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Maurice H. Stans, Secretary
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
Robert M. White, Administrator
NATIONAL OCEAN SURVEY
Don A. Jones, Director

United States Coast Pilot 3

NINTH EDITION - 1971

ATLANTIC COAST

Sandy Hook to Cape Henry

Corrected through Notices to Mariners, May 1, 1971

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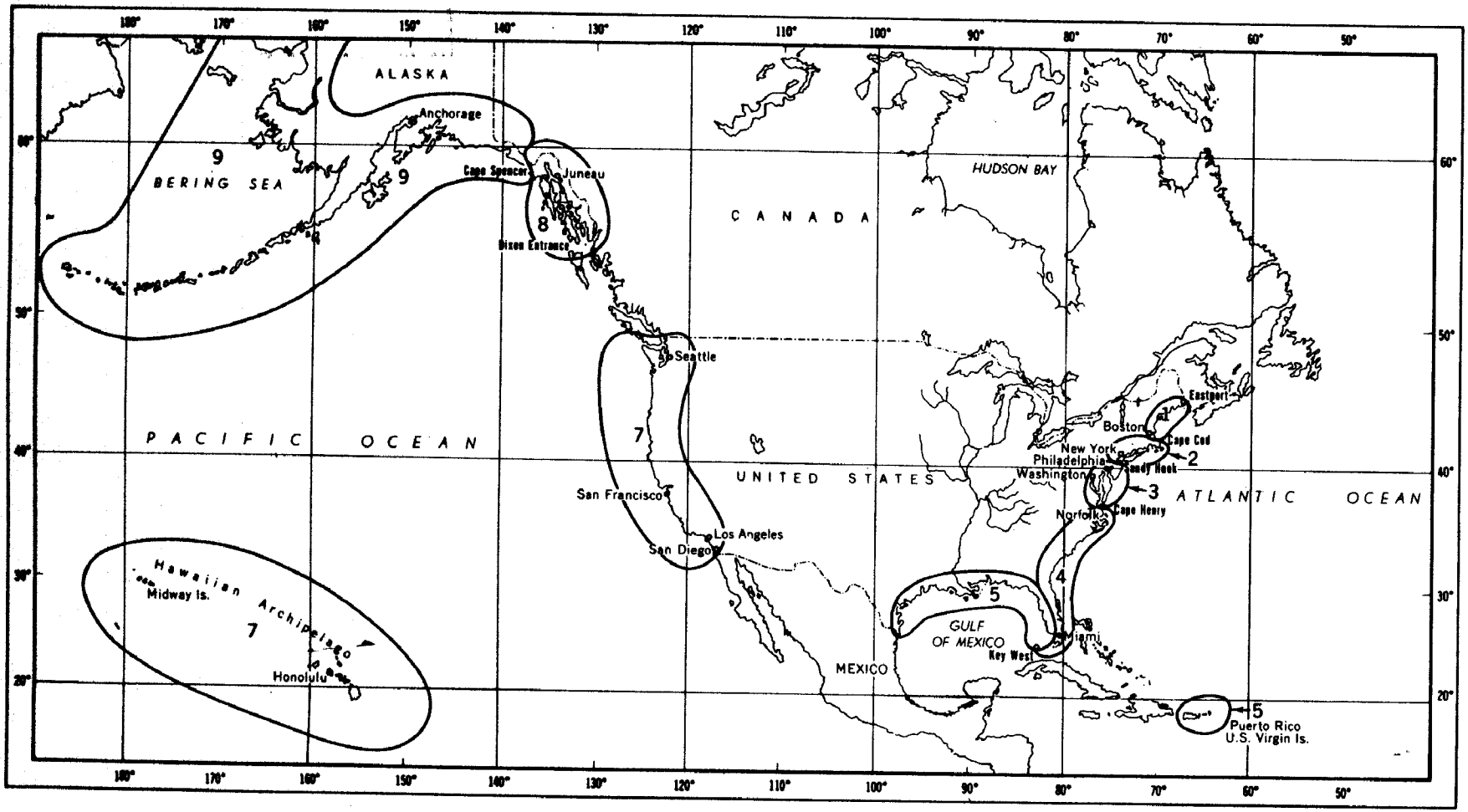
LIMITS OF UNITED STATES COAST PILOTS

Atlantic Coast

1 Eastport to Cape Cod
2 Cape Cod to Sandy Hook
3 Sandy Hook to Cape Henry
4 Cape Henry to Key West
5 Gulf of Mexico, Puerto Rico, and Virgin Islands

Pacific Coast

7 California, Oregon, Washington, and Hawaii
8 Alaska - - Dixon Entrance to Cape Spencer
9 Alaska - - Cape Spencer to Beaufort Sea



Preface

United States Coast Pilot 3, Atlantic Coast, Sandy Hook to Cape Henry, is published by the National Ocean Survey, pursuant to Public Law 80–373, approved August 6, 1947, as amended by Public Law 86–409, approved April 5, 1960, and as amended by Public Law 88–611, approved October 2, 1964 (33 USC 883a–i). The former Coast and Geodetic Survey is now part of the National Ocean Survey in accordance with Reorganization Plan No. 4 of 1970, published in Federal Registers dated October 6, 1970, and October 24, 1970.

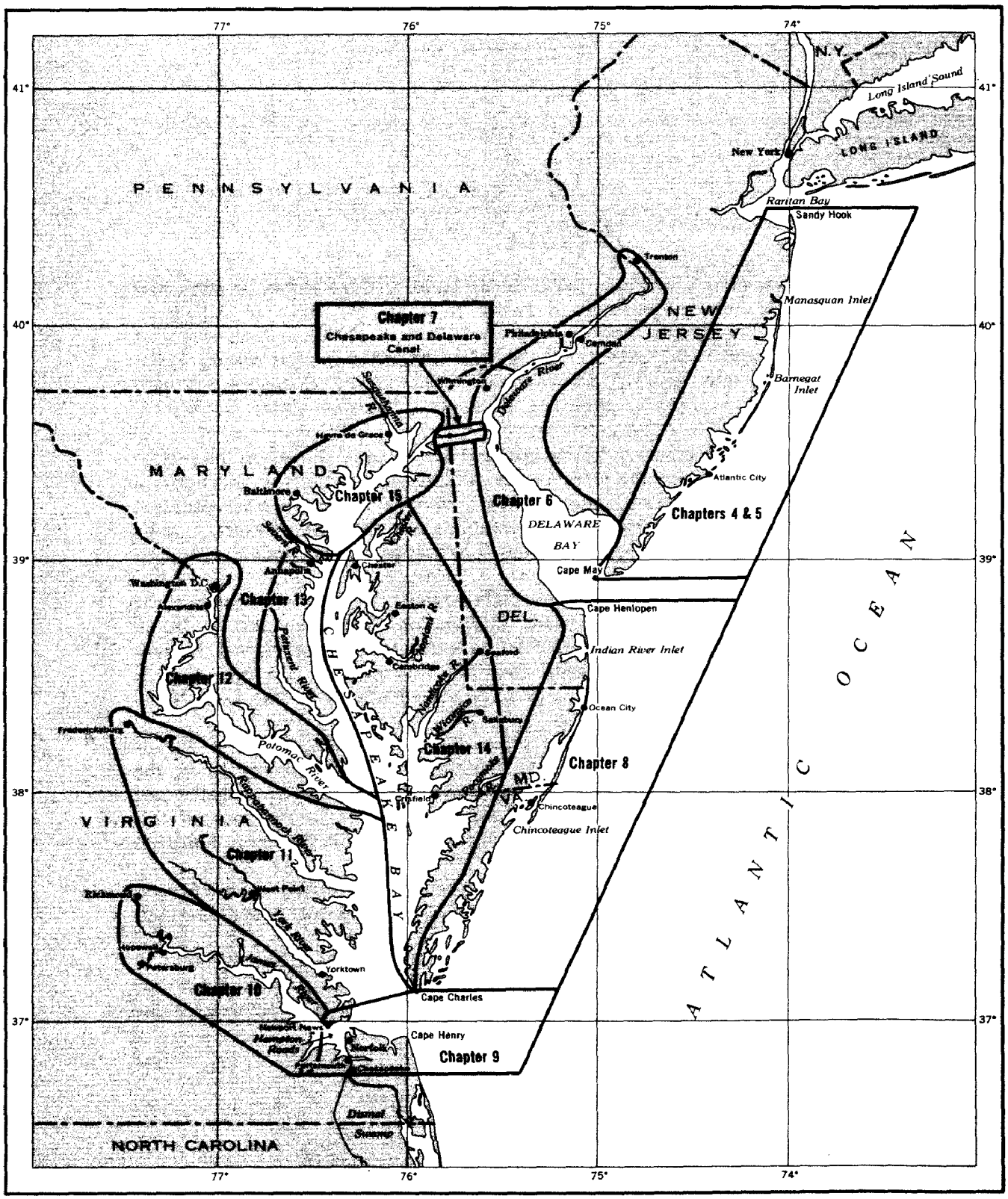
Coast Pilot 3, which supplements the navigational information shown on the marine charts of the area, is based upon the work of the National Ocean Survey and updated by reports from other federal agencies, state and local governments, maritime associations, port authorities, mariners, and others. Field observations are made about every 5 years by the National Ocean Survey to check reported information and to update published information.

The Ninth (1971) Edition supersedes the Eighth (1966) Edition and includes the April–July 1970 field observations of Marine Information Specialist Jack H. Burch of the National Ocean Survey. The Coast Pilot is corrected through Local Notices to Mariners issued by the U.S. Coast Guard District Commanders through May 1, 1971, and Notice to Mariners 17 of May 1, 1971, published weekly by the U.S. Naval Oceanographic Office.

Mariners and others are urged to report promptly to the National Ocean Survey any conditions found to differ from or to be additional to those published in the Coast Pilot or shown on the charts in order that they may be fully investigated and proper corrections made. A Coast Pilot Report form is included in the back of this book and a Marine Information Report form is printed in the Weekly Notice to Mariners for your convenience.

Errors or omissions found in the book or suggestions for increasing the usefulness of the Coast Pilot should be sent to Director, National Ocean Survey, Attention C325, Rockville, Maryland 20852.

The information published in this book has been computerized and printed by an automatic photocomposition process. The magnetic tape will be updated each year and a new edition of Coast Pilot 3 will be published annually, thus eliminating the annual supplements.



COAST PILOT 3 - GRAPHIC CHAPTER INDEX

Contents

		Page
Preface		III
Chapter 1.	General Information	1
Chapter 2.	Navigation Regulations	23
Chapter 3.	Sandy Hook to Cape Henry	69
Chapter 4.	New Jersey Coast	79
Chapter 5.	New Jersey Intracoastal Waterway	84
Chapter 6.	Delaware Bay	93
Chapter 7.	Chesapeake and Delaware Canal	115
Chapter 8.	Delaware-Maryland-Virginia Coast	120
Chapter 9.	Chesapeake Bay Entrance	127
Chapter 10.	Chesapeake Bay, James River	139
Chapter 11.	Chesapeake Bay, York and Rappahannock Rivers	146
Chapter 12.	Chesapeake Bay, Potomac River	158
Chapter 13.	Chesapeake Bay, Patuxent and Severn Rivers	170
Chapter 14.	Chesapeake Bay, Eastern Shore	178
Chapter 15.	Baltimore to Head of Chesapeake Bay	195
Appendix		209
Index		235

1. GENERAL INFORMATION

UNITED STATES COAST PILOTS.—The National Ocean Survey Coast Pilots are a series of eight nautical books that cover a wide variety of information important to navigators of United States coastal and intracoastal waters. Most of this book information cannot be shown graphically on the standard nautical charts and is not readily available elsewhere. Coast Pilot subjects include navigation regulations, outstanding landmarks, channel and anchorage peculiarities, dangers, weather, ice, freshets, routes, pilotage, and port facilities.

When new editions of Coast Pilots are published, they will be printed annually by an automatic photocomposition process, thus eliminating the yearly supplements. Coast Pilots 3 and 4 have been computerized and are now published on an annual basis.

Cumulative supplements, containing changes reported since dates of editions, will continue to be published early each year for the other Coast Pilots until they are due for new editions. Eventually all Coast Pilots will be computerized and new editions will be printed on an annual basis.

Bearings.—These are true, and when given in degrees are clockwise from 000° (north) to 359°. Light-sector bearings are toward the light.

Bridges and cables.—Vertical clearances of bridges and overhead cables are in feet above mean high water unless otherwise stated; clearances of drawbridges are for the closed position, although the open clearances are also given for vertical-lift bridges. Clearances given in the Coast Pilots are those approved for nautical charting, and are supplied by the U.S. Coast Guard (bridges) and U.S. Army Corps of Engineers (cables); they may be as-built (verified by actual inspection after completion of structures) or authorized (design values specified in permit issued prior to construction). No differentiation is made in the Coast Pilots between as-built and authorized clearances. See charts for horizontal clearances of bridges, as these are given in the Coast Pilots only when they are less than 50 feet. Submarine cables are rarely mentioned.

Courses.—These are true and are given in degrees clockwise from 000° (north) to 359°. The courses given are the courses to be made good.

Currents.—Stated current velocities are the averages at strength. Velocities are in knots, which are nautical miles per hour. Directions are the true directions to which the currents set.

Depths.—Depths are in feet or fathoms below the low-water tidal datum of the charts unless otherwise stated. The **controlling depth** of a channel is the least depth within the limits of the channel; it restricts the safe use of the channel to drafts of less than that depth. The **centerline controlling depth** of a channel applies only to the channel centerline; lesser depths may exist in the remainder of the channel. The **midchannel controlling depth** of a channel is the controlling depth of only the middle half of the channel. **Federal project depth** is the design dredging depth of a channel constructed by the Corps of Engineers, U.S. Army; the project depth may or may not be the goal of maintenance dredging after completion of the channel, and for this reason, project depth must not be confused with controlling depth. **Depths alongside wharves** usually have been reported by owners and/or operators of the waterfront facilities, and have not been verified by Government surveys; since these depths may be subject to change, local authorities should be consulted for current controlling depths.

In general, the Coast Pilots give the project depths for deep-draft ship channels maintained by the Corps of Engineers. The latest controlling depths are usually shown on the charts and published in the Notices to Mariners. For other channels, the latest controlling depths available at the time of publication are given.

Distances.—These are in nautical miles unless otherwise stated. A nautical mile is one minute of latitude, or approximately 2,000 yards, and is about 1.15 statute miles.

Heights.—These are in feet above the tidal datum used for that purpose on the charts, usually mean high water. However, the heights of the decks of piers and wharves are given in feet above the chart datum for depths.

Light and fog signal characteristics.—These are not described, and light sectors and visible ranges are normally not defined. See Coast Guard Light Lists.

Obstructions.—Wrecks and other obstructions are mentioned only if of a relatively permanent nature and in or near normal traffic routes.

Radio aids to navigation.—These are seldom described. See Coast Guard Light Lists and Naval Oceanographic Office Radio Navigational Aids publications.

Ranges.—These are not fully described. "**A 339° Range**" means that the rear structure bears 339° from the front structure. See Coast Guard Light Lists.

Reported information.—Information received by the National Ocean Survey from various sources concerning depths, dangers, currents, facilities, and other subjects, which has not been verified by

Government surveys or inspections, is often included in Coast Pilots; such **unverified information** is qualified as "reported", and should be regarded with caution.

Time.—All times are given in local standard time in the 24-hour system (i.e., noon is 1200, 2:00 p.m. is 1400, and midnight is 0000 unless otherwise stated.

Winds.—Directions are the true directions from which the winds blow. Speeds are in knots, which are nautical miles per hour.

NOTICES TO MARINERS

Notices to Mariners are published by federal agencies to advise operators of vessels of marine information affecting the safety of navigation. The notices include changes in aids to navigation, depths in channels, bridge and overhead cable clearances, reported dangers, and other useful marine information. They should be used routinely for updating the latest editions of nautical charts and related publications.

Local Notice to Mariners is issued by each Coast Guard District Commander for the waters under his jurisdiction (see Appendix for Coast Guard district(s) covered by this volume). These notices are usually published weekly and may be obtained without cost by making application to the appropriate District Commander.

Notice to Mariners, published weekly by the U.S. Naval Oceanographic Office, is prepared jointly with the National Ocean Survey and the Coast Guard. These notices contain selected items from the Local Notices to Mariners and other reported marine information required by oceangoing vessels operating in both **foreign** and **domestic** waters, except the Great Lakes. Special items covering a variety of subjects and generally not discussed in the Coast Pilot or shown on nautical charts are published annually in Notice to Mariners 1. These items are important to the mariner and should be perused for future reference. The weekly notices may be obtained by operators of oceangoing vessels, without cost, by making application to Commander, U.S. Naval Oceanographic Office, Washington, D.C. 20390.

Notice to Mariners, relating to the **Great Lakes** and tributary waters west of Montreal, is published weekly by the U.S. Coast Guard. These notices contain selected items from the Local Notices to Mariners and other reported marine information, and are intended primarily for use in correcting Great Lakes charts and related publications. Application for these free notices should be made to Commander, 9th Coast Guard District, Federal Building, Cleveland, Ohio, 44199.

Notices and reports of **improved channel depths** are also published by district offices of the Corps of Engineers, U.S. Army (see Appendix for districts covered by this volume). Although information from these notices/reports affecting National Ocean Survey charts and related publications is usually published in the Notices to Mariners, the local district engineer office should be consulted where depth information is critical.

Marine Broadcast Notices to Mariners are made by the Coast Guard through Coast Guard, Navy, and some commercial radio stations to report deficiencies and important changes in aids to navigation; see RADIO WARNINGS AND WEATHER.

Vessels operating within the limits of the Coast Guard districts can obtain information affecting National Ocean Survey charts and related publications from the Local Notices to Mariners. Small craft using the Intracoastal Waterway and other waterways and small harbors within the United States that are not normally used by oceangoing vessels will require the Local Notices to Mariners to keep charts and related publications up-to-date. Information for oceangoing vessels can be obtained from the Notice to Mariners published by the U.S. Naval Oceanographic Office.

Notices to Mariners may be consulted at Coast Guard district offices, National Ocean Survey field offices, U.S. Naval Oceanographic branch and distribution offices, most local marine facilities, and sales agents handling charts and related publications.

U.S. GOVERNMENT AGENCIES PROVIDING MARITIME SERVICES

Agricultural Research Service, Department of Agriculture.—The Animal Health and Plant Quarantine Divisions of this organization are responsible for protecting the Nation's animal population, food and fiber crops, and forests from invasion by foreign pests. They administer agricultural quarantine and restrictive orders issued under authority provided in various acts of Congress. The regulations prohibit or restrict the importation or interstate movement of live animals, meats, plants, plant products, soil, injurious insects, and associated items that may introduce or spread plant and animal pests new to or not widely distributed within the United States or its territories. Inspectors examine imports at ports of entry as well as the vessel, its stores, and crew or passenger baggage.

The Service also provides an inspection and certification service for exporters to assist them in meeting the quarantine requirements of foreign countries. See Appendix for a list of ports where agricultural inspectors are located and inspections conducted.

Bureau of Customs, Department of the Treasury.—The Bureau of Customs administers the entry and clearance of vessels; collects regular and special tonnage taxes on vessels; supervises and administers the landing and delivery of foreign merchandise, and collects the duties on the

merchandise required by the customs laws (includes the processes of unlading; appraisement; and lighterage, drayage, warehousing, and shipment under bond); regulates the treatment of sea and ship's stores while in port and the baggage of crewmen and passengers, including the collection of any required duties on these articles; enforces the federal navigation laws regarding illegally imported merchandise; and, through the procedures of entry and clearance, ascertains if any navigation laws have been violated, and if so, detains the vessel and reports the suspected violations to the appropriate federal enforcing agency. Customs districts, stations, and ports of entry are listed in the Appendix.

The Bureau of Customs may issue a **cruising license,** valid for a period of up to six months and in specified customs districts, to a yacht of a foreign country which has a reciprocal agreement with the United States. A foreign yacht holding a cruising license may cruise in U.S. waters and arrive in and depart from U.S. ports without entering or clearing at the customhouse, and without the payment of any charges for entering or clearing, dues, tonnage taxes, or charges for the cruising license, **provided** that such yachts do not engage in trade or violate the laws of the United States, and upon arrival at each port or place in the U.S., shall report the fact of arrival to the customs officer at the nearest customhouse. Countries which have a reciprocal agreement, granting the above privileges to U.S. yachts, include Canada, the Bahama Islands, and Bermuda. Further information and application forms for cruising licenses may be obtained from the customs headquarters port of entry in the customs district for which the license is desired; see the Appendix. American yachts planning a cruise to a foreign port may contact the nearest U.S. customs headquarters port of entry for information on the foreign customs requirements.

National Ocean Survey (NOS), National Oceanic and Atmospheric Administration (NOAA), Department of Commerce.—The National Ocean Survey, established by joining the former Coast and Geodetic Survey with elements of the U.S. Lake Survey, provides charts and related publications for the safe navigation of marine and air commerce, and provides basic data for engineering and scientific purposes and for other commercial and industrial needs. The principal marine facilities of the National Ocean Survey are located in the Washington, D.C. area (headquarters); in Norfolk, Va. (Atlantic Marine Center); and in Seattle, Wash. (Pacific Marine Center). NOAA ships are based at the marine centers. There are also field offices in New York, Detroit, Kansas City, San Francisco, Honolulu, and Anchorage (Alaska); see Appendix for addresses. The field offices maintain files of charts and other publications which are available for the use of the mariner, who are invited to avail themselves of the facilities afforded.

The distribution center for NOS charts and publications is at Washington, D.C. Orders mailed to headquarters should be accompanied by a check or money order made payable to National Ocean Survey, Department of Commerce.

Sales agents for Charts, Coast Pilots, Tide Tables, Tidal Current Tables, and Tidal Current Charts of the National Ocean Survey are located in many U.S. ports and in some foreign ports. A list of authorized sales agents and chart catalogs may be had free upon request from National Ocean Survey, Distribution Division (C44), Washington, D.C. 20235.

Nautical charts are published primarily for the use of the mariner but serve the public interest in many other ways. They are compiled principally from National Ocean Survey basic field surveys, supplemented by data from other Government organizations.

Tide Tables are issued annually by the National Ocean Survey in advance of the year for which they are prepared. These tables include predicted times and heights of high and low waters for every day in the year for a number of reference stations and differences for obtaining similar predictions for numerous other places. They also include other useful information such as a method of obtaining heights of tide at any time, local mean time of sunrise and sunset for various latitudes, reduction of local mean time to standard time, and time of moonrise and moonset for various ports.

Caution.—In using the Tide Tables, slack water should not be confused with high or low water. For ocean stations there is usually little difference between the time of high or low water and the beginning of ebb or flood currents; but for places in narrow channels, land-locked harbors, or on tidal rivers, the time of slack current may differ by several hours from the time of high or low water. The relation of the times of high or low water to the turning of the current depends upon a number of factors, so that no simple general rule can be given. To obtain the times of slack water, reference should be made to the Tidal Current Tables.

Tidal Current Tables for the coasts of the United States are issued annually by the National Ocean Survey in advance of the year for which they are prepared. These tables include daily predictions of the times of slack water and the times and velocities of strength of flood and ebb currents for a number of waterways, together with differences for obtaining predictions for numerous other places. Also included is other useful information such as a method for obtaining the velocity of current at any time, duration of slack, coastal tidal currents, wind currents, combination of currents, and current diagrams. Some information on the Gulf Stream is included in the tables for the Atlantic coast.

Tidal Current Charts are published by the National Ocean Survey for various localities. These charts depict the direction and velocity of the current for each hour of the tidal cycle. They present a comprehensive view of the tidal current movement in the respective waterways as a whole and when used with the proper current tables or tide tables supply a means for readily determining for any time the direction and velocity of the current at various localities throughout the areas covered.

Coast Guard, Department of Transportation.—The Coast Guard has among its duties the enforcement of the laws of the United States on the high seas and in coastal and inland waters of the U.S. and its possessions; enforcement of navigation and neutrality laws and regulations; establishment and enforcement of navigational regulations upon the Inland Waters of the United States, including the establishment of a demarcation line separating the high seas from waters upon which United States navigational rules apply; administration of the Oil Pollution Act of 1961, as amended; establishment and administration of water vessel anchorages; approval of bridge locations and clearances over navigable waters; administration of the alteration of obstructive bridges; regulation of drawbridge operations; inspection of vessels of the Merchant Marine; admeasurement of vessels; documentation of vessels; preparation and publication of merchant vessel registers; registration of stack insignia; port security; issuance of Merchant Marine licenses and documents; search and rescue operations; investigation of marine casualties and accidents, and suspension and revocation proceedings; destruction of derelicts; operation of aids to navigation; publication of Light Lists and Local Notices to Mariners; and operation of ice breaking facilities.

The Coast Guard operates the **Automated Merchant Vessel Report (AMVER) System.** It is an international maritime mutual assistance program which provides important aid to the development and coordination of search and rescue (SAR) efforts in many offshore areas of the world. Merchant ships of all nations making offshore passages are encouraged to voluntarily send sailing reports and periodic position reports to the AMVER Center at Coast Guard New York via selected radio stations. Information from these reports is entered into an electronic computer which generates and maintains dead reckoning positions for the vessels. Characteristics of vessels which are valuable for determining SAR capability are also entered into the computer from available sources of information.

Information concerning the predicted location and SAR characteristics of each vessel known to be within an area of interest, called a Surface Picture (SURPIC), is made available upon request to recognized SAR agencies or vessels needing assistance regardless of nationality for use during emergencies.

Instructions guiding participation in the AMVER System are available in the following 13 languages: Danish, Dutch, English, French, German, Greek, Italian, Japanese, Norwegian, Portuguese, Russian, Spanish, and Swedish. They are available from: Commander, Eastern Area, U.S. Coast Guard, Governors Island, New York 10004; Commander, Western Area, U.S. Coast Guard, 630 Sansome Street, San Francisco, California 94126; and at U.S. Coast Guard District Offices, Marine Inspection Offices, and Captain of the Port Offices in major U.S. ports.

The Coast Guard conducts and/or coordinates **search and rescue** operations for surface vessels and aircraft that are in distress or overdue. See DISTRESS SIGNALS AND PROCEDURES.

Light Lists, published by the Coast Guard, describe aids to navigation, consisting of lights, fog signals, buoys, lightships, daybeacons, and electronic aids, in U.S. (including Puerto Rico and U.S. Virgin Islands) and contiguous Canadian waters. Light Lists are for sale by the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402, and by sales agents in the principal seaports. Mariners should refer to these publications for detailed information regarding the characteristics and visibility of lights, and the descriptions of light structures, lightships, buoys, fog signals, and electronic aids.

Documentation (issuance of certificates of registry, enrollments, and licenses), admeasurements of vessels, and administration of the various navigation laws pertaining thereto are functions of the Coast Guard. Yacht commissions are also issued, and certain undocumented vessels required to be numbered by the Federal Boating Act of 1958 are numbered either by the Coast Guard or by a state having an approved numbering system (the latter is most common). Owners of vessels may obtain the necessary information from any Coast Guard District Commander or Marine Inspection Office. Coast Guard District Offices, Coast Guard Stations, Captain of the Port Offices, and Marine Inspection Offices are listed in the Appendix.

Corps of Engineers, Department of the Army.—The Corps of Engineers has charge of the improvement of the rivers and harbors of the United States and of miscellaneous other civil works which include the administration of certain Federal laws enacted for the protection and preservation of navigable waters of the United States, the establishment of regulations for the use, administration, and navigation of navigable waters, the establishment of harbor lines, the removal of sunken vessels obstructing or endangering navigation, and the granting of permits for structures or operations in navigable waters.

Information concerning the various ports, improvements, channel depths, navigable waters, and the condition of the Intracoastal Waterways in the

areas under their jurisdiction may be obtained direct from the District Engineer offices; see Appendix.

Restricted areas in most places are defined and regulations governing them are established by the Corps of Engineers. The regulations are enforced by the authority designated in the regulations, and the areas are shown on the large-scale charts of the National Ocean Survey. Copies of the regulations may be obtained at the District offices of the Corps of Engineers. The regulations also are copied into the appropriate Coast Pilots.

Fishtraps.—The Corps of Engineers has general supervision of location, construction, and manner of maintenance of all traps, weirs, pounds, or other fishing structures in the navigable waters of the United States. Construction permits issued by the Engineers specify the lights and signals required for the safety of navigation.

Fish Havens, artificial reefs constructed to attract fish, can be established in U.S. coastal waters only as authorized by a Corps of Engineers permit; the permit specifies the location, extent, and depth over these "underwater junk piles"

Federal Communications Commission.—The Federal Communications Commission controls radio communications in the United States and in all possessions except the Panama Canal Zone. Commission inspectors have authority to board ships to determine whether their radio stations comply with international treaties, Federal Laws and Commission regulations. The commission has field offices in the principal United States ports; see Appendix. Information concerning ship radio regulations and service documents may be obtained from the Federal Communications Commission, Washington, D.C. 20554, or from any of the field offices.

Immigration and Naturalization Service, Department of Justice.—The Immigration and Naturalization Service administers the laws relating to admission, exclusion, and deportation of aliens, the registration and fingerprinting of aliens, and the naturalization of aliens lawfully resident in the United States.

The designated ports of entry for aliens are divided into three classes. Class A is for all aliens. Class B is only for aliens who at the time of applying for admission are lawfully in possession of valid resident aliens' border-crossing identification cards or valid non-resident aliens' border-crossing identification cards or are admissible without documents under the documentary waivers contained in 8 CFR 212.1(a). Class C is only for aliens who are arriving in the United States as crewmen as that term is defined in Section 101(a) (10) of the Immigration and Nationality Act. [The term "crewman" means a person serving in any capacity on board a vessel or aircraft.] No person may enter the United States until he has been inspected by an immigration officer. A list of the offices covered by this Coast Pilot is given in the Appendix.

Naval Oceanographic Office, Department of the Navy.—The Naval Oceanographic Office provides accurate charts and related information for foreign waters. Publications include Sailing Directions (pilots), Light Lists, Table of Distances, Radio Navigational Aids, Radio Weather Aids, International Code of Signals, American Practical Navigator (Bowditch), and the Notice to Mariners published weekly.

Public Health Service, Department of Health, Education, and Welfare.—The Public Health Service administers hospitalization and outpatient treatment to legal beneficiaries of the government; it also administers foreign and domestic quarantine laws and conducts medical examinations of aliens.

A vessel arriving at a port under the control of the United States shall undergo **quarantine** inspection prior to entry unless exempted from such inspection by section 71.46 or 71.47 of Foreign Quarantine Regulations (42 CFR Part 71), and Supplemental Provisions, of the Public Health Service, Department of Health, Education, and Welfare.

Vessels subject to quarantine inspection shall upon arrival at ports under the control of the United States fly a yellow flag, and await inspection, as provided in section 71.62 of Foreign Quarantine Regulations. Only the pilot shall board or be permitted to board any vessel subject to quarantine inspection until after it has been inspected by the quarantine officer and granted pratique, except with the permission of the quarantine officer. A person boarding such vessel shall be subject to the same restrictions as those imposed on the persons on the vessel. No person shall leave or be permitted to leave any vessel subject to quarantine inspection until after it has been inspected by the quarantine officers and granted pratique, except with the permission of the quarantine officer.

Vessels subject to quarantine inspection may also apply for and receive pratique by radio. Requests for radio pratique should be made in accordance with instructions on the Maritime Quarantine Declaration (HSM 13.19, 7-69) and addressed directly to the vessel's agent for relay to the quarantine station. Upon evaluation of information contained in the radio message, either radio free or radio provisional pratique will be granted to the vessel. In the case of radio free pratique, the vessel may proceed directly to dockside without inspection by a quarantine officer. Vessels granted radio provisional pratique may proceed to dockside for partial or complete inspection, depending upon the evaluation of the radio message received.

Vessels arriving at a port under the control of the United States from a foreign port shall be subject to **sanitary inspection** to ascertain whether there exists rodent, insect, or other vermin infestation, contaminated food or water, or other insanitary condition requiring measures for the prevention of the introduction, transmission, or spread of communicable disease.

National quarantine regulations will be found at the stations of the Public Health Service and at United States consulates and will be furnished to vessels upon application to officers of the Service or to Chief, Foreign Quarantine Program, National Communicable Disease Center, Atlanta, Georgia 30333.

United States merchant seamen are entitled to **medical relief** obtainable through the Public Health Service. A United States seaman is one engaged on board in care, preservation, or navigation of any registered, enrolled, or licensed vessel of the United States, or in the service, on board, of those so engaged. Hospitals, outpatient clinics, and contract physician's offices of the Public Health Service are located at the addresses given in the Appendix. Free **medical advice** is furnished to seamen by radio through the cooperation of governmental and commercial radio stations whose operators receive and relay messages from ships at sea to Public Health Service stations and then radio the medical advice back to the ships; see Appendix for list of radio stations that provide this service.

National Weather Service (NWS), National Oceanic and Atmospheric Administration (NOAA), Department of Commerce.—The National Weather Service, formerly the Weather Bureau, makes forecasts and gives warnings of approaching storms over land and ocean areas to navigation, commerce, agriculture, and the general public. Other warnings cover cold waves, frost, forest-fire hazard, tornadoes, and floods. Meteorological information is collected and transmitted at 1-hour, 3-hour, and 6-hour intervals from land stations, ships at sea, and aircraft. These reports form a basis for the forecasting service, for summarization and publication of climatological data having general value and applicability, and for research basic to improvement of the national weather service.

National Weather Service offices are in many ports and other places in the United States and possessions. Stations in the area of concern to this Coast Pilot, where the public may compare barometers against NWS barometers and discuss weather information with service officials, are listed in the Appendix. By international agreement, the NWS and the Coast Guard share in the operation of certain weather ships in the North Atlantic and North Pacific Oceans.

The collection of **marine meteorological observations** from ships at sea is conducted on a purely voluntary and cooperative basis. The NWS supplies shipmasters with blank forms, printed instructions, and such other materials as is essential to the making and recording of observations. In the course of an average peacetime year, more than 400,000 observations are received from vessels representing every maritime nation and reaching every quarter of the globe.

The **hurricane and storm warning service** was established primarily to aid marine interests. Warnings are issued whenever winds, weather, storm surge, or other conditions are expected that will be a hazard to marine operations. These warnings are given wide distribution by commercial radio and television, daily newspapers, government and commercial radio, and by storm warning displays. During the hurricane season, June to November, ships are asked to be especially watchful for signs of hurricanes and report by radio immediately. Satellite weather pictures are also used to locate hurricanes; these pictures are especially useful in areas of the ocean infrequently crossed by ships. Special reports are obtained from weather reconnaissance planes dispatched to keep track of hurricanes. Coastal radar reports are extremely valuable in defining the size and intensity of hurricanes when they are within about 200 miles of the station.

A **hurricane watch** is an announcement by the NWS to the public and all other interests via press, radio, and television whenever a tropical storm or hurricane becomes a threat to a coastal area. The "hurricane watch" announcement is not a warning; it indicates that the hurricane is near enough that everyone in the "watch" area should listen for subsequent advisories and be ready to take precautionary action in case hurricane warnings are issued.

The NWS, along with the Coast Guard, state and local governments, and private interests, cooperate in operating a **coastal warning display system** to warn pleasure boatmen, and other marine interests lacking radio-receiving equipment, of impending hazardous weather and sea conditions on coastal and inland waters. There are more than 550 of these flag or light display stations. The storm warning display stations are listed on NOS charts and included on the Marine Weather Services Charts published annually by the NWS.

DISTRESS SIGNALS AND PROCEDURES

Coast Guard search and rescue operations.—The Coast Guard conducts and/or coordinates search and rescue operations for surface vessels or aircraft that are in distress or overdue. Search and rescue aircraft have special markings, including a wide band of fluorescent red-orange around the after part of the fuselage. The cooperation of vessel operators with Coast Guard helicopters, fixed-wing aircraft, and vessels may mean the difference

between life and death for some seaman or aviator; such cooperation is greatly facilitated by the prior knowledge on the part of vessel operators of the operational requirements of Coast Guard equipment and personnel, of the international distress signals and procedures, and of good seamanship.

International distress signals.—(1) A signal made by radiotelegraphy or by any other signalling method consisting of the group "SOS" in Morse Code.

(2) A signal sent by radiotelephony consisting of the spoken word "MAYDAY".

