a VMRS. VMRS participation is required for:

(a) power-driven vessels of 40 meters (approximately 131 feet) or more in length, while navigating;

(b) every towing vessel of 8 meters (approximately 26 feet) or more in length, while navigating; or

(c) every vessel certificated to carry 50 or more passengers for hire, when engaged in trade.

Also subject to the provisions of this section are VTS users. A VTS user is a vessel, or an owner, operator, charterer, master, or person directing the movement of a vessel that is:

(a) subject to the Vessel Bridge-to-Bridge Radiotelephone Act; or

(b) required to participate in a VMRS within a VTS area (VMRS User).

Military vessels have been directed to participate in the VTS by the Senior Officer Present Afloat (SOPA), San Francisco.

On July 15, 1994, the U.S. Coast Guard published a final rule that makes participation in all VTSs mandatory. This rule establishes two levels of VTS participation: "full participation" and "passive participation." Full participation requires vessels to comply with all communication, Vessel Movement Reporting System and general VTS operating rules. This class of vessels includes:

(a) power-driven vessels 40 meters or more in length,

(b) towing vessels 8 meters or more in length, and

(c) vessels certified to carry 50 or more passengers for hire when engaged in trade.

Passive participation requires vessels to monitor designated VTS frequencies and to comply with general VTS operating rules. Military vessels have been directed participate in VTS by Senior Officer Present Afloat (SOPA), San Francisco. No further action is necessary.

c. Rule 10, RNA. Incorporate the provisions of International Rule 10 in the federal regulations regarding VTS.

> **STATUS.** Provisions of International Rule 10 have been incorporated in the Regulated Navigation Areas (RNA) that the Coast Guard is establishing within the San Francisco Bay Region. No further action is necessary.

d. Expand Sensor Coverage. 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.

> **STATUS.** On May 22, 1997, VTS San Francisco officially cut-over to the VTS Upgrade system. This new system replaced a 24-year-old-method of handwritten cards. The training staff successfully prevailed by completing the transition one week ahead of schedule. For the 10 days prior to the cut-over date, the watch center ran double staffed in order to ensure the customer continued to receive a valued and trusted product. One immediate concern, which is still VTS's top priority to resolve, was the time delay in taking in calls. Because the computer system can only handle one call at a time, and all the information must be completely entered into the form before moving on, the waiting queue has increased.
>
> With the VTS Upgrade came the integration of two new radars and two cameras. The Furuno radars are located at Point San Pablo and at the Mare Island breakwater wall and the cameras are at Mare Island and the Ozol dock. With these, San Pablo Bay is now under complete VTS surveillance and the VTS has visual coverage up to the Union Pacific Railroad Bridge. All radios were replaced, allowing the VTC to transmit and receive on all marine bank frequencies. This is a major improvement over the old system in that each transceiver could only carry two, fixed frequencies. No further action is necessary.

New Areas: VTS reports the following additional steps to be taken to improve its Scope of Coverage.

- Begin the implementation of Automated Identification System (AIS). Harbor Safety Committee to explore and make recommendation as to how and when the system will be implemented.

- VTS will develop a new User's Manual supplement providing details of the RNAs in a compact format.
- VTS to explore revisions to the RNAs:
  - ⇔ Pinole Shoal Channel: Vessels with draft less than 20 feet, with no conflicting traffic, should not have to ask for a deviation.
  - ⇔ Union Pacific Railroad Bridge: Incorporate a visibility check for bridge tender to verify sufficient visibility for westbound vessels. VTS recommends the Wickland Martinez Dock.

XI.2. Changes in VTS Operations and Requirements

a. VHF Working Frequency. 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.

STATUS. On August 15, 1995, VTS San Francisco shifted its working frequency to Channel 14 for VTS ship to shore communications. Channel 13 continues to be monitored and used for ship to ship communications. No further action is necessary.

b. Upgrade Equipment. Upgrade the current equipment used by VTS–SF to include state-of-the-art technology (U.S. Coast Guard, *Port Needs Study:* Vessel Traffic Services Benefits, Volume I: Study Report and Volume II, Appendices, Part 2).