(3) The International Flag Code Signal of NC.

(4) A signal consisting of a square flag having above or below it a ball or anything resembling a ball.

(5) Flames on the craft (as from a burning oil barrel, etc.)

(6) A rocket parachute flare or hand flare showing a red light.

(7) Rockets or shells, throwing red stars fired one at a time at short intervals.

(8) Orange smoke, as emitted from a distress flare.

(9) Slowly and repeatedly raising and lowering arms outstretched to each side.

(10) A gun or other explosive signal fired at intervals of about one minute.

(11) A continuous sounding of any fog-signal apparatus.

(12) A repeated waving of a flag or other distinctive item or material.

Radio distress procedures.—Distress calls are made on 500 kHz (SOS) for radiotelegraphy and on 2182 kHz or channel 16 (156.80 MHz) VHF (MAYDAY) for radiotelephony. For less serious situations than warrant the distress procedure, the urgency signal (PAN for radiotelephony) or the safety signal (SECURITY for radiotelephony) are used as appropriate. Since radiotelegraph transmissions are normally made by professional operators, and urgency and safety situations are less critical, only the distress procedures for voice radiotelephone are described. For complete information on emergency radio procedures, see H.O. Pubs. 117A, 117B, or Part 83, Title 47, Code of Federal Regulations. **See Appendix for a list of Coast Guard Stations which guard 2182 kHz and 156.80 MHz.** Complete information on distress guards can be obtained from Coast Guard District Commanders.

Distress calls indicate a vessel or aircraft is threatened by grave and imminent danger and requests immediate assistance. They have absolute priority over all other transmissions. All stations which hear a distress call must immediately cease any transmission capable of interfering with the distress traffic and shall continue to listen on the frequency used for the emission of the distress call. This call shall not be addressed to a particular station and acknowledgement of receipt shall not be given before the distress message which follows it is sent.

Radiotelephone distress communications include the following actions:

(1) The **radiotelephone alarm signal** (if available): The signal consists of two audio tones, of different pitch, transmitted alternately; its purpose is to attract the attention of persons on radio watch or to actuate automatic alarm devices. It may only be used to announce that a distress call or message is about to follow.

(2) The **distress call,** consisting of:—the distress signal MAYDAY (spoken three times);

—the words THIS IS (spoken once);

—the call sign or name of the vessel in distress (spoken three times).

(3) The **distress message** follows immediately and consists of:

—the distress signal MAYDAY:

—The call sign and name of the vessel in distress;

—particulars of its position (latitude and longitude, or true bearing and distance from a known geographical position);

—the nature of the distress;

—the kind of assistance desired;

—the number of persons aboard and the condition of any injured;

—present seaworthiness of vessel;

—description of the vessel (length, type; cabin, masts, power; color of hull, superstructure, trim; etc.);

—any other information which might facilitate the rescue, such as display of a surface-to-air identification signal or a radar reflector;

—your listening frequency and schedule;

—THIS IS (call sign and name of vessel in distress). OVER.

(4) **acknowledgement of receipt of a distress message:** If a distress message is received from a vessel which is definitely in your vicinity, immediately acknowledge receipt. If it is not in your vicinity, allow a short interval of time to elapse before acknowledging, in order to permit vessels nearer to the vessel in distress to acknowledge receipt without interference. However, in areas where reliable communications with one or more shore stations are practicable, all vessels may defer this acknowledgement for a short interval so that a shore station may acknowledge receipt first. The acknowledgement of receipt of a distress is given as follows:

—the call sign or name of the vessel sending the distress (spoken three times);

—the words THIS IS;

—the call sign or name of acknowledging vessel (spoken three times);

—The words RECEIVED MAYDAY.

After the above acknowledgement, allow a momentary interval of listening to insure that you will

not interfere with another vessel better situated to render immediate assistance; if not, with the authority of the person in charge of the vessel, transmit:

—the word MAYDAY;

—the call sign and name of distressed vessel;

—the words THIS IS;

—the call sign and name of your vessel;

—your position (latitude and longitude, or true bearing and distance from a known geographical position);

—the speed you are proceeding towards, and the approximate time it will take to reach, the distressed vessel. OVER.

(5) **Further distress messages and other communications:** Distress communications consist of all messages relating to the immediate assistance required by the distressed vessel. Each distress communication shall be preceded by the signal MAYDAY. The vessel in distress or the station in control of distress communications may **impose silence** on any station which interferes. The procedure is:—the words SEELONCE MAYDAY (Seelonce is French for silence). Silence also may be imposed by nearby mobile stations other than the vessel in distress or the station in control of distress communications. The mobile station which believes that silence is essential may request silence by the following procedure: —the word SEELONCE, followed by the word DISTRESS, and its own call sign.

(6) **Transmission of the distress procedure by a vessel or shore station not itself in distress:** A vessel or a shore station which learns that a vessel is in distress shall transmit a distress message in any of the following cases:

(a) **When the vessel in distress is not itself able to transmit the distress message.**

(b) When a vessel or a shore station considers that further help is necessary.

(c) When, although not in a position to render assistance, it has heard a distress message that has not been acknowledged.

In these cases, the transmission shall consist of:

—the radiotelephone alarm signal (if available);

—the words MAYDAY RELAY (spoken three times);

—the words THIS IS;

—the call sign and name of vessel (or shore station), spoken three times.

When a vessel transmits a distress under these conditions, it shall take all necessary steps to contact the Coast Guard or a shore station which can notify the Coast Guard.

(7) **Termination of distress:** When distress traffic has ceased, or when silence is no longer necessary on the frequency used for the distress traffic, the station in control shall transmit on that frequency a message to all stations as follows:

—the distress signal MAYDAY;

—the call TO ALL STATIONS, spoken three times;

—the words THIS IS;

—the call sign and name of the station sending the message;

—the time;

—the name and call sign of the vessel in distress;

—the words SEELONCE FEENEE (French for silence finished).

Radar reflectors on small craft.—Operators of disabled wooden craft and persons adrift in rubber rafts or boats that are, or may consider themselves to be, the object of a search, should hoist on a halyard or otherwise place aloft as high as possible any metallic object that would assist their detection by radar. Coast Guard cutters and aircraft are radar equipped and thus are able to continue searching in darkness and during other periods of low visibility. It is advisable for coastal fishing boats, yachts, and other small craft to have efficient radar reflectors permanently installed aboard the vessel.

Filing Cruising schedules.—Small-craft operators should prepare a cruising plan before starting on extended trips and leave ashore with a yacht club, marina, friend, or relative. It is advisable to use a checking-in procedure by telephone for each point specified in the cruising plan. Such a trip schedule is vital for determining if a boat is overdue and will assist materially in locating a missing craft in the event search and rescue operations become necessary.

Aircraft procedures for directing surface craft to scene of distress incident.—The following procedures performed in sequence by an aircraft mean that the aircraft is directing a surface craft toward the scene of a distress incident.

(a) Circling the surface craft at least once.

(b) Crossing the projected course of the surface craft close ahead at low altitude, opening and closing the throttle, or changing the propeller pitch.

(c) Heading in the direction in which the surface craft is to be directed. The surface craft should acknowledge the signal by changing course and following the aircraft. If, for any reason, it is impossible to follow, the surface craft should hoist the international code flag NOVEMBER, or use any other signaling means available to indicate this.

The following procedures performed by an aircraft mean that the assistance of the surface craft is no longer required:

(a) Crossing the wake of the surface craft close astern at a low altitude opening and closing the throttle or changing the propeller pitch.

Since modern jet engined aircraft cannot make the characteristic sound associated with opening and closing the throttle, or changing propeller pitch, ships should be alert to respond to the signals without the sounds, when jets or turboprop aircraft are involved.

Helicopter evacuation of personnel.—Helicopter evacuation, usually performed by the Coast

Guard, is a hazardous operation to the patient and to the flight crew, and should only be attempted in event of very serious illness or injury. Provide the doctor on shore with all the information you can concerning the patient, so that an intelligent evaluation can be made concerning the need for evacuation. Most rescue helicopters can proceed less than 150 miles offshore (a few new helicopters can travel 250 miles out to sea), dependent on weather conditions and other variables. If an evacuation is necessary, the vessel must be prepared to proceed within range of the helicopter, and should be familiar with the preparations which are necessary prior to and after its arrival.

When requesting helicopter assistance:

(1) Give the accurate position, time, speed, course, weather conditions, sea conditions, wind direction and velocity, type of vessel, voice and CW frequency for your ship.

(2) If not already provided, give **complete** medical information including whether or not the patient is ambulatory.

(3) If you are beyond helicopter range, advise your diversion intentions so that a rendezvous point may be selected.

(4) If there are changes to any items reported earlier, advise the rescue agency immediately. Should the patient die before the arrival of the helicopter, be sure to advise those assisting you.

Preparations prior to the arrival of the helicopter:

(1) Provide continuous radio guard on 2182 kHz or specified voice frequency, if possible. The helicopter normally cannot operate CW.

(2) Select and clear the most suitable hoist area, preferably aft on the vessel with a minimum of 50 feet radius of clear deck. This must include the securing of loose gear, awnings, and antenna wires. Trice up running rigging and booms. If hoist is aft, lower the flag staff.

(3) If the hoist is to take place at night, light the pickup areas as well as possible. Be sure you **do not shine any lights on the helicopter,** so that the pilot is not blinded. If there are any obstructions in the vicinity, put a light on them so the pilot will be aware of their positions.

(4) Point search lights vertically to aid the flight crew in locating the ship and turn them off when the helicopter is on the scene.

(5) Be sure and advise the helicopter of the location of the pickup area on the ship before the helicopter arrives, so that the pilot may make his approach to aft, amidships or forward, as required.

(6) There will be a high noise level under the helicopter, so voice communications on deck are almost impossible. Arrange a set of hand signals among the crew who will assist.

Hoist operations:

(1) If possible, have the patient moved to a position as close to the hoist area as his condition will permit—**time is important.**

(2) Normally, if a litter (stretcher) is required, it will be necessary to move the patient to the special litter which will be lowered by the helicopter. Be prepared to do this as quickly as possible. Be sure the patient is strapped in, face up, and with a life jacket on (if his condition will permit).

(3) Be sure that the patient is tagged to indicate what medication, if any, was administered to him, and when it was administered.

(4) Have patient's medical record and necessary papers in an envolope or package ready for transfer with the patient.

(5) Again, if the patient's condition permits, be sure he is wearing a life jacket.

(6) Change the vessel's course to permit the ship to ride as easily as possible with the wind on the bow, preferably on the port bow. Try to choose a course to keep the stack gases clear of the hoist area.

(7) Reduce speed to ease ship's motion but maintain steerageway.

(8) If you do not have radio contact with the helicopter, when you are in all respects ready for the hoist, signal the helicopter in with a "come on" with your hand, or at night by flashlight signals.

(9) **Allow basket or stretcher to touch deck prior to handling to avoid static shock.**

(10) If a trail line is dropped by the helicopter, guide the basket or stretcher to the deck with the line; keep the line free at all times. This line will not cause shock.

(11) Place the patient in basket, sitting with his hands clear of the sides, or in the litter, as described above. Signal the helicopter hoist operator when ready for the hoist. Patient should signal by a nodding of the head if he is able.

(12) If it is necessary to take the litter away from the hoist point, unhook the hoist cable and keep it free for the helicopter to haul in. **Do not secure cable or trail line to the vessel or attempt to move stretcher without unhooking.**

(13) When patient is strapped into the stretcher, signal the helicopter to lower the cable, hook up, and signal the hoist operator when the patient is ready to hoist. Steady the stretcher so it will not swing or turn.

(14) If a trail line is attached to the basket or stretcher, use it to steady the patient as he is hoisted. Keep your feet clear of the line.

Coast Guard droppable, floatable pumps.—The Coast Guard often provides vessels in distress with emergency pumps by either making parachute drops or delivering by vessel. The most commonly used type of pump comes complete in a sealed aluminum drum about half the size of a 50 gallon oil drum. One single lever on top opens it up. Don't be smoking as there may be gas fumes inside the can. The pump will draw about 90 gallons per minute. There should be a waterproof flashlight on top of the pump for night use.

To operate:

(1) Make sure suction and discharge hose connections are tight. Use the spanner wrench provided.

(2) Fill the gas tank with the gas provided.

(3) Prime the pump, using attached 8" wrench to open priming plug. It will take about a gallon of water.

(4) Pull the stop switch away from the spark plug.

(5) Close Carburetor choke-turn in direction of arrow.

(6) Open throttle at base of engine.

(7) Attach cord and start engine.

(8) Open choke.

(9) When finished, flush out pump with fresh water.

Preparations for being towed by Coast Guard:

(1) Clear the forecastle area as well as you can.

(2) If a line-throwing gun is used, keep everyone out of the way until line clears the boat. The Coast Guard vessel will blow a police whistle or otherwise warn you before he shoots.

(3) Have material ready for chafing gear.

Surface ship procedures for assisting an aircraft that must ditch.—The following are recommended procedures for assisting an aircraft that desires to ditch alongside:

By day: (1) Establish a radiotelephone watch on 2182 kHz if equipped. Attempt to contact the aircraft on this frequency.

(2) Maintain a radiotelegraphy watch on 500 kHz. The Rescue Coordination Center controlling the case will try to contact the ship on this frequency via a shore radio station. Communications with the aircraft may have to be relayed in this manner.

(3) Be prepared to send homing signals for the aircraft on 410 kHz or 522 kHz.

(4) Provide black smoke if possible to aid aircraft in sighting the ship.

(5) Post extra lookouts.

(6) Prepare to stop vessel or proceed towards plane according to circumstances.

(7) Have two lifeboats and lifeboat crews ready. Include in each lifeboat two ring buoys with buoyant heaving lines, and fire extinguishers.

(8) Have medicine chest, stretchers, blankets, hot drinks and food ready.

(9) Have ships' hospital prepared to receive injured persons.

(1) Rig Jacobs ladders. Rig cargo net or rope mail sling on lee side amidships by cargo boom, to be used if necessary to heave up exhausted survivors. Injured persons should be left in the lifeboat to be hoisted aboard with it.

(11) Be prepared to give aircraft information on weather and sea conditions. Aircraft will want to know wind direction and force; direction, height, and length of primary and secondary swell systems. If pilot selects ditch heading in sufficient time and conditions otherwise permit, lay foam path along ditching course.

(12) When aircraft is in sight set course parallel to ditch heading that pilot has chosen. If not in communication with the aircraft by the time the plane is sighted and unable to obtain pilot's ditch heading, set course parallel to the main swell system and into the wind component, if any.

(13) If on board, use a liferaft or buoyant apparatus in water as a landing platform at the Jacobs ladder.

(14) Instruct coxswains to recover those survivors in the water or clinging to wreckage before recovering those in liferafts.

(15) Keep the Rescue Coordination Center advised by radio, prior to, and subsequent to ditching.

By night.—In addition to procedures recommended for daytime, the following are also recommended if the emergency occurs at night:

(1) Lay a string of not less than 6 ring buoys with water lights approximately 500 feet apart in a single line along the ditch heading received from the pilot. Take station two-thirds down the lighted lane off to one side. The aircraft will attempt to land close to the lighted lane. Do not use carbide water lights because of the danger of gasoline on the water.

(2) Light up the ship with all fixed deck lights and rig cargo lights on masts, king posts, top of decks, etc., if possible.

(3) Use searchlights as visual beacons, shining one vertically and sweeping the sky at 15° off the horizon with the other. Do not shine lights toward the aircraft at any time, since this would blind the pilot.

RADIO WARNINGS AND WEATHER

Marine radio warnings and weather forecasts are available from many sources and through several types of transmissions. Only voice radiotelephone broadcasts are described in the Coast Pilots. Radiotelegraph (CW), radioteletype, radiofacsimile, and CW broadcasts of navigational warnings and other advisories are not described, since these transmissions are normally copied only by professional radio operators. For complete information on radio warnings and weather, see H.O. Pubs. 117A, 117B, and 118.

Frequency units.—**Hertz (Hz)**, a unit equal to one cycle per second, has been generally adopted for radio frequencies; accordingly, frequencies formerly given in the Coast Pilots in kilocycles (kc) and megacycles (mc) are now stated in **kilohertz (kHz)** and **Megahertz (MHz)**, respectively.

Coast Guard radio stations.—Coast Guard radio stations provide urgent, safety, and scheduled marine information broadcasts with virtually complete coverage of the approaches and coastal waters of the United States, Puerto Rico, and the U.S. Virgin Islands.

Scheduled radiotelephone broadcasts include routine weather, small-craft warnings, storm

warnings, navigation information, and other advisories on **2670 kHz**, following a preliminary call on **2182 kHz.** See the Appendix for a list of the stations and their broadcast times for the area covered by this Coast Pilot.

Urgent and safety radiotelephone broadcasts of important Notice to Mariners items, storm warnings, and other vital marine information are transmitted upon receipt, and urgent broadcasts are repeated 15 minutes later; additional broadcasts are made at the discretion of the originator. **Urgent** broadcasts are preceded by the urgent signal PAN. **Both the urgent signal and message are transmitted on 2182 kHz. Safety** broadcasts are preceded by the safety signal SECURITY. **The safety signal is given on 2182 kHz and the message is given on 2670 kHz.** At the discretion of the originator, urgent and safety broadcasts may also be made on VHF channel 16 (156.80 MHz).

The National Weather Service (NWS) operates a series of **VHF-FM radio stations** which provide continuous recorded weather broadcasts on the frequencies **162.40 or 162.55** MHz. These broadcasts are available to those with suitable receivers within about 40 miles of the antenna site; see the Appendix for a list of these stations in the area covered by this Coast Pilot.

Commercial radiotelephone coast stations.—Broadcasts of coastal weather and warnings are made by some commercial radiotelephone coast stations (marine operators) on the normal transmitting frequencies of the stations. Vessels with suitable receivers and desiring this service may determine the frequencies and schedules of these broadcasts from their local stations or from the series of Marine Weather Services Charts published annually by the NWS.

Local broadcast-band radio stations.—Many local radio stations in the standard AM and FM broadcast band give local marine weather forecasts from the NWS on a regular schedule. These stations are listed on the series of Marine Weather Services Charts published annually by the NWS. The broadcast schedules are usually given in local newspapers.

Reports from ships.—The master of every ship of the United States equipped with radio transmitting apparatus, on meeting with a tropical storm, dangerous ice, subfreezing air temperatures with gale force winds causing severe ice accretion on superstructures, derelict, or any other direct danger to navigation, is required to cause to be transmitted a report of these dangers to ships in the vicinity and to the appropriate Government agencies.

During the West Indies hurricane season, June 1 to November 30, ships in the Gulf of Mexico, Caribbean Sea area, southern North Atlantic Ocean, and the Pacific waters west of Central America and Mexico are urged to cooperate with the NWS in furnishing these special reports in order that warnings to shipping and coastal areas may be issued.

TIME SIGNALS.—The United States system of broadcasting time signals begins at 55 minutes 0 second of some hour and continues for 5 minutes. Signals are transmitted on every second of this period except the 29th of each minute, the 51st of the first minute, the 52d of the second minute, the 53d of the third minute, the 54th of the fourth minute, the last 4 seconds of the first 4 minutes, and the last 9 seconds of the last minute. The hour signal is a 1.3-second dash, which is much longer than the others.

In all cases the beginning of the dashes indicate the beginnings of the seconds, and the ends of the dashes are without significance. The number of dashes sounded in the group at the end of any minute indicates the number of minutes of the signal yet to be sent. In case of signal failure or error, the signal is repeated 1 hour later.

The **United States Naval Observatory** at Washington, D.C., is the origin of all Government time signals broadcast in the United States and its possessions. The time signals are broadcast by Navy Radio Station **NSS** in Washington on the following frequencies: 162 kHz (replaced by 121.95 kHz from 1400 to 2000 on Thursdays), 5870 kHz, 9425 kHz, 13575 kHz, 17050.4 kHz, and 23650 kHz; the hours of transmission are 0155-0200, 0555-0600, 0755-0800, 1155-1200, 1355-1400, 1755-1800, and 2355-0000 **Greenwich Mean Time.**

The **National Bureau of Standards,** in cooperation with the Naval Observatory, broadcasts time signals from its radio station **WWV** near Fort Collins, Colorado, on radio frequencies of 2.5, 5, 10, 15, 20, and 25 megahertz. The service is continuous, day and night. This insures reliable coverage of the United States and useful coverage of many other parts of the world. The services include standard radio frequencies, standard audio frequencies, standard musical pitch, standard time intervals, time signals, UT2 corrections, radio propagation forecasts, and geophysical alerts.

Time announcements.—The audio frequencies are interrupted at precisely 2 minutes before each hour. They are resumed precisely on the hour and each 5 minutes thereafter. The beginnings of these periods, when the audio frequencies are resumed, are coordinated with the United States Naval Observatory and accurately mark the hour and successive 5-minute periods.

Greenwich Mean Time is announced in International Morse Code and voice during the last half of each fifth minute of the hour. The announcement gives the correct time at the commencement of the next tone.

Standard Time Intervals.—An audio pulse, resembling the ticking of a clock, occurs each second of the minute except the 59th second. A double pulse occurs for the 60th (or zero) second of each minute.

Radio Propagation Forecasts are given in International Morse Code during the last half-minute of each 5 minute interval. These symbols indicate the existing condition of the ionosphere over the North Atlantic and the expected condition for the succeeding 6 hours. A letter (N, U, or W) expresses the present condition as normal, unsettled or disturbed and is followed by a number from 1 to 9 expressing the expected condition, the higher numbers being more favorable. Radio direction finders may behave unreliably during disturbed conditions.

Silent periods occur for 4 minutes each hour from 45 minutes 15 seconds after the hour to 49 minutes 15 seconds after the hour.

Radio Station WWVH, also operated by the National Bureau of Standards, broadcasts a similar program from the island of Maui, Hawaii, at frequencies of 2.5, 5, 10, and 15 megahertz. **Greenwich Mean Time** is announced both by voice and International morse code during each fifth minute of the hour. **Radio propagation forecasts** are not broadcast by WWVH. **Silent Periods** occur at WWVH for about 4 minutes each hour commencing between 15 minutes 00 seconds and 15 minutes 15 seconds after the hour.

Special Publication 236 describes in detail the standard frequency and time service of the National Bureau of Standards. Single copies may be obtained upon request from the National Bureau of Standards, Boulder, Colorado 80302. Quantities may be obtained from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 at 15 cents per copy.

NAUTICAL CHARTS

Reporting chart deficiencies.—Users are requested to report all significant observed discrepancies in and desirable additions to NOS nautical charts, including depth information in privately maintained channels and basins; obstructions, wrecks, and other dangers; new landmarks or the nonexistence or relocation of charted ones; uncharted fixed private aids to navigation; and deletions or additions of small-craft facilities listed on the SC series of charts. All such reports should be sent to The Director (C323), National Ocean Survey, Rockville, Md. 20852.

Chart symbols and abbreviations.—The standard symbols and abbreviations approved for use on all regular nautical charts published by the U.S. Naval Oceanographic Office and the U.S. National Ocean Survey are contained in **Chart No. 1,** United States of America **Nautical Chart Symbols and Abbreviations.** The publication is available at all Naval Oceanographic and National Ocean Survey sales agents.

On certain foreign charts reproduced by the United States, and on foreign charts generally, the symbols and abbreviations used may differ from U.S. approved standards. It is, therefore, recommended that navigators who acquire and use foreign charts and reproductions procure the symbol sheet or Chart No. 1 produced by the same foreign agency.

The tidal datum for depths on NOS charts is the mean of all low waters for the Atlantic coast of the United States, including the West Indies, and the mean of the lower low waters for the Pacific coast, including the Hawaiian Islands and Alaska. The plane most frequently used on foreign charts is mean low water springs. The effect of strong winds, in combination with the regular tidal action, may at times cause the water level to fall considerably below the reference plane.

Accuracy of a nautical chart.—The value of a nautical chart depends upon the accuracy of the surveys on which it is based. The chart reflects what was found by field surveys and what has been reported to NOS Headquarters. The chart represents general conditions at the time of surveys or reports and does not necessarily portray present conditions. Significant changes may have taken place since the date of the last survey or report.

Each sounding represents an actual measure of depth and location at the time the survey was made, and each bottom characteristic represents a sampling of the surface layer of the sea bottom at the time of sampling. Areas where sand and mud prevail, especially the entrances and approaches to bays and rivers exposed to strong tidal current and heavy seas, are subject to continual change.

In coral regions and where rocks and boulders abound, it is always possible that surveys may have failed to find every obstruction. Thus, when navigating such waters, customary routes and channels should be followed and areas avoided where irregular and sudden changes in depth indicate conditions associated with pinnacle rocks, coral heads, or boulders.

Information charted as "reported" should be treated with caution in navigating the area because the actual conditions have not been verified by government surveys.

The **date of a chart** is of vital importance to the navigator. When charted information becomes obsolete, further use of the chart for navigation may be dangerous. Announcements of new editions of nautical charts are usually published in notices to mariners. A monthly list of the latest editions is distributed to sales agents; free copies may be obtained from the sales agents or by writing to Distribution Division (C44), National Ocean Survey, Washington, D.C. 20235.

Corrections to charts.—It is essential for navigators to keep charts corrected through information published in the notices to mariners, especially since the NOS no longer hand-corrects charts prior to distribution.

Caution in using small-scale charts.—Dangers to navigation cannot be shown with the same amount

of detail on small-scale charts as on those of larger scale. Therefore, the largest scale chart of an area should always be used.

The **scales of nautical charts** range from 1:2,500 to about 1:5,000,000. Graphic scales are generally shown on charts with scales of 1:80,000 or larger, and numerical scales are given on smaller-scale charts. NOS charts are classified according to scale as follows:

Sailing charts, scales 1:600,000 and smaller, are for use in fixing the mariner's position as he approaches the coast from the open ocean, or for sailing between distant coastwise ports. On such charts the shoreline and topography are generalized and only offshore soundings, the principal lights, outer buoys, and landmarks visible at considerable distances are shown.

General charts, scales 1:100,000 to 1:600,000, are for coastwise navigation outside of outlying reefs and shoals.

Coast charts, scales 1:50,000 to 1:100,000 are for inshore navigation leading to bays and harbors of considerable width and for navigating large inland waterways.

Harbor charts, scales larger than 1:50,000, are for harbors, anchorage areas, and the smaller waterways.

Special charts, various scales, cover the Intracoastal waterways and miscellaneous small-craft areas.

Blue tint in water areas.—A blue tint is shown in water areas on many charts to accentuate shoals and other areas considered dangerous for navigation, when using that particular chart. Since the danger curve varies with the intended purpose of a chart a careful inspection should be made to determine the contour depth of the bluetint areas.

Caution on bridge and cable clearances.—For bascule bridges whose spans do not open to a full vertical position, unlimited overhead clearance is not available for the entire charted horizontal clearance when the bridge is open, due to the inclination of the drawspans over the channel.

The charted clearances of overhead cables are for the lowest wires at normal high water unless otherwise stated. **Vessels with masts, stacks, booms, or antennas should allow sufficient clearance under power cables to avoid arcing.**

Submarine cable areas are shown on the charts but are not described in the Coast Pilots. Special effort should be made to avoid anchoring or trawling in cable areas. If a vessel does foul a cable, extreme care should be used when attempting to clear. Should normal methods fail, the anchor or other gear should be slipped and abandoned rather than risk breaking or cutting the cable. The high voltages in certain cables could cause severe burn or loss of life.

Artificial obstructions to navigation.—Disposal areas are designated by the Corps of Engineers for depositing dredged material where existing depths indicate that the intent is not to cause sufficient shoaling to create a danger to surface navigation. The areas are charted without blue tint, and soundings and depth curves are retained.

Dumping grounds are areas established by federal regulation (Part 205, Title 33, Code of Federal Regulations) in which dumping of dredged material and other nonbuoyant objects is prohibited or in which such dumping is allowed with the permission of and under the supervision of the Corps of Engineers.

Spoil areas are for the purpose of depositing dredged material, usually near and parallel to dredged channels; they are usually a hazard to navigation. Spoil areas are usually charted from survey drawings from Corps of Engineers after-dredging surveys, though they may originate from private or other Government agency surveys. Spoil areas are tinted blue on the charts, are labeled, and all soundings and depth curves are omitted. Navigators of even the smallest craft should avoid crossing spoil areas.

Fish havens are established by private interests, usually sport fishermen, to simulate natural reefs and wrecks that attract fish. The reefs are constructed by dumping assorted junk ranging from old trolley cars and barges to scrap building material in areas which may be of very small extent or may stretch a considerable distance along a depth curve; old automobile bodies are a commonly used material. The Corps of Engineers must issue a permit, specifying the location and depth over the reef, before such a reef may be built. However, the reefbuilders' adherance to permit specifications can be checked only with a wire drag. Fish havens are outlined and labeled on the charts, but soundings and depth curves are usually retained and blue tinting is seldom used. Navigators should be cautious about passing over fish havens or anchoring in their vicinity.

Fish trap areas are areas established by the Corps of Engineers in which traps may be built and maintained according to established regulations. The areas and regulations are in Part 206, Title 33, Code of Federal Regulations. The fish stakes which may exist in these areas are obstructions to navigation and may be dangerous. The limits of fish trap areas and a cautionary note are usually charted. Navigators should avoid these areas.

Local magnetic disturbances.—If measured values of magnetic variation differ from the expected (charted) values by several degrees, a magnetic disturbance note will be printed on the chart. The note will indicate the location and magnitude of the disturbance, but the indicated magnitude should not be considered as the largest possible value that may be encountered. Large disturbances are more frequently detected in the shallow waters near land masses than on the deep sea. Generally,

the effect of a local magnetic disturbance diminishes rapidly with distance, but in some locations there are multiple sources of disturbances and the effects may be distributed for many miles.

Compass roses on charts.—Each compass rose shows the date, magnetic variation, and the annual change in variation. Prior to the new edition of a nautical chart, the compass roses are reviewed. Corrections for annual change and other revisions may be made as a result of newer and more accurate information. On some general and sailing charts, the magnetic variation is shown by isogonic lines in addition to the compass roses.

The **Mercator projection** used on most nautical charts has straight-line meridians and parallels that intersect at right angles. On any particular chart the distances between meridians are equal throughout, but distances between parallels increase progressively from the equator toward the poles, so that a straight line between any two points is a rhumb line. This unique property of the Mercator projection is one of the main reasons why it is preferred by the mariner.

Echo soundings.—Ship's echo sounders may indicate small variations from charted soundings; this may be due to the fact that various corrections (instrument corrections, settlement and squat, draft, and velocity corrections) are made to echo soundings in surveying which are not normally made in ordinary navigation, or to observational errors in reading the echo sounder. Instrument errors vary between different equipment and must be determined by calibration aboard ship. Most types of echo sounders are factory calibrated for a velocity of sound in water of 800 fathoms per second, but the actual velocity may differ from the calibrated velocity by as much as 5 percent, depending upon the temperature and salinity of the waters in which the vessel is operating; the highest velocities are found in warm, highly saline water, and the lowest in icy, fresh water. Velocity corrections for these variations are determined and applied to echo soundings during hydrographic surveys. All echo soundings must be corrected for the vessel's draft, unless the draft correction has been set on the echo sounder.

Observational errors include misinterpreting false echos from schools of fish, seaweed, etc., but the most serious error which commonly occurs is where the depth is greater than the scale range of the instrument; a 400-fathom scale indicates 15 fathoms when the depth is 415 fathoms. Caution in navigation should be exercised when wide variations from charted depths are observed.

AIDS TO NAVIGATION

Reporting of defects in aids to navigation.—Promptly notify the nearest Coast Guard District Commander if an aid to navigation is observed to be missing, sunk, capsized, out of position, damaged, extinguished, or showing improper characteristics.

Radio messages should be prefixed "Coast Guard" and transmitted directly to any U.S. Government shore radio station for relay to the Coast Guard District Commander. If the radio call sign of the nearest U.S. Government radio shore station is not known, radiotelegraph communication may be established by the use of the general call "NCG" on the frequency of 500 kHz. Merchant ships may send messages relating to defects noted in aids to navigation through commercial facilities only when they are unable to contact a U.S. Government shore radio station. Charges for these messages will be accepted "collect" by the Coast Guard.

Lights.—The visibility of lights is given in the Light Lists and on the charts. The Light Lists give both the nominal range and geographic range, whereas the charts show only the shorter range (charts with edition or revision dates prior to July, 1969, may not conform to this policy). **Nominal range** is the luminous range (a function of light intensity) in clear weather (meteorological visibility 10 miles), and **geographic range** is the maximum distance at which a light can be seen with perfect visibility (without regard to light intensity) with the observer's eye 15 feet above sea level. The actual luminous range for meteorological visibilities other than 10 miles may be determined graphically; see the light list. Geographic range is a function of only the curvature of the earth, and is determined solely from the heights above sea level of the light and the observer's eye; therefore, to determine the actual geographic range for a height of eye other than 15 feet, the geographic range from the Light List or chart must be corrected by a distance corresponding to the height difference, the distance correction being determined from a table of "distances of visibility for various heights above sea level" (see Light List or Coast Pilot Appendix). The maximum distances at which lights can be seen may at times be increased by abnormal atmospheric refraction and may be greatly decreased by unfavorable weather conditions, such as fog, rain, haze, or smoke. All except the most powerful lights are easily obscured by such conditions. In some conditions of the atmosphere white lights may have a reddish hue. During weather conditions which tend to reduce visibility, colored lights are more quickly lost to sight than are white lights. Navigational lights should be used with caution because of the following conditions that may exist:

A light may be extinguished and the fact not reported to the Coast Guard for correction, or a light may be located in an isolated area where it will take time to correct.

In regions where ice conditions prevail the lantern panes of unattended lights may become covered with ice or snow, which will greatly reduce the visibility and may also cause colored lights to appear white.

Brilliant shore lights used for advertising and other purposes, particularly those in densely populated areas, make it difficult to identify a navigational light.

At short distances flashing lights may show a faint continuous light between flashes.

The distance of an observer from a light cannot be estimated by its apparent intensity. The characteristics of lights in an area should always be checked in order that powerful lights visible in the distance will not be mistaken for nearby lights showing similar characteristics at low intensity such as those on lighted buoys.

The apparent characteristic of a complex light may change with the distance of the observer, due to color and intensity variations among the different lights of the group. The characteristic as charted and shown in the Light List may not be recognized until nearer the light.

Motion of a vessel in a heavy sea may cause a light to alternately appear and disappear, and thus give a false characteristic.

Where lights have different colored sectors, be guided by the correct bearing of the light; do not rely on being able to accurately observe the point at which the color changes. On either side of the line of demarcation of colored sectors there is always a small arc of uncertain color.

On some bearings from the light, the range of visibility of the light may be reduced by obstructions. In such cases, the obstructed arc might differ with height of eye and distance. When a light is cut off by adjoining land and the arc of visibility is given, the bearing on which the light disappears may vary with the distance of the vessel from which observed and with the height of eye. When the light is cut off by a sloping hill or point of land, the light may be seen over a wider arc by a ship far off than by one close to.

Arcs of circles drawn on charts around a light are not intended to give information as to the distance at which it can be seen, but solely to indicate, in the case of lights which do not show equally in all directions, the bearings between which the variation of visibility or obscuration of the light occurs.

Lights of equal candlepower but of different colors may be seen at different distances. This fact should be considered not only in predicting the distance at which a light can be seen, but also in identifying it.

Lights should not be passed close aboard because in many cases rip-rap mounds are maintained to protect the structure against ice damage and scouring action.

Many prominent towers, tanks, smokestacks, buildings, and other similar structures, charted as landmarks, display flashing and/or fixed red aircraft obstruction lights. Lights shown from landmarks are charted only when they have distinctive characteristics to enable the mariner to positively identify the location of the charted structure.

Lights and clearance gages on bridges.—The Coast Guard regulates marine obstruction lights and clearance gages on bridges across navigable waters. Where installed, clearance gages are generally vertical numerical scales, reading from top to bottom, and show the actual vertical clearance between the existing water level and the lowest point of the bridge over the channel; the gages are normally on the right-hand pier or abutment of the bridge, on both the upstream and downstream sides.

Bridge lights are fixed red or green, and are privately maintained; they are generally not charted or described in the text of the Coast Pilots. All bridge piers (and their protective fenders) and abutments which are in or adjacent to a navigation channel are marked on all channel sides by red lights. On each channel span of a fixed bridge, there is a range of two green lights marking the center of the channel and a red light marking both edges of the channel, except that when the margins of the channel are confined by bridge piers, the red lights on the span are omitted, since the pier lights then mark the channel edges; for multiplespan fixed bridges, the main-channel span may also be marked by three white lights in a vertical line above the green range lights.

On all types of drawbridges, one or more red lights are shown from the drawspan (higher than the pier lights) when the span is closed; when the span is open, the higher red lights are obscured and one or two green lights are shown from the drawspan, higher than the pier lights. The number and location of the red and green lights depend upon the type of drawbridge.

A complete description of bridge lighting is contained in Coast Guard Publication 208. Bridges and their lighting, construction, maintenance, and operation are set forth in the Code of Federal Regulations, Title 33, Parts 115—118. Aircraft obstruction lights, prescribed by the Federal Aviation Administration, may operate at certain bridges. Drawbridge operation regulations are published in Chapter 2 of the Coast Pilots.

Fog signals.—Caution should be exercised in the use of sound fog signals for navigation purposes. They should be considered solely as warning devices.

Sound travels through the air in a variable manner, even without the effects of wind and, therefore, the hearing of fog signals cannot be implicitly relied upon.

Experience indicates that distances must not be judged only by the intensity of the sound; that occasionally there may be areas close to a fog signal in which it is not heard; and that fog may exist not far from a station, yet not be seen from it, so the signal may not be operating. It is not always possible to start a fog signal immediately when fog is observed.

Avoidance of collision with lightships, ocean station vessels, offshore light stations, and large navigational buoys (LNB).—Courses should invariably be set to pass these aids with sufficient clearance to avoid the possibility of collision from any cause. Errors of observation, current and wind effects, other vessels in the vicinity, and defects in steering gear may be, and have been the cause of actual collisions, or imminent danger thereof, needlessly jeopardizing the safety of these facilities and their crews, and that of all navigation dependent on these important aids to navigation.

Experience shows that lightships and offshore light stations cannot be safely used as leading marks to be passed close aboard, but should always be left broad off the course, whenever sea room permits. When approaching lightships, ocean station vessels, fixed offshore light structures, and large navigational buoys (LNB) on radio bearings, the risk of collision will be avoided by insuring that radio bearing does not remain constant.

It should be borne in mind that most lightships and large buoys are anchored to a very long scope of chain and, as a result, the radius of their swinging circle is considerable. The charted position is the location of the anchor. Furthermore under certain conditions of wind and current, they are subject to sudden and unexpected sheers which are certain to hazard a vessel attempting to pass close aboard.

During extremely heavy weather and due to their exposed locations, lightships may be carried off station without the knowledge and despite the best efforts of their crews. The mariner should, therefore, not implicitly rely on a lightship maintaining its precisely charted position during and immediately following severe storms. A lightship known to be off station will secure her light, fog signal and radiobeacon and fly the International Code signal "LO" signifying "I am not in my correct position".

Watch (station) buoys are sometimes moored near lightships and seacoast buoys to mark the approximate station should these important aids be carried away or temporarily removed. The lightship watch buoy also gives the crew an indication of dragging.

Since these uncharted buoys are always unlighted and, in some cases, moored as much as a mile from the lightship or seacoast buoy, the danger of a closely passing vessel colliding with them is always present—particularly so during darkness or periods of reduced visibility.

Buoys.—The navigator should check the position by shore bearings, soundings, or other means, and not rely entirely on a buoy being on its charted position and showing its proper characteristic. Buoys are liable to be carried away, shifted, capsized, or sunk as a result of storms, ice conditions, collision, or other accident. Lighted buoys may become extinguished or show improper characteristics, or sound buoys may not function because of storm, ice, or collision.

The charted position of a buoy is the location of its sinker. Since a buoy is moored to it by varying lengths of chain, the position shifts due to wind and current; a vessel attempting to pass close aboard always risks collision with a yawing buoy.

Buoys may not always properly mark shoals or other obstructions due to shifting of the shoals or of the buoys. Buoys marking wrecks or other obstructions are usually placed on the seaward or channelward side and not directly over a wreck. Since buoys may be located some distance from a wreck they are intended to mark, and since sunken wrecks are not always static, extreme caution should be exercised when operating in the vicinty of such buoys.

Caution, channel markers.—Lights, daybeacons, and buoys along dredged channels do not always mark the bottom edges. Due to local conditions, aids may be located inside or outside the channel limits shown by dashed lines on a chart. The Light List tabulates the offset distances for these aids in many instances.

Aids may be moved, discontinued, or replaced by other types to facilitate dredging operations. Mariners should exercise caution when navigating areas where dredges with auxiliary equipment are working.

Temporary changes in aids are not included on the charts.

Radiobeacons.—A map showing the locations and operating details of marine radiobeacons is given in each Light List. There is included in these publications the procedure to follow for the use of radiobeacons for calibration of radio direction-finders as well as a list of special radio direction-finder calibration stations.

A vessel steering a course for a radiobeacon should observe the same precautions as when steering for a light or any other mark. If the radiobeacon is aboard a lightship, particular care should be exercised to avoid the possibility of collision, and sole reliance should never be placed on sighting the lightship or hearing its fog signal. If there are no dependable means by which the vessel's position may be fixed and the course changed well before reaching the lightship, a course should be selected that will insure passing the lightship at a distance, rather than close aboard, and repeated bearings of the radiobeacon should show an increasing change in the same direction.

Radio bearings.—No exact data can be given as to the accuracy to be expected in radio bearings taken by a ship, since the accuracy depends to a large extent upon the skill of the ship's operator, the condition of the ship's equipment and the accuracy of the ship's calibration curve. Mariners are urged to obtain this information for themselves by taking frequent radio bearings, when their ship's position is accurately known, and recording the results.

Radio bearings obtained at twilight or at night, and bearings which are almost parallel to the coast, should be accepted with reservations, due to "night effect" and to the distortion of radio waves which travel overland. Bearings of aircraft ranges and standard broadcast stations should be used with particular caution due to coastal refraction and lack ofcalibration of their frequencies.

Conversion of radio bearings to Mercator bearings.—Radio directional bearings are the bearings of the great circles passing through the radio stations and the ship, and, unless in the plane of the Equator or a meridian, would be represented on a Mercator chart as curved lines. Obviously it is impracticable for a navigator to plot such lines on a Mercator chart, so it is necessary to apply a correction to a radio bearing to convert it into a Mercator bearing, that is, the bearing of a straight line on a Mercator chart laid off from the sending station and passing through the receiving station.

A table of corrections is given in the Appendix for the conversion of a radio bearing into a Mercator bearing. It is sufficiently accurate for practical purposes for distances up to 1,000 miles.

The only data required are the latitudes and longitudes of the radiobeacons and of the ship by dead reckoning. The latter is scaled from the chart, and the former is either scaled from the chart or taken from the Light List.

The table is entered with the differences of longitude in degrees between the ship and station (the nearest tabulated value being used), and opposite the middle latitude between the ship and station, the correction to be applied is read.

The sign of the correction (bearings read clockwise from the north) will be as follows: In north latitude, the minus sign is used when the ship is east of the radiobeacon and the plus sign used when the ship is west of the radiobeacon. In south latitude, the plus sign is used when the ship is east of the radiobeacon, and the minus sign is used when the ship is west of the radiobeacon.

To facilitate plotting, 180 degrees should be added to or subtracted from the corrected bearing, and the result plotted from the radiobeacon.

Should the position by dead reckoning differ greatly from the true position of the ship as determined by plotting the corrected bearings, retrial should be made, using the new value as the position of the ship.

Radio bearings from other vessels.—Any vessel with a radio direction-finder can take a bearing on a vessel equipped with a radio transmitter. These bearings, however, should be used only as a check, as comparatively large errors may be introduced by local conditions surrounding the radio direction-finder unless known and accounted for. Although any radio station, for which an accurate position is defintely known, may serve as a radiobeacon for vessels equipped with a radio direction-finder, extreme caution must be exercised in their use. Stations established especially for maritime services are more reliable.

Loran.—A list of stations and descriptive details of the Loran System are given in the Light Lists. Instructions, tables, and charts of the Loran System are published by the Naval Oceanographic Office. The National Ocean Survey shows Loran lines on general charts of the United States coasts.

Exact data cannot be given as to the accuracy to be expected in loran positions since the accuracy depends to a large extent on the skill of the operator, the condition and type of receiving equipment, and the area of operation. The accuracy of a loran fix is determined by the accuracy of the individual lines of positions used to establish the fix and by their angle of intersection.

Loran position determinations on or near the baseline extensions are subject to geometric errors exceeding two nautical miles per microsecond and, therefore, should be avoided whenever possible. Loran is a long-range aid to navigation and should not normally be used in pilot waters. The use of skywaves is not recommended within 250 miles of either station.

Caution must be used in matching loran signals to insure that the ground wave signal of one station is not unknowingly matched with a skywave signal of the other station of the pair, or a one-hop skywave signal from station with a two-hop skywave signal from the other.

Uniform State Waterway Marking System.—Many bodies of water used by boatmen are located entirely within the boundaries of a state. The Uniform State Waterway Marking System (USWMS) has been developed to indicate to the small-boat operator hazards, obstructions, restricted or controlled areas, and to provide directions. Although intended primarily for waters within the state boundaries, the USWMS is suited for use in all water areas, since it supplements and is generally compatible with the Coast Guard lateral system of aids to navigation. The Coast Guard is gradually employing more aids bearing the USWMS geometric shapes described below.

Two categories of waterway markers are employed. Regulatory markers, buoys, and signs, use distinctive standard shape marks to show regulatory information. The signs are white with black letters, and have a wide orange border. They signify speed zones, restricted areas, danger areas, and directions to various places. Aids to navigation on state waters use red and black buoys to mark channel limits. Red and black buoys are generally used in pairs. The boat should pass between the red buoy and its companion black buoy. If the buoys are not placed in pairs, the distinctive color of the buoy indicates the direction of dangerous water from the buoy. White buoys with red tops should be passed to the south or west, indicating that danger lies to the north or east of the buoy. White buoys with black tops should be passed to the

north or east. Danger lies to the south or west. Vertical red and white striped buoys indicate a boat should not pass between the buoy and the nearest shore. Danger lies inshore of the buoy.

DESTRUCTIVE WAVES.—Unusual sudden changes in water level can be caused by tsunamis or violent storms. These two types of destructive waves have become commonly known as **tidal waves,** a name which is technically incorrect as they are not the result of tide-producing forces.

Tsunamis (seismic sea waves) are setup by submarine earthquakes. Many such seismic disturbances do not produce sea waves and often those produced are small, but the occasional large waves can be very damaging to shore installations and dangerous to ships in harbors.

These waves travel great distances and can cause tremendous damage on coasts far from their source. The wave of April 1, 1946, which originated in the Aleutian Trench, demolished nearby Scotch Cap Lighthouse and caused damages of $25 million in the Hawaiian Islands 2,000 miles away. The wave of May 22-23, 1960, which originated off southern Chile, caused widespread death and destruction in islands and countries throughout the Pacific.

The speed of tsunamis varies with the depth of the water, reaching 300 to 500 knots in the deep water of the open ocean. In the open sea they cannot be detected from a ship or from the air because their length is so great, sometimes a hundred miles, as compared to their height, which is usually only a few feet. Only on certain types of shelving coasts do they build up into waves of disastrous proportions.

There is usually a series of waves with crests 10 to 40 minutes apart, and the highest may occur several hours after the first wave. Sometimes the first noticeable part of the wave is the trough which causes a recession of the water from shore, and people who have gone out to investigate this unusual exposure of the beach have been engulfed by the oncoming crest. Such an unexplained withdrawal of the sea should be considered as nature's warning of an approaching wave.

Improvements have been made in the quick determination and reporting of earthquake epicenters, but no method has yet been perfected for determining whether a sea wave will result from a given earthquake. The Honolulu Observatory of the National Ocean Survey is headquarters of a warning system which has field reporting stations (seismic and tidal) in most countries around the Pacific. When a warning is broadcast, waterfront areas should be vacated for higher ground, and ships in the vicinity of land should head for the deep water of the open sea.

Storm surge.—A considerable rise or fall in the level of the sea along a particular coast may result from strong winds and sharp change in barometric pressure. In cases where the water level is raised, higher waves can form with greater depth and the combination can be destructive to low regions, particularly at high stages of tide. Extreme low levels can result in depths which are considerably less than those shown on nautical charts. This type of wave occurs especially in coastal regions bordering on shallow waters which are subject to tropical storms.

Seiche is a stationary vertical wave oscillation with a period varying from a few minutes to an hour or more, but somewhat less than the tidal periods. It is usually attributed to external forces such as strong winds, changes in barometric pressure, swells, or tsunamis disturbing the equilibrium of the water surface. Seiche is found both in enclosed bodies of water and superimposed upon the tides of the open ocean. When the external forces cause a short-period horizontal oscillation of the water, it is called **surge.**

The combined effect of seiche and surge sometimes makes it difficult to maintain a ship in its position alongside a pier even though the water may appear to be completely undisturbed, and heavy mooring lines have been parted repeatedly under such conditions. Pilots advise taut lines to reduce the effect of the surge.

SPECIAL SIGNALS FOR CERTAIN VESSELS

Special signals for surveying vessels.—Pilot Rules for Inland Waters, §80.33, state that by day a surveying vessel of the National Ocean Survey (NOS), underway and employed in hydrographic surveying, may carry in a vertical line, one over the other not less than 6 feet apart where they can best be seen, three shapes not less than 2 feet in diameter of which the highest and lowest shall be globular in shape and green in color and the middle one diamond in shape and white.

(a) Vessels of the NOS shall carry the above-prescribed marks while actually engaged in hydrographic surveying and underway, including drag work. Launches and other boats shall carry the prescribed marks when necessary.

(b) It must be distinctly understood that these special signals serve only to indicate the nature of the work upon which the vessel is engaged and in no way give the surveying vessel the right-of-way over other vessels or obviate the necessity for a strict observance of the rules for preventing collision of vessels.

(c) By night a surveying vessel of the NOS, underway and employed in hydrographic surveying, shall carry the regular lights prescribed by the rules of the road.

(d) A vessel of the NOS, when at anchor in a fairway on surveying operations, shall display from the mast during the daytime two black balls in a vertical line and 6 feet apart. At night two red lights shall be displayed in the same manner. In the

case of a small vessel the distance between the balls and between the lights may be reduced to not less than 3 feet if necessary.

(e) Such vessels, when at anchor in a fairway on surveying operations, shall have at hand and show, if necessary, in order to attract attention, a flare-up light in addition to the lights which are, by this section required to be carried.

International Rules of the Road, Part B, Rule 4(c), states that a vessel engaged in laying or in picking up a submarine cable or navigation mark, or a vessel engaged in surveying or underwater operations, or a vessel engaged in replenishment at sea, or in the launching or recovery of aircraft when from the nature of her work she is unable to get out of the way of approaching vessels, shall carry in lieu of the lights prescribed in Rule 2(a) (i) and (ii), or Rule 7(a) (i), three lights in a vertical line one over the other so that the upper and lower lights shall be the same distance from, and not less than 6 feet above or below, the middle light. The highest and lowest of these lights shall be red, and the middle light shall be white, and they shall be of such a character as to be visible all round the horizon at a distance of at least 2 miles. By day, she shall carry in a vertical line one over the other not less than 6 feet apart, where they can best be seen, three shapes each not less than 2 feet in diameter, of which the highest and lowest shall be globular in shape and red in color, and the middle one diamond in shape and white.

The **wire drags** used by the NOS in sweeping for dangers to navigation may be crossed by vessels without danger of fouling at any point except between the towing launches and the large buoys near them, where the towline approaches the surface of the water. Vessels passing over the drag are requested to change course so as to cross it approximately at right angles, as a diagonal course may cause the propeller to foul the supporting buoys and attached wires. No attempt should be made to pass between the drag launches while the wire is being set out or taken in, unless it would endanger a vessel to do otherwise, because the bottom wire is slack and the floats at each 100-foot section may lift it nearly to the surface; at this time the launches usually are headed directly toward or away from each other and the operation may be clearly seen.

Warning signals for Coast Guard vessels while handling or servicing aids to navigation:

Inland waters (Inland Rules):

DAY, two orange and white vertically striped balls in a vertical line not less than 3 feet nor more than 6 feet apart displayed from the yardarm.

NIGHT, two red lights in a vertical line not less than 3 feet nor more than 6 feet apart.

Vessels, with or without tows, passing Coast Guard vessels displaying this signal shall reduce speed sufficiently to insure the safety of both vessels, and when passing within 200 feet of the Coast Guard vessel displaying this signal, their speed shall not exceed 5 miles per hour.

High seas (International Rules):

DAY, three shapes each not less than 2 feet in diameter in a vertical line not less than 6 feet apart, the highest and lowest being red globular shapes and the middle being a white diamond shape.

NIGHT, three lights in a vertical line not less than 6 feet apart, the highest and lowest being red and the middle being white in color.

Minesweeper signals.—U.S. vessels engaged in minesweeping operations or exercises are hampered to a considerable extent in their maneuvering powers. With a view to indicating the nature of the work on which they are engaged, these vessels will show the signals hereinafter mentioned. For the public safety, all other vessels, whether steamers or sailing craft, must endeavor to keep out of the way of vessels displaying these signals and not approach them inside the distances mentioned herein, especially remembering that it is dangerous to pass between the vessels of a pair or group sweeping together.

All vessels towing sweeps are to show: **By day,** a black ball at the fore truck and a black ball at the fore yard on the side or sides on which it is dangerous to pass; there may be thus 2 or 3 black balls displayed; **By night,** all around green lights instead of the black balls, and in a similar manner.

Vessels or formations showing these signals are not to be approached nearer than 1,500 feet on either beam and vessels are not to cross astern closer than 3,000 feet. Under no circumstances is a vessel to pass through a formation of minesweepers. Minesweepers should be prepared to warn merchant vessels which persist in approaching too close by means of any of the appropriate signals from the International Code of Signals. In fog, mist, falling snow, heavy rainstorms, or any other condition similarily restricting visibility, whether by day or night, minesweepers while towing sweeps when in the vicinity of other vessels will sound whistle signals for a vessel towing (1 prolonged blast followed by 2 short blasts).

Submarine emergency identification signals.—United States submarines are equipped with signal ejectors which may be used to launch identification signals, including emergency signals. Two general types of signals may be used: smoke floats and flares or stars. The smoke floats, which burn on the surface, produce a dense colored smoke for a period of fifteen to forty-five seconds. The flares or stars are propelled to a height of three hundred to four hundred feet from which they descend by small parachute. The flares or stars burn for about twenty-five seconds. The color of the smoke or flare/star has the following meaning:

Green or black is used under training exercise conditions only to indicate that a torpedo has been fired or that the firing of a torpedo has been simulated.

Yellow indicates the submarine is about to rise to periscope depth. Surface craft terminate antisubmarine counterattack and clear vicinity of submarine. Do not stop propellers.

Red indicates an emergency inside the submarine; she will try to surface immediately. Surface ships clear the area and stand by to assist. In case of repeated red signals, or if the submarine fails to surface in a reasonable time, she may be presumed disabled. Buoy the location, look for submarine buoy, and attempt to establish sonar communications. Advise U.S. Naval authorities.

Submarine marker buoys consist of 2 spheres 3 feet in diameter with connecting structure, painted international orange. The buoy has a wire cable to the submarine, to act as a downhaul line for a rescue chamber. The buoy may be accompanied by an oil slick release to attract attention. A submarine on the bottom in distress may release this buoy. If sighted, such a buoy should be investigated and reported immediately to Naval authorities.

The submarine may transmit the International Distress Signal (SOS) on its sonar gear independently or in additional to the red signal. Submarine also may use these other means of attracting attention: release of dye marker or air bubble; ejection of oil; pounding on hull; ejection of life jackets and other floating objects; ejection of emergency transmitter buoy, which sends the CW coded signal "SOS SUB SUNK SOS" on 121.5 MHz.

Special signals for deep-draft ships in narrow channel.—The following "Recommendation on Additional Signals for Deep-Draught Ships in Narrow Channels" was adopted by the Inter-Governmental Maritime Consultative Organization (IMCO) on November 26, 1968:

"A power-driven vessel under way in a narrow channel which, owing to its draught, can navigate only inside such channel, may carry in addition to the lights prescribed in Rule 2(a) (i), (ii), (v) and Rule 10(a) of the International Regulations for Preventing Collisions at Seas and during the same circumstances as prescribed in the Regulations for these lights, three red lights in a vertical line one over the other so that the upper and lower lights shall be the same distance from and not less than 6 feet (1.83 meters) above or below the middle light. They shall be carried where they can best be seen and visible all around the horizon at a distance of at least 2 miles. By day such a vessel may carry, where it can best be seen, a black cylinder of not less than two feet (0.61 meters) in diameter and a height of not less than 3.5 feet (1.07 meters)."The recommendation is not mandatory but may be used on an optional basis. Familiarity with the signals is necessary as it may be encountered in use by U.S. and/or foreign flag vessels throughout the world. The night signal recommended above is similar to the U.S. Pilot Rules provisions for vessels engaged in underwater construction and related operations, but confusion between these vastly different situations is considered unlikely.

NAVIGATION RESTRICTIONS AND REQUIREMENTS

Traffic separation schemes.—To increase the safety of navigation, particularly in areas of high shipping density, routes incorporating traffic separation have, with the approval of the Inter-Governmental Maritime Consultative Organization (IMCO), been established in certain areas of the world. In the interest of safe navigation, it is recommended that through traffic should use such routes, as far as circumstances permit, by day and by night and in all weather conditions. The routes which are intended for use by all vessels are **not mandatory** and do not give any special rights to vessels using them.

General principles for navigation in Traffic Separation Schemes are as follows:

(1) The International Regulations for Preventing Collisions at Sea must be observed at all times.

(2) Ships navigating in lanes should keep to starboard of the separation line or separation (buffer) zone.

(3) Ships entering or leaving traffic lanes should normally do so at the ends of the lanes. When necessary to enter or leave lanes from the sides, ships should do so at as small an angle as practicable.

(4) Ships navigating in lanes should insure, as far as possible, that their courses conform with the axis of the lanes.

(5) Ships should avoid crossing traffic lanes.

(6) When necessary to cross traffic lanes ships should, as far as practicable, do so at right angles.

(7) Other than by crossing ships, the separation (buffer) zone should not be crossed except in cases of emergency to avoid immediate danger.

(8) The arrows printed in the tracks shown on charts are intended only to give the general direction of traffic, and ships need not set their courses strictly along the arrows; the full width of each lane should be considered as available for navigation.

When approved or established, traffic separation scheme details are announced in Notice to Mariners, and later depicted on appropriate charts and included in Coast Pilots and Sailing Directions.

Oil Pollution.—The Oit Pollution Act, 1961, as amended, provides for **prohibited zones** throughout the world within which the discharge of oil or any oily mixture is unlawful. The prohibited zones for the United States, Puerto Rico, the U.S. Virgin Islands, and adjacent foreign territory include sea areas within 50 miles from the nearest land and the following sea areas extending more than 50 miles from the nearest land: North-West Atlantic Zone, comprising the sea areas within a line drawn from 38°47′N., 73°43′ W., to 39°58′ N., 68°34′ W., thence to 42°05′ N., 64°37′ W., thence along the east coast of Canada at a distance of 100 miles from the nearest land. Canadian Western Zone (Pacific ocean), extending for a distance of 100

miles from the nearest land along the west coast of Canada.

The law applies (with the exceptions stated below) to any seagoing vessel of any type whatsoever of American registry or nationality, including floating craft towed by another vessel making a sea voyage; this includes a **"tanker"**, defined as a type of ship in which the greater part of the cargo space is constructed or adapted for the carriage of liquid cargoes in bulk and which is not, for the time being, carrying a cargo other than oil in that part of its cargo space. The excepted categories of vessels are: tankers of under 150 gross tons, and other ships of under 500 gross tons; ships for the time being engaged in the whaling industry when actually employed on whaling operations; ships for the time being navigating the Great Lakes of North America and their connecting and tributary waters as far east as the lower exit of St. Lambert Lock at Montreal in the Province of Quebec, Canada; naval ships and ships for the time being used as naval auxiliaries.

Foreign vessels to which the International Convention for the Prevention of the Pollution of the Sea by Oil (1954, as amended) applies, while in the territorial waters of the United States, may be boarded, examined, and required to produce records as provided in Section 11 of the Oil Pollution Act of 1961, as amended. For a complete discussion of the Oil Pollution Regulations, see the Code of Federal Regulations, Title 33, Part 151.

The Federal Water Pollution Control Act, as amended, prohibits the discharge of harmful quantities of oil into the navigable waters of the United States, the contiguous zone, or onto adjoining shorelines. Discharges that do occur must be reported to the Coast Guard by the most rapid available means. If the spiller or other industry organization, or state or local government, does not clean up the spill, the Federal Government may. The spiller will be liable for the cleanup costs. A harmful discharge of oil has been defined as one which causes a film or sheen upon or discoloration of the surface of the water, violates applicable state water quality standards, or causes a sludge or emulsion to be deposited beneath the surface of the water. For regulations pertaining to this Act, see the Code of Federal Regulations, Title 18, Part 610 and Title 33. Parts 152—154.

Other requirements for the protection of navigable waters.—United States laws prohibit discharge from any vessel or shore establishment of any refuse matter, other than that flowing from streets and sewers in a liquid state, into any navigable water. It is not lawful to tie up or anchor vessels or to float log rafts in navigable channels in such manner as to obstruct normal navigation. When a vessel or raft is wrecked and sunk in a navigable channel it is the duty of the owner to immediately mark it with a buoy or beacon during the day and a light at night until the sunken craft is removed or abandoned.

Obligation of deck officers.—Licensed deck officers are required to acquaint themselves with the latest information published in Notice to Mariners regarding aids to navigation.

Improper use of searchlights prohibited.—No person shall flash or cause to be flashed the rays of a searchlight or other blinding light onto the bridge or into the pilothouse of any vessel underway. The International Code Signal "PG2" may be made by a vessel inconvenienced by the glare of a searchlight in order to apprise the offending vessel of the fact.

Unnecessary whistling prohibited.—The unnecessary sounding of the vessel's whistle is prohibited within any harbor limits of the United States.

Use of Radar while underway in low visibility.—Failure on the part of a vessel equipped with radar to make use of it while underway in low visibility has been held by a court to be directly contributory to a collision in which the vessel was involved. Rule 29 of the International Rules of the Road and Article 29 of the Inland Rules of the Road are applicable. This decision places an additional responsibility on vessels which are equipped and manned to use radar, to do so while underway during periods of reduced visibility without in any way relieving commanding officers of the responsibility of carrying out normal precautionary measures.

Recommendations on the use of radar during restricted visibility are included within the Annex of the International Rules of the Road.

Danger signal.—It is stated in the **Pilot Rules for Inland Waters,** §80.1, if, when steam vessels are approaching each other, either vessel fails to understand the course or intention of the other, from any cause, the vessel so in doubt shall immediately signify the same by giving several short and rapid blasts, not less than four, of the steam whistle, the danger signal. Article 18, Rule III, of the **Inland Rules of the Road** also contains this provision. The **International Rules of the Road,** Part D, Rule 28(b), states, in part, that, whenever a power driven vessel which, under these Rules is to keep her course and speed, is in sight of another vessel and is in doubt whether sufficient action is being taken by the other vessel to avert collision, she may indicate such doubt by giving at least five short and rapid blasts on the whistle.

Narrow channels.—Sailing vessels and power-driven vessels of less than 65 feet in length shall not hamper the safe passage of larger steam vessels which can navigate only inside that channel.

Control of shipping in time of emergency or war.—In time of war or national emergency, merchant vessels of the United States and those foreign flag vessels, which are considered under effective United States control, will be subject to control by agencies of the United States Government. The allocation and employment of such vessels, and of domestic port facilities, equipment, and services will be performed by appropriate

agencies of the War Transport Administration. The movement, routing, and diversion of merchant ships at sea will be controlled by appropriate naval commanders. The movement of merchant ships within domestic ports and dispersal anchorages will be coordinated by the U.S. Coast Guard. The commencement of naval control will be signalled by a general emergency message. See H.O. Publication 117A or 117B for emergency procedures and communication instructions.

BRIDGE-TO-BRIDGE RADIO COMMUNICATION.—Voice radio bridge-to-bridge communication between vessels is an effective aid in the prevention of collisions where there is restricted maneuvering room and/or visibility. Its use, though not yet mandatory, is highly recommended. VHF-FM radio is used for this purpose, due to its essentially line-of-sight characteristic and relative freedom from static. As VHF has increasingly come into use for short-range communications in U.S. harbors and other high-traffic waters, so has the number of ships equipped with this gear increased.

Channel 13 (156.65 MHz) has been designated by the Federal Communications Commission as a navigational frequency. It is restricted to navigational exchanges between bridge of ships, to some shore stations, locks, and drawbridges. Its use is intended to assist mariners in congested, confined, or approaching situations to navigate their vessels free of dangers, and safely by one another. These navigational communications are conducted on a single-channel (simplex) basis so that all vessels in the vicinity may hear. Channel 13 should, therefore, be used for bridge-to-bridge communication; however, in some harbors local usage has established some other channel for this purpose, and in this case, vessels should monitor the frequency used locally.

When vessels equipped with VHF channel 13 are in waters where bridge-to-bridge communication is in effect, they should have at least **two VHF receivers** in order to guard the **distress, safety, and calling frequency, channel 16 (156.80 MHz),** in addition to maintaining a continuous watch on channel 13 (or other frequency in local use for bridge-to-bridge purposes).

An essential element in the bridge-to-bridge communication system, as in any safety program, is the assurance of **participation** by all ships operating in the area. Participation is obtained in many areas by agreement with the local pilots to carry lightweight portable VHF sets aboard vessels which have no communication capability on channel 13.

Mariners are reminded that the use of bridge-to-bridge voice communication in no way alters the obligation to comply with the provisions of the Rules of the Road; the radio system is an **additional** safety feature only.

2. NAVIGATION REGULATIONS

This chapter contains the sections of Code of Federal Regulations, Title 33, Navigation and Navigable Waters, that are of most importance in the areas covered by Coast Pilot 3. The sections are from Part 82, Boundary Lines of Inland Waters; Part 110, Anchorage Regulations; Part 117, Drawbridge Operation Regulations; Part 124, Control Over Movement of Vessels; Part 204, Danger Zone Regulations; Part 205, Dumping Grounds Regulations; and Part 207, Navigation Regulations.

PART 82—BOUNDARY LINES OF INLAND WATERS:

§82.1 General basis and purpose of boundary lines. Under section 2 of the act of February 19, 1895, as amended (28 Stat. 672, 33 U.S.C. 151), the regulations in this part are prescribed to establish the lines dividing the high seas from rivers, harbors, and inland waters in accordance with the intent of the statute and to obtain its correct and uniform administration. The waters inshore of the lines described in this part are "inland waters," and upon them the inland rules and pilot rules made in pursuance thereof apply. The waters outside of the lines described in this part are the high seas and upon them the international rules apply. The regulations in this part do not apply to the Great Lakes or their connecting and tributary waters.

§82.2 General rules for inland waters. At all buoyed entrances from seaward to bays, sounds, rivers, or other estuaries for which specific lines are not described in this part, the waters inshore of a line approximately parallel with the general trend of the shore, drawn through the outermost buoy or other aid to navigation of any system of aids, are inland waters, and upon them the inland rules and pilot rules made in pursuance thereof apply, except that Pilot Rules for Western Rivers apply to the Red River of the North, the Mississippi River and its tributaries above Huey P. Long Bridge, and that part of the Atchafalaya River above its junction with the Plaquemine-Morgan City alternate waterway.

§82.25 Delaware Bay and tributaries. A line drawn from Cape May Inlet East Jetty Light to Cape May Harbor Inlet Lighted Bell Buoy 2CM; thence to South Shoal Lighted Bell Buoy 4; thence to the northernmost extremity of Cape Henlopen.

§82.30 Chesapeake Bay and tributaries. A line drawn from Cape Henry Light to Cape Henry Buoy 1; thence to Chesapeake Bay Entrance Lighted Bell Buoy CBC; thence to North Chesapeake Entrance Lighted Gong Buoy NCD; thence to Cape Charles Light.

PART 110—ANCHORAGE REGULATIONS:

§110.1 General. (a) The areas described in Subpart A of this part are designated as special anchorage areas pursuant to the authority contained in an act amending laws for preventing collisions of vessels approved April 22, 1940 (54 Stat. 150); Article 11 of section 1 of the act of June 7, 1897, as amended (30 Stat. 98; 33 U.S.C. 180), Rule 9 of section 1 of the act of February 8, 1895, as amended (28 Stat. 647; 33 U.S.C. 258), and Rule Numbered 13 of section 4233 of the Revised Statutes as amended (33 U.S.C. 322). Vessels not more than 65 feet in length, when at anchor in any special anchorage area shall not be required to carry or exhibit the white anchor lights required by the Navigation Rules.

(b) The anchorage grounds for vessels described in Subpart B of this part are established, and the rules and regulations in relation thereto adopted, pursuant to the authority contained in section 7 of the act of March 4, 1915, as amended (38 Stat. 1053; 33 U.S.C. 471).

(c) All bearings in the part are referred to true meridian.

Subpart A—Special Anchorage Areas:

§110.65 Indian River Bay, Del. Beginning at a point bearing 174°, 300 feet, from a point on the southerly edge of the project channel 5,500 feet westerly from the State highway bridge across Indian River Inlet; thence 174°, 600 feet; thence 264°, 800 feet; thence 354°, 600 feet; and thence 84°, 800 feet, to the point of beginning.

§110.67 Delaware River, Essington, Pa. North of Little Tinicum Island, between the mouth of Darby Creek and Jansen Avenue, Essington, bounded as follows: Beginning at a point (approximately latitude 39°51′31″, longitude 75°17′43″) on a line in prolongation of the westerly line of Jansen Avenue 135 yards southerly from the mean high water line; thence 184°, 300 yards; thence 274°30′, 1,700 yards; thence 04°, 425 yards; thence 100°, 1,255 yards; and thence 95°, 490 yards, to the point of beginning.

§110.70 Chesapeake and Delaware Canal, easterly of Courthouse Point, Md. The waters southerly of a line joining the northernmost extremity of Courthouse Point and the westernmost point of Herring Island; westerly of a line bearing 180° from a point on the aforesaid line 220 yards from the westernmost point of Herring Island; and northerly and easterly of the shore line.

§110.72 Blackhole Creek, Md. The waters on the west side of Blackhole Creek, a tributary of Magothy River, southwest of a line bearing 310°30′ from the most northerly tip of an unnamed island located 0.16 mile upstream from the mouth of the creek approximately 660 feet to the west shore of the creek; northwest of a line ranging from the southwesterly tip of the island toward the point of land on the west shore of the creek immediately southwest thereof; and north of a line 100 feet from and parallel to the shore of the creek to its intersection with the south property line extended of the Potapskut Sailing Association, Inc., thence northwesterly along the said property line extended to the shore.

Subpart B—Anchorage Grounds:

§110.157 Delaware Bay and River. (a) The anchorage grounds—(1) Anchorage A (tanker lightering) off the entrance to Mispillion River. To the southwest of the channel along Brandywine Range, bounded as follows: Beginning at a point at latitude 38°57′42″ N., longitude 75°11′08″ W., bearing 246.5° true 7,400 yards from Brandywine Shoal Light; thence 330°, 5,000 yards; thence 240°, 2,000 yards; thence 150°, 5,000 yards; thence 060°, 2,000 yards, to the point of beginning. This anchorage is intended for the specific purpose of allowing deep draft tankers to anchor and lighten their cargo before proceeding up the Delaware River. Supervision over the anchoring of vessels in the anchorage area will be exercised by the District Commander or his authorized representative. The provisions of paragraph (b) of this section shall be applicable to the anchoring of vessels in this anchorage, except for subparagraphs (1) and (2).

(2) Anchorage 1 off Bombay Hook Point. On the southwest side of the channel along Liston Range, bounded as follows: Beginning at a point (approximately latitude 39°17′59″, longitude 75°23′07″) bearing 228 from Ship John Shoal Light, 167 yards southwest of the southwest edge of the channel along Liston Range; thence 228°, 2,000 yards; thence 318°, 8,000 yards; thence 48°, 2,000 yards; and thence 138°, 8,000 yards, to the point of beginning.