STATUS. VTS installation of upgraded equipment was completed in 1997. While the VTC internal operational processes have changed as a result of the new equipment, VTS Users' procedures will remain unchanged.

At the initial cut-over, VTS had to increase the staffing on watch by one controller. This addition came without hiring new personnel and had a serious effect on covering expected and unexpected absences. This staffing increase lasted through the summer, but since October 1997 the added watchstander has been relaxed to occur only during the "rush hours" between the hours of 0600 to 0900 and then again from 1600 to 1900.

Through the efforts of the V-PIC and the quarterly training held at the California Maritime Academy, VTS has begun asking pilots to state the vessel's name after the unit designator upon checking in. This allows the operator the opportunity to activate the vessel's data entry form, which saves air time and makes for a quicker reply. All Regulated Navigation Areas are under coverage, including the Pinole Shoal Channel and the Union Pacific Railroad Bridge RNAs. VTS

eliminated the mandatory reporting points for piloted ships at the Richmond San Rafael Bridge and the Echo Buoy. No further action is necessary.

XI.3. Federal Funding for VTS. The Harbor Safety Committee supports continued federal funding for VTS–San Francisco in order to ensure navigational safety in the San Francisco Bay Area.

STATUS. Continued federal funding has been appropriated to maintain VTS-San Francisco. No further action necessary at this time.

XII. TUG ESCORT / ASSIST FOR TANK VESSELS

Background

In 1990, Senate Bill 2040 (the Oil Spill Prevention and Response Act) mandated that tug escorting was beneficial for tanker operations and directed expeditious development of escorting regulations on San Francisco Bay. The requirement 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.

The Final Report of the States/British Columbia Oil Spill Task Force (1990) 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 Harbor Safety Committee (HSC) established a Tug Escort Subcommittee which created Interim Guidelines for tug escorting in San Francisco Bay. The Interim Guidelines recommended: minimum requirements for tug escort equipment and crews; a formula for matching tugs to tankers; establishing a central Clearing House to measure bollard pull and monitor and document compliance with the regulations; setting tug escort zones in the Bay; and various operational considerations. OSPR caused emergency regulations to be established in the winter of 1992 based on the Interim Guidelines.

In the spring of 1993, the HSC adopted a revised set of Permanent Guidelines to supersede the emergency regulations. The Permanent Tug Escort Guidelines differed from the Interim Guidelines in a number of significant respects. The Permanent Guidelines altered the formula for matching tugs to vessels by changing the bollard pull formula from ahead static bollard pull equal (or greater) than the dead weight tonnage of a regulated vessel to the astern static bollard pull in the same ratio. Additionally performance standards for stopping a tanker; equipment standards and inspection of tugs; positioning of regulated vessels; and training requirements for tug escort crews were established. During the State's administrative process, OSPR chose to reject the permanent guidelines on the basis of their lack of rationale and scientific basis for matching tugs to tankers.

The subcommittee began what turned out to be a two-year process of preparing a scientific study through use of a consultant and holding extensive public hearings on

the results. Based on State funding concerns and time limitations, industry volunteered to engage a consultant in conjunction with an industry-based Technical Advisory Group and the Tug Escort Subcommittee acting as a policy board. Glosten Associates was hired to prepare a professional study focusing on the specific of tug escorting on San Francisco Bay. Additionally, the State funded a peer reviewer, Michael M. Bernitsas of the University of Michigan, to review the consultant's work and to mitigate concern regarding bias. Their reports were completed in the winter of 1994.

The Glosten Study had adopted a dual-failure standard, that is the simultaneous loss of both propulsion and steering, as the basis for measuring the force (tanker demands) required to recover from the tanker machinery failure and remain within the tactical area of performance. Further, the tactical area was based on the ninety-fifth percentile of success in stopping the tanker within the available reach and transfer. After review of the enabling scope of work and industry concerns regarding the likelihood of a dual failure and the attendant tanker demands, the dual standard was thought to be unreasonable. The subcommittee set up various working groups to review failure probability, waterway characteristics, commercial and navigational safety implications of demand standards and requested that Glosten calculate demands based on single failures.