(3) Anchorage 2 (explosives) northwest of Artificial Island. On the east side of the channel along Reedy Island Range, bounded as follows: Beginning at a point bearing 105° from the northernmost point of Reedy Island, 167 yards easterly of the east edge of the channel along Reedy Island Range; thence 105°, 800 yards; thence 195°, 4,500 yards; thence 285°, 800 yards, to a point (approximately latitude 39°28′58″, longitude 75°33′37″) opposite the intersection of Reedy Island and Baker Ranges; and thence 15°, 4,500 yards, to the point of beginning. This anchorage is intended for vessels engaged in the transportation and handling of explosives and other dangerous articles. No vessel not so engaged will be permitted to anchor in this anchorage except in case of emergency or by special permission of the District Commander. For special regulations relating to this anchorage, see paragraph (c) of this section.

Note: The term "District Commander" as used in this section means the Commander, Third Coast Guard District, or his authorized representative.

(4) Anchorage 3 southeast of Reedy Point. Southeast of the entrance to the Chesapeake and Delaware Canal at Reedy Point, bounded on the east by the west edge of the channel along Reedy Island and New Castle Ranges; on the west by a line beginning at a point on the west edge of the channel along Reedy Island Range at latitude 39°31′43″, thence to a point bearing 168°30′, 3,150 yards, from Chesapeake and Delaware Canal 2 Light, and thence to a point bearing 131°, 1,160 yards, from Chesapeake and Delaware Canal 2 Light; and on the north by a line running from the last-described point 113°30′, approximately 813 yards, to the west edge of the channel along New Castle Range.

(5) Anchorage 4 north of Reedy Point. North of the entrance to the Chesapeake and Delaware Canal at Reedy Point, on the West side of the river, bounded as follows: Beginning at a point (approximately latitude 39°33′51″, longitude 75°33′35″) 344°58′ true, 160 yards from Chesapeake and Delaware Canal Light 2; thence 306°26′, 1,442 yards; thence 36°26′, 377 yards; thence 126°26′, 1,442 yards; thence 216°26′, 377 yards to the point of beginning.

(6) Anchorage 5 southeast of Pea Patch Island. On the northeast side of the channel along New Castle Range, bounded as follows: Beginning at latitude 39°34′28″, longitude 75°33′06″; thence 334°, 2,343 yards; thence 64°, 512 yards; thence 154°, 2,343 yards; and thence 244°, 512 yards, to the point of beginning.

(7) Anchorage 6 off Deepwater Point. Southeast of the entrance to Christina River, on the east side of the channel along Cherry Island Range, bounded as follows: Beginning at latitude 39°41′31″, longitude 75°30′55″; thence 17°, 2,747 yards; thence 112°, 847 yards; thence 215°, 1,340 yards; thence 204°, 893 yards; thence 186°30′, 500 yards; and thence 286°, 377 yards, to the point of beginning. Vessels must not cast anchor in the cable area at the lower end of this anchorage except in case of emergency.

(8) Anchorage 7 off Marcus Hook. On the southeast side of the channel along Marcus Hook Range, bounded as follows: Beginning at a point on the southeast edge of the channel at longitude 75°25′50″; thence northeasterly along the edge of the channel to longitude 75°23′30″; thence 207°, 933 yards; thence 237°, 2,692 yards; thence 267°, 933 yards, to the point of beginning. A preferential area in this anchorage is designated for the use of

vessels awaiting quarantine inspection, this area being 333 yards wide on the downstream side of a line projected from Blueball Road in Marcus Hook. Should the remainder of the anchorage be in use, the preferential area, when available, may be used by vessels not subject to quarantine inspection.

(9) Anchorage 8 off Thompson Point. On the south side of the channel along Tinicum Range, between Thompson Point and the east side of Crab Point, bounded as follows: Beginning at a point on the south edge of the channel along Tinicum Range at longitude 75°18′24″; thence easterly along the edge of the channel to longitude 75°17′54″; thence 179°, 267 yards; thence 260°30′, 793 yards; thence 358°, 425 yards, to the point of beginning.

(10) Anchorage 9 near entrance to Mantua Creek. On the southeast side of the channel along Mifflin Range, bounded as follows: Beginning at a point on the southeast edge of the channel at longitude 75°14′26″; thence northeasterly along the edge of the channel to longitude 75°12′01.5″; thence 203°30′, 933 yards; thence 233°30′, 3,058 yards; and thence 263°30′, 933 yards, to the point of beginning. Vessels must not cast anchor in this anchorage in such manner as to interfere unreasonably with the passage of other vessels to and from Mantua Creek.

(11) Anchorage 10 (naval) at Naval Base, Philadelphia. On the north side of the channel along West Horseshoe Range, bounded as follows: Beginning at the southeasterly corner of Pier 7 (approximately latitude 39°53′11″, longitude 75°09′58.5″); thence 174°, 525 yards, to the north edge of the channel along West Horseshoe Range; thence 273°30′ along the edge of the channel, 880 yards; thence 354°, 433 yards, to the southeasterly corner of Pier 1; and thence 88°30′, 875 yards, to the point of beginning. This is a restricted naval anchorage.

(12) Anchorage 11 at Gloucester. On the east side of the channel south of the Walt Whitman Bridge at Gloucester, bounded as follows: Beginning at a point on the east edge of the channel at latitude 39°54′16″; thence 174°30′, 500 yards, to latitude 39°54′02″, longitude 75°07′43″; thence 202°, 1,133 yards; thence 217°30′, 1,142 yards, to the east edge of channel; thence northeasterly along the edge of the channel to the point of beginning.

(13) Anchorage 12 between Gloucester and Camden. On the east side of the channel adjoining and on the upstream side of Anchorage 11, from Gloucester to Camden, bounded as follows: Beginning at a point on the east edge of the channel at latitude 39°54′16″; thence northerly along the edge of the channel to latitude 39°56′32.5″; thence 133°, 283 yards to a point on a line 100 feet west of the established pierhead line; thence southerly along this line to latitude 39°54′02″; thence 354°36′, 500 yards to the point of beginning. The area between New York Shipbuilding Corporation Pier No. 2 and the MacAndrews and Forbes Company pier, Camden, shall be restricted to facilitate the movement of carfloats to and from Bulson Street, Camden. The area in front of the Public Service Electric and Gas Company pier shall be restricted to facilitate the movement of vessels to and from the pier. Should the anchorage become so congested that vessels are compelled to anchor in these restricted areas, they must move immediately when another berth is available.

(14) Anchorage 13 at Camden. On the east side of the channel adjoining and on the upstream side of Anchorage 12, to Cooper Point, Camden, bounded as follows: Beginning at a point on the east edge of the channel at latitude 39°56′32.5″; thence northerly along the edge of the channel to latitude 39°57′39.7″; thence 139°, 217 yards to a point on a line 100 feet west of the established pierhead line; thence southerly along this line to latitude 39°56′26.5″; thence 313°, 283 yards to the point of beginning.

(15) Anchorage 14 opposite Port Richmond. On the southeast side of the channel, north of Petty Island, bounded as follows: Beginning at a point on the southeast edge of the channel at longitude 75°05′43″; thence 163°, 248 yards; thence 253°, 1,978 yards, to the southeast edge of the channel; and thence northeasterly along the edge of the channel to the point of beginning. Vessels having a draft of less than 20 feet must anchor southwest of Pier No. 11, Port Richmond. The area off the Cities Service Oil Company wharves, Petty Island, shall be restricted to facilitate the movement of vessels to and from the wharves.

(16) Anchorage 15 off northeasterly end of Petty Island. On the southeast side of the channel, bounded as follows: Beginning at a point on the southeast edge of the channel at longitude 75°05′34.7″; thence northeasterly along the southeast edge of the channel to longitude 75°05′09.5″; thence 171°, 198 yards; thence 260°30′, 667 yards; and thence 351°, 198 yards, to the point of beginning. When necessary, this anchorage will be reserved for vessels under the custody of the United States, at which time other vessels may be required by the District Commander to shift position.

(17) Anchorage 16 between Port Richmond and Five Mile Point. On the northwest side of the channel, bounded as follows: Beginning at a point on the northwest edge of the channel at longitude 75°05′35″; thence northeasterly along the edge of the channel to longitude 75°04′20″; thence 328°, 125 yards; thence 243°, 450 yards; thence 251°, 475 yards; thence 257°, 1,042 yards; thence 174°30′, 122 yards, to the point of beginning. When necessary, this anchorage will be reserved for vessels under the custody of the United States, at which time other vessels may be required by the District Commander to shift position.

(b) General regulations. (1) Except in cases of great emergency, no vessel shall be anchored in Delaware Bay and River between Ship John Light and The Pennsylvania Railroad Company bridge at Delair, New Jersey, outside of the anchorage areas established in this section, or within a cable or pipe line area shown on a Government chart, or be moored, anchored, or tied up to any pier, wharf, or other vessel in such manner as to obstruct or endanger the passage of any vessel. When an emergent condition exists due to congestion in the prescribed anchorage areas in the Delaware River, the District Commander may authorize the anchorage of vessels in locations other than the prescribed areas. Vessels so anchored must not be anchored within the channel limits. Any vessel anchored outside of the prescribed anchorage limits must move to a prescribed anchorage area when space becomes available.

(2) No vessel shall occupy any prescribed anchorage for a longer period than 48 hours without a permit from the District Commander. Vessels expecting to be at anchor for more than 48 hours shall obtain a permit from the District Commander for that purpose in either Anchorage 15 or Anchorage 16. No vessel in such condition that it is likely to sink or otherwise become a menace or obstruction to navigation or anchorage of other vessels shall occupy an anchorage except in an emergency, and then only for such period as may be permitted by the District Commander.

(3) Whenever, in the opinion of the District Commander such action may be necessary, he may require any or all vessels in any designated anchorage area to moor with two or more anchors.

(4) Every vessel whose crew may be reduced to such number that it will not have sufficient men on board to weigh anchor at any time shall, before release or reduction of the crew, be anchored with two anchors with mooring swivel unless the District Commander shall waive the requirement of a mooring swivel.

(5) Anchors shall be placed well within the anchorage areas, so that no portion of the hull or rigging will at any time extend outside of the anchorage area.

(6) Light-draft barges using the anchorages shall be anchored away from the deeper portions of the anchorages, so as not to interfere with the anchoring of deep-draft vessels. Any barges towed in tandem to an anchorage area shall be bunched together when anchoring.

(7) Upon approval of the District Engineer, Corps of Engineers, the District Commander may permit wrecking plant or other vessels legally engaged in recovering sunken property, or in laying or repairing pipe lines or cables, or plant engaged in dredging operations, to anchor in channels. Such permission is not necessary for plant engaged upon works of river and harbor improvement under the supervision of the District Engineer, but the District Engineer will notify the District Commander in advance of all such proposed work.

(8) Whenever the maritime or commercial interests of the United States so require, the District Commander is hereby empowered to shift the position of any vessel anchored or moored within or outside an anchorage area, including any vessel which is so moored or anchored as to obstruct navigation or interfere with range lights.

(9) A vessel upon being notified to shift its position shall get under way at once or signal for a tug and shall change position as directed with reasonable promptness.

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

(c) Regulations for explosives anchorage. (1) All vessels carrying explosives and other dangerous cargo as defined in Title 46, Code of Federal Regulations, §146.03-8, or on which explosives and other dangerous cargoes are to be loaded, shall be within Anchorage 2 when anchored, except as provided in subparagraph (7) of this paragraph. The maximum amount of explosives, or other dangerous cargo for which a permit is required in 46 CFR Parts 146-149, which may be carried or loaded at any time by a vessel anchored within Anchorage 2 shall not exceed 800 tons, except in cases of great emergency or by special permit from the District Commander.

(2) A written permit shall be obtained from the District Commander before vessels carrying explosives and other dangerous cargoes, or on which explosives and other dangerous cargoes are to be loaded within the weight limit specified in subparagraph (1) of this paragraph, may anchor in Anchorage 2, and no vessel shall anchor therein except by authority of such permit, which may be revoked at any time. This anchorage shall not be used by vessels which do not carry explosives and other dangerous cargoes, or on which explosives and other dangerous cargoes are not to be loaded, except in cases of great emergency or by special permit from the District Commander. All other vessels used in connection with loading or unloading explosives and other dangerous cargoes in this anchorage shall carry written permits from the District Commander and shall show such permits whenever required by him.

(3) Vessels shall be anchored in Anchorage 2 so as to be at least 2,200 feet apart, but the number of vessels which may anchor in the anchorage at any one time shall be at the discretion of the District Commander. This provision is not intended to prohibit barges or lighters from tying up alongside the vessels for the transfer of cargoes.

(4) Whenever any vessel or barge not mechanically self-propelled anchors in Anchorage 2 while carrying explosives and other dangerous cargoes, or on which explosives and other dangerous cargoes are to be loaded within the weight limit specified in subparagraph (1) of this paragraph, the District Commander may require the attendance of a tug upon such vessel or barge when in his judgment such action is necessary.

(5) Every vessel transporting, stowing, storing, or handling explosives and other dangerous articles as cargo, within the weight limit specified in subparagraph (1) of this paragraph, in the vicinity of Anchorage 2 shall display by day a red flag at least 16 square feet in area at its masthead, or at least 10 feet above the upper deck if the vessel has no mast, and shall display by night a red light in the same position specified for the flag.

(6) Fishing and navigation are prohibited within Anchorage 2 at all times when vessels which are moored in the area display a red flag by day or a red light by night.

(7) The District Engineer, U.S. Army Engineer District, Philadelphia, may authorize, in writing, a vessel carrying explosives for use on river and harbor works or on other work under Department of the Army permit, to anchor in or near the vicinity of such work. The District Commander will prescribe the quantity of explosives allowed and the conditions under which explosives shall be stored and handled in such cases.

(8) Vessels carrying explosives and other dangerous cargoes, or on which explosives and other dangerous cargoes are to be loaded, within the weight limit specified in subparagraph (1) of this paragraph, shall comply with the general regulations in paragraph (b) of this section when applicable.

(9) Nothing in this section shall be construed as relieving any vessel or the owner or person in charge of any vessel, and all others concerned, of the duties and responsibilities imposed upon them to comply with the regulations governing the handling, loading or discharging of explosives, and other dangerous articles, entitled "Subchapter N—Dangerous Cargoes." (46 CFR Parts 146 and 147.)

§110.158 Baltimore Harbor, Md. (a) The anchorage grounds—(1) Anchorage No. 1, general anchorage. In the Patapsco River at Fort McHenry angle beginning at latitude 39°15′13″, longitude 76°34′08.5″; thence southwest to latitude 39°15′10.5″, longitude 76°34′12.5″; thence southeast to latitude 39°14′52.5″, longitude 76°33′54″; thence east-southeast to latitude 39°14′48″, longitude 76°33′42″; thence northwest to the point of beginning. This anchorage shall be reserved for deep draft vessels and shall be used only by vessels waiting overnight to proceed to pier facilities. No vessel shall remain in this anchorage for more than 12 hours without a written permit from the Captain of the Port. Vessels anchored in this anchorage shall insure that they do not project into Fort McHenry Channel.

(2) Anchorage No. 2, general anchorage. In the Patapsco River, 2000 yards southeast of Lazaretto Point beginning at latitude 39°15′05″, longitude 76°33′47″; thence southeast to latitude 39°14′49″, longitude 76°33′29.5″; thence northeast to latitude 39°14′58″, longitude 76°33′15″; thence southeast to latitude 39°14′40.5″, longitude 76°32′57″; thence northeast to latitude 39°14′50″, longitude 76°32′41.5″; thence northwest to latitude 39°15′19″, longitude 76°33′11.5″; thence west to latitude 39°15′19″, longitude 76°33′29.5″; thence southwest to the point of beginning. This is a general anchorage for ships with drafts of less than 24 feet. No vessel shall remain in this anchorage for more than 72 hours without a written permit from the Captain of the Port.

(3) Anchorage No. 3, general anchorage. In the Patapsco River 3,000 yards southeast of Lazarette Point beginning at latitude 39°14′49″, longitude 76°33′29.5″; thence northeast to latitude 39°14′58″, longitude 76°33′15″; thence southeast to latitude 39°14′23.5″, longitude 76°32′39″; thence southwest to latitude 39°14′14″, longitude 76°32′53.5″; thence northwest to the point of beginning. This is a general anchorage for deep draft vessels only. No vessel shall remain in this anchorage for more than 72 hours without a written permit from the Captain of the Port.

(4) Anchorage No. 4, general anchorage. In the Patapsco River 1,000 yards southwest of Dundalk Marine Terminal beginning at latitude 39°14′18.5″, longitude 76°32′38.5″; thence southeast to latitude 39°14′00″, longitude 76°32′19″; thence southwest to latitude 39°13′53″, longitude 76°32′31″; thence northwest to latitude 39°14′11″, longitude 76°32′50″; thence northeast to the point of beginning. This is a general anchorage for vessels with drafts of less than 30 feet. No vessel shall remain in this anchorage for more than 72 hours without a written permit from the Captain of the Port.

(5) Anchorage No. 5, general anchorage. In the Patapsco River in the angle between Fort McHenry Channel and Curtis Bay Channel beginning at latitude 39°14′07″, longitude 76°32′58.5″; thence southeast to latitude 39°13′34″, longitude 76°32′24″; thence south-southwest to latitude 39°13′22″, longitude 76°32′29″; thence west to latitude 39°13′21″, longitude 76°33′12″; thence north-northeast to the point of beginning. This is a general anchorage for vessels having drafts of 19 feet or less. No vessel shall remain in this anchorage for more than 72 hours without a written permit from the Captain of the Port.

(6) Anchorage No. 6, general anchorage. In the Patapsco River 2,000 yards west of Sollers Point beginning at latitude 39°14′07″, longitude 76°32′08″; thence southeast to latitude 39°13′34″,

longitude 76°31′33.5″; thence southwest to latitude 39°13′20″, longitude 76°31′56″; thence northwest to latitude 39°13′53″, longitude 76°32′31″; thence northeast to the point of beginning. This is a general anchorage for vessels with drafts of 20 feet or less. No vessel shall remain in this anchorage for more than 72 hours without a written permit from the Captain of the Port.

(7) (Revoked).

(8) Dead ship anchorage. In Curtis Bay beginning on the shoreline at latitude 39°13′00″, longitude 76°34′11.5″; thence north to latitude 39°13′13.5″, longitude 76°34′12″; thence east to latitude 39°13′14″, longitude 76°33′31″; thence south to the shoreline at latitude 39°12′54″, longitude 76°33′31″. This anchorage shall be used as a dead ship anchorage only. A written permit from the Captain of the Port must be obtained prior to the use of this anchorage for any period of time.

(9) Small vessel anchorage. In the Northwest Harbor, north of the Turning Basin beginning at latitude 39°16′50.5″, longitude 76°35′08″; thence southeast to latitude 39°16′43″, longitude 76°34′53.5″; thence southwest to latitude 39°16′36.5″, longitude 76°34′59″; thence northwest to latitude 39°16′44″, longitude 76°35′13″; thence northeast to the point of beginning. This anchorage shall be used only by vessels 100 feet in length or less.

(b) General regulations. (1) Except in cases where unforeseen circumstances create conditions of imminent peril, or with the permission of the Captain of the Port, no vessel shall be anchored in Baltimore Harbor and Patapsco River outside of the anchorage areas established in this section for more than 24 hours. No vessel shall anchor within a tunnel, cable or pipeline area shown on a Government chart. No vessel shall be moored, anchored, or tied up to any pier, wharf, or other vessel in such manner as to extend into established channel limits. No vessel shall be positioned so as to obstruct or endanger the passage of any other vessel.

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

(3) Whenever, in the opinion of the Captain of the Port, such action may be necessary, he may require any vessel in a designated anchorage area to moor with two or more anchors.

(4) Every vessel that will not have sufficient personnel on board to weigh anchor at any time shall be anchored with two anchors with mooring swivel, unless the Captain of the Port, upon application, waives this requirement.

(5) Light-draft barges shall be anchored away from the deeper portions of the anchorages, so as not to interfere with the anchoring of deep-draft vessels. Any barges towed in tandem to an anchorage area shall be nested together when anchoring.

(6) No vessel shall be navigated within an anchorage at a speed exceeding 6 knots.

(7) A vessel being notified by the Captain of the Port or his authorized representative to shift its position shall take steps to promptly make the change.

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

§110.159 Annapolis Harbor, Md. (a) The Anchorage Grounds—(1) Naval Anchorage for Deep Draft Vessels. In the Chesapeake Bay, bounded on the north by latitude 38°58′00″; on the east by a line bearing 203° from latitude 38°58′00″, longitude 76°24′00″; on the south by latitude 38°56′30″; and on the west by a line bearing 139° from Greenbury Point Shoal Light. This anchorage is reserved for deep draft naval vessels. Berths in the area will be assigned on application to the Superintendent, U.S. Naval Academy.

(2) Middle Ground Anchorage. Beginning at a point in the Severn River 139°, 620 yards from Triton Light (located at the intersection of the northeast and southeast seawall of the Naval Academy grounds); thence easterly to a point 112°30′, 970 yards from Triton Light; thence southeasterly to a point 274°, 1,045 yards from the radio tower at the tip of Greenbury Point; thence south-southeasterly to a point 233°30′, 925 yards from the radiotower at the tip of Greenbury Point; thence west to a point 295°, 1,015 yards from Greenbury Point Shoal Light; thence to the point of beginning.

(3) South Anchorage. In the Severn River, beginning at a point on the shoreline at Horn Point, Eastport, 168°, 1,190 yards from Triton Light; thence east to a point 294°, 1,075 yards from Greenbury Point Shoal Light; thence northwest to a point 143°, 595 yards from Triton Light; thence westerly to a point 209°, 700 yards from Triton Light; thence 180° to a point on the shoreline at Eastport. No vessel shall anchor within 100 feet of any wharf, marine railway, or other structure without the permission of the owner thereof.

(4) Naval Anchorage for Small Craft. In the Severn River, beginning at a point 80 feet off the southeast seawall of the Naval Academy bearing 132° from Triton Light; thence easterly to a point 072°30′, 285 yards from Triton Light; thence southeasterly to a point 109°, 785 yards from Triton Light; thence westerly to a point 211°, 537

yards from Triton Light; thence northwesterly to a point 45 yards off the southeast seawall of the Naval Academy bearing 214°, 535 yards from Triton Light; thence to the point of beginning. Except in the case of emergency, no vessel shall be anchored in this area without the permission of the Superintendent, U.S. Naval Academy. Anchorages will be assigned upon request to the Superintendent, U.S. Naval Academy.

(5) Anchorage A. In Spa Creek beginning at a point on the shoreline 219°30′, 545 yards from Triton Light; thence southeasterly to a point 214°30′, 555 yards from Triton Light; thence southwesterly to a point 237°30′, 185 yards from the Naval Academy Light; thence southwesterly to a point 235°30′, 315 yards from the Naval Academy Light; thence westerly to a point 240°, 410 yards from the Naval Academy Light; thence northeasterly to a point 244°, 305 yards from the Naval Academy Light; thence northeasterly to a point on the shoreline 255°, 205 yards from the Naval Academy Light.

(6) Anchorage B. In Spa Creek beginning at a point 223°, 185 yards from the Naval Academy Light; thence southeasterly to a point 214°, 190 yards from the Naval Academy Light; thence southwesterly to a point 211°, 335 yards from the Naval Academy Light; thence southwesterly to a point 212°, 520 yards from the Naval Academy Light; thence northwesterly to a point 229°30′, 465 yards from the Naval Academy Light; thence northeasterly to the point of beginning.

(b) The regulations. (1) Except in the case of emergency, no vessel shall be anchored in the area to the north and east of the Annapolis Channel bounded on the east by Greenbury Point; on the south by a line bearing 270° from the southern tip of Greenbury Point; on the west by the Annapolis Channel; on the north by the southern boundry of the cable area and the shoreline of the Government reservation and Carr Creek.

(2) Except in the case of emergency, no vessel shall be anchored in Annapolis Harbor to the westward of the dredged channel and northward of the southern boundry of the South Anchorage outside of the established anchorage areas, except in Spa Creek and the area to the southwestward of the Naval anchorage for small craft. No vessel shall be so anchored that any part of the vessel extends at any time within this area. Any vessel anchoring, under great emergency, within this area shall be placed as close to an anchorage area as practicable, and shall move away immediately after the emergency ceases.

(3) No vessel shall be anchored in the cable and pipeline area, lying between the Naval Academy and the Naval Ship Research and Development Laboratory and having the following limits: Southeastern limit, from Triton Light 072° to white "Cable Crossing" sign at the Naval Ship Research and Development Laboratory; northwestern limit, a line bearing 054° from the Capitol Dome.

(4) Except in the case of emergency, no vessel shall be anchored, without permission of the Superintendent, U.S. Naval Academy, in the Naval Academy Drill area described as follows:

That portion of the Severn River lying to the northeastward of the Naval Academy, bounded on the north by the State Highway Bridge and on the south by the northern limit of the cable and pipeline area, excluding that area off the eastern shoreline enclosed by a line bearing approximately 131° from the eastern abutment of the State Highway Bridge to the vicinity of Ferry Point. This drill area also includes the lower part of Dorseys Creek below the Naval Academy Drawbridge. Requests to anchor in this drill area shall be made to the Superintendent, U.S. Naval Academy.

(5) The restrictions in this section do not apply to the anchoring or marking by buoys or apparatus used for the purpose of taking seafood, except within the cable or pipeline area described in subparagraph (3) of this paragraph.

(6) The regulations in this section shall be enforced by the Superintendent, U.S. Naval Academy, and such agencies as he may designate.

§110.166 York River, Va., naval anchorage. (a) The anchorage grounds. Between Yorktown and the Naval Mine Depot, beginning at latitude 37°15′34″, longitude 76°31′25″; thence to latitude 37°15′25″, longitude 76°31′39.5″; thence to latitude 37°16′21.5″, longitude 76°32′46″; thence to latitude 37°17′07.5″, longitude 76°34′17″; thence to latitude 37°17′55″, longitude 76°35′14.5″; thence to latitude 37°18′05″, longitude 76°35′01″; thence to latitude 37°17′20″, longitude 76°34′07″; thence to latitude 37°16′33.5″, longitude 76°32′34″, and thence to the point of beginning.

(b) The regulations. This anchorage is reserved for the exclusive use of naval vessels and except in cases of emergency, no other vessel shall anchor therein without permission from the local naval authorities, obtained through the Captain of the Port, Norfolk, Virginia. Movement of vessels through the anchorage will not be restricted.

§110.168 Hampton Roads, Va., and adjacent waters. (a) Hampton Roads—(1) Anchorage A, Hampton Bar. South of a line running from latitude 37°00′45″, longitude 76°20′36″, across the mouth of Hampton Creek to latitude 37°00′47″, longitude 76°19′56″; thence along the shore to a point east of Mill Creek at latitude 37°00′44″, longiutde 76°19′38″; thence to latitude 37°00′15″, longitude 76°19′29″; thence to latitude 36°59′33″, longitude 76°18′57″; thence to latitude 36°59′11″, longitude 76°19′00″; thence to latitude 36°59′09″, longitude 76°19′05″; thence to latitude 37°00′00″, longitude 76°22′08″; and thence northeast along the shoreline to the point of beginning.

(i) No vessel shall be anchored in such manner as to swing within 200 feet of the dredged channel leading to Hampton.

(ii) This anchorage is reserved for the use of vessels while undergoing examination by quaran-

tine, customs, or immigration authorities. Upon completion of these examinations vessels shall move promptly to a regular anchorage.

(iii) The master of every mechanically propelled vessel using this anchorage shall keep the vessel in condition to move promptly under its own power upon notification by the Captain of the Port, and when any such vessel is in charge of a pilot the pilot shall remain on board until the vessel is safely anchored in a regular anchorage. No sailing vessel using this anchorage shall be left unattended by a tugboat while undergoing examination by quarantine, customs, or immigration authorities, except when its stay is likely to be of several hours' duration when it shall be anchored in the western part of the anchorage out of the way of other vessels before the tug and pilot leave.

(iv) No master of a vessel awaiting or undergoing quarantine inspection shall release any part of the crew until the vessel has been passed by the proper quarantine officials and safely anchored or moored in a regular anchorage.

(2) Anchorage B, Hampton Flats (Naval). Shoreward of a line described as follows: Beginning at latitude 37°00′00″, longitude 76°22′08″; thence to latitude 36°59′08.5″, longitude 76°19′04.5″; thence to latitude 36°57′57.5″, longitude 76°20′46.5″; and thence to latitude 36°58′56″, longitude 76°23′47″, including within the above-described limits an Explosives Handling Berth W covering a circular area of 1,200 yards diameter with its center at latitude 36°58′18″, longitude 76°20′51″.

(i) Vessels shall not be anchored within 425 yards of Anchorage F-1 when that anchorage is occupied by a vessel carrying explosives.

(ii) Vessels shall not be anchored within 300 yards of Explosives Handling Berth W when that berth is occupied by a vessel handling explosives.

(iii) Anchorage B, including Explosives Handling Berth W, is reserved for the use of Naval vessels, but in the absence of the fleet the Captain of the Port may, in his discretion, permit the anchorage and berth to be used by merchant vessels. Upon notification that need for occupancy by Naval vessels is expected, the Captain of the Port may cause a sufficient area in the anchorage to be vacated to accommodate the number of Naval vessels scheduled to arrive.

(3) Anchorage C, Newport News Bar. Shoreward of a line described as follows: Beginning at latitude 36°58′56″, longitude 76°23′47″; thence to latitude 36°57′57.5″, longitude 76°20′46.5″; thence to latitude 36°57′41″, longitude 76°21′12.5″; thence to latitude 36°57′35.5″, longitude 76°21′29″; thence along the north side of Newport News Channel to latitude 36°57′20″, longitude 76°24′38″; and thence to the radio tower at approximately latitude 36°57′47.5″, longitude 76°24′40.5″.

(i) When Anchorage F-1, which lies within Anchorage C, is not occupied by vessels carrying explosives, it may be used as a general anchorage in the same manner as other portions of Anchorage C. It shall be vacated promptly upon notice from the Captain of the Port when a vessel carrying explosives, of a draft too great to permit it to use Anchorage F, desires to anchor therein. Vessels shall not be anchored within 425 yards of Anchorage F-1 when that anchorage is occupied by a vessel carrying explosives.

(ii) This anchorage is a general anchorage for all vessels, but when fleet operations are scheduled the Captain of the Port may, in his discretion, permit it to be used by naval vessels. Upon receiving word that any part of the fleet is expected, the Captain of the Port may cause a sufficient area in this anchorage to be vacated to accommodate the number of vessels scheduled to arrive.

(4) Anchorage D. Beginning at a point west of Norfolk Harbor Channel at latitude 36°57′55″, longitude 76°20′31.3″; thence south to latitude 36°57′06″, longitude 76°20′32″; thence to latitude; 36°57′14.8″, longitude 76°20′46.5″; thence to latitude 36°56′08″, longitude 76°22′23″; thence to latitude 36°56′00″, longitude 76°22′50″; thence to latitude 36°56′00″, longitude 76°23′34″; thence to latitude 36°56′09.5″, longitude 76°23′33.5″; thence to latitude 36°57′18.5″, longitude 76°21′52″; thence to a point on the south side of Newport News Channel at latitude 36°57′23.8″, longitude 76°22′03.8″; thence along the south side of Newport News Channel to latitude 36°57′28″, longitude 76°21′11″; thence to the point of beginning.

(i) Vessels shall be anchored so as to leave a clear fairway 200 yards wide through this anchorage for the operation of shallow-draft vessels and tows.

(ii) This anchorage shall be used by deep-draft vessels, wind-bound vessels from Lambert Point and Sewall Point, and vessels awaiting turn for docking. Other vessels may use this anchorage when permitted by the Captain of the Port.

(5) Anchorage E, Newport News Middle Ground. Beginning at a point on the south side of Newport News Channel at latitude 36°57′23.8″, longitude 76°22′03.8″; thence to latitude 36°57′18.5″, longitude 76°21′52″; thence to latitude 36°56′09.5″, longitude 76°23′33.5″; thence to a point on the south side of Newport News Channel at 36°57′09.8″, longitude 76°24′51.9″; thence along the south side of Newport News Channel to the point of beginning.

(i) Vessels shall be anchored so as to leave a clear fairway 200 yards wide through this anchorage for the operation of shallow-draft vessels and tows.

(6) Anchorage H. Beginning at a point west of Norfolk Harbor Channel at latitude 36°57′01.8″, longitude 76°20′22.3″; thence to latitude 36°57′14.8″, longitude 76°20′46.5″; thence to latitude 36°56′08″, longitude 76°22′23″; thence to latitude 36°56′00″, longitude 76°22′50″; thence to

latitude 36°56′00″, longitude 76°20′27″; thence along the west side of Norfolk Harbor Channel to the point of beginning.

(I) Vessels shall be anchored so as to leave a clear fairway 200 yards wide through this anchorage for the operation of shallow-draft vessels and tows.

(6-a) Anchorage H-2 (Explosives).

(i) A circular area with a radius of 150 yards centered at latitude 36°55′52″, longitude 76°21′21″.

(ii) The net high-explosive content of any vessel anchored in the area shall not exceed 27 tons.

(iii) No vessel shall anchor within 500 yards of any vessel occupying the explosives-handling area.

(iv) The area shall not be occupied more than an average of two days per week.

(7) Anchorages for vessels carrying explosives—(i) Anchorage F (for shallow draft vessels). Beginning at latitude 36°56′03″, longitude 76°23′50″; thence to latitude 36°54′30″, longitude 76°23′55.5″; thence to latitude 36°54′30″, longitude 76°24′59″; thence to latitude 36°56′31″, longitude 76°24′50.1″; thence to latitude 36°56′31″, longitude 76°24′30.7″; thence to the point of beginning.

(ii) Anchorage F-1 (for deep-draft vessels). Within Anchorage C and having a northeast boundary coincident with a portion of the northeast boundary of Anchorage C, beginning at latitude 36°58′06″, longitude 76°21′13″; thence to latitude 36°57′49.5″, longitude 76°21′36″; thence to latitude 36°57′47.5″, longitude 76°22′04″; thence to latitude 36°57′56″, longitude 76°22′30″; thence to latitude 36°58′19.5″, longitude 76°21′56″; thence to the point of beginning.

(iii) Vessels are forbidden to anchor with 425 yards of Anchorage F or between the northeast boundary of Anchorage F and the southwest boundary of Anchorage E.

(iv) When Anchorage F-1 is not occupied by vessels carrying explosives it may be used as a general anchorage in the same manner as other portions of Anchorage C, except that it shall be vacated promptly upon notice from the Captain of the Port when a vessel carrying explosives of a draft too great to permit it to use Anchorage F desires to anchor. When Anchorage F-1 is occupied by a vessel carrying explosives, vessels shall not anchor in Anchorages B and C within 425 yards of Anchorage F-1. No vessel carrying explosives shall be anchored in Anchorage F-1 so as to swing within 500 yards of the Newport News Channel.

(v) Vessels carrying explosives or other dangerous cargo, including inflammable liquids, inflammable solids, oxidizing materials, corrosive liquids, compressed gases, and poisonous substances, shall be within Anchorage F or F-1 when anchored, except as provided in subdivision (x) of this subparagraph. Anchorage F is reserved for this special purpose and shall not be used by vessels carrying other classes of cargo except in cases of great emergency or by special permit from the Captain of the Port.

(vi) A written permit shall be obtained from the Captain of the Port before a vessel carrying explosives, or on which explosives are to be loaded, may proceed to an explosives anchorage; and no vessel shall occupy a berth in such an anchorage except by authority of such a permit which may be revoked at any time.

(vii) Vessels used in connection with loading or unloading explosives in anchorage areas, including tugs and stevedore boats, shall carry a written permit from the Captain of the Port. Such permits shall be shown whenever required by him or by his properly authorized agents.

(viii) Whenever any vessel not mechanically self-propelled anchors in an explosives anchorage while carrying explosives, the Captain of the Port may require the attendance of a tug upon such vessel when in his judgment such action is necessary.

(ix) Vessels carrying explosives shall comply with the general regulations in paragraph (h) of this section when applicable.