These efforts resulted in a second Glosten Study and reports on failure probability and waterway specific characteristics. The subcommittee reviewed these reports and adopted a single failure standard for the development of matching criteria.

The process involved close involvement and participation by the interested public and OSPR. On August 10, 1995, the full Harbor Safety Committee reviewed and adopted the Tug Escort Subcommittee's guidelines on a vote of twelve to one. The Harbor Safety Committee promptly transmitted the new guidelines and recommendations to OSPR for implementation.

The Committee publicly reviewed the regulatory language proposed by OSPR. During the review of the regulations, several issues were identified as not being in compliance with the Committee's recommendations. The most critical issues related to the intended use of checklists to review and develop a transit-specific plan versus OSPR's new requirements that plans be filed with OSPR thirty days in advance. OSPR subsequently agreed to modify its proposed language to comply with the intent of the Committee's guidelines, which the Committee adopted in January, 1996..

OSPR held a hearing on the proposed permanent tug escort regulations on March 19, 1996. Approximately 15 people testified at the hearing. Most supported the new regulations but a sizable group protested the use of a single-failure standard instead of a dual-failure standard. Many of the commenters also suggested minor modifications to

the regulations, such as individualized, company-specific check lists and reducing pilot liability. Written comments were also received.

In addition to the public hearing process on regulations, OSPR is required by law to have regulations reviewed by the State Inter-Agency Oil Spill Prevention Committee, which reviewed and approved the regulations for implementation, and by the Technical Advisory Committee (TAC), which is purely advisory and has no approval or disapproval authority. The issue of dual- versus single-failure standard was again debated.

The new Tug Escort regulations became effective January 1, 1997. (See Appendices for current list of certified tug escorts, the current Clearing House Report on escorted vessel movements and Appendix G for Amended Tug Escort Regulations which became effective January 1, 1997.)

It should be noted that the 1997 Tug Escort regulations requires that the OSPR Administrator must:

> "review the matching criteria and other program elements within two years of the effective date of this subchapter. The program review will include a survey of the tanker-related incidents in U.S. waters to determine the types of failures that have occurred, an assessment of tug technology and any advances made in design and power, and the tug escort organizations. At the conclusion of the review, the Administrator will determine whether it is necessary to modify the tug/tanker matching criteria or any other provision of the program requirements."

This OSPR review must take place by January 1, 1999, to determine whether any changes to the tug/tanker matching formula should be made.

The Clearing House reports that industry has changed their procedures to comply with the new regulations and that there have been no significant problems in implementing the regulations. (See Chapter XVI Plan Enforcement.)

Recommendations

Technical Pilotage Committee. The Harbor Safety Plan calls for establishing a technical pilotage committee to review waterway-specific maneuvers.

> **STATUS.** This recommendation is pending, awaiting the call of the Chair of the Harbor Safety Committee.

XIII. PILOTAGE

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-five years, the state has regulated pilotage over the Golden Gate bar by creating the State Board of Pilot Commissioners in 1850 to regulate pilotage.

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.

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. 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.

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.

Recommendations

XIII.1 Shipping Company Employees Who Serve as Pilots.

The California Harbor and Navigation Code, Section 1179 regarding use of shipping company employees for piloting vessels should be amended to read:

"Notwithstanding any other provisions of this division, any shipping company which regularly employed its employees, or expressed its intent to the Board of Pilot Commissioners to use its employees for piloting vessels on the Bays of San Francisco, San Pablo and Suisun on or before July 1, 1983, may employ and use its employees in that manner in lieu of pilots provided under this Chapter so long as these employees shall hold a master's license with pilotage endorsement and have made at least 20 trips as pilot trainee or observer on vessels over the routes to be piloted within a one-year period."