(x) The District Engineer, Corps of Engineers, may authorize a vessel carrying explosives for use on river and harbor works or on other work under permit issued by the District Engineer to anchor in or near the vicinity of such work without a permit from the Captain of the Port. The District Engineer will prescribe the quantities of such explosives allowed on such vessel and the conditions under which they are to be stored and handled, and will furnish the Captain of the Port with a copy of such instructions.

(8) **Anchorage T-1, Construction Barges.** Anchorage T-1, is a 300-yard diameter area with the center at latitude 37°00′30″ N., longitude 76°19′07″ W. (200 yards west of buoy No. 9, Phoebus Channel). This anchorage is for the exclusive use of barges used in the construction of the second Hampton Roads Bridge-Tunnel.

(9) **Anchorage T-2, Construction Barges.** Anchorage T-2 is a 200-yard diameter area with the center at latitude 36°59′10″ N., longitude 76°18′15″ W. (200 yards west of the present South Island of the Hampton Roads Bridge-Tunnel). This anchorage is for the exclusive use of barges used in the construction of the second Hampton Roads Bridge-Tunnel. Any barge mooring in this anchorage must be tended by a boat or boats capable of maneuvering the barge in case of emergency. No barge may moor in this anchorage for more than six (6) hours.

(b) James River—(1) Anchorage G. Beginning at the mouth of the river opposite Newport News, east of a line running from Barrel Point, latitude 36°54′53″ longitude 76°28′51″; thence across the mouth of Batten Bay to Candy Island, latitude 36°56′18″, longitude 76°29′05″; and shoreward of a line beginning at Fishing Point, latitude 36°57′50″, longitude 76°29′38″; thence to latitude 36°59′08″,

longitude 76°27′56″; thence to latitude 36°58′37″, longitude 76°26′41″; thence to latitude 36°57′50″, longitude 76°26′04″; thence to latitude 36°57′32.1″, longitude 76°25′40″; thence to latitude 36°57′09.8″, longitude 76°24′51.9″; thence to latitude 36°56′44″, longitude 76°24′18.5″; thence to latitude 36°56′44″, longitude 76°25′05.7″; thence to latitude 36°55′52.5″, longitude 76°25′09.5″; thence to latitude 36°54′00″, longitude 76°28′59″.

(2) Anchorage G-1. On the northeast side of the river downstream from the James River Bridge, and shoreward of a line described as follows: Beginning at latitude 36°59′41″, longitude 76°26′40″; thence to latitude 37°00′15″, longitude 76°27′52″; and thence to latitude 37°00′45″, longitude 76°27′17″.

(3) Anchorage G-2. On the northeast side of the river upstream from the James River Bridge, and shoreward of a line described as follows: Beginning at latitude 37°00′58″, longitude 76°27′23″; thence to latitude 37°00′24″, longitude 76°28′06″; thence to latitude 37°01′55″, longitude 76°31′19″; and thence to latitude 37°03′06″, longitude 76°30′29″.

(c) East of Norfolk Harbor Channel—

(1) Anchorage K-1. Shoreward of a line described as follows: Beginning at the shoreward end of the jetty north of Army Base Pier No. 2, latitude 36°55′13″, longitude 76°19′42″; thence along the jetty to latitude 36°55′14″, longitude 76°19′46.5″; thence along the jetty to latitude 36°55′10″, longitude 76°19′49.5″; thence to a point on the east side of Norfolk Harbor Channel at latitude 36°55′06″, longitude 76°20′22″; thence northerly along the east side of Norfolk Harbor Channel to latitude 36°55′36.5″, longitude 76°20′20″; and thence to latitude 36°55′38″, longitude 76°19′47″,

(2) Anchorage K-2. South of a line running from Tanner Point latitude 36°54′13″, longitude 76°19′25″, across the mouth of Lafayette River to latitude 36°54′14″, longitude 76°18′43″; and shoreward of a line described as follows: Beginning at latitude 36°52′56″, longitude 76°19′08″; thence to a point on the east side of the dredged area alongside Norfolk Harbor Channel at latitude 36°53′04.5″, longitude 76°19′58.5″, thence northerly along the side of the dredged area to latitude 36°53′27″, longitude 76°20′02″; thence northwesterly along the side of the dredged area to latitude 36°53′31″, longitude 76°20′06″; thence northerly along the east side of Norfolk Harbor Channel to latitude 36°54′45.5″, longitude 76°20′19″; and thence to latitude 36°54′49″, longitude 76°19′40.5″.

(i) Anchorage is prohibited in the dredged channel to Lafayette River.

(3) Anchorage K-3 (for yachts and pleasure craft). That part of Lafayette River upstream from Anchorage K-2 and downstream from a line crossing the river below the Hampton Boulevard bridge from latitude 36°54′27.5″, longitude 76°18′22.5″, to latitude 36°54′11″, longitude 76°18′18″.

(i) Anchorage is prohibited in the dredged channel in Lafayette River.

(d) Elizabeth River—(1) Anchorage H-1, West Norfolk. An improved anchorage on the west side of Norfolk Harbor Channel, south of Craney Island, providing anchorage spaces 38 and 35 feet deep, each with a swing radius of 750 feet, and 3 anchorage spaces 20 feet deep, each with a swing radius of 500 feet, bounded as follows: Beginning at a point on the western boundary of Norfolk Harbor Channel at latitude 36°52′51.6″, longitude 76°20′08.8″; thence westerly to latitude 36°52′48.2″, longitude 76°20′39.3″; thence southerly to latitude 36°52′18.8″, longitude 76°20′34.3″; thence easterly to latitude 36°52′22.2″, longitude 76°20′03.8″; and thence northerly along the western boundary of Norfolk Harbor channel to the point of beginning.

(i) No vessel shall remain anchored in this anchorage awaiting loading for a period longer than 48 hours, except when non-availability of loading facilities, inclement weather, ice conditions, or other conditions reasonably require a longer period in awaiting turn for docking.

(ii) No vessel after receiving its load shall remain more than 12 daylight hours in this anchorage, i. e., vessels loaded during the afternoon or night shall clear the anchorage prior to the hour of darkness of the following day.

(2) Anchorage L. On the northeast side of Elizabeth River, south of Lambert Point, and shoreward of a line described as follows: Beginning at latitude 36°52′06.5″, longitude 76°19′04.5″; thence to latitude 36°51′56.5″, longitude 76°19′20″; thence to latitude 36°52′13″, longitude 76°19′44.5″; and thence to latitude 36°52′21″, longitude 76°19′34″.

(3) Anchorage M. On the northeast side of Elizabeth River, opposite Pinner Point, and shoreward of a line described as follows: Beginning at latitude 36°51′29.5″, longitude 76°18′37″; thence to latitude 36°51′32″, longitude 76°18′45.5″; thence to latitude 36°51′42″, longitude 76°19′00″; and thence to latitude 36°51′52″, longitude 76°18′47.5″.

(4) Anchorage N-1, Smith Creek (for yachts and pleasure craft)—(i) Mowbray Arch. Between Mowbray Arch and a line described as follows: Beginning at Ghent Bridge 150 feet from Mowbray Arch and continuing westerly the same distance therefrom to the intersection of the prolongation of the east side of Colonial Avenue; thence in a straight line to a point on the south side of Mill Street prolonged and 70 feet from Mowbray Arch; thence parallel to and 70 feet from Mowbray Arch to the south side of Pembroke Avenue prolonged; thence along the prolongation of the south side of Pembroke Avenue to a point 50 feet from Mowbray Arch; and thence in a straight line to a point on the south side of Fairfax Avenue prolonged and 40 feet from Mowbray Arch.

(ii) The Hague. Between the wall on the west side of the Hague and a straight line joining a point 40 feet easterly thereof in the south side of Fairfax Avenue prolonged with a point 70 feet easterly from the wall in a line perpendicular to the wall at the south end thereof.

(iii) No floats, rafts, lighters, houseboats, or other craft laid up for any reason shall be permitted within these anchorages, except by permission of the Captain of the Port.

(iv) No vessel shall anchor or moor alongside any wharf or pier in Smith Creek so as to extend more than 40 feet beyond the pierhead line except in the authorized anchorages.

(5) Anchorage O, Hospital Point. On the southwest side of Elizabeth River, adjacent to the Portsmouth Naval Hospital, and shoreward of a line described as follows: Beginning at latitude 36°50′57″, longitude 76°18′43″; thence to a point on the southwest side of Norfolk Harbor Channel at latitude 36°51′05″, longitude 76°18′23″; thence southeasterly along the side of the channel to latitude 36°50′49.5″, longitude 76°18′00″; thence southeasterly along the side of the channel to latitude 36°50′33.5″, longitude 76°17′50.5″; and thence to latitude 36°50′27″, longitude 76°17′55″.

(6) Anchorage P, Port Norfolk. On the southwest side of Elizabeth River, between Pinner Point and Western Branch Channel, and shoreward of a line described as follows: Beginning at latitude 36°51′25″, longitude 76°19′59″; thence to latitude 36°51′44.5″, longitude 76°19′47″; thence to a point on the southwest side of Norfolk Harbor Channel at latitude 36°52′01″, longitude 76°19′42.5″; thence southeasterly along the side of the channel to latitude 36°51′32″, longitude 76°19′01″; and thence to latitude 36°51′18″, longitude 76°19′16″.

(e) Eastern Branch of Elizabeth River— (1) Anchorage Q, Berkley. South of the channel, shoreward of a line described as follows: Beginning at latitude 36°50′20″, longitude 76°17′12.5″; thence to latitude 36°50′24″, longitude 76°17′14.5″; thence to latitude 36°50′22.5″, longitude 76°16′58.5″; and thence to latitude 36°50′13″, longitude 7°16′59″.

(2) Anchorage R—(i) Section 1. South of the channel, shoreward of a line described as follows: Beginning at latitude 36°50′11″, longitude 76°16′17″; thence to latitude 36°50′18″, longitude 76°16′19″; thence to latitude 36°50′20″, longitude 76°16′05″; and thence to latitude 36°50′14.5″, longitude 76°16′03″.

(ii) Section 2. South of the channel, shoreward of a line described as follows: Beginning at latitude 36°50′15″, longitude 76°15′48.5″; thence to latitude 36°50′21″, longitude 76°15′50.5″; thence to latitude 36°50′17″, longitude 76°15′18″; and thence to latitude 36°50′11″, longitude 76°15′20″.

(iii) Section 3. South of the channel, shoreward of a line described as follows: Beginning at latitude 36°50′10″, longitude 76°15′15″; thence to latitude 36°50′15.5″, longitude 76°15′12.5″; thence to latitude 36°50′10.5″, longitude 76°14′50″; and thence to latitude 36°50′08″, longitude 76°14′51″.

(iv) No vessel shall anchor within 200 feet of permanent improvements.

(3) Anchorage S—(i) Section 1. On the north side of the river, upstream from the Virginian Railway bridge, and shoreward of a line described as follows: Beginning at latitude 36°50′23″, longitude 76°14′18″; thence to latitude 36°50′18.5″, longitude 76°14′18″; thence to latitude 36°50′14″, longitude 76°14′35″; and thence to latitude 36°50′19.5″, longitude 76°14′33″.

(ii) Section 2. On the north side of the Eastern Branch, below the mouth of Broad Creek, and shoreward of a line described as follows: Beginning at latitude 36°50′22.5″, longitude 76°13′50″; thence to latitude 36°50′19.5″, longitude 76°14′12.5″; and thence to latitude 36°50′24″, longitude 76°14′13″.

(iii) Anchorage is prohibited within 200 feet of permanent improvements.

(f) Willoughby Bay—(1) Anchorage J-1 (for yachts and pleasure craft). East of the west end of Willoughby Spit, shoreward of a line running from latitude 36°57′54″, longitude 76°17′46″ to latitude 36°57′50.5″, longitude 76°17′49″.

(2) Anchorage J-2 (for yachts and pleasure craft). South of Willoughby Spit, shoreward of a line described as follows: Beginning at latitude 36°57′42″, longitude 76°16′21.5″; thence to latitude 36°57′44.5″, longitude 76°17′27″; thence to latitude 36°57′48″, longitude 76°17′43″; and thence to latitude 36°57′55.5″, longitude 76°17′44″.

(g) Lower Chesapeake Bay south of Thimble Shoal Channel—(1) Anchorage L-A (naval). Between Cape Henry and Little Creek, beginning at latitude 36°57′11.0″, longitude 76°03′03.0″; thence to latitude 36°55′41.0″, longitude 76°03′14.5″; thence to latitude 36°56′22.0″, longitude 76°05′53.5″; thence to latitude 36°57′01.5″, longitude 76°05′59.0″; thence to latitude 36°57′57.0″, longitude 76°09′35.0″; thence to latitude 36°58′47.0″, longitude 76°09′08.5″; thence to the point of beginning.

(i) This anchorage is reserved primarily for the use of naval vessels, but in the absence of the fleet the Captain of the Port may, in his discretion, permit it to be used by merchant vessels. Movement of vessels through the area will not be restricted.

(2) Anchorage L-C. Northwest of Anchorage L-A, beginning at latitude 36°59′14″, longitude 76°10′56.5″; thence to latitude 36°58′18.3″, longitude 76°10′54″; thence to latitude 36°58′59″, longitude 76°13′32.5″; thence to latitude 36°59′56″, longitude 76°13′36.3″; thence to the point of beginning.

(i) This anchorage is primarily for the use of merchant vessels but the Captain of the Port may, in his discretion, permit it to be used by naval vessels, the commercial conditions at the time being

given due consideration. No vessels shall occupy any berth in this anchorage without first obtaining permission from the Captain of the Port.

(3) Anchorage L-E (for naval amphibious craft). Southwest of Anchorage L-A, east of the Little Creek thorofare, and shoreward of a line described as follows: Beginning at Little Creek Harbor Jetty 1 light (approximately latitude 36°55′57.0″, longitude 76°10′36.0″); thence to latitude 36°58′04.0″, longitude 76°10′02.0″; thence to latitude 36°57′31.5″, longitude 76°07′55.0″; thence to latitude 36°55′25.0″, longitude 76°08′28.5″.

(i) This anchorage is reserved for the exclusive use of naval vessels and, except in case of emergency, no other vessel shall anchor therein without permission from local naval authorities, obtained through the Captain of the Port, Norfolk, Virginia. Movement of vessels through the anchorage will not be restricted.

(h) General regulations. (1) Except in cases of great emergency, no vessel shall be anchored in Hampton Roads or adjacent waters outside of the anchorage areas established in this section or within a cable or pipe line area shown on a Government chart, nor be moored, anchored, or tied up to any pier, wharf or other vessel in such manner as to obstruct or endanger the passage of any vessel.

(2) No vessel shall occupy for a longer period than 30 days, unless a permit is obtained from the Captain of the Port for that purpose, any anchorage for which the time of occupancy is not otherwise prescribed in this section. No vessel in a condition such that it is likely to sink or otherwise become a menace or obstruction to navigation or anchorage of other vessels shall occupy an anchorage except in an emergency, and then only for such period as may be permitted by the Captain of the Port.

(3) Whenever, in the opinion of the Captain of the Port, such action may be necessary, that officer may require any or all vessels in any designated anchorage area to moor with two or more anchors.

(4) Every vessel whose crew may be reduced to such number that it will not have sufficient men on board to weigh anchor at any time shall, before release or reduction of the crew, be anchored with two anchors with mooring swivel unless the Captain of the Port shall waive the requirement of a mooring swivel.

(5) Anchors shall be placed well within the anchorage areas, so that no portion of the hull or rigging will at any time extend outside the boundaries of the anchorage area.

(6) Any vessel anchoring under circumstances of great emergency outside an anchorage area shall be placed near the edge of the channel and in such position as not to interfere with the free navigation of the channel nor obstruct the approach to any pier nor impede the movement of any other vessel, and shall move away immediately after the emergency ceases, or upon notification by the Captain of the Port.

(7) Upon application, a berth in an anchorage, if available, will be assigned to any vessel by the Captain of the Port. He may grant revocable permits for the habitual use of the same berth, and no vessel shall occupy a berth habitually except under authority of such a permit.

(8) Upon approval of the District Engineer, Corps of Engineers, the Captain of the Port may permit wrecking plant or other vessels legally engaged in recovering sunken property or in laying or repairing legally established pipe lines or cables, or plant engaged in dredging operations, to anchor in channels. Such permission is not necessary for plant engage upon works of river and harbor improvement under the supervision of the District Engineer, but the District Engineer will notify the Captain of the Port in advance of all such proposed work.

(9) Whenever the maritime or commercial interests of the United States so require, the Captain of the Port is hereby empowered to shift the position of any vessel anchored or moored within or outside an anchorage area, including any vessel which is so moored or anchored as to obstruct navigation or interfere with range lights.

(10) A vessel upon being notified to shift its position shall get under way at once or signal for a tug and shall change position as directed with reasonable promptness.

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

PART 117—DRAWBRIDGE OPERATION REGULATIONS:

§117.1 General. (a) The operation of drawbridges, in the absence of specific regulations in this part, shall be as required by section 5 of the act of August 18, 1894, as amended (28 Stat. 362; 33 U.S.C. 499). It shall be the duty of persons owning, operating, and tending drawbridges built across navigable waters of the United States, to open, or cause to be opened, the draws of such bridges under such rules and regulations as in the opinion of the Commandant the public interests require. Insofar as criminal liability on the part of the bridge owner is concerned, the Commandant is of the opinion that, in the absence of Federal regulations, there is no Federal authority requiring the opening of any drawbridge to which the General Bridge Act of March 23, 1906, does not apply. With reference to the civil liability of the bridge owner, however, it has been held that the duty to

take proper care of a bridge includes the duty to make proper provision for the passage of vessels through the draw. In constructing a bridge with a draw, and in undertaking to open and manage the draw so as to allow vessels to pass, the owner has recognized the right of vessels to pass through without any appeal to the national authority to protect that right. Having thus recognized the rights of commerce, and undertaken to provide accommodations for the passage of vessels, the owner is bound that the custodians of the bridge shall use ordinary diligence to avoid accidents to vessels going through the draw at customary hours, and in the customary manner, as one of the incidents of the care, management, and control of the bridge itself. The owner is responsible, therefor, for the want of ordinary care and diligence in his servants, and for the consequent damage.

(b) The Attorney General has held (Jan. 28, 1899; 22 Opin. 314) that the first part of section 5 of the 1894 act is merely declaratory of the legal duty of the owners or operators which attaches to the maintenance and operation of a drawbridge across navigable waters. "It is the duty of all persons operating such drawbridges to open or cause them to be opened in a reasonable manner and at a reasonable time, consistent with the uses for which drawbridges are constructed, for the passage of vessels. The repair of such draws and of the bridges with which they are connected is also necessary for their maintenance. It is reasonable that a sufficient time should be allowed for such repairs and if they cannot be prosecuted without closing the bridge for a number of successive days, such closing cannot be considered an unreasonable interference with navigation." "It is entirely competent for the Secretary of the Army to make rules and regulations governing this subject, but in the absence of such rules and regulations the law is as I have above stated it." (The Commandant prescribes these rules and regulations.)

(c) Notwithstanding any general or special regulation heretofore or hereafter prescribed, drawbridges across navigable waters of the United States will not be opened to navigation for certain periods determined by the proper civil defense authorities to be in the interest of public safety during a major disaster or civil defense emergency indicated by a civil defense condition of "Air Raid Warning" (attack by enemy aircraft probable, imminent, or taking place).

(d) As used in this part, the term "long blast" means a distinct blast of a whistle, horn, siren, or other efficient sound producing device, of approximately three (3) seconds' duration. The term "blast" or "short blast" means a distinct blast of one (1) second's duration, or where specified, a distinct stroke of a bell.

(e) The Commandant may require the owner or operator to install and operate a radiotelephone station or stations of appropriate characteristics on a drawbridge when he finds that for navigation or safety it is essential that in addition to the use of sound or visual signals prescribed a supplemental means be available by which vessels may communicate to confirm requests for opening of the draw as well as exchange information with the drawtender concerning the condition of the draw or governing its operation.

(1) The Commandant's determination is based on such factors as location and navigational clearance of the particular bridge, character and volume of marine traffic, configuration of the navigational channel, restrictions in channel approaches, currents in the approaches to or through the drawbridge, obstructions and conditions limiting visibility, and similar conditions affecting navigation or safety through or in the vicinity of the drawbridge.

(2) Each station shall be subject to the rules and regulations of the Federal Communications Commission or the Director of Telecommunications Management as applicable governing the assignment of operating frequencies, licensing, and operation of radiotelephone stations.

(3) When the Commandant proposes that a radiotelephone station, or stations, be installed and operated on a specific drawbridge, he gives written notice of the proposed requirement to the bridge owner (or operator as appropriate) who shall have 30 days in which to submit comments or objections to the proposal. If the Commandant determines that such installation is necessary the bridge owner (or operator) shall have a reasonable time, but normally not more than 6 months, in which to effect installation and commence operation.

(4) Radiotelephone communications pursuant to this section supplement the sound and visual signals prescribed elsewhere in this part for the operation of drawbridges in general or for specific bridges and do not alter any obligation with respect to their use. The provisions of this section are not intended to restrict the voluntary installation and operation of radiotelephone stations on drawbridges.

§117.1a Temporary departures from regulations in this part. (a) Temporary closures of drawbridges. Notwithstanding any general or special regulation in this part, heretofore or hereafter prescribed, a specific drawbridge across navigable waters of the United States need not be open to navigation for specified periods of time when such a bridge may be undergoing repairs or maintenance work or when the public interest, health, or safety so requires.

(b) Delegation to District Commanders. The Commandant further delegates pursuant to 49 CFR 1.4(g) to District Commanders authority to place in effect the provisions of paragraph (a) of this section with respect to drawbridges in their respective Coast Guard Districts for periods of time determined to be necessary but in no event to exceed 15

calendar days. For a specific drawbridge the District Commander having jurisdiction may suspend any drawbridge operation regulations applicable thereto and if necessary establish other operational requirements without prior notice and public procedures thereon for such actions. Where practicable, notice of the District Commander's actions taken pursuant to this section shall be disseminated in Notices to Mariners, or otherwise, for the information of all concerned.

(c) Closure for repairs or maintenance. (1) When a draw must be closed for scheduled repairs or maintenance work, approval of the District Commander should be obtained at least 10 days prior to the date of the intended closure by the owners of or the agency controlling the drawbridge. The request for approval of the proposed closure shall include a brief description of the nature of the work to be performed and the times and dates of such closure. The granting of the approval will depend upon the necessity for the closure, the reasonableness of the time(s) and date(s) requested, and the overall effect on navigation.

(2) When a draw is closed for repairs in case of emergency or damage to the structure or for vital maintenance that may not be delayed, the owners of or the agency controlling the drawbridge shall immediately inform the District Commander concerned of the closure, the reasons for the closure, and the expected completion date of the emergency repairs. Normally, the extension of any period of emergency closure to include the accomplishment of routine maintenance or for other nonemergency purposes will not be authorized.

(d) Closure for public interest, health, and safety. In situations where the public interest, health, or safety so requires, including the holding of public functions or events such as street parades and marine regattas, the District Commander may authorize the temporary closure of a drawbridge. A request for approval of a temporary closure of a drawbridge for a street parade or marine regatta or otherwise should include a brief description of the proposed event or reason why closure of the drawbridge is desired, and the time and date of such closure. The closure of a drawbridge for public interest, health, or safety will depend upon the necessity for the closure, the reasonableness of the time and date (if requested), and the overall effect on navigation.

(e) Closure of draw for emergency vehicles. When a drawtender is informed by a reliable source that an emergency vehicle is due to cross the draw, he shall take all reasonable measures necessary to have the draw closed at the time the emergency vehicle arrives at the bridge.

§117.215 Navigable streams flowing into Raritan Bay (except Raritan River and Arthur Kill), the Shrewsbury River and its tributaries, and all inlets on the Atlantic Ocean including their tributaries and canals between Sandy Hook and Bay Head, N.J.; bridges. (a) The owners of or agencies controlling drawbridges shall provide the appliances and the personnel necessary for the safe, prompt and efficient operation of the draws.

(b) Drawbridges shall be opened promptly for the passage of any vessel or other watercraft unable to pass under the closed spans, except as hereinafter provided.

(c) Signals—(1) Call signals for opening of draw. (i) Sound Signal. Three distinct blasts of a whistle, horn or megaphone, or three loud and distinct strokes of a bell, sounded within a reasonable hearing distance of the bridge.

(ii) Visual signal. To be used in conjunction with sound signals when conditions are such that sound signals cannot be heard. A white flag by day, a white light by night, swung in full circles at arm's length in full sight of the bridge and facing the draw.

(2) Acknowledging signals by bridge operator—(i) Sound signals. Draw to be opened immediately: Same as call signal. Draw cannot be opened immediately, or, if open, must be closed immediately: Two long distinct blasts of a whistle, horn or megaphone, or two loud and distinct strokes of a bell, to be repeated at regular intervals until acknowledged by the vessel.

(ii) Visual signals. To be used in conjunction with sound signals when conditions are such that sound signals cannot be heard. Draw to be opened immediately: A white flag by day or a green light at night swung up and down vertically a number of times in full sight of the vessel. Draw cannot be opened immediately, or, if open, must be closed immediately: A red flag by day, a red light by night, swung to and fro horizontally in full sight of the vessel, to be repeated until acknowledged by the vessel.

(3) Acknowledging signals by the vessel. Vessels or other water craft having signaled for the opening of the draw and having received a signal that the draw cannot be opened immediately, or if open must be closed immediately, shall acknowledge said signal by one long blast followed by a short blast, or by swinging to and fro horizontally a red flag by day and a red light by night.

(d) Trains, automobiles, trucks, and other vehicles, vessels or other water craft shall not be stopped or manipulated in a manner hindering or delaying the operation of these drawbridges, but all passage over drawspans or through draw openings shall be so as to expedite both land and water traffic.

(e) The owners of or agencies controlling these bridges shall provide and keep in good legible condition two board gages painted white, with black figures not less than 8 inches high, to indicate the headroom clearance under the closed drawspan at all stages of the tide. The gages shall be so placed on the bridge that they will be plainly visible to the

operator of the vessel approaching the bridge either up or downstream.

(f) These drawbridges shall not be required to open for craft carrying appurtenances unessential for navigation which extend above the normal superstructure. Military masts shall be considered as part of the normal superstructure. Upon request, the District Commander in charge of the locality will cause inspection to be made of the superstructure and appurtenances of any craft habitually frequenting those waterways, with a view to adjusting any differences of opinion in this matter between the vessel owner and the bridge owner.

(g) Copies of the regulations in this section shall be conspicuously posted on both the upstream and downstream sides of the bridges in such manner that it can be easily read at any time.

(h) [Reserved]

(i) [Reserved]

(j) The general regulations contained in paragraphs (a) to (g), inclusive, of this section shall apply to all bridges except as modified by the special regulations contained in this paragraph.

(1) Lemon Creek, N.Y.; the City of New York highway bridge at Bayview Avenue, Borough of Richmond, Staten Island, New York. The draw need not be opened for the passage of vessels between the hours of 4:00 p.m. and 8:00 a.m. from November 1, to March 31, inclusive, and between the hours of 10:00 p.m. and 6:00 a.m. from April 1, to May 15, inclusive, and from October 16, to October 31, inclusive.

(2) Shark River, N.J. (i) For the purposes of the regulations in this paragraph, the Route 71, the New York and Long Branch Railroad Company and the Route 35 bridges, being less than 800 feet apart, shall be considered and operated as a unit. The owners thereof shall provide and install, for uninterrupted service, systems of electric signals on their respective bridges, so connected that the operator of any of the bridges may thereby simultaneously notify, by signal, the operators of all the other drawbridges of the desire of any vessel or other watercraft to pass through the draws. The operator of the first bridge to be passed by an approaching vessel or other watercraft shall be responsible for observing the approach of such vessel or other watercraft toward the bridge, for receiving and acknowledging the signal or notice for passing, and for communicating to the operators of the other bridges, the intention of such vessel or other watercraft to pass.

(ii) Except as otherwise provided in subdivisions (iii) and (iv) of this sub-paragraph from May 15, to September 30, inclusive, on Saturdays, Sundays, Memorial Day, Independence Day and Labor Day, between the hours of 9:00 a.m. and 9:00 p.m., and onweekdays, between the hours of 4:00 p.m. and on weekdays, and 7:00 p.m., the lift span of the Route 71, the New York and Long Branch Railroad Company and the Route 35 bridges shall not be required to open except at half-hourly intervals on the hour and half-hour, for those vessels or other watercraft waiting to pass through the draws, provided that when once opened for the passage of any vessel or craft, the said bridge or bridges shall remain open sufficiently long to permit the passage of all vessels or craft which may be engaged in passing or which may be presenting themselves for passage.

(iii) The draws shall be opened promptly on signal for the passage of vessels in the event of emergencies.

(iv) The draws shall be opened promptly at any time for the passage of vessels owned, controlled or employed by the United States Government, the State government or municipal and local governments.

(3) Shrewsbury River (South Branch), N.J. (i) Monmouth County bridge between the Boroughs of Rumson and Sea Bright. From May 15 to September 30, inclusive, of each year, on Saturdays, Sundays, Memorial Day, Independence Day, and Labor Day, between the hours of 11 a.m., e.d.s.t., and 7 p.m., e.d.s.t., openings of the draw shall be made only if necessary, every half-hour on the hour and half-hour.

(ii) The draw shall not be opened for a sailboat unless it is propelled by auxiliary power or is towed by a powered vessel.

§117.220 New Jersey Intracoastal Waterway and tributaries; bridges. (a) The New Jersey Intracoastal Waterway referred to in this section is defined as that waterway extending through the bays and thoroughfares on the eastern coast of New Jersey from Manasquan Inlet on the north to Cape May on the south, including Cape May Canal to Delaware Bay.

(b) When drawbridges are less than 1,000 feet apart they shall, for the purposes of this section, be considered and operated as a unit. The owners thereof shall provide and install, for uninterrupted service, systems of electric signals on their respective bridges, so connected that the operator of any bridge of the group may thereby simultaneously notify, by signal, the operators of all the other drawbridges of that group of the desire of the master of any vessel or other watercraft to pass through the draws. The operator of the bridge first in any group of bridges to be passed by an approaching vessel or other watercraft shall be responsible for observing the approach of such vessel or other watercraft toward that bridge, also for receiving the signal or notice for passing and for communicating, by means of the electric signals prescribed above, to the operators of the other bridges composing such group the purpose of such vessel or other watercraft to pass.

(c) Whenever any vessel or watercraft approaches a bridge affected by this section, and under which it cannot pass, the lawful signal of the desire of the master of the vessel or craft to pass

through the draw opening shall be three blasts of a whistle or horn blown on the vessel or craft. These drawbridges shall not be required to open for craft carrying appurtenances unessential for navigation which extend above the normal superstructure. Upon request, District Commander will cause inspection to be made of the superstructure and appurtenances of any craft habitually frequenting those waterways, with a view to adjusting any differences of opinion in this matter between the vessel owner and the bridge owner. Appurtenances unessential for navigation shall include but not be limited to fishing outriggers, radio or television antennae, false stacks, and masts purely for ornamental purposes. Appurtenances unessential to navigation will not include flying bridges, sailboat masts, pile driver leads, spud frames on hydraulic dredges, or other items of equipment clearly necessary to the intended use of the vessel.

(d) The draws in each and every bridge or group of bridges shall, upon the signal prescribed in paragraph (c) of this section, be promptly opened at any and all hours of the day or night, except as provided in paragraphs (m), (n), and (o) of this section, for the passage of any vessel, vessels, or other watercraft unable to pass safely beneath the draw when closed. For bridges crossing the New Jersey Intracoastal Waterway, failure of the draws to be fully opened within 4 minutes from the signal to open shall be considered a violation of the requirement for prompt opening, except as provided in paragraphs (m), (n), and (o) of this section.

(e) If a car, train of cars, or other vehicle is, at the time of receiving the signal prescribed in paragraph (c) of this section, approaching any draw so closely that it cannot be safely stopped before reaching such draw, two blasts of a whistle or horn shall be blown on the bridge. As soon thereafter as such draw shall be cleared, such draw or all draws comprised in any group of bridges concerned shall be promptly opened, and three blasts of a whistle or horn blown on the bridge to indicate such clearance.

(f) After the draw or draws of any bridge or group of bridges shall have remained open for a period of 10 minutes or for such shorter period as may be necessary for the passage of vessels or other watercraft waiting to pass, the draw or draws may be closed for the crossing of cars, trains, vehicles, or individuals, if any be waiting to cross. After being so closed for a period of 10 minutes or for such shorter times as may be necessary, the draw or draws shall be again promptly opened for the passage of vessels or other watercraft, if there be any desiring to pass.

(g) No vehicle, car, locomotive, or train shall be stopped on the drawspan of any bridge subject to this section; nor shall any such bridges carrying railway or tramway tracks be used for switching purposes, except those bridges for which special regulations are prescribed in paragraph (m) of this section; nor shall locomotives or trains be stopped in bridge blocks of railroad bridges in such manner as to hinder or delay the operation of any draw, except in cases of urgent necessity. Vessels shall not be so moored nor maneuvered as to delay or hinder unnecessarily closing the draw of any bridge. All passages of vessels and other watercraft through or under the drawbridges and all passage of cars, locomotives, trains, and other vehicles over drawbridges shall be prompt and as rapid as practicable in order to avoid unnecessary delay to either land or water traffic.

(h) The owner or owners of each and every drawbridge covered by this section shall maintain in good and serviceable order the drawspan, together with the machinery and appliances required for operating the same, and the electric signal system prescribed in paragraph (b) of this section; shall provide such number of draw operators or tenders as may be found necessary to open and close the draws promptly; and shall also provide and maintain in good order on the bridge piers or fenders such fixtures as may be necessary for vessels to moor or make fast while waiting for the drawspan to be opened.

(i) The length of time that a draw has been opened shall be computed from the time that the drawspan begins to move in opening, and the length of time that a draw has been closed shall be computed from the time that the drawspan ceases to move in closing.

(j) At each opening of a draw full horizontal and vertical clearances shall be provided, regardless of the size or requirements of the passing vessel or other watercraft.

(k) The owner or owners of each and every bridge covered by this section shall provide and maintain in good legible condition two board gages, with figures not less than 6 inches high, the figures painted black on a white background, or vice versa, to indicate the vertical clearance under the closed drawspan at all stages of the tide. The gages shall be so placed on the ends of the drawspan fender that they shall be plainly visible to the master of a vessel or other watercraft approaching such bridge either upstream or downstream.

(l) The owner or owners of each and every bridge covered by this section shall cause to be kept a complete record of all openings of the draw and shall promptly report to the District Commander cases in which the drawspan has been required to remain open for an unreasonable length of time or to remain closed for more than 10 minutes after the prescribed signal to open the draw has been given.

(m) The provisions of paragraph (d) of this section shall be applicable to the bridge of the Pennsylvania-Reading Seashore Lines, over Beach Thorofare at Atlantic City, N.J., only between the

hours of 11:00 p.m. and 6:00 a.m. daily. Between the hours of 6:00 a.m. and 11:00 p.m. this bridge shall be opened upon signal from any vessel or craft desiring to pass at any time during the periods from 20 to 30 minutes past each hour, but may remain closed during such periods if no vessel or craft give such signal, provided that when once opened for the passage of any vessel or craft the said bridge shall remain open sufficiently long to permit the passage of all vessels or craft which may be engaged in passing or which may be presenting itself for passage. Between such hours (6:00 a.m. and 11:00 p.m.) this bridge shall not be opened except as provided for in this paragraph.

(n) From June 1 to September 30, inclusive, the drawspan of the Albany Avenue bridge over Inside Thorofare at Atlantic City, N.J., shall be required to open only on the hour and half hour between 9 a.m. and 9 p.m., daily, except that between 4 p.m. and 6 p.m., daily, the drawspan shall not be required to open for the passage of vessels or craft. When once opened for the passage of any vessel or craft during these hours the said bridge shall remain open sufficiently long to permit the passage of all vessels or craft which may be engaged in passing or which may be presenting themselves for passage.

(o) The draw of the Dorset Avenue bridge shall be opened promptly on signal from October 1 through May 30 and from 9:15 p.m. to 9:15 a.m. from June 1 through September 30. From 9:15 a.m. to 9:15 p.m. from June 1 through September 30 the draw need be opened only on the quarter and three-quarter hours for any vessels waiting to pass, however a public vessel on an emergency or a vessel in distress shall be passed promptly and if opened for such vessels the draw shall remain open sufficiently long to permit passage of any other vessels within at least 300 yards of the bridge that has signaled for its opening. The emergency or distress signal shall be four blasts of a whistle, horn, or siren.

§117.225 Navigable waters in the State of New Jersey; bridges where constant attendance of draw tenders is not required. (a) The owners of or agencies controlling the bridges listed in paragraph (f) of this section will not be required to keep draw tenders in constant attendance.

(b) Whenever a vessel unable to pass under a closed bridge desires to pass through the draw, advance notice, as specified, of the time the opening is required shall be given to the authorized representative of the owner of or agency controlling the bridge.

(c) Upon receipt of such advance notice, the authorized representative of the owner of or agency controlling the bridge, in compliance therewith, shall arrange for the prompt opening of the draw at the time specified in the notice for the passage of the vessel.

(d) The owners of or agencies controlling the bridges shall keep conspicuously posted on both the upstream and downstream sides thereof, in such manner that it can easily be read at any time, a copy of the regulations in this section together with a notice stating exactly how the representative specified in paragraph (b) of this section may be reached.

(e) The operating machinery of the draws shall be maintained in a serviceable condition, and the draws shall be opened and closed at intervals frequent enough to make certain that the machinery is in proper order for satisfactory operation.

(f) The bridges to which this section applies, and the regulations applicable in each case, are as follows:

(1) Overpeck Creek, New York, Susquehanna and Western Railroad Company bridge and West Shore Railroad Company (New York Central System) bridge at Ridgefield Park. From January 1 to March 31, inclusive, the bridges need not be opened for the passage of vessels. From April 1 to December 31, inclusive, at least 2 hours' advance notice required, except from May 1 to November 30, inclusive, between the hours of 8 a.m. and 5 p.m., the bridges will be opened promptly upon signal for the passage of vessels, in accordance with the regulations contained in §117.200.

(1-b) Hackensack River, New Jersey State Highway Department drawbridge at Little Ferry, N.J. At least 48 hours' advance notice required.

(2) Passaic River, Passaic and Bergen Counties highway bridges at Market Street and at West Eighth Street, Passaic. The draws need not be opened for the passage of vessels, and paragraphs (b) to (e) of this section shall not apply to these bridges.

(2-a) Passaic River, Erie Lackawanna Railroad bridge between Newark and West Arlington, N.J. The draw need not be opened from 11 p.m. to 7 a.m. From 7 a.m. to 11 p.m., the draw shall be opened promptly on signal provided 8 hours' advance notice has been given.

(3) Elizabeth River; The Central Railroad Company of New Jersey bridge and Union County bridges at Baltic Street, Summer Street, South Street, and Bridge Street, in the City of Elizabeth. The draws need not be opened for the passage of vessels and the special regulations contained in paragraphs (b) to (e) inclusive, of this section shall not apply to these bridges.

(4) Elizabeth River; Union County Bridge at South First Street in the City of Elizabeth. At least three hours' advance notice required.

(5) Woodbridge Creek; Middlesex County highway bridge and The Central Railroad Company of New Jersey bridge at Maurer. At least four hours' advance notice required.

(6) Shrewsbury River (South Branch) at junction of Parker Creek and Oceanport Creek; Monmouth County Gooseneck Highway Bridge. From

November 1 to April 30, inclusive, at least four hours' advance notice required. At all other times and in all other respects the regulations contained in §117.215 shall govern the operation of this bridge.

(7) Oceanport Creek; The New York and Long Branch Railroad Company bridge near Oceanport. At least four hours' advance notice required.

(8) Beaver Dam Creek; Ocean County highway bridge near Point Pleasant. At all times during January, February, March and December and between 4:00 p.m. and 8:00 a.m., during April, May, October and November, at least 24 hours' advance notice required. At all other times the regulations in §117.220 shall govern the operation of this bridge.

(8-a) Bass River; New Jersey State Highway Department bridge on U.S. Route 9 at New Gretna. At all times during January, February, and December, and between 11 p.m. and 7 a.m. from March 1 to November 30, inclusive, at least 6 hours' advance notice required.

(9) Patcong Creek; Atlantic County highway bridge 0.5 mile upstream from the mouth. At least 24 hours' advance notice required.

(10) Tuckahoe River; New Jersey State Highway Department bridge at Tuckahoe. At least 24 hours' advance notice required.

(11) Great Channel; Cape May County Bridge Commission bridge between Stone Harbor and Nummy Island. From November 1 to April 30, inclusive, at least 24 hours' advance notice required.

(11-a) Cape Island Creek; Cape May County highway bridge. The draw need not be opened for the passage of vessels, and the special regulations contained in paragraphs (b) to (e), inclusive, of this section shall not apply to this bridge.

(12) Maurice River; New Jersey State Highway Department bridge near Millville. The draw need not be opened for the passage of vessels and the special regulations contained in paragraphs (b) through (e) of this section shall not apply to this bridge.

(13) Manantico Creek; New Jersey State Highway Department bridge near Millville. The draw need not be opened for the passage of vessels, and paragraphs (b) to (e), inclusive, of this section shall not apply to this bridge.

(14) Cohansey River; New Jersey State Highway Department bridge at Broad Street, Bridgeton. The draw need not be opened for the passage of vessels, and paragraphs (b) and (e), inclusive, of this section shall not apply to this bridge.

(15) Alloway Creek; Salem County highway bridges at Hancocks Bridge and at Upper Hancocks Bridge. At least 24 hours' advance notice required. New Jersey State Highway Department bridge at Quinton. The draw need not be opened for the passage of vessels, and the special regulations contained in paragraphs (b) to (e), inclusive, of this section shall not apply to this bridge.

(15-a) Salem River, Route 49, Salem, N.J.; at least 24 hours' advance notice required.

(16) Oldmans Creek; Pennsylvania-Reading Seashore Lines railroad bridge near Pedricktown, Salem County high-way bridge at Pedricktown and New Jersey State Highway Department bridge near Nortonville. The draws need not be opened for the passage of vessels and the special regulations contained in paragraph (b) and (e) of this section shall not apply to these bridges. Any or all of these bridges shall be restored to an operable condition within 6 months after notification by the Commandant to take such action.

(16-a) Raccoon Creek; Pennsylvania-Reading Seashore Lines railroad bridge at Bridgeport. At least four hours' advance notice required for opening this bridge during January, February and December between 10:00 p.m. and 6:00 a.m. on regular weekdays and at all times on Saturdays, Sundays and national holidays during these months.

(17) Woodbury Creek; Gloucester County highway bridge at National Park. At least 24 hours' advance notice required during December, January and February of each year.

(17-a) Cooper River: (i) Penn Central railroad bridge at North River Avenue and Camden County highway bridge at Federal Street at Camden. At least 4 hours' advance notice is required.

(ii) New Jersey State Highway Department bridge at Admiral Wilson Boulevard at Camden. The draw need not be opened for the passage of vessels and the special regulations contained in paragraphs (b) through (e) of this section shall not apply to this bridge. However, it shall be restored to an operable condition within 6 months after notification by the Commandant to take such action.

(18) Delaware River (back channel); The Pennsylvania Railroad Company bridge between Petty Island and Camden. At least 24 hours' advance notice required.

(19) Rancocas River; Burlington County highway bridge and Pennsylvania Railroad Company bridge between Riverside and Delanco, New Jersey State Highway Department bridge at Bridgeboro, and Burlington County highway bridge at Centerton. Between 11:00 p.m. and 7:00 a.m. each day of the year the draws of these bridges need not be opened for the passage of vessels. At least 24 hours' advance notice required for opening these bridges between 7:00 a.m. and 11:00 p.m. during January, February, March and December.

§117.227 Schuylkill and Delaware Rivers. (a) Signals. The signal by a vessel requesting that a draw be opened on a drawbridge across the Schuylkill or Delaware Rivers will be 3 blasts on a horn or whistle. The bridge tender will reply with 1 blast when the draw can be opened immediately and with 4 or more blasts when there will be a delay. When the bridge is open and clear the bridge tender will sound 2 blasts.

(b) Lights. The foregoing signals by the bridge tender will be supplemented by the following lights in the center of the drawspan, on both the upstream and downstream sides of the bridge.

(1) Fixed amber light—bridge being prepared for opening. Flashing red light—bridge opening to be delayed.

(2) These supplementary operation lights shall not conflict with the fixed navigation lights required in Part 68 of this title.

(3) Supplementary operation lights are not required for birdges across the Schuylkill River.

(c) Opening the draw. The bridge tender, upon hearing or perceiving the prescribed signal, shall immediately clear the drawspan and open the draw to its full extent, except that:

(1) A railroad bridge need not be opened when there is a train in the bridge block approaching the bridge with the intention of crossing, or within 5 minutes of the known time of the passage of a scheduled passenger, mail, or express train.

(2) The opening of a bridge may not be delayed more than 5 minutes for a highway bridge or 10 minutes for a railroad bridge after the sounding of the prescribed signal by a vessel.

(3) The draw need not be opened for the passage of tugs or other craft equipped with a movable stack or mast which can be readily lowered so as to permit its passage under the closed draw. Each tug, towboat, barge, and other small craft regularly navigating the Schuylkill River shall be subject to inspection and measurement by the District Commander. The District Commander is hereby empowered to determine in each case whether or not the vessel shall be equipped with hinged or removable stacks, masts, and flagstaffs which can be lowered to enable the vessel to pass under the closed draw of any or all of the bridges. If the District Commander decides that such action should be taken, he shall notify the vessel owner and the bridge owner of his decision, specifying a reasonable time for making the alterations. After the expiration of the time specified the draw need not be opened for the passage of such vessel unless it has in tow a vessel unable to pass under the closed draw or by reason of stress of weather it is unsafe to lower such stack or mast.

(d) Interference with operation. Vehicles and trains shall not be stopped on the drawspans, nor shall trains be stopped in the bridge blocks of railroad bridges in such a manner as to delay the operation of the draw, except in case of urgent necessity, nor shall vessels be moored to the bridge or so maneuvered as to unnecessarily hinder or delay the closure of the draw. All passages over, through, or under the bridges shall be prompt, to minimize delays to both land and water traffic.

(e) Operating machinery. All drawbridges shall be equipped with quick-operating power machinery for opening and closing the draw, and this machinery shall at all times be kept in good and effective working condition and manned by competent operators.

(f) Clearance gages. Those responsible for the maintenance of these bridges shall provide and keep in good legible condition two board gages, painted white with black figures 6 inches high, to indicate headroom clearances under the closed span at all stages of the tide. These gages will be placed at the ends of the drawspan fenders so that they will be visible to the navigator of a vessel approaching the bridge from either upstream or downstream.

(g) Posted regulations. Those responsible for maintaining each bridge shall keep posted on the upstream and downstream sides a copy of the regulations applicable to each bridge in this section and the telephone number(s) to call to reach the designated representatives.

(h) Schuylkill River bridges; special regulations. (1) All drawbridges across the Schuylkill River are subject to the provisions of paragraph (c) of this section with specific bridges subject to additional special regulations stated herein.

(2) The bridges at Passyunk Avenue maintained by the city of Philadelphia and at Tasker Street maintained by the Baltimore and Ohio Railroad and any others for which special regulations are not hereinafter prescribed will be opened at any time on signal.

(3) The bridges at Grays Ferry Avenue maintained by the Pennsylvania Railroad and the city of Philadelphia and the bridge at University Avenue maintained by the city of Philadelphia will be opened on signal from 8 a.m. to 4 p.m. and from 8 p.m. to 4 a.m., Monday through Friday. At all other times an advance notice of at least 2 hours will be required.

(4) The bridge near Christian Street maintained by the Pennsylvania Railroad requires an advance notice of at least 2 hours at all times before opening.

(i) Delaware River bridges; special regulations. (1) The drawbridges across the Delaware River will open at any time on signal, except as provided for in paragraph (c) of this section.

§ 117.228 Darby Creek, Pa., The Pennsylvania Railroad Co., and Reading Co. bridges near Essington. (a) The owners of or agencies controlling these bridges will not be required to keep draw tenders in constant attendance.

(b) Between 11:00 p.m. and 7:00 a.m. each day from May 15 to October 15, inclusive, the draws of these bridges need not be opened for the passage of vessels.

(c) Between 7:00 a.m. and 11:00 p.m. each day from May 15 to October 15, inclusive, the bridges will be opened upon signal from an approaching vessel or vessels at 7:15 a.m., 10:30 a.m., 1:00 p.m., 3:00 p.m., 7:30 p.m., and 10:30 p.m. and at other times on signal during these hours if such

openings will not unduly delay railroad operations. Any vessel which may have passed through one of these bridges shall be passed through the draw of the other bridge without delay. When once opened for the passage of any vessel or craft the said bridges shall remain opened sufficiently long to permit the passage through both bridges of all vessels or craft which may be engaged in passing and all accumulated vessels presenting themselves for passage.

(d) From October 16 to May 14, inclusive, whenever a vessel unable to pass under the closed bridges desires to pass through the draws, 24 hours' advance notice of the time opening is required must be given to the authorized representative of the owner of or agency controlling each of the bridges to insure prompt opening thereof at the time required. On receipt of such advance notice the authorized representative, in compliance therein, shall arrange for the prompt opening of the draw on proper signal at approximately the time specified in the notice.

(e) In an emergency, the drawspans of these bridges will be opened as soon as possible after notification.

(f) The owners of or agencies controlling these bridges shall provide and keep in good legible condition two board gages of a type to be approved by the Commandant to indicate the controlling minimum vertical clearance under both closed drawspans at all stages of the tide. These gages shall be so placed on the upstream and downstream ends of the right channel drawspan piers or fenders so that they will be plainly visible to the navigators approaching from either direction.

(g) The owner of or agency controlling each bridge shall keep conspicuously posted on both the upstream and downstream sides thereof, in such manner that it can easily be read at any time, a copy of the regulations in this section together with information as to whom notice should be given, specified in paragraphs (d) and (e) of this section, when it is desired that the bridge be opened and directions for communicating with such person by telephone or otherwise.

(h) The operating machinery of the draws shall be maintained in a serviceable condition, and the draws shall be opened and closed at intervals frequent enough to make certain that the machinery is in proper order for satisfactory operation.

§117.229 Chester River, Pa.; the Reading Co. bridge at Front Street, Chester, Pa. (a) Between 6 a.m. and 10 p.m., the draw shall be opened promptly on signal for a vessel desiring to pass through the bridge. From 10 p.m. to 6 a.m., the draw will remain closed and the bridge unattended.

(b) The owner of or agency controlling this bridge shall keep conspicuously posted on both the upstream and downstream sides of the bridge, in such manner that it can easily be read at any time, a copy of the regulations in this section.

§117.230 Brandywine River, Del.; bridges. (a) Seventh Street bridge, Wilmington, Del. (1) The owner of or agency controlling the bridge will not be required to keep a draw tender in constant attendance.

(2) The owner of or agency controlling the bridge shall provide the appliances and the personnel necessary for the safe, prompt and efficient opening of the draw at any time during the day or night, except as provided in subparagraph (5) of this paragraph, for the passage of any vessel or other watercraft which cannot pass under the closed draw, when the following signal is received: Three blasts of a whistle or horn. When the draw of the bridge can be opened immediately, the draw tender shall reply by two blasts of a whistle or horn. When the draw of the bridge cannot be opened immediately or when the bridge is open and is to be closed immediately, the draw tender shall reply by one blast of a whistle or horn.

(3) Vehicles shall not be stopped on the drawspan, in such manner as to delay the operation of the draw except in case of urgent necessity, nor shall vessels be moored to the bridge fenders or so maneuvered as to unnecessarily hinder or delay the closing of the draw, but all passage over, through, or under the bridge shall be prompt to avoid delay to either land or water traffic.

(4) The owner of or agency controlling the bridge shall provide and keep in good legible condition two board gages painted white with black figures not less than 6 inches high, to indicate the headroom clearance under the closed span at all stages of the tide. Theses gages shall be so placed on the ends of the drawspan fenders that they will be plainly visible to the navigators of a vessel approaching the bridge from either direction.

(5) At least 24 hours' advance notice will be required for opening this bridge at all times during January, February, March and December and between 8:00 p.m. and 6:00 a.m. from April to November, inclusive.

(i) Whenever a vessel unable to pass under the closed bridge desires to pass through the draw, advance notice, as specified, of the time the opening is required shall be given to the authorized representative of the owner of or agency controlling the bridge.

(ii) Upon receipt of such advance notice, the authorized representative of the owner of or agency controlling the bridge, in compliance therewith, shall arrange for the prompt opening of the draw at the time specified in the notice for the passage of the vessel.

(iii) The owner of or agency controlling the bridge shall keep conspicuously posted on both the upstream and downstream sides thereof, in such manner that it can easily be read at any time, a copy of the regulations in this paragraph together with a notice stating exactly how the representative specified in subdivision (i) of this subparagraph may be reached.

(iv) The operating machinery of the draw shall be maintained in a serviceable condition, and the draw shall be opened and closed at intervals frequent enough to make certain the machinery is in proper order for satisfactory operation.

(b) Pennsylvania Railroad bridge above Seventh Street and Highway bridges at Church Street and Sixteenth Street, Wilmington, Del. (1) The draws of these bridges need not be opened for the passage of vessels.

(2) The owners of or agencies controlling the bridges shall keep conspicuously posted on both the upstream and downstream sides of the respective bridges, in such manner that it can easily be read at any time, a copy of the regulations in this paragraph.

§117.235 Christina River, Del.; bridges. (a) The owners of or agencies controlling the bridges shall provide the appliances and the personnel necessary for the safe, prompt, and efficient opening of the draws at any time during the day or night for the passage of any vessel or other watercraft which cannot pass under the closed draws.

(b) Except as otherwise provided in paragraphs (g) and (h) of this section, the bridge tender upon hearing or perceiving the prescribed call signal shall immediately clear the drawspan and open the draw to its full extent for the passage of the vessel or other craft: Provided, That the draw of a railroad bridge need not be opened when there is a train in the bridge block approaching the bridge with the intention of crossing, nor within 5 minutes of the known time of passage of a scheduled passenger, mail, or express train; but in no event, except in case of breakdown of the operating machinery, shall the opening of the draw be delayed more than 5 minutes in the case of a highway bridge, nor more than 10 minutes in the case of a railroad bridge.

(c) Call signal for opening of draw. Three blasts of a whistle or horn.

(2) Acknowledging signal—(i) When the draw can be opened immediately. Two blasts of a whistle or horn.

(ii) When the draw cannot be opened immediately, or when it is open and is to be closed immediately. One blast of a whistle or horn.

(d) Vehicles, street cars, locomotives, and trains shall not be stopped on the drawspan, nor shall locomotives or trains be stopped in the bridge blocks of railroad bridges in such manner as to delay the operation of the draws, except in case of urgent necessity, nor shall vessels be moored to the bridge fenders or so maneuvered as to unnecessarily hinder or delay the closing of the draw, but all passages over, through, or under the bridges shall be prompt, to avoid delay to either land or water traffic.

(e) The owners of, or agencies controlling, the bridges shall provide and keep in good legible condition two board gages painted white with black figures not less than 6 inches high, to indicate the headroom clearance under the closed span at all stages of the tide. These gages shall be so placed on the ends of the drawspan fenders that they will be plainly visible to the navigators approaching from either direction.

(f) The foregoing general regulations contained in paragraphs (a) to (e), inclusive, of this section shall apply to all bridges except as modified by the special regulations contained in paragraphs (g) and (h), of this section, prescribed to provide for closed or open periods when land or water traffic predominates and for the operation of a particular bridge on advance notice.

(g) (1) The owners of or agencies controlling the bridges listed in subparagraph (6) of this paragraph will not be required to keep draw tenders in constant attendance.

(2) Whenever a vessel unable to pass under a closed bridge desires to pass through the draw, advance notice as specified, of the time the opening is required shall be given to the authorized representative of the owner of or agency controlling the bridge.

(3) Upon receipt of such advance notice, the authorized representative of the owner of or agency controlling the bridge, in compliance therewith, shall arrange for the prompt opening of the draw at the time specified in the notice for the passage of the vessel.

(4) The owners of or agencies controlling the bridges shall keep conspicuously posted on both the upstream and downstream sides thereof, in such manner that it can easily be read at any time, a copy of the regulations together with a notice stating exactly how the representative specified in subparagraph (2) of this paragraph may be reached.

(5) The operating machinery of the draws shall be maintained in a serviceable condition, and the draws shall be opened and closed at intervals frequent enough to make certain the machinery is in proper order for satisfactory operation.

(6) The bridges to which the special regulations in this paragraph apply, the periods when draws need not be operated and advance notice required, are as follows:

(i) Pennsylvania Railroad Company bridge at Mile 4.12, Reading Company bridge at Mile 4.15 and Penslyvania Railroad Company bridge at Mile 5.38. Between 8:00 p.m. and 6:00 a.m. the draws need not be opened for the passage of vessels. Between 6:00 a.m. and 8:00 p.m., at least 24 hours' advance notice required.

(ii) Delaware State Highway Department bridge at Newport. At least 24 hours' advance notice required.

(h) Closed periods. The Third Street, Walnut Street and Market Street bridges shall not be required to open for the passage of vessels between 7:00 a.m. and 8:00 a.m. and between 4:30

p.m. and 5:30 p.m., except on Sundays and legal holidays: Provided, That any vessel which has passed through one or more of these three bridges immediately prior to a closed period and will require passage through the other bridge or bridges in order to continue to its destination shall be passed through the draw or draws of such bridge or bridges without delay: Provided further, That in time of flood or other emergency the closed periods may be suspended or modified by the District Commander.

§117.235a Chesapeake and Delaware Canal, Del. (Repeated in **207.100 (j)**). (a) When any vessel is unable to pass under a closed drawbridge of the Chesapeake and Delaware Canal, the opening signal shall be three blasts.

(1) If the drawspan is to be opened immediately: One blast.

(2) If the drawspan is not ready to be opened: Four blasts.

(3) When the drawspan is open and clear for vessel passage: Two blasts.

(b) The sound signals listed in paragraph(a) of this section shall be supplemented by the following light signals in the center of the drawspan on both upstream and downstream sides of the bridge.

(1) When the drawspan is to be opened immediately: One fixed amber light.

(2) When the drawspan is not ready to be opened: One flashing red light.

§117.236 Appoquinimink River, Del.; Delaware State Highway Department bridge at Fennimores, Del. (a) The owner of this bridge will not be required to keep a draw tender in constant attendance.

(b) Whenever a vessel unable to pass under the closed bridge desires to pass through the draw, at least 24 hours' advance notice of the time the opening is required shall be given to the authorized representative of the owner of the bridge.

(c) Upon receipt of such advance notice, the authorized representative shall arrange for the prompt opening of the draw at the time specified in the notice for the passage of the vessel.

(d) The owner of the bridge shall keep conspicuously posted on both the upstream and downstream sides of the bridge, in such manner that it can easily be read at any time, a copy of these regulations together with a notice stating, exactly how the representative specified in paragraph (b) of this section may be reached.

(e) The operating machinery of the draw shall be maintained in a serviceable condition, and the draw shall be opened and closed at intervals frequent enough to make certain that the machinery is in proper order for satisfactory operation.

§117.237 St. Jones River, Del.; Delaware State Highway Department bridges at Barkers Landing and at Lebanon. (a) The owner of or agency controlling these bridges will not be required to keep draw tenders in constant attendance.

(b) Whenever a vessel unable to pass under the closed bridges desires to pass through the draws, at least 24 hours' advance notice of the time opening is required must be given to the authorized representative of the owner of or agency controlling the bridges to insure prompt opening thereof at the time required.

(c) On receipt of such advance notice the authorized representative, in compliance therewith, shall arrange for the prompt opening of the draw on signal at approximately the time specified in the notice.

(d) The owner of or agency controlling the bridges shall keep conspicuously posted on both the upstream and downstream sides thereof, in such manner that it can easily be read at any time, a copy of the regulations of this section together with a notice stating exactly how the representative specified in paragraph (b) of this section may be reached.

(e) The operating machinery of the draws shall be maintained in a serviceable condition, and the draws shall be opened and closed at intervals frequent enough to make certain that the machinery is in proper order for satisfactory operation.

§117.237a Mispillion River, Delaware; Delaware State Route 14 bridge at Washington Street, Milford. (a) The owner of or agency controlling this bridge will not be required to keep a drawtender in constant attendance.

(b) Opening requirements:

(1) This bridge shall open on signal from 8 a.m. to 8 p.m. daily, except from May 31 to September 15 the draw need not be opened from 5 p.m. to 8 p.m. on Fridays, 8 a.m. to 2 p.m. on Saturdays and 11 a.m. to 8 p.m. on Sundays.

(2) From 8 p.m. to 8 a.m., at least 24 hours' advance notice must be given to the authorized representaive of the owner of or agency controlling the bridge who shall arrange for the prompt opening of the draw on signal.

(c) The owner of or agency controlling the bridge shall keep conspicuously posted on both the upstream and downstream sides thereof, in such manner that it can easily be read at any time, a copy of the regulations in this section together with a notice stating exactly how the representatives specified in paragraph (b) of this section may be reached.

(d) The operating machinery of the draw shall be maintained in a serviceable condition and the draw shall be opened and closed at intervals frequent enough to make certain that the machinery is in proper order for satisfactory operation.

§117.237b Lewes and Rehoboth Canal, Del.; Delaware State Highway Department bridges at Rehoboth. (a) The owner of or agency controlling these bridges will not be required to keep draw tenders in attendance from 5:00 p.m. to 7:00 a.m.

(b) Whenever a vessel unable to pass under the closed bridges desires to pass through the draws

from 5:00 p.m. to 7:00 a.m., at least 24 hours' advance notice of the time opening is required must be given to the authorized representative of the owner of or agency controlling the bridges to insure prompt opening thereof at the time required.

(c) On receipt of such advance notice the authorized representative, in compliance therewith, shall arrange for the prompt opening of the draws on signal at approximately the time specified in the notice.

(d) The owner of or agency controlling the bridges shall keep conspicuously posted on both the upstream and downstream sides thereof, in such manner that it can easily be read at any time, a copy of the regulations in this section together with a notice stating exactly how the representatives specified in paragraph (b) of this section may be reached.

(e) The operating machinery of the draws shall be maintained in a serviceable condition, and the draws shall be opened and closed at intervals frequent enough to make certain that the machinery is in proper order for satisfactory operation.

§117.238 Smyrna River, Del. (a) Fleming Landing highway bridge. At least 24 hours' advance notice shall be given to New Castle County Division Engineer, Delaware State Highway Department, Bear, Del. In all other respects, the regulations contained in §117.245 (a) through (e) shall govern the operation of this bridge.

§117.240 Navigable waters discharging into the Atlantic Ocean south of Delaware Bay (including the Lewes and Rehoboth Canal, Del.), and into the Gulf of Mexico (including coastal waterways contiguous thereto and tributaries to such waterways and the Lower Atchafalaya River, La.), except the Mississippi River and its tributaries and outlets; bridges. (a) Corporations or persons owning or controlling a drawbridge shall provide the same with the necessary tenders and the proper mechanical appliances for the safe, prompt, and efficient opening of the draw for the passage of vessels.

(b) If the weather conditions are good and sound signals can be heard when a vessel approaches a drawbridge and desires to pass through the draw, three distinct blasts of a whistle or horn shall be sounded or three calls through a megaphone shall be made from the vessel when within reasonable hearing distance of the bridge.

(1) When the draw of the bridge can be opened immediately, the drawtender shall reply by three distinct blasts of a whistle or horn, by three calls through a megaphone, or by three loud and distinct strokes of a bell.

(2) When the draw of the bridge cannot be opened immediately or when the bridge is open and is to be closed immediately, the drawtender shall reply by four or more short, distinct blasts of a whistle or horn, by four or more calls through a megaphone, or by four or more loud and distinct strokes of a bell (danger signal).

(c) When weather conditions prevent hearing the sound signals when a vessel approaches a drawbridge and desires to pass through the draw, signals shall be made from the vessel by swinging in circles at arm's length a lighted lantern at night and a flag by day.

(1) When the draw of the bridge can be opened immediately, the drawtender shall reply by raising and lowering in vertical plane a number of times a lighted lantern at night and a flag by day.

(2) When the draw of the bridge cannot be opened immediately or when the bridge is open and is to be closed immediately, the drawtender shall reply by swinging to and fro horizontally a number of times a lighted lantern at night and a flag by day.

(d) When a vessel wishes to pass two or more bridges close together or crossing a section of the waterway less than 500 feet in length, signals as prescribed above shall be given from the vessel for opening the first bridge, followed at an interval of about five seconds by the same signals for the second bridge, and so on, thus giving, at intervals of about five seconds, separate signals for each bridge the vessel desires to pass.

(e) When two or more vessels are approaching a bridge at nearly the same time from the same or opposite directions with the draw opened or closed, each of these vessels shall signal independently for the opening of the draw, and the drawtender shall reply as prescribed and in turn to the signal of each vessel.

(f) Where bridges are less than 500 feet apart, the signals to govern the movements of the approaching vessel shall be given from the bridge nearest the vessel. If the bridge can be opened immediately, the bridgetender shall await the reply signals from the other bridges and then give the signal circumstances require. If the nearest bridge cannot be opened immediately, the prescribed signal shall be given the approaching vessel at once to be followed as soon as possible by the signal from that bridge that the draws are about to open.

(g) The draw shall be opened with the least possible delay upon receiving the prescribed signal: Provided, That the drawspan shall not be opened when a train is approaching so closely that it cannot safely be stopped before reaching the bridge, or when a passenger or mail train is approaching within sight or hearing of the operator of the drawspan.

(h) When a bridgetender is about to close a draw, he shall sound four or more short, distinct blasts of a whistle or horn, four or more calls through a megaphone, or four or more loud and distinct strokes of a bell (danger signal).

(i) Trains, wagons, and other vehicles shall not be stopped on a drawbridge for the purpose of delaying its opening, nor shall watercraft be so manipulated as to hinder or delay the operation of a drawspan, but all passage over, through, or

under a drawbridge shall be prompt, to prevent delay to either land or water traffic.

(j) The following provisions shall not relieve the owner of or agency controlling a drawbridge from opening the draw for the passage of vessels in accordance with paragraphs (a) through (i) of this section.

(1) A vessel shall not require the opening of the draw when such opening is needed only to provide additional clearance for appurtenances unessential to navigation of the vessel, or for appurtenances essential to navigation but which may be altered by hinging, telescoping, collapsing, or otherwise, so as to require no greater clearance than the highest fixed and essentially unalterable point of the vessel.

(2) Appurtenances unessential to navigation shall include but not be limited to fishing outriggers, radio antennae which are or can reasonably be made flexible or collapsible, television antennae, false stacks, and masts purely for ornamental purposes. Appurtenances unessential to navigation shall not include radar antennae, flying bridges, sailboat masts, piledriver leads, spud frames on hydraulic dredges, drilling derricks, derrick substructures and/or buildings, cranes on drilling or construction vessels, or other items of permanent and fixed equipment clearly necessary to the intended use of the vessel.

(3) Owners of or agencies controlling drawbridges shall report to the District Commander in charge of the locality the names of any vessels causing bridge openings considered to be in violation of this paragraph. The District Commander may at any time cause an inspection to be made of any craft so reported and is empowered to decide in each case whether or not the appurtenances are unessential to navigation. If the District Commander decides a vessel has appurtenances unessential to navigation, he shall notify the vessel owner of his decision, specifying a reasonable time for making necessary alterations. If the vessel owner is aggrieved by the decision of the District Commander, he may within 30 days after receipt of the request to perform necessary alterations appeal the decision to the Commandant in writing. If the Commandant rules that an appurtenance is unessential to navigation, the District Commander shall again specify to the vessel owner a reasonable time for making necessary alterations to the appurtenance, and after the expiration of the time specified, any operation of the vessel in such a manner as to require drawbridge openings shall be deemed in violation of the regulations of this paragraph unless the necessary alterations shall have been made.

(4) The provisions of subparagraphs (1), (2) and (3) of this paragraph shall not be applicable to ocean or coastwise vessels engaged in foreign or domestic commerce.

(k) Clearance gages, of a type to be approved by the Commandant, shall be installed on the upstream and downstream sides of each drawbridge by and at the expense of the owner of or agency controlling the bridge and such gages shall be kept in good repair and legible condition.

Note: The special regulations contained in §§117.237(b) and 117.245 to 117.349, prescribed where local conditions require to govern the operation of certain bridges, supplement the general regulations contained in §117.240.

§117.245 Navigable waters discharging into the Atlantic Ocean south of and including Chesapeake Bay and into the Gulf of Mexico, except the Mississippi River and its tributaries and outlets; bridges where constant attendance of draw tenders is not required. (a) The owners of or agencies controlling certain bridges will not be required to keep draw tenders in constant attendance. The bridges to which this section applies are listed, and the special regulations applicable in each case are set forth, in paragraphs (f) to (j) inclusive, of this section. At all times not covered by the regulations in this section, and in all other respects, the regulations contained in §117.240 shall govern the operation of these bridges.

(b) Whenever a vessel unable to pass under a closed bridge desires to pass through the draw, advance notice, as specified, of the time the opening is required shall be given to the authorized representative of the owner of or agency controlling the bridge.

(c) Upon receipt of such advance notice, the authorized representative of the owner of or agency controlling the bridge, in compliance therewith, shall arrange for the prompt opening of the draw at the time specified in the notice for the passage of the vessel.

(d) The owners of or agencies controlling the bridges shall keep conspicuously posted on both the upstream and downstream sides thereof, in such manner that it can easily be read at any time, a copy of the regulations in this section together with a notice stating exactly how the representative specified in paragraph (b) of this section may be reached.

(e) The operating machinery of the draws shall be maintained in a serviceable condition, and the draws shall be opened and closed at intervals frequent enough to make certain the machinery is in proper order for satisfactory operation.

(f) Waterways discharging into Chesapeake Bay. (1) Susquehanna River, Md.; The Pennsylvania Railroad Company bridge at Perryville. At least 24 hours' advance notice required.

(2) Bohemia River, Md.; Maryland State Roads Commission bridge at Cayots. From May 30 to September 30, inclusive, except on Saturdays, Sundays, State and Federal holidays, between sunrise and sunset, and from October 1 to May 29, inclusive, except between the hours of 7:00 p.m. on

Fridays and 7:00 a.m. on Mondays, inclusive, the draw will not be required to be opened except upon 3 hours' advance notice. From October 1 to May 29, inclusive, between the hours of 7:00 p.m. on Fridays and 7:00 a.m. on Mondays, inclusive, the draw will not be required to be opened except upon advance notice given prior to 7:00 p.m. on Friday. From May 30 to September 30, inclusive, between sunrise and sunset on Saturdays, Sundays, State and Federal holidays, the regulations contained in §117.240 shall govern operation of this bridge.

(3) Bush River, Md.; The Pennsylvania Railroad Company bridge at Bush River. From June 1 to September 30, inclusive, the draw will be required to be opened not more than two times each day on Saturdays and Sundays only between 10:00 a.m. and 5:00 p.m., on receipt of at least 24 hours' advance notice from the duly authorized representative of the Bush River Boat Club. At all other times the draw need not be opened for the passage of vessels. The notice posted in accordance with paragraph (d) of this section shall state exactly how the representative of the Bush River Boat Club may be reached.

(4) Chester River, Md.; Maryland State Roads Commission bridge at Chestertown. From October 1 to March 31, inclusive, and between 6 p.m. and 6 a.m. from April 1 to September 30, inclusive, at least six hours' advance notice required. Between 6 a.m. and 6 p.m. from April 1 to September 30, inclusive, the regulations contained in §117.240 shall govern operation of this bridge.

(5) Bear Creek, Md.; The Baltimore County Revenue Authority highway toll bridges between Dundalk and Sparrows Point, Miles 1.3 and 1.8. Between the hours of 12 midnight and 8:00 a.m., inclusive (except Saturdays, Sundays, and the national and State legal holidays between April 16 and November 15 inclusive), at least one-half hour advance notice required.

(5-a) Bear Creek, Md.; the Baltimore County highway bridge at Wise Avenue. At least 4 hours' advance notice required.

(5-b) Middle Branch, Patapsco River (Spring Garden Channel) Baltimore, Md., Western Maryland Railway Bridge. The draw shall be opened promptly on signal between the hours of 7 a.m. to 12 noon and 1 p.m. to 4 p.m. Monday through Friday. At all other times at least 6 hours' advance notice required except for marine firefighting equipment which shall be passed as soon as possible but in no event more than 15 minutes after notification that such an opening is required.