Pilots within this category, known as docking pilots, are not presently required to have completed local trips within the Bays and are not subject to jurisdiction of the State Board of Commissioners. The OSPR Administrator should pursue making this change to the California Harbor and Navigation Code.

STATUS. As of this date, no amendment to the California Harbors and Navigation Code has been proposed to require that shipping company employees eligible to pilot vessels in the Bay area must hold a Master's license with pilotage endorsement and have made at least 20 trips as pilot trainee or observer on vessels over the routes to be piloted within a specified period of time.

In 1997 OSPR made preliminary inquiries to assess the scope of piloting performed by shipping company employees. OSPR requested that the Harbor Safety Committee convene a meeting of the Pilotage Subcommittee to discuss this recommendation with a view towards the development of rationale and legislative strategy. To date the Harbor Safety Committee has not responded to this request.

XIII.2. Require Pilots on Board Vessels Towing Barges Over 5,000 Long tons.

The U.S. Coast Guard should amend 46 C.F.R. 15.812 to change the provision for pilotage requirements by adjusting the limit of 10,000 gross tons for tank barges by amending Section 15.812(e) to read:

"A licensed individual qualifying under paragraph (c)(2) of this section may serve as pilot of coast-wise seagoing tank barges or tank barges operating upon the Great Lakes totaling not more than 10,000 gross tons carrying cargoes subject to the provision of 46 U.S.C. Chapter 37, **or tank barges operating on the Bays of San Francisco, San Pablo and Suisun, carrying not more than 5,000 long tons of oil or other petroleum products as cargo**."

The Committee concluded there should be federal licensing requirements for the operation of tugs towing 5,000 to 10,000 long tons of oil or other petroleum products as

cargo in order to ensure local knowledge of the Bays. The OSPR Administrator should request that the U.S. Coast Guard make this change to federal licensing requirements.

STATUS. In 1997 OSPR reviewed this recommendation and, based on this review, requested that the Harbor Safety Committee convene a meeting of the Pilotage Subcommittee to discuss this recommendation with a view towards clarifying terms, developing rationale and implementing strategy. To date the Harbor Safety Committee has not responded to this request.

XIII.3. Amend Harbors and Navigation Code to Prevent Unlicensed Person From Performing Pilotage.

The Pilotage Subcommittee reviewed federal and state pilotage licensing. To prevent unlicensed persons from performing pilotage, it is recommended that legislative language in the California Harbors and Navigation Code be strengthened, by increasing the penalty for acting as a pilot while not holding a pilot license, from the maximum penalty for a misdemeanor of $1,000 to a specified maximum penalty of $25,000, as follows:

"(A) Every person who does not hold a license as pilot or as an inland pilot issued pursuant to this division, and who pilots any vessel into or out of any harbor or port of the bays of San Francisco, San Pablo, and Suisun, or who acts as a pilot for ship movements or special operations upon the waters of those bays, is guilty of a misdemeanor.

"(B) If a vessel refuses or neglects to take and employ a pilot, the vessel, its master, owner operator, charterer, cosignee or agent shall: (1) Forfeit and pay to a pilot suing for same a sum equal to the pilotage of the vessel, recoverable by an action in the courts of this state or the pilot may pursue his remedy by filing an action in admiralty in a United States Court, either in personal or in rem, to enforce the lien given him on the vessel, as the pilot may see fit and proper to do; (2) Be liable to pay a civil penalty of up to twenty-five thousand dollars, which penalty shall be payable to the general fund of the State of California; and (3) Be liable to the pilot for all costs and attorney fees incurred."

STATUS. Senator Milton Marks introduced legislation (SB 1641) that was signed into law in 1996 requiring the use of pilots on San Francisco Bay. The recommendation has been carried out. No further action is called for.

XIV. UNDERKEEL CLEARANCE AND REDUCED VISIBILITY

1. 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 harbor depths, 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 Chapter II General Weather, Tides and Currents.