(6) (Reserved).

(7) [Reserved]

(8) Dorseys Creek, Md.; United States Naval Academy highway and railroad bridges; Maryland State Roads Commission bridge and Baltimore and Annapolis Railroad Company bridge at Annapolis. The draws need not be opened for the passage of vessels, and paragraphs (b) to (e), inclusive, of this section shall not apply to these bridges.

(9) Weems Creek, Md.; Anne Arundel County highway bridge at West Annapolis. From October 1 to April 30, inclusive, and between sunset and sunrise from May 1 to September 30, inclusive, at least five hours' advance notice required.

(10) South River, Md.; Maryland State Roads Commission bridge at Edgewater. From December 1 to March 31, inclusive, the draw will not be required to be opened except upon at least 3 hours' advance notice for openings between 10:00 a.m. Monday and 7:30 p.m. Friday, inclusive, such notice to be given between 7:00 a.m. and 4:30 p.m. Monday through Friday; and the draw will not be required to be opened from 7:30 p.m. Friday until 10:00 a.m. Monday except upon advance notice given between 7:00 a.m. and 4:30 p.m. Monday through Friday. From April 1 to November 30, inclusive, the regulations contained in §117.240 shall govern operation of this bridge.

(11) Choptank River, Denton, Md., highway bridge, State route 404. Three (3) hours' advance notice is required for openings between the hours of 6 p.m. and 6 a.m. At all other times the draw shall be opened promptly on signal.

(12) Choptank River, Md.; the Pennsylvania Railroad Co. bridge at Denton. The draw shall, upon signal, be opened for the passage of vessels from May 30 through September 30, inclusive, between sunrise and sunset. Between sunset and sunrise from May 30 through September 30, inclusive, and during all hours between October 1 and May 29, inclusive, the draw will be opened upon 4 hours advance notice.

(13) Marshyhope Creek, Md.; Maryland State Roads Commission bridge at Brookview. The draw need not be opened for the passage of vessels and paragraphs (b) to (d), inclusive, of this section shall not apply to this bridge. Paragraph (e) of this section shall apply to this bridge only to the extent that the operating machinery of the draw shall be maintained in a serviceable condition.

(13-a) Nanticoke River, Del.; Pennsylvania Railroad Company bridge at Seaford. From May 1, to September 30, inclusive, between the hours of 8:00 p.m. and 8:00 a.m., the draw will not be required to be opened. From October 1, to April 30, inclusive, the draw will not be required to be opened except on 4 hours' advance notice. From May 1, to September 30, inclusive, between the hours of 8:00 a.m. and 8:00 p.m., inclusive, the regulations contained in §117.240 shall govern operation of this bridge.

(14) Broad Creek River, Del.: (i) Highway bridges at Poplar Street and U.S. 13A, and Penn Central railroad bridge at Laurel. At least 4 hours' advance notice is required at all times.

(ii) Delaware State Highway Department bridge, Delaware Avenue at Laurel. The draw need not be opened for the passage of vessels, and paragraph

(b), (c), and (d) of this section shall not apply to this bridge.

(15) Patuxent River, Md.; Maryland State Roads Commission bridge at Benedict. Between 6:00 p.m. and 6:00 a.m. (local time), advance notice required, to be given verbally or by telephone to the Toll Captain at the Administration Building at the east end of the bridge before 6:00 p.m. The owner of or agency controlling the bridge shall keep a complete record of all openings of the draw in such form as may be prescribed by the District Commander, and shall report to him all cases where the draw has been required to be kept open for an unreasonable length of time.

(16) Sinepuxent Bay, Ocean City, Md., U.S. 50 Bridge. The draw shall be opened promptly on signal provided that from 6 p.m. to 6 a.m., from October 1 through April 30 at least 3 hours' advance notice has been given.

(16-a) Wicomico River (North Prong), Maryland; Maryland State Roads Commission bridges at Main Street and U.S. Route 50. The draws need not be opened for the passage of vessels between the hours of 8:00 a.m. and 9:00 a.m., 12 noon and 1:00 p.m., and 4:30 p.m. and 5:30 p.m.

(16-b) Wicomico River (South Prong), Md.; County Commissioners of Wicomico County bridge at Camden Avenue, Salisbury. The draw need not be opened for the passage of vessels and paragraphs (b) to (e), inclusive, of this section shall not apply to this bridge.

(16-c) Wicomico River (South Prong), Maryland; County Commissioners of Wicomico County bridge at South Division Street. The draw need not be opened for the passage of vessels and paragraphs (b) to (e) inclusive, of this section shall not apply to this bridge.

(17) Pocomoke River, Md.; Maryland State Roads Commission bridge at Snow Hill. At least five hours' advance notice required.

(18) Onancock River (Warrington Branch), Va.; highway bridge at Onancock. At least three hours' advance notice required.

(19) Kinsale Creek, Va.; Virginia Department of Highways bridge at Kinsale. The draw need not be opened for the passage of vessels, and paragraphs (b) to (e), inclusive, of this section shall not apply to this bridge.

(20) Great Wicomico River, Va.; Virginia Department of Highways bridge at Tipers Ferry. Between 6:00 p.m. and 6:00 a.m., advance notice required to be given to the draw tender on duty at the bridge before 6:00 p.m.

(21) [Reserved]

(22) Cat Point Creek, Va.; Virginia Department of Highways bridge near Warsaw. The draw need not be opened for the passage of vessels, and paragraphs (b) to (e), inclusive, of this section shall not apply to this bridge.

(22-a) Mattaponi River, Va.; Virginia Department of Highways bridge on Route 629 at Walkerton. At least 24 hours' advance notice required: Provided, That the draw tender service shall be increased on 30 days notice in writing from the District Commander; the degree of such service to be determined by the said District Commander.

(23) Chuckatuck Creek, Va.; Virginia Department of Highways bridge on U.S. Route 17 at Eclipse. Between 7:00 a.m. and 3:00 p.m., daily, except Sundays, the regulations contained in §117.240 shall govern the operation of this bridge. At all other times, 4 hours' advance notice required, provided that if an emergency exists, the advance notice may be given without time limit.

(23-a) Lafayette River, Granby Street bridge. The draw of this bridge need not be opened for the passage of vessels and paragraphs (a) through (e) of this section shall not apply to this bridge.

(24) Elizabeth River, Eastern Branch, Va.; City of Norfolk highway bridge (Campostella Bridge) at Norfolk. Between 7:35 a.m. and 7:50 a.m., on week days only, the draw need not be opened except for the passage of tugs with tows.

(25) Elizabeth River, Western Branch, Va.; Atlantic Coast Line Railroad Company bridge at Bruce. Between 1:00 a.m. and 6:00 a.m., from April 1 to October 31, inclusive, at least 8 hours' advance notice required. Any vessel operator intending to make a return passage through the bridge during this period shall notify the bridge tender prior to 6:00 a.m. of the time he desires to make the return passage and the draw shall be opened at the specified time. From November 1 to March 31, inclusive, at least 4 hours' advance notice required.

(26) Elizabeth River, Western Branch, Va.; Virginia Department of Highways bridge at Hodges Ferry. At least 8 hours' advance notice required.

(26-a) Elizabeth River, Southern Branch, Va.; Virginia Department of Highways bridge at Chesapeake. A 24-hour advance notice is required at all times.

(27) [Reserved]

(28) Nansemond River, Western Branch, Va.; Virginia Department of Highways bridge at Reid's Ferry. The draw need not be opened for the passage of vessels, and paragraphs (b) to (e), inclusive, of this section shall not apply to this bridge.

(28-a) Nansemond River, Va.; Virginia Department of Highways bridge on U.S. Route 460 at Suffolk. At least 12 hours' advance notice required.

(28-b) Cypress Creek, Va.; Virginia Department of Highways Bridge on U.S. Highway 258 and State Highway 10 at Smithfield, Va. Between sunset and sunrise the draw need not be opened for the passage of vessels.

(29) Appomattox River, Va.; Seaboard Air Line Railroad Company bridge near Hopewell. At least 24 hours' advance notice required, such notice to be given to the Seaboard Air Line Railroad Agent at Hopewell, Virginia: Provided, That a draw-

tender shall be placed in constant attendance, on 30 days' notice in writing from the District Commander.

§117.270 Cambridge Harbor, Md.; bridge. (a) The draw shall be promptly opened at any time for the passage of vessels unable to pass under the closed bridge, except during the following hours (eastern standard time) when it need not be opened: From 8 p.m. to 6 a.m.; from 12 noon to 12:10 p.m.; from 12:50 p.m. to 1 p.m.; and for 20 minutes before the scheduled time of departure from Cambridge of any regularly scheduled passenger train on the Pennsylvania Railroad.

(b) With the exceptions noted in paragraph (a) of this section, vessels have the right of way over vehicles or persons using the bridge.

(c) Whenever a vessel unable to pass under the closed bridge approaches it, the signal of a desire for the draw to be opened shall be three blasts of a whistle or horn blown on the vessel. This signal shall be repeated at intervals until it is answered from the bridge. Upon receiving the signal from the vessel, the tender or operator of the bridge, in case the draw can be operated immediately, shall reply by three blasts of a whistle or horn. In case of accident to the machinery or other contingency necessitating delay in opening the draw, the signal from the vessel shall be answered by the tender or operator of the bridge by one blast of a whistle or horn.

(d) The owner of the bridge shall post and maintain a copy of the regulations in this section in a conspicuous place at each end of said bridge.

§117.280 Miles River, Md.; bridge (highway) at Easton, Md. (a) Between sunrise and sunset the draw of the above-mentioned bridge shall be promptly opened for the passage of any vessel unable to pass under the closed bridge.

(b) Whenever a vessel unable to pass under the closed bridge approaches it, the signal of a desire for the draw to be opened shall be three blasts of a whistle or horn blown on the vessel. Upon receiving the signal from the vessel the tender or operator of the bridge, in case the bridge can be opened immediately, shall reply by three blasts of a whistle or horn. In case, however, of accident to the machinery or other contingency involving unavoidable delay in the opening of the draw, the signal shall be answered by one blast of a whistle or horn.

(c) A vessel wishing to pass the bridge between sunset and sunrise and unable to pass under the closed draw will request that the bridge be opened by notifying the draw tender of the time at which it is desired to pass and the draw of the bridge shall be opened as soon as practicable after the receipt of notice.

(d) A copy of the regulations in this section will be conspicuously posted on both the upstream and downstream sides of the bridge in such manner that it can be easily read at any time, together with a notice stating exactly how the draw tender, when not on duty at the bridge, may be reached.

(e) The operating machinery of the draw shall be kept in serviceable condition and the draw shall be opened and closed at intervals frequent enough to make certain that the machinery is kept in proper condition for satisfactory operation.

§117.285 Oak Creek, tributary of Miles River, Md.; bridge of the Baltimore, Chesapeake and Atlantic Railroad Co. at Royal Oak, Md. (a) During the period from June 1 to September 30, inclusive, the draw shall be opened promptly at any time during the day or night for the passage of any vessel unable to pass under the closed bridge. During the period from October 1 to May 31, inclusive, the hours for opening the draw shall be from sunrise to sunset.

(b) Whenever a vessel unable to pass under the closed bridge approaches it, the signal of a desire for the draw to be opened shall be three blasts of a whistle or horn blown on the vessel. This signal shall be repeated at intervals until it is answered from the bridge. Upon receiving the signal from the vessel the tender or operator of the bridge, in case the draw can be opened immediately, shall reply by three blasts of a whistle or horn. In case of accident to the machinery or other contingency necessitating delay in opening the draw, the signal from the vessel shall be answered by the tender or operator of the bridge by one long blast of a whistle or horn.

(c) A copy of the regulations in this section shall be posted in a conspicuous place on each side of the bridge.

§117.290 Kent Island Narrows, Md. (a) Bridge (highway) of Maryland State Roads Commission. (1) Between the hours of 1 hour before sunrise and 1 hour after sunset the draw shall be promptly opened for all vessels desiring to pass through it whose masts permanently remain standing or which have masts that may be unstepped but which are 20 feet or more in height and 5 inches or more in diameter at butt.

(2) Whenever a vessel of the kind described in subparagraph (1) of this paragraph shall approach the bridge and desire to pass through the draw, the signal therefor shall be three blasts of a whistle or horn blown on the craft, and when such signal is given the draw shall be opened forthwith if no person or vehicle is then in the way, and immediately upon the person or vehicle then on the bridge, if any, passing out of the way, and before any person or vehicle not then on the bridge shall be allowed to come upon it.

(3) If the draw is ready to be opened immediately when the signal is given on the craft, the signal shall be answered immediately by three blasts of a whistle or horn blown on the bridge, and if the draw is not ready to be opened immediately, by reason of persons or vehicles being on the bridge as aforesaid, or by reason of accident to the

machinery or other contingency involving unavoidable delay in opening the draw, the signal for the craft shall be answered immediately by one blast of a whistle or horn blown on the bridge.

§117.305 Baltimore Harbor, Md.; bridge (highway) at Hanover Street across Middle Branch of Patapsco River. (a) When, at any time between the hours of 5 a.m. and 6:30 a.m., 9:30 a.m. and 4 p.m., and 6 p.m. and 9 p.m., a vessel, tug, or any watercraft unable to pass under the bridge approaches it, the signal of intention to pass through the draw and for the draw to be opened shall be three blasts of a whistle or horn blown on the craft. When such signal is given, the bridge shall be immediately cleared, no vehicle or person not then on the drawspan shall be allowed to come upon it, and the draw shall be opened forthwith.

If the draw is ready to be opened immediately, the draw operator shall answer immediately by three blasts of a whistle or horn blown on the bridge; and if the draw is not ready to be opened immediately, he shall answer by one short blast of a whistle or horn blown on the bridge.

(b) The draw shall not be required to open to vessels between 6:30 a.m. and 9:30 a.m. and between 4 p.m. and 6 p.m., except in cases involving the passage of fire boats, police boats, and craft similarly engaged in emergency operations. An attendant shall be kept on duty during these periods.

(c) When a vessel, tug, or any watercraft unable to pass under the bridge desires to pass through the draw at any time between the hours of 9 p.m. and 5 a.m., notice of such intention shall be given to the superintendent of the bridge by telephone or otherwise, either at the bridge before 9 p.m. or at his residence thereafter. If the notice is given between the hours of 5 a.m. and 9 p.m., or if at least one-half hour has elapsed since it was given, the draw shall be promptly opened at the time specified in the notice on signal given and answered as hereinbefore prescribed.

(d) The owner of the bridge shall keep conspicuously posted thereon, in such manner that it may be easily read at any time, a notice stating how the superintendent may be reached and shall arrange for ready telephonic communication with him at any time between 9 p.m. and 5 a.m., either from the bridge or from its immediate vicinity.

§117.310 Severn River, Md.; bridge (highway) near Annapolis, Md. (a) The leaves of the draw shall be promptly raised to their full height so as to provide full horizontal clearance through the bridge at any time during the day or night for all vessels desiring to pass through it whose masts are 15 feet or more in height or for any vessels whose hulls, deckhouses, or cargoes are of such height that they will not pass under the bridge when it is closed.

(b) Vessels have the right of way over vehicles or persons using the bridge.

(c) A vessel approaching the bridge and desiring to pass through the draw shall signal by three blasts of a whistle or horn. The signal shall be answered by three blasts of a whistle or horn that can be heard three-fourths of a mile from the bridge, and the draw shall be opened forthwith. In case, however, of accidents to the machinery or other contingency involving unavoidable delay in opening the draw, the signal shall be answered by one blast of a whistle or horn.

§117.311 Spa Creek, Md.; highway bridge at Annapolis. (a) The owner of or agency controlling the bridge shall not be required to open the draw between the hours of 7:30 a.m. and 9:00 a.m. and between the hours of 4:30 p.m. and 6:00 p.m., Monday through Friday, inclusive, except on State and Federal holidays: Provided, That the draw shall be opened at any time for the passage of a vessel in an emergency involving danger to life or property, which shall be indicated by four blasts of a whistle, horn or megaphone.

(b) Whenever any emergency vehicle sounds an alarm for the purpose of crossing the bridge toward a fire or other emergency situation involving life or property, the bridgetender shall, if the draw is open, close the same as soon as practicable; and after the draw is closed, or if it is closed at the time, keep it closed until such emergency vehicle has crossed the bridge.

(c) The owner of or agency controlling the bridge shall keep a copy of the regulations in this section conspicuously posted on both the upstream and downstream sides thereof, in such manner that it can be easily read at any time.

(d) In all other respects, the regulations contained in § 117.240 of this part shall govern the operation of this bridge.

§117.325 Potomac River (a) Woodrow Wilson Memorial Bridge at Jones Point, Alexandria, Va. (1) From 6:30 a.m. to 9 a.m. and from 4 p.m. to 6:30 p.m. Monday through Friday, except on National Holidays, the draw of this bridge shall not be opened for the passage of vessels, except those listed below:

(i) Public vessels owned or operated by the United States.

(ii) Vessels in distress, or

(iii) Vessels engaged exclusively in the tourist trade on the Potomac River which operate from Washington, D.C., when the vertical clearance under the draw is less than 50 feet.

(2) The regulations contained in section 117.240 shall govern the operation of this bridge at all other times.

(3) The owner of or agency controlling this bridge shall keep a copy of the regulations in this section conspicuously posted on both the upstream and downstream sides thereof, in such a manner that can be easily read at any time.

(b) Washington, D.C., drawbridges across the Potomac River. The draws of the bridges need not be opened for the passage of vessels.

§117.330 Anacostia River, Washington, D.C.; bridges. (a) Pennsylvania Railroad Company Freight Bridge No. 134.35. (1) During the period from April 1 to September 30, inclusive, on Saturdays, Sundays, and legal holidays, the lift span shall be opened on signal. During the same period, on weekdays between the hours of 10:00 a.m. and 8:00 p.m., the lift span shall be opened on signal on the hour for the passage of two or more vessels or other watercraft: Provided, That in no case shall the delay to a single vessel be more than 30 minutes.

(2) During the period from April 1 to September 30, inclusive, on weekdays between the hours of 8:00 p.m. and 10:00 a.m., and from October 1 to March 31, inclusive, on Saturdays, Sundays, and legal holidays between the hours of 10:00 a.m. and 6:00 p.m., the lift span shall be opened on signal on the hour for the passage of any vessel or other watercraft: Provided, That when once opened the bridge shall remain open sufficiently long to permit the passage of all vessels or other watercraft which may be in sight of the bridgetender and expected to desire a passage of the bridge. The time referred to shall be eastern standard or eastern daylight time, whichever is in effect locally.

(3) At all other times not covered, at least two hours' advance notice is required to be given to the designated representative of the owner of or agency controlling the bridge. The notice shall contain the name or number of the vessel and the expected time of its arrival at the bridge.

(4) Vessels employed or controlled by the United States Government, the District of Columbia and agencies of the State of Maryland shall be passed without delay through the draw of said bridge at any hour of the day or night upon giving the proper signal.

(5) Clearance gages, of a type approved by the Commandant, shall be provided by the owners of the bridge. These gages shall be so set and maintained on the upstream and downstream fenders of the bridge as to show accurately and clearly the distance between the water surface and the lowest point of the closed lift span.

(6) The bridge shall not be required to be opened for the passage of vessels habitually using the waterway and carrying appurtenances such as radio antenna or flag staffs which as determined by the District Commander, can readily be removed, lowered or hinged, and which are otherwise capable of clearing the bridge when closed. Habitual users are defined as any vessel passing the bridge as often as seven (7) times in a 30-day period.

(7) The owner of or agency controlling the bridge shall keep conspicuously posted on both the upstream and downstream sides of the bridge, in such a manner that it can easily be read at all times, a copy of the regulations in this paragraph, together with a notice stating a local telephone number where the representative specified in subparagraph (3) of this paragraph may be reached.

(c) District of Columbia highway bridge at South Capital Street. (1) Between the hours of 6:00 a.m. and 9:00 a.m., and between the hours of 3:30 p.m. and 6:30 p.m., daily, the draw need not be opened for the passage of navigation, except that in the case of an emergency the draw will be opened for the passage of U.S. Government owned vessels, regardless of the hour.

(2) The draw will occasionally be closed to navigation, without advance notice, to permit uninterrupted transit of dignitaries across the bridge.

(3) At all times not covered by the regulations in this paragraph, and in all other respects, the regulations contained in §117.240 shall govern the operation of this bridge.

(4) The owner of or agency controlling the bridge shall keep conspicuously posted on both the upstream and downstream sides thereof, in such manner that it can be easily read at any time, a copy of the regulations of this paragraph.

§117.340 Rappahannock River, Va.; all bridges. (a) The corporations or persons owning or controlling a drawbridge shall provide the same with the necessary tenders and the proper mechanical appliances for the safe, prompt, and efficient opening of the draw and shall maintain the fender system in good condition for the passage of vessels.

(b) If the weather conditions are good and sound signals can be heard when a vessel approaches a drawbridge and desires to pass through the draw, three distinct blasts of a whistle, horn, or megaphone shall be sounded from the vessel when within reasonable hearing distance of the bridge.

(1) When the draw of the bridge can be opened immediately, the draw tender shall reply by three distinct blasts of a whistle, horn, or megaphone or by three loud and distinct strokes of a bell.

(2) When the draw of the bridge cannot be opened immediately or when the bridge is open and is to be closed immediately, the draw tender shall reply by two long distinct blasts of a whistle, horn, or megaphone or by two loud and distinct strokes of a bell.

(c) When weather conditions prevent hearing the sound signals when a vessel approaches a drawbridge and desires to pass through the draw, signals shall be made from the vessel by swinging in circles at arm's length a lighted lantern at night and a flag by day.

(1) When the draw of the bridge can be opened immediately, the draw tender shall reply by raising and lowering in vertical plane a number of times a lighted lantern at night and a flag by day.

(2) When the draw of the bridge cannot be opened immediately or when the bridge is open and is to be closed immediately, the draw tender shall reply by swinging to and fro horizontally a number of times a lighted lantern at night and a flag by day.

(d) When a vessel wishes to pass two or more bridges close together signals as prescribed above shall be given from the vessel for opening the first bridge, followed at an interval of about 5 seconds by the same signals for the second bridge, and so on, thus giving at intervals of about 5 seconds, separate signals for each bridge the vessel desires to pass.

(e) When two or more vessels are approaching the bridge at nearly the same time from the same or opposite directions with the draw opened or closed, each of these vessels shall signal independently for the opening of the draw, and the draw tender shall reply as prescribed and in turn to the signal of each vessel.

(f) Where bridges are less than 500 feet apart, the signals to govern the movements of the approaching vessel shall be given from the bridge nearest the vessel. If that bridge can be opened immediately, the bridge tender shall await the reply signals from the other bridges and then give the signal circumstances require. If the nearest bridge cannot be opened immediately, the prescribed signal shall be given the approaching vessel at once, to be followed as soon as possible by the signal from that bridge that the draws are about to open.

(g) The draw shall be opened with the least possible delay, upon receiving the prescribed signal: Provided, That the drawspan shall not be opened when a train is approaching so closely that it cannot safely be stopped before reaching the bridge, or when a passenger or mail train is approaching within sight or hearing of the operator of the drawspan.

(h) When a bridge tender is about to close a draw, he shall sound two distinct blasts of a whistle, horn, or megaphone, or two loud and distinct strokes of a bell.

(i) Trains, vehicles, vessels or other water craft shall not be stopped or manipulated in a manner hindering or delaying the operation of the draws, but all passage over the drawspans or through the draw openings shall be in a manner to expedite both land and water traffic.

(j) Any vessel with or without tows requiring the opening of the draw of a bridge on which only one draw opening is protected by a fender system, shall pass through the opening so protected.

(k) A copy of the regulations in this section will be conspicuously posted on both upstream and downstream sides of the bridges in such manner that it can be easily read at any time.

§117.343

Milford Haven, Va.; Virginia Department of Highways bridge between the mainland and Gwynns Island. (a) The draw of the bridge shall not be required to be opened for the passage of vessels, habitually using the waterway and carrying appurtenances unessential for navigation (such as patent tong masts, flagstaffs, radio antennas, etc.), which are otherwise capable of clearing the bridge when closed: Provided, That vessels engaged in commercial oystering or haul seine fishing shall be passed promptly at any time during the respective legal oystering or haul seine fishing seasons.

(b) Any vessel passing through the bridge as often as once a day for 5 consecutive days of any month will be regarded as a habitual user within the meaning of this section. Failure of any vessel to comply with the regulations after one warning by the person controlling the bridge shall be sufficient cause for refusal to open the draw for the future passage of the vessel.

§117.349 Eastern Branch of Elizabeth River, Va.; Elizabeth River Tunnel Commission bridge between Norfolk and Berkley. (a) Sound signals. To be used if weather conditions are such that sound signals can be heard:

(1) Call signal for opening of draw. When a vessel approaches the bridge and desires to pass through the draw, three distinct blasts of a whistle, horn or megaphone or three loud and distinct strokes of a bell shall be sounded from the vessel when within reasonable hearing distance of the bridge.

(2) Acknowledging signals—(i) When the draw must be cleared of traffic and prepared for opening. The draw tender shall reply with two distinct blasts of a whistle, horn or megaphone or by two loud and distinct strokes of a bell. The vessel shall be checked and standby for either the signal in subdivision (ii) or subdivision (iii) of this subparagraph.

(ii) When the draw is clear of traffic and can be opened immediately. The draw tender shall reply with three distant blasts of a whistle, horn or megaphone or by three loud and distinct strokes of a bell.

(iii) When the draw cannot be opened for an indefinite period or when it is open and must be closed immediately. The draw tender shall reply with four or more distinct blasts of a whistle, horn or megaphone or four or more loud and distinct strokes of a bell, to be followed by the signal in subdivision (ii) of this subparagraph when the draw is to be opened.

(b) Visual signals. To be used if weather conditions are such that sound signals may not be heard.

(1) Call signal for opening of draw. When a vessel approaches the bridge and desires to pass through the draw signals shall be made from the approaching vessel by swinging in vertical circles at arm's length a lighted lantern at night and a flag by day.

(2) Acknowledging signals—(i) When the draw must be cleared to traffic and prepared for opening. The draw tender shall reply by swinging in vertical circles at arm's length a lighted lantern at night and a flag by day. The vessel shall be checked and standby for either the signal in sub-

division (ii) or subdivision (iii) of this subparagraph.

(ii) When the draw is clear of traffic and can be opened immediately. The draw tender shall reply by raising and lowering in a vertical plane a number of times a lighted lantern at night and a flag by day.

(iii) When the draw cannot be opened for an indefinite period or when it is open and must be closed immediately. The draw tender shall reply by swinging to and fro horizontally a number of times a lighted lantern at night and a flag by day, to be followed by the signal in subdivision (ii) of this subparagraph when the draw is to be opened.

(c) Posting of regulations in this section. The owner of or agency controlling the bridge shall keep a legible copy of the regulations in this section posted conspicuously on both the upstream and downstream sides of the bridge.

PART 124—CONTROL OVER MOVEMENT OF VESSELS:

124.10 Advance notice of vessel's time of arrival to Captain of the Port. (a) The master of agents of every registered vessel of the United States, and every foreign vessel arriving at a United States port or place from a port or place outside the United States, or any such vessel destined from one port or place in the United States to another port or place in the United States, shall give at least 24 hours advance notice of arrival to the Captain of the Port at every port or place where the vessel is to arrive, except as follows:

(1) Registered United States pleasure vessels and registered United States fishing vessels are not required to submit advance notice of arrival report.

(2) When the port of arrival is not located within the geographical area assigned to a particular Captain of the Port, this advance notice of time of arrival shall be made to the Commander of the Coast Guard District in which such port or place is located.

(3) When the arrival is a direct result of the operation of "force majeure," and it is not possible to give at least 24 hours' advance notice of time of arrival, then advance notice as early as practicable shall be furnished.

(4) When the vessel, while in United States waters, does not navigate any portion of the high sea, i.e. does not navigate beyond the low water mark along the coasts or beyond the waters contained within the headlands of the United States.

(5) When a vessel is engaged upon a scheduled route if a copy of the schedule is filed with the Captain of the Port for each port of call named in the schedule and the times of arrival at each such port are adhered to.

(6) When the master of a merchant vessel (except on a coastwise voyage of 24 hours or less) reports in accordance with the U.S. Coast Guard's voluntary Automated Merchant Vessel Report (AMVER) System, he shall be considered to be in constructive compliance with the requirements of paragraph (a) of this section and no additional advance notice of vessel's arrival reports to the Captain of the Port is required. The master or agent of a vessel on coastwise voyages of 24 hours or less shall report the advance notice of vessel's arrival to the Captain of the Port at next port of call prior to or upon departure from port.

(7) For that vessel which is engaged in operations in and out of the same port to sea and return without entering any other port, or on coastwise voyages between ports in the same Coast Guard District, or on voyages between ports in the First, Ninth, Thirteenth, or Seventeenth Coast Guard Districts and adjacent Canadian ports, or between ports of Commonwealth of Puerto Rico and ports in the Lesser Antilles, or between ports in the Lesser Antilles, or between ports on the east coast of Florida and the Bahama Islands, the Coast Guard District Commander having jurisdiction may, when no reason exists which renders such action prejudicial to the rights and interests of the United States, prescribe conditions under which such vessels may be considered by the Captains of the Port as being in constructive compliance with the requirements of this section.

(8) A westbound vessel which is to proceed to or through United States waters of the St. Lawrence River and/or the Great Lakes shall be subject to compliance with paragraph (b) of this section.

(b) The master or agent of every vessel other than vessels of United States or Canadian nationality engaged in the coastal trade of their respective countries or in trade between their two countries without calling at any other country en route, when proceeding westbound to United States waters of the St. Lawrence River and/or the Great Lakes shall:

(1) At least 24 hours in advance of the vessel's arrival at the Snell Lock, Massena, New York, advise the Commander, Ninth Coast Guard District, Cleveland, Ohio, of estimated time of arrival of such vessel at the Snell Lock.

(2) In addition, at least 24 hours in advance of the vessel's arrival at the first United States port-of-call, advise the Commander, Ninth Coast Guard District, Cleveland, Ohio, of the estimated time of arrival at that port.

(3) [Reserved]

(4) A master of a vessel who reports in accordance with the U.S. Coast Guard's voluntary Automated Merchant Vessel Report (AMVER) System and who includes in this report an estimated time of arrival at the Snell Lock, Massena, New York, shall be considered to be in constructive compliance with the requirements of subparagraph (1) of this paragraph and no additional ad-

vance notice of vessel's arrival at the Snell Lock is required. Likewise a Master of such vessel who indicates in this report the name of the first intended United States port of call and estimated time of arrival at that port shall be considered in constructive compliance with subparagraph (2) of this paragraph and no additional advance notice of arrival is required.

(5) A master or agent of a vessel who files a copy of the scheduled route with the Commander, Ninth Coast Guard District, Cleveland, Ohio, at least 24 hours prior to arrival at Snell Lock, and who includes in the schedule the estimated time of arrival at the Snell Lock, Massena, N.Y., shall be considered to be in constructive compliance with requirements of subparagraph (1) of this paragraph and no additional advance notice of the vessel's arrival at the Snell Lock is required. Likewise, a master or agent of such vessel who indicates in this schedule the name of the first intended United States port of call and estimated time of arrival at that port shall be considered in constructive compliance with subparagraph (2) of this paragraph and no additional advance notice of arrival is required.

(6) When the arrival is a direct result of the operation of "force majeure," and it is not possible to give at least 24 hours advance notice of time of arrival, then advance notice as early as practicable shall be furnished.

§124.14 Advance notice of arrival of vessel laden with explosives or certain specified dangerous cargoes. (a) The master, agent, or person in charge of any domestic or foreign vessel which is bound for a port or place in the United States and which is carrying as cargo any of the dangerous cargoes described in this paragraph, whether for discharge in the United States or not, shall at least 24 hours in advance of arrival at each port or place, notify the Captain of the Port or the Commander of the Coast Guard District in which such port or place is located concerning the amount and location of stowage on board the vessel of any of the following:

(1) Explosives, class A (commercial or military).

(2) Oxidizing materials for which a special permit for water transportation is required by 46 CFR 146.22.

(3) Radioactive materials for which a special approval by the Commandant for water transportation is required by 46 CFR 146.25-30.

(4) Any dangerous cargo considered to involve a particular hazard when transported or handled in bulk quantites, as further described in paragraph (b) of this section.

(b) (1) A dangerous cargo considered to involve a particular hazard, when transported in bulk quantities on board vessels, or when handled in bulk quantities on waterfront facilities, is any commodity which by virtue of its properties would create an unusual hazard if released. The commodities subject to this section are:

Acetaldehyde.
Acetone cyanohydrin.
Acetonitrile.
Acrylonitrile.
Allyl alcohol.
Allyl chloride.
Ammonia, anhydrous.
Aniline.
Butadiene.
Carbolic oil.
Carbon disulfide.
Chlorine.
Chlorohydrins, crude.
Crotonaldehyde.
1,2-Dichloropropane.
Dichloropropene.
Epichlorohydrin.
Ethylene.
Ethyl ether.
Ethylene oxide.
Hydrochloric acid.
Methane.
Methyl acrylate.
Methyl bromide.
Methyl chloride.
Methyl methacrylate (monomer).
Nonyl phenol.
Oleum.
Phenol.
Phosphorus, elemental.
Propane.
Propylene.
Propylene oxide.
Sulfuric acid.
Sulfuric acid, spent.
Tetraethyl lead.
Tetraethyl lead mixture.
Vinyl acetate.
Vinyl chloride.
Vinylidene chloride

(2) Each commodity listed in subparagraph (1) of this paragraph is considered to possess one or more of the following properties:

(i) Is highly reactive or unstable; or

(ii) Has severe or unusual fire hazards; or

(iii) Has severe toxic properties; or

(iv) Requires refrigeration for its safe containment; or

(v) Can cause brittle fracture of normal ship structural materials or ashore containment materials by reason of its being carried at low temperatures, or because of its low boiling point at atmospheric pressure (unless uncontrolled release of the cargo is not a major hazard to life).

(c) For U.S. vessels, this section is applicable to such vessels on international voyages, coastwise voyages, or Great Lakes voyages. For foreign vessels this section is applicable to such vessels when bound to a port or place in the United States, or a port or place under the jurisdiction of the United States.

(d) When the arrival is a direct result of "force majeure" and it is not possible to give at least 24 hours advance notice, then advance notice as early as possible will be given.

§124.16 Advance notice of fire or other abnormal condition on arriving vessel. (a) The master, agent, or person in charge of any domestic or foreign vessel which is bound for a port or place in the United States shall give notice to the Captain of the Port or the Commander of the Coast Guard District in which such port or place is located as early as possible in advance of arrival of any fire or other abnormal condition which may jeopardize the vessel's safety or that of other vessels or facilities in port.

§124.20 Penalties for violations. Failure to give advance notice will subject the master or agents of a vessel to the penalties of fine and imprisonment,

as well as subject the vessel to seizure and forfeiture, as provided in section 2, Title II of the Act of June 15, 1917, as amended, 50 U.S.C. 192. In addition, such failure may result in delay in the movement of the vessel from the harbor entrance to her facility destination within the particular port.

PART 204 DANGER ZONE REGULATIONS:

§204.20 Waters of Atlantic Ocean; National Guard Training Center, Sea Girt, N.J. (a) The danger zone. (1) Beginning at a point defined by the North Range Flagpole along the east shore of the National Guard Training Center at latitude 40°07′20″, longitude 74°01′54″; thence northeasterly to latitude 40°07′38″, longitude 74°01′28″; thence northeasterly to latitude 40°07′40″, longitude 74°00′41″; thence easterly to latitude 40°07′10″, longitude 73°59′04″; thence southerly to latitude 40°06′18″, longitude 73°59′20″; thence westerly to latitude 40°06′25″, longitude 74°01′05″; thence northwesterly to latitude 40°06′43″, longitude 74°01′46″; and thence northwesterly to the east shore to a point defined by the South Range Flagpole at latitude 40°07′07″, longitude 74°01′58″.

(2) The area described in subparagraph (1) of this paragraph will be marked by lighted buoys located at the extreme offshore corners and can buoys at the other corners of the danger zone to be placed and maintained by the Department of Defense, State of New Jersey.