Recommendations

XIV.1. The committee determined that the following guidelines should be adopted for underkeel clearances of tank vessels carrying oil or petroleum products as cargo:

Underkeel clearance is the minimum clearance between the deepest point on the vessel and the bottom of the vessel in still water conditions. Tank vessels carrying oil or petroleum products as cargo shall maintain minimum underkeel clearances as listed below. The underkeel clearances are minimum standards during normal weather conditions. Masters and pilots shall at all times use prudent seamanship and shall evaluate the need for clearance in excess of these guidelines in adverse weather conditions, or when other circumstances would require such evaluation.

a. Vessels west of the Golden Gate Bridge: Ten percent (10%) of the vessel's draft.
b. Vessels under way east of the Golden Gate Bridge: Two feet (2)
c. Vessels at final approach to berth and at berth: Always afloat.

STATUS. On July 30, 1996, the Coast Guard published the Final Rule (effective November 27, 1996) regarding Operational Measures to Reduce Oil Spills for Existing Tank Vessels of 5,000 gross tons or more without double hulls. In part, the regulations required the Master to calculate the vessel's deepest navigational draft, the controlling depth of the waterway and the anticipated underkeel clearance. In addition, the Master and Pilot were to discuss the tankship's planned transit and required owner notification. Following issuance, the Coast Guard received comments expressing concern regarding the new provisions. Because of these concerns, the Coast Guard suspended the effective date of the owner notification part of the Final Rule. Coast Guard Headquarters is currently reviewing the comment submissions.

A working Group has been formed with representatives from the San Francisco Bar Pilots, Coast Guard, Port authorities and tankship companies to evaluate the process of calculating, in a dynamic condition, underkeel clearances with the goal of promulgating COTP guidance on minimum clearances for the San Francisco Bay Area.

2. Reduced Visibility

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 500–1,500 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 diminishes 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 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.

Because of the large size of the Bay (500 square miles), the longer distances traveled to the various ports, and the diverse weather conditions encountered in the Bay, mariners are dependent on accurate weather forecasting for vessel movements. To increase the reliability of Bay Area marine weather forecasts, the National Weather Service installed a weather radio devoted exclusively to marine weather data.

The National Weather Service pointed out that the new doppler radar is not capable of tracking weather patterns below 3,500 feet because of the radar's elevation above sea level. This is particularly important to Bay area mariners because wind patterns below 3,500 feet can radically shift in a short period of time, signaling an abrupt change in the weather. Because of the coastal hills, very localized wind conditions exist just outside the Golden Gate at the entrance to the harbor and else where in the Bay. In February,

1996, three container ships were significantly damaged by strong winds suddenly shifting in the Oakland Harbor. The cost to install a 'wind profiler' was estimated to be $250,000. However, funds for the 'wind profiler', which would provide real time wind information, have been denied. Until more sophisticated equipment can be installed, the National Weather Service is encouraging input on real time conditions from the maritime community by contacting the National Weather Service at (408) 656-1710 x245 or (800) 437-2689 and ask for extension 245.

Recommendations

XIV.2. Restricted Visibility. 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.

STATUS: No change to recommended guidelines.

XIV.3. 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.

STATUS: No change to recommended guidelines.

XV. ECONOMIC AND ENVIRONMENTAL IMPACTS

The Harbor Safety Plan must identify and discuss the potential economic impacts of implementing the provisions of the Plan, and describe the significant differences in the restrictions that could vary from port to port within the geographic boundaries of the plan.

Economic Impacts

In order to make an economic assessment of the impacts of implementing the plan, recommendations which have a cost implication are identified with their potential economic impact. The following recommendations have a direct cost and an economic impact:

- **Tides and Currents.** Federal funding is necessary for the National Oceanic and Atmospheric Administration (NOAA) to conduct adequate surveys.
- **Depths and surveys.** Conducting comprehensive annual condition surveys noting depths alongside and at the head of their facilities would be a cost for each facility owner or operator.
- **Channel Design and Dredging.** Lowering areas such as Arch Rock, Harding Rock, and Shag Rocks to a minimum of 55' MLLW would cost between $25 to $43 million of federal and state (local) funds. More precise estimates depend on Corps of Engineers studies to determine the material composition of the submerged rocks, the preferred method of engineering and on subsequent removal estimates.
- **Vehicular Bridge Management.** Install energy absorbing fendering systems, bridge clearance gauges where needed, water level gauges at bridge approach points, racons on the Golden Gate and Bay Bridges, and shield bridge floodlights to reduce the glare for ships. Costs would be borne by Caltrans and the Golden Gate Bridge District.
- **San Francisco Vessel Traffic Service (VTS).** Expand VTS to north of the San Rafael Bridge and east of the Carquinez Strait and upgrade the existing VTS to include state-of-the-art technology (federal funds).
- **Radio Communications.** Acquire emergency backup communications power for the Marine Exchange and the San Francisco Bar Pilots. Costs would be borne by private industry.
- **Tug Escorts.** The cost of tug escorts and standby tugs for ships and barges underway carrying more than 5,000 metric tons of oil or other petroleum products in the tug escort zones defined in the Plan are directly borne by the shipper. Marine Exchange records showed that 1,123 regulated ships and 518 regulated barges were required to use tug escorts in 1997. This compares to 1,485 ships and 589 barges in 1996. Based on the best information available, it is estimated that the average cost for

a tug escort was approximately $6,500 for a regulated ship and $2,700 for a regulated barge. Based on these figures, the cost of tug escorts in 1997 for the 1,123 regulated ships and 518 barges would be $8,698,100.

- **Pilotage.** Future recommendations for pilotage may have cost implications.

Each of the recommendations listed above has a cost that would be incurred by a commercial operator, port facility, or government agency if that recommendation were implemented. To that extent, these would be economic impacts of the Harbor Safety Plan. Generally these items of cost are either capital items (such as emergency power sources) or significant additional duties for an established agency.

The economic impact of the Harbor Safety Plan appears to fall equally on government agencies and private industry. The Corps of Engineers, NOAA, Caltrans, the Golden Gate Bridge District, and each port and facility operator would be required to spend money to improve facilities they own or operate in order to meet the recommendations of the Harbor Safety Plan. In addition, private industry would be required to meet the cost of escort tugs and possible increased pilotage.

Differences in Restrictions from Port to Port

Eight ports are within the geographic boundaries of the Harbor Safety Plan, namely: San Francisco, Oakland, Encinal Terminals, Richmond, Redwood City, Benicia, Sacramento, and Stockton. Nothing in this Plan would disadvantage anyone of these port as compared to any other port within the plan area.

Environmental Impact

The Harbor Safety Plan has increased the level of navigational safety for the San Francisco Bay Region and the Ports of Sacramento and Stockton. A major oil spill accident could cause millions of dollars in damage to the marine environment, particularly to sensitive marshland habitat and shorebirds. San Francisco Bay is part of the Pacific Flyway; in the winter months by many thousands of birds migrate to the area which could be severely impacted by a sizeable oil spill.

XVI. PLAN ENFORCEMENT

The Oil Spill Prevention and Response Act 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 and Electric power plant terminal at Pier 70 in the Port of San Francisco, 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, inspects 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 is 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 Escorts are 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 contacts the pilot, the master of the vessel, and the shipping company and/or agent and advise them accordingly. The vessel is not to move until the escort tug is on station. The Clearing House notifies 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 of the Harbor Safety Plan is mandated to take place on or before June 30th of each year. At this time, all aspects of the Harbor Safety Plan are assessed and the findings and recommendations for improvements are sent to the Administrator. Annual review will help ensure full, regular, and uniform enforcement.

Tug Escort Violations, 1997

Enforcement personnel from the Office of Spill Prevention and Response (OSPR) investigated twenty-nine suspected tug escort violations during the 1997 calendar year.

Three of the investigations revealed that no violation was committed. Twenty-five incidents involved the regulated vessel failing to make the notification to the Clearing House prior to movement of the vessel. Eleven of these violations occurred in the first quarter of 1997 when the more stringent reporting requirements went into effect. The last investigation involves an escort tug with insufficient bollard pull for the escort assignment.

One formal letter of warning was issued and several cases are still pending action.

Recommendation

XVI.1. Coordination of Enforcement Responsibilities. The Coast Guard and the State Department of Fish and Game should 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 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.

STATUS. No further action is necessary.

XVII. OTHER: SUBSTANDARD VESSEL INSPECTION PROGRAM AND PREVENTION THROUGH PEOPLE

1. Substandard Vessel Examination Program

Recommendation

XVII.1. Support the U.S. Coast Guard vessel examination program of targeting substandard vessels in the Bay.

STATUS. Beginning May 1, 1994, the Coast Guard implemented a revised vessel boarding program designed to identify and eliminate substandard ships from U.S. waters. The program pursues this goal by systematically targeting the relative risk of vessels and increasing the boarding frequency on high risk (potentially substandard) vessels. Each vessel's relative risk is determined through the use of a Boarding Priority Matrix which factors the vessel's flag, owner, operator, classification society, vessel particulars, and violation history. Vessels are assigned a boarding priority from I to IV with priority I vessels being the potentially highest risk. This program also aligns Coast Guard efforts with international initiatives through reliance upon a two-tiered boarding process where the greatest effort, and most detailed examinations, are reserved for the highest risk vessels.

The International Maritime Organization (IMO) adopted an amendment to SOLAS with provisions entitled *"Special Measures to Enhance Marine Safety"* which became effective January 1, 1996. These provisions allow for operational testing during Port State examinations to ensure Masters and crews are familiar with essential shipboard procedures relating to ship safety.

The Vessel Boarding Branch (VBB) continued its mission in identifying and eliminating substandard foreign commercial vessels from U.S. waters by use of the Coast Guard's risk-based Boarding Priority Matrix System. In calendar year 1997, the Captain of the Port San Francisco Bay detained 21 vessels due to major safety discrepancies under SOLAS and other IMO conventions. Inadequate crew performance in conducting emergency drills was a contributing factor for 11 (52%) of the detentions and poor performance on drills was the sole deciding factor for detaining 2 vessels. Overall in 1997, the VBB boarded over 400 (19%) of the more than 2,200 foreign vessels which called upon the ports of San Francisco Bay. This translates to a 5% ratio of detentions to vessel boardings.

2. Prevention Through People

Recent analysis indicates that up to 80% of all marine casualties are caused by people, not material or systems' failures. Prevention of accidents through examining human and organizational factors is receiving increased attention by government and industry as the maritime industry becomes more mechanized.

The Prevention Through People (hereafter PTP) Subcommittee was appointed by San Francisco Bay Harbor Safety Committee Chairman on October 16, 1997.

The PTP subcommittee consists of the following members:

Margot J. Brown, Chairman .....National Boating Federation
John C. Gosling.....Matson Navigation
Ronald W. Kennedy.....Port of Richmond
Gunnar Lundeberg .....Sailors Union of the Pacific
Gail Skarish .....Sanders Towboat Service

Active ex-officio participants:

Capt. Harlan Henderson & LtCdr. Randy Sharpe ...Coast Guard Marine Safety Office
Cdr. Danny Ellis & Scott Humphrey.....Vessel Traffic Service
Jay Phelps .....State Land Commission

The subcommittee held its first meeting on December 2, 1997. Its members have adopted the following mission statement:

> "The PTP subcommittee of the San Francisco Area Harbor Safety Committee works to reduce the risk of incidents, influenced by or due to human and organizational elements which could result in oil spills."

The following areas of interest for the subcommittee were expressed:

- Compilation of various rules and standards by those agencies which regulate maritime and fueling procedures;
- Licensing requirements for fueling personnel;
- Training and licensing of crews, recreational boaters, fishermen, and all towing vessels; and
- Foreign vessels: Radio communication and tests for English language proficiency; training and manning requirements vs. U.S. crews.

Specific projects and priorities to be determined in 1998.

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