(b) Regulations. (1) Range firing will normally take place between the hours of 7 a.m. and 6 p.m. on all Saturdays and Sundays during the period April 1 to November 30 and between the hours of 7 a.m. and 12 p.m., Monday through Friday, during the period January 1 to December 31 annually.

(2) No vessel shall enter or remain in the danger zone during the operation of the firing range, excepting vessels of the United States or the State of New Jersey.

(3) When firing is scheduled or is in progress during daylight hours, a large red flag will be displayed from the flagstaffs on the beach. When firing is scheduled or is in progress during nighttime hours, a blinking and/or revolving red warning light will be displayed from the top of the same flagstaff on the beach. Flagstaffs are located at both the northern and southern boundaries of the training center. Warning flags and lights shall be clearly visible for a distance of at least three (3) miles offshore.

(4) No permits to erect and maintain fish pounds within the zone will hereafter be issued.

(5) The regulations in this section shall be enforced by The Chief of Staff, Department of Defense, State of New Jersey, and such agencies as he may designate.

§204.23 Atlantic Ocean off Cape May, N.J.; Coast Guard Rifle Range. (a) The danger zone. The waters of the Atlantic Ocean within an area described as follows: Beginning at Cape May West Jetty Light; thence 180° true, 800 yards; thence 250° true 1,325 yards; and thence 335° true to the shore line.

(b) The regulations. (1) No vessel shall enter or remain in the danger area between sunrise and sunset daily, except as authorized by the enforcing agency.

(2) The regulations in this section shall be enforced by the Commander, Third Coast Guard District, or his authorized representative.

§204.24 Delaware Bay off Milford Neck; naval aircraft bombing target area. (a) The danger zone. A circular area of one nautical mile radius having its center in Delaware Bay at latitude 38°58′12″, longitude 75°17′30″.

(b) The regulations. (1) Anchoring, trawling, crabbing, fishing and dragging in the danger zone are prohibited during daylight hours.

(2) The regulations in this section shall be enforced by the Commandant, Fourth Naval District, and such agencies as he may designate.

§204.25 Atlantic Ocean off Delaware Coast; antiaircraft artillery firing area, First U.S. Army. (a) The danger zone. An area east of Bethany Beach described as follows: Beginning near Bethany Beach at latitude 38°31′15″, longitude 75°03′10″; thence to latitude 38°35′11″, longitude 74°57′30″; thence to latitude 38°30′15″, longitude 74°55′30″; thence to latitude 38°25′30″, longitude 74°57′15″; thence to a point on the shore at latitude 38°29′03″; and thence northerly along the shore to the point of beginning.

Note: The danger zone will be marked by buoys.

(b) The regulations. (1) All firing during the months of October to May, inclusive, will be conducted between 8 a.m. and 4 p.m., local time. Scheduled firing during the months June to September, inclusive, will be conducted between 12 noon and 6 p.m., local time. Certain firing may be conducted, however, between 8 a.m. and 12 noon during this latter period and will be rounds fired at fixed points for settling weapons, testing and verification purposes only in accordance with established Department of the Army Safety Regulations, and will involve no restrictions on navigation. No firing will be conducted during hours of darkness.

(2) Firing will take place on certain days other than National holidays during October to May, inclusive, and on certain days other than Saturdays, Sundays, and National holidays during June to September, inclusive, as listed in public notice to be issued each year by the District Engineer, U.S. Army Engineer District, Philadelphia, Pennsylvania.

(3) When it is determined that no firing will take place on any of the days for which firing is scheduled, the public will be so advised by radio and other practicable means as far in advance as possible.

(4) Except as provided in subparagraph (6) of this paragraph, no vessel shall enter or remain in the danger zones during the time of firing unless specific permission is granted in each case by one of the representatives of the enforcing agency policing the area in patrol boats.

(5) Prior to the conducting of each firing practice, the danger zones will be adequately patrolled to insure that no watercraft are within the danger zones and to warn any watercraft in a danger zone that firing is to take place. Any such watercraft shall, upon being so warned, immediately leave the area designated and shall remain outside the area until the conclusion of the firing practice.

(6) The regulations in this section shall not deny traverse of portions of the danger zones by regular cargo-carrying vessels, or commercial fishing vessels based at Lewes, Delaware. In case of the presence of any such vessel in a danger zone, the officer in charge of firing operations will cause the cessation or postponement of fire until the vessel has cleared the area. The vessel shall proceed on its normal course and shall not delay its progress.

(7) This section shall be enforced by the Commanding General, 1st U.S. Army, Fort George G. Meade, Md., and such agencies as he may designate.

§204.27 Atlantic Ocean off Wallops Island and Chincoteague Inlet, Va.; danger zone. (a) The area. An area immediately offshore from Wallops Island defined by lines drawn as follows: Beginning at latitude 37°51′30″ N., longitude 75°27′30″ W.; thence to latitude 37°51′30″ N., longitude 75°17′12″ W.; thence to latitude 37°43′18″ N., longitude 75°29′42″ W.: and thence to latitude 37°49′18″ N., longitude 75°29′42″ W.

(b) The regulations. (1) Vessels may enter and operate in the danger zone at all times when warning signals are not displayed.

(2) When warning signals are displayed, all vessels in the danger zone except vessels entering or departing Chincoteague Inlet shall leave the zone promptly by the shortest possible route and shall remain outside the zone until allowed by a patrol boat to enter, or until the danger signal has been discontinued. Vessels entering or departing Chincoteague Inlet shall take the shortest passage possible through the danger zone upon display of the danger signal.

(3) The intent to conduct rocket-launching operations involving the area shall be indicated by a signal consisting of a large orange-colored, "blimp-shaped" balloon by day and a signal rotating alternately red and white beacon by night. The balloon shall be flown at latitude 37°50′38″, longitude 75°28′47″ and the beacon shall be displayed about 200 feet above mean high water at latitude 37°50′16″, longitude 75°29′07″. The appropriate one of these signals shall be displayed 30 minutes prior to rocket-launching time and shall remain displayed until danger no longer exists.

(4) The regulations in this section shall be enforced by the Director, Wallops Station, National Aeronautics and Space Administration, Wallops Island, Va., or such agencies as he may designate.

§204.30 Chesapeake Bay; United States Army Proving Ground Reservation, Aberdeen, Md. (a) Restricted area defined. The following indicates the limits of the waters of or adjacent to the Aberdeen Proving Ground, Maryland, and inside of which boundaries will lie the restricted area known as the Aberdeen Proving Ground, Maryland.

(1) Beginning at a point on the westerly side of Chesapeake Bay, at the south side of the mouth of Swan Creek, Harford County, Maryland, the most northerly point of the reservation known as Plum Point; thence southeasterly along the low water mark on the shore of Chesapeake Bay to and across the north entrance of Spesutie Narrows to and thence along the low water mark on the north shore of Spesutie Island to Locust Point; thence along straight line from Locust Point to Turkey Point for a distance of approximately 1,400 yards; thence following a line parallel with and 1,000 yards from the low water mark on the easterly shore of Spesutie Island to a point 1,000 yards due southeast of Sandy Point; thence approximately southwest in a straight line to a point approximately 1,250 yards S. 10°30′ W. from Bear Point; thence approximately 9,275 yards S. 51°04′ W. to a point in Chesapeake Bay about 1,700 yards due east from Taylor Island Point; thence southwesterly in a straight course, except such variations as may be necessary to include all of Pooles Island to the southwesterly point of Pooles Island, thence in a northwesterly direction to the most southwesterly point of Spry Island, including all of Spry Island; thence northwesterly in a straight line to extreme southerly island off Lower Island Point; thence northwesterly in a straight line through Brier Point to a point in Seneca Creek where this line intersects a straight line which passes through monuments No. 124 and No. 125 on westerly part of Carroll Island; thence northeasterly in a straight line passing through Marshy Point, at the junction of Dundee Creek and Saltpeter Creek, to the intersection of the center line of Reardon Inlet with Gunpowder River, except such variations as may be necessary to exclude any and all parts of the point of land on the westerly side of Gunpowder River about one mile south of Oliver Point; thence northerly along the center line of Reardon Inlet to its intersection with the southeasterly line of the right of way of the Pennsylvania Railroad; thence northeast along the Pennsylvania Railroad following the reservation boundary line to shore of Bush River, and along its western shore to Fairview Point; thence northeast in a straight line across Bush River to concrete monument No. 64, located on the eastern shore of Bush River, south of Chelsea; thence along the

eastern shore of Bush River northerly to the mouth of Sod Run; thence by a broken line along the boundary of the reservation to Swan Creek; and thence in a straight line to Plum Point. (The above description may be traced on Coast and Geodetic Chart No. 1226).

(b) Authority delegated Commanding Officer. The Commanding Officer, Aberdeen Proving Ground, has been delegated the authority by the Secretary of the Army to designate from time to time by suitably posted bulletins or announcements, the conditions under which the public, including food fishermen and crabbers, may enter restricted waters of the Aberdeen Proving Ground.

(c) Penalty. All persons who enter the restricted waters, except as authorized in this section, without the authority of the Commanding Officer, Aberdeen Proving Ground Md., are under the terms of the information given above, guilty of a misdemeanor and upon conviction thereon are punishable by a fine not exceeding $500 or by imprisonment not exceeding 6 months.

(d) Entrance into restricted waters by the public. The restricted areas will normally be open for navigation during the following hours:

(1) Monday through Thursday, 5 p.m. to 7:30 a.m.

(2) Saturdays and Sundays, 5 p.m. Friday to 7:30 a.m. Monday.

(3) National (not State) holidays, 5 p.m. the day preceding the holiday to 7:30 a.m. the day following the holiday. When urgent requirements of tests in the interest of national defense necessitate closing the restricted area during the aforementioned times and days, the Commanding Officer, Aberdeen Proving Ground, will publish appropriate circulars or cause to be broadcast over local radio stations notices informing the public of the time and days in which entrance into the restricted waters of Aberdeen Proving Ground by the general public will be prohibited.

(e) No limitations on firing to be conducted over land. There are no limitations on firing over land belonging to Aberdeen Proving Ground.

(f) Permits required from the Commanding Officer to set fixed nets in restricted waters. (1) Fishermen and crabbers desiring to set fixed nets within the restricted waters of Aberdeen Proving Ground Reservation are required in every instance to have a written permit. A fixed net for the purpose of this paragraph is defined as a pound net, staked gill net, hedge fike net, hoop net, eel pot, crab pot, and all other types of nets fastened by means of poles, stakes, weights, or anchors. Permits to fish and crab within the restricted waters of Aberdeen Proving Ground may be obtained by written application to the Commanding Officer, Department of the Army, Aberdeen Proving Ground, Attention: Provost Marshall Division, Aberdeen Proving Ground, Md. Applicants for permits must state the location at which they desire to set fixed nets and state the period of time for which they desire the permit to cover. Nets placed in the restricted waters are subject to damage by gunfire and bombing, and the risk of such damage will be assumed by the holder of the permit.

(2) Holders of permits for setting fixed nets must comply with the provisions of this part and also with § 206.50 (d) of this chapter.

(g) Identification signs required at each location of fixed nets. Fishermen and crabbers who have been granted permits to fish or crab within the restricted waters of Aberdeen Proving Ground Reservation with fixed nets must at each location have a stake securely driven at the outer end of the line of nets on which is mounted a sign board which contains their name and permit number. All stakes set within the restricted area established by this regulation will project at least three (3) feet above the surface of the water at all ordinary high stages of the tide. Nets and other fishing and crabbing structures erected will be marked by stakes set at intervals not greater than fifty (50) feet. Fishing and crabbing structures erected in Aberdeen Proving Ground waters will be plainly marked on both ends, and will be lighted with a white light between sunset and sunrise, by and at the expense of the owner.

(h) Removal of pound net poles and or stakes. At the end of the fishing and crabbing season, fishermen and crabbers must remove and haul away from the location all pound nets, pots, poles or stakes used in their operation. Pound net poles or stakes must not be cast adrift after removal.

(i) Restrictions on fishermen and crabbers. It must be distinctly understood that holders of permits to fish or crab are not authorized to enter the restricted waters of Aberdeen Proving Ground Reservation outside the hours as announced by the Commanding Officer, Aberdeen Proving Ground. In addition, the privileges granted in this paragraph include no right to land nor to cut or procure pound nets poles or stakes on the Aberdeen Proving Ground Reservation.

(j) Fishing and crabbing with any type of net prohibited in all creeks. Fishing and crabbing with any type of net is prohibited in all creeks of the Aberdeen Proving Ground Reservation.

(k) Compliance with Federal, State and county laws required. The taking of fish and crabs in the waters of Aberdeen Proving Ground Reservation and the setting of and location of nets, in a manner not in compliance with Federal, State, and county laws is prohibited.

§204.32 Chesapeake Bay, in the vicinity of Chesapeake Beach, Md.; firing range, Naval Research Laboratory. (a) The danger zone—(1) Area A. A roughly rectangular area bounded on the north by latitude 38°39′55″; on the south by latitude 38°39′09″; on the east by longitude 76°31′03″; and on the west by the shore of Chesapeake Bay.

(2) Area B. The sector of a circle bounded by radii of 9,600 yards bearing 31° (to Bloody Bar Light) and 137° 30′ (to Buoy N "16 FF"), respectively, from the center at the southeast corner of building No. 3; excluding Area A.

(3) Area C. The segment of a circle inclosed by the arcs of two circles having radii of 9,600 yards and 13,200 yards, respectively, and bounded by the extended radii marking the north and south limits of Area B.

Note: All bearings referred to true meridian.

(4) Area D. A roughly rectangular area bounded on the north by an eastwest line through Buoy C "1" at the entrance channel to Fishing Creek; on the south by an east-west line through Buoy C "23" northeast from Breezy Point; on the east by the established fishing structure limit line; and on the west by the shore of Chesapeake Bay.

(b) The regulations. No vessel shall enter or remain in Area A at any time.

(2) No vessel shall enter or remain in Area B or Area C between the hours of 1:00 p.m. and 5:00 p.m. daily except Sundays, except that through navigation of commercial craft will be permitted in Area C at all times, but such vessels shall proceed on their normal course and shall not delay their progress.

(3) No fishing structures, other than those presently in established locations, which may be maintained, will be permitted to be established in Area D without specific permission from the Director, Naval Research Laboratory.

(4) The areas will be in use throughout the year, and no further notice is contemplated that firing is continuing.

(5) Prior to the conduct of each firing practice a patrol vessel will patrol the range to warn navigation. "Baker" will be flown from a conspicuous point on the patrol vessel and from a prominent position on shore.

(6) This section shall be enforced by the Commandant, Fifth Naval District, and such agencies as he may designate.

§204.36 Chesapeake Bay, in vicinity of Bloodsworth Island, Md.; shore bombardment, air bombing, air strafing, and rocket firing area, U.S. Navy.

(a) **The areas**—(1) **Prohibited area.** All waters within a circle 0.5-mile in radius .with its center at latitude 38°10′00″, longitude 76°06′00″.

(2) **The danger zone.** All waters of Chesapeake Bay and Tangier Sound within an area bounded as follows: Beginning at latitude 38°08′15″, longitude 76°10′00″; thence to latitude 38°12′00″, longitude 76°10′00″; thence to latitude 38°12′00″, longitude 76°07′00″; thence to latitude 38°13′00″, longitude 76°06′00″; thence to latitude 38°13′00″, longitude 76°04′00″; thence to latitude 38°12′00″, longitude 76°02′00″; thence to latitude 38°12′00″, longitude 76°00′00″; thence to latitude 38°08′15″, longitude 76°00′00″; thence to the point of beginning, excluding the prohibited area described in subparagraph (1) of this paragraph.

(b) **The regulations.** (1) Vessels or other craft shall not enter or remain in the prohibited area at any time unless authorized to do so by the enforcing agency.

(2) No vessel or other craft shall enter or remain in the danger zone when notified by the enforcing authority to keep clear or when firing is or will soon be in progress, except as provided in subparagraph (5) of this paragraph.

(3) Advance notice will be given of the dates and times of all firings in the danger zone and such notice will be published in the local "Notice to Mariners." The area will be in use intermittently throughout the year. On days when firing is conducted, firing will take place normally between sunrise and sunset, except that occassional night firing may be conducted between sunset and 12 midnight.

(4) Prior to the commencement of firing each day in the danger zone, surface or air search of the entire area will be made for the purpose of locating and warning all craft and persons not connected with the firing, and a patrol will be maintained throughout the duration of firing.

(5) Warning that ships are firing or soon will be firing in the danger zone will be indicated during daylight by a red flag prominently displayed from a tower off Okahanikan Point at latitude 38°11′45″, longitude 76°05′35″, and at night by a searchlight beam pointed into the sky. Warning that aircraft are firing or soon will be firing will be indicated by the aircraft patrolling the area. All persons, vessels, or other craft shall clear the area when these signals are displayed or when warned by patrol vessels or by aircraft employing the method of warning known as "buzzing" which consists of low flight by the airplane and repeated opening and closing of the throttle.

(6) During hours when firing is in progress or is about to commence, no fishing or oystering vessels or other craft not directly connected with the firing shall navigate within the danger zone, except that deep-draft vessels proceeding in established navigation lanes and propelled by mechanical power at a speed greater than 5 knots normally will be permitted to traverse the area. When ships are firing or soon will be firing in the danger zone, permission for such deep-draft vessels to enter and traverse the area will be indicated during daylight by dipping the red warning flag to half-mast, and at night flashing the warning searchlight. When aircraft are firing or soon will be firing in the danger zone, such deep-draft vessels may proceed unless warned to stay clear of the area by the method of warning known as "buzzing."

(7) When firing is not in progress or is not about to commence, oystering and fishing boats and other craft may operate within the danger zone.

(8) All projectiles, bombs, and rockets will be fired to land on Bloodsworth Island or Pone Island, but Naval authorities will not be responsible for damage by such projectiles, bombs, or

rockets, or by Navy or Coast Guard vessels, to nets, traps, buoys, pots, fish pounds, stakes, or other equipment which may be located within the danger zone.

(9) The regulations in this section shall be enforced by the Commandant, Fifth Naval District, and such agencies as he may designate.

§204.40 Potomac River. (a) U.S. Naval Weapons Laboratory, Dahlgren, Va.—(1) The danger zone—

(i) Lower zone. The entire portion of the lower Potomac River between a line from Point Lookout, Md., to Smith Point, Va., and a line from Buoy 14 (abreast of St. Clements Island) to a point near the northeast shore of Hollis Marsh at latitude 38°10′00″, longitude 76°45′23.5″. Long-range and aerial machine gun firing is normally conducted in this zone at infrequent intervals.

(ii) Middle zone. Beginning at the intersection of the Potomac River Bridge with the Virginia shore; thence to Light 33; thence to latitude 38°19′06″, longitude 76°57′07″, which point is about 3,300 yards east-southeast of Light 30; thence to Line of Fire Buoy O, about 1,150 yards southwesterly of Swan Point; thence to Line of Fire Buoy M, about 1,700 yards south of Potomac View; thence to Line of Fire Buoy K, about 1,400 yards southwesterly of the lower end of Cobb Island; thence to Buoy 14, abreast of St. Clements Island; thence southwesterly to a point near the northeast shore of Hollis Marsh at latitude 38°10′00″, longitude 76°45′23.5″; thence northwesterly to Line of Fire Buoy J, about 3,000 yards off Popes Creek, Va; thence to Line Buoy L, about 3,600 yards off Church Point; thence to Line of Fire Buoy N, about 900 yards off Colonial Beach; thence to Line of Fire Buoy P, about 1,000 yards off Bluff Point; thence northwest to latitude 38°17′52″, longitude 77°01′00″, a point of the Virginia shore on property of the U.S. Naval Weapons Laboratory, a distance of about 3,800 yards; thence northerly along the shore of the U.S. Naval Weapons Laboratory to Baber Point, latitude 38°18′42″, longitude 77°01′45″, and thence north-northwest to latitude 38°19′09″, longitude 77°02′08″, a point on the Main Dock at the U.S. Naval Weapons Laboratory. Firing is normally conducted in this zone daily except Saturdays, Sundays, and national holidays.

(iii) Upper zone. Beginning at Mathias Point, Va; thence north to Light 5; thence in a northeasterly direction to Light 6; thence east-southeast to Lighted Buoy 2, thence east-southeast to a point on the Maryland shore at approximately latitude 38°23′35″, longitude 76°59′18″; thence southerly with the Maryland shore to a line passing through Light 1 to the Virginia shore, parallel to the Potomac River Bridge; thence northerly with the Virginia shore to the point of beginning. Aerial bombing and strafing is normally conducted in this zone at infrequent intervals.

(2) The regulations. (i) Firing normally takes place between the hours of 8:00 am. and 4:00 p.m. daily except Saturdays, Sundays, and national holidays, with infrequent night firing between 4:00 p.m. and 10:30 p.m. During a national emergency, firing will take place between the hours of 6:00 a.m. and 10:30 p.m. daily except Sundays.

(ii) When firing is in progress, no fishing or oystering vessels shall operate within the danger zone affected unless so authorized by the Naval Weapons Laboratory's patrol boats. Oystering and fishing boats or other craft may cross the river in the danger zone only after they have reported to the patrol boats and received instructions as to when and where to cross. Deep-draft vessels using dredged channels and propelled by mechanical power at a speed greater than five miles per hour may proceed directly through the danger zones without restriction except when especially notified to the contrary. Unless instructed to the contrary by the patrol boat, small craft navigating up or down the Potomac River during firing hours shall proceed outside of the northeastern boundary of the Middle Danger Zone. All craft desiring to enter the Middle Danger Zone when proceeding in or out of Upper Machodoc Creek during firing hours will be instructed by the patrol boat; for those craft which desire to proceed in or out of Upper Machodoc Creek on a course between the western shore of the Potomac River and a line from the Main Dock of the U.S. Naval Weapons Laboratory to Line of Fire Buoy P, clearance will be granted to proceed upon request directed to the patrol boat.

(iii) The regulations in this section shall be enforced by the Commander, U.S. Naval Weapons Laboratory and such agencies as he may designate. Patrol boats, in the execution of their mission assigned herein, shall display a square red flag during daylight hours for purposes of identification; at night time, a 32 point red light shall be displayed at the mast head.

(b) Accotink Bay, Accotink Creek, and Pohick Bay; United States Military Reservation, Fort Belvoir, Va.—(1) The danger zone. The waters of Accotink Bay, Accotink Creek, and Pohick Bay, Virginia, within and adjacent to the target ranges of the United States Military Reservation, Fort Belvoir, as follows: All of Accotink Bay; all of Accotink Creek below the bridge which crosses Accotink Creek approximately 400 yards south of U.S. Highway No. 1; and that portion of Pohick Bay bordering its north shore. The mouth of Accotink Bay and that portion of Pohick Bay within the danger zone will be marked by the Post Commander with suitable warning buoys.

(2) The regulations. (i) When firing affecting the area is in progress, the Post Commander will post guards at such locations that the waters in the danger zone may be observed and arrange signals whereby these guards may stop the firing should

any person be seen in the danger zone. When firing is in progress, the Post Commander will cause to be displayed both on the east shore of Accotink Bay at its mouth and near the danger zone boundary on Accotink Creek a red streamer which shall be visible to a person in a boat near those points.

(ii) Persons desiring to cross the waters in the danger zone shall first determine whether a red streamer is displayed on the east Shore of Accotink Bay at its mouth or near the danger zone boundary on Accotink Creek. If the red streamer is displayed, it will indicate that firing is in progress and that the waters in the danger zone are covered by rifle fire, and the area shall not be entered until the streamer is lowered.

(iii) The Post Commander is hereby authorized by using such agencies and equipment necessary to stop all boats at the boundary of the danger zone and prohibit their crossing the area until convenient to the the firing schedule to do so.

§204.41 Potomac River, Mattawoman Creek and Chicamuxen Creek; U.S. Naval Propellant Plant, Indian Head, Md. (a) The danger zone. Beginning at a point on the easterly shore of the Potomac River at latitude 38°36′00″, longitude 77°11′00″; thence to latitude 38°34′30″, longitude 77°13′00″; thence to latitude 38°33′20″, longitude 77°14′20″; thence to latitude 38°32′20″, longitude 77°15′10″; thence to latitude 38°32′00″, longitude 77°15′0″; thence to latitude 38°32′00″, longitude 77°14′40″; thence to latitude 38°32′30″, longitude 77°14′00″; thence upstream along the easterly shoreline of Chicamuxen Creek to its head; thence downstream along the westerly shoreline of Chicamuxen Creek to the southernmost point of Stump Neck; thence northeasterly along the shoreline of Stump Neck to the mouth of Mattawoman Creek; thence along the southeasterly shore of Mattawoman Creek to the footbridge connecting the left bank of the creek to the Naval Propellant Plant; thence along the northwesterly shore of Mattawoman Creek from the footbridge to the mouth of the creek; thence in a northeasterly direction along the easterly shore of the Potomac River to the point of beginning.

(b) The regulations. (1) Firings consisting of controlled explosions within the danger zone, and controlled shore operations, or accidental explosions, hazardous to vessel traffic within the limits of the danger zone, may take place at any time of the day or night and on any day of the week.

(2) Flashing red lights, horns, and signs established at appropriate points will warn vessels of impending tests or operations considered to be hazardous to vessels within the danger zone.

(3) No vessel except vessels of the United States or vessels authorized by the enforcing agency shall enter or remain in the danger zone while lights are flashing, when warning horns are in operation, or when warned or directed by a patrol vessel.

(4) Nothing in this section shall prohibit the use of Mattawoman Creek or Chicamuxen Creek as a harbor of refuge because of stress of weather.

(5) Except as prescribed in subparagraph (3) of this paragraph, vessels may enter and proceed through the danger zone without restriction; however, accidental explosions may occur at any time and vessels entering the area do so at their own risks.

(6) Fishermen operating in the danger zone when warning signals are sounded shall evacuate the area immediately.

(7) The regulations in this section shall be enforced by the Commanding Officer, U.S. Naval Propellant Plant, Indian Head, Maryland.

§204.42 Chesapeake Bay, Point Lookout to Cedar Point; aerial firing range and target areas, U.S. Naval Air Test Center, Patuxent River, Md. (a) Aerial firing range—(1) The danger zone. The waters of Chesapeake Bay within an area described as follows: Beginning at the easternmost extremity of Cedar Point; thence easterly to the southern tip of Barren Island; thence southeasterly to latitude 38°01′15″, longitude 76°05′33″; thence southwesterly to Chesapeake Channel Buoy 50 (approximately latitude 37°59′25″, longitude 76°10′54″); thence northwesterly to latitude 38°02′20″, longitude 76°17′26″; thence northerly to Point No Point Light; thence northwesterly to the shore at latitude 38°15′45″; thence northeasterly along the shore to the point of beginning. Aerial firing and dropping of nonexplosive ordnance will be conducted in this area throughout the year, Monday through Saturday, except national holidays.

(2) The regulations. (i) Through navigation of surface craft outside the target areas will be permitted at all times. Vessels shall proceed on their normal course and shall not delay their progress.

(ii) Prior to firing or ordnance drops, the range will be patrolled by naval surface craft or aircraft to warn watercraft likely to be endangered. Surface craft so employed will display a square red flag. Naval aircraft will use a method of warning consisting of repeated shallow dives in the area, following each dive by a sharp pullup.

(iii) Any watercraft under way or at anchor, upon being so warned, shall immediately vacate the area and shall remain outside the area until conclusion of firing practice.

(iv) Nothing in this section shall prevent the taking of shellfish or the setting of fishing structures within the range outside target areas in accordance with Federal and State regulations; Provided, That no permanent or temporary fishing structures or oyster ground markers shall be placed on the western side of the Chesapeake Bay between Point No Point and Cedar Point without prior written approval of the Commanding Officer, U.S. Naval Air Station, Patuxent River, Md.

(v) Naval authorities will not be responsible for damage caused by projectiles, bombs, missiles, or Naval or Coast Guard vessels to fishing structures or fishing equipment which may be located in the aerial firing range immediately adjacent to the target areas.

(b) Target areas—(1) Prohibited area. A circular area with a radius of 1,000 yards having its center at latitude 38°13′00″, longitude 76°19′00″ identified as Hooper Target.

(2) Restricted area. A circular area with a radius of 600 yards having its center at latitude 38°02′18″, longitude 76°09′26″, identified as Hannibal Target.

(3) The regulations. Nonexplosive projectiles and bombs will be dropped at frequent intervals in the target areas. Hooper Target shall be closed to navigation at all times and Hannibal Target during daylight hours, except for vessels engaged in operational and maintenance operations as directed by the Commanding Officer, U.S. Naval Air Station, Patuxent River, Md. No person in the waters, vessel, or other craft shall enter or remain in the closed area except on prior written approval of the Commanding Officer, U.S. Naval Air Station, Patuxent River, Md.

(c) The regulations in this section shall be enforced by the Commander, Naval Air Test Center, and such agencies as he may designate.

§204.44 Chesapeake Bay, in vicinity of Tangier Island; Naval guided missiles test operations area. (a) The danger zone—(1) Prohibited area. A circle 1,000 yards in radius with its center at latitude 37°47′54″, longitude 76°03′48″.

(2) Restricted area. A circle three nautical miles in radius with its center at latitude 37°47′54″, longitude 76°03′48″, excluding the prohibited area.

(b) The regulations. (1) Vessels or other craft shall not enter or remain in the prohibited area at any time unless authorized to do so by the enforcing agency.

(2) Except as otherwise provided in subparagraph (6) of this paragraph, vessels or other craft shall not enter or remain in the restricted area when firing is or will soon be in progress unless authorized to do so by the enforcing agency.

(3) Advance notice will be given of the date on which the first firing is to be conducted and such notice will be published in "Notice to Mariners." Thereafter, the danger zone will be in use intermittently throughout the year and no further notice is contemplated that firing is continuing.

(4) Warning that firing is or will soon be in progress will be indicated by a red flag displayed from one of six dolphin platforms on the perimeter of the prohibited area, and by patrol vessels within the danger zone or by aircraft employing the method of warning known as "buzzing" which consists of low flight by the airplane and repeated opening and closing of the throttle. Surface or air search of the entire area will be made prior to the commencement of firing on each scheduled day. During periods of firing a patrol vessel will remain in the approaches to the restricted area and maintain continuous contact with the firing planes to warn when the area is not clear.

(5) Upon observing the warning flag or upon receiving a warning by any of the patrol vessels or aircraft, vessels or other craft shall immediately vacate the restricted area and remain outside the area until the conclusion of firing for the day.

(6) This section shall not deny traverse of portions of the restricted area by commercial craft proceeding in established steamer lanes, but when firing is or will soon be in progress all such craft shall proceed on their normal course through the area with all practicable speed.

(7) All projectiles, bombs and rockets will be fired to land within the prohibited area, and on or in the immediate vicinity of a target in the restricted area located adjacent to the west side of Tangier Island. The Department of the Navy will not be responsible for damages by such projectiles, bombs, or rockets to nets, traps, buoys, pots, fishpounds, stakes, or other equipment which may be located within the restricted area.

(8) The regulations of this section shall be enforced by the Commander, Naval Air Bases, Fifth Naval District, Norfolk, Virginia, and such agencies as he may designate.

§204.46 Chesapeake Bay, South of Tangier Island, Virginia; naval firing range. (a) The danger zone. Beginning at latitude 37°46′39″, longitude 75°57′43″, thence to latitude 37°43′42″, longitude 75°55′30″; thence to latitude 37°27′00″, longitude 76°02′48″; thence to latitude 37°27′00″, longitude 76°08′00″; thence to latitude 37°45′00″, longitude 76°09′48″; thence to latitude 37°45′00″, longitude 76°08′51″; and thence along the circumference of a circle of five nautical miles radius whose center is at latitude 37°47′54″, longitude 76°03′48″, to the point of beginning.

(b) The regulations. (1) Any vessel propelled by mechanical means or by sail at a speed greater than five knots may proceed through the danger zone to and from points without, but not from one point to another point within, the area, except when especially notified to the contrary.

(2) All vessels, other than naval craft, are forbidden to anchor within the danger zone except in cases of great emergency. All vessels anchoring under circumstances of great emergency within the area shall leave the area immediately after the emergency ceases or upon notification by the enforcing agency.

(3) Fishing, oystering, clamming, crabbing, and other aquatic activities are forbidden within the limits of the danger zone, except that existing fishing structures licensed by the State of Virginia may be maintained and operated; Provided, The owners thereof obtain written permits from the enforcing agency designated in subparagraph (5) of this paragraph.

(4) Day and night firing over the range will be conducted intermittently by one or more vessels, depending on weather and operating schedules. When firing is in progress, adequate patrol by naval craft will be conducted to prevent vessels from entering or remaining within the danger zone.

(5) This section shall be enforced by the Commandant, Fifth Naval District, U.S. Naval Base, Norfolk, Virginia, and such agencies as he may designate.

§204.48 Atlantic Ocean and connecting waters in vicinity of Myrtle Island, Va.; Air Force practice bombing, rocket firing, and gunnery range. (a) The danger zone. The waters of the Atlantic Ocean and connecting waters within an area described as follows: Beginning at latitude 37°12′18″, longitude 75°46′00″; thence southwesterly to latitude 37°08′21″, longitude 75°50′00″; thence northwesterly along the arc of a circle having a radius of three nautical miles and centered at latitude 37°11′26″, longitude 75°49′29″, to latitude 37°10′14′, longitude 75°52′57″; thence northeasterly to latitude 37°14′30″, longitude 75°48′32″; thence southeasterly to 37°13′38″, longitude 75°46′18″; and thence southeasterly to the point of beginning.

(b) The regulations. (1) No vessel shall enter or remain in the danger zone except during intervals specified and publicized from time to time in local newspapers or by radio announcement.

(2) This section shall be enforced by the Commanding General, Tactical Air Command, Langley Air Force Base, Virginia, and such agencies as he may designate.

§204.49 Chesapeake Bay off Plumtree Island, Hampton, Va.; Air Force precision test area. (a) The danger zone. The waters of Chesapeake Bay and connecting waters within an area bounded as follows: Beginning at latitude 37°08′12″, longitude 76°19′30″, which is a point on the circumference of a circle of 10,000-foot radius with its center on Plumtree Point at latitude 37°07′30″, longitude 76°17′36″; thence clockwise along the circumference of the circle to latitude 37°09′06″, longitude 76°18′00″; thence southeasterly to latitude 37°08′12″, longitude 76°17′48″; thence clockwise along the circumference of a circle of 4,000-foot radius (with its center at latitude 37°07′30″, longitude 76°27′36″) to latitude 37°07′48″, longitude 76°18′24″; thence northwesterly to the point of beginning.

(b) The regulations. (1) The danger zone will be in use not more than a total of 4 hours per month, which hours shall be during not more than any 2 days per month.

(2) No vessel shall enter or remain in the danger zone during periods of firing or bombing or when the zone is otherwise in use.

(3) The Commander, Tactical Air Command, Langley Air Force Base, Va., shall be responsible for publicizing in advance through the Coast Guard's "Local Notice to Mariners," in the local press, and by radio from time to time the schedule of use of the area, and shall station patrol boats to warn vessels during periods of use.

(4) This section shall be enforced by the Commander, Tactical Air Command, Langley Air Force Base, Va., or such agency as he may designate.

(c) Disestablishment of danger zone. The danger zone will be disestablished not later than December 31, 1967, unless written application for its continuance shall have been made to and approved by the Secretary of the Army prior to that date.

§204.49a Chesapeake Bay off Fort Monroe, Va.; firing range danger zone. (a) The danger zone. All of the water area lying within a section extending seaward a distance of 4,600 yards between radial lines bearing 83° True and 115° True, respectively, from a point on shore at latitude 37°01′30″ N., longitude 76°17′54″ W.

(b) The regulations. (1) No weapon having a greater range than the 30-calibre carbine is to be fired into the firing range danger zone.

(2) During periods when firing is in progress, red flags will be displayed at conspicuous locations on the beach. Observers will be on duty and firing will be suspended as long as any vessel is within the danger zone.

(3) Passage of vessels through the area will not be prohibited at any time, nor will commercial fishermen be prohibited from working fish nets within the area. No loitering or anchoring for other purposes will be permitted during announced firing periods.

(4) No firing will be done during hours of darkness or low visibility.

(5) The Commander, Fort Monroe, Va., is responsible for furnishing in advance the firing schedule to the Commander, 5th Coast Guard District, for publication in his "Local Notice to Mariners" and to the local press at Norfolk and Newport News, Va.

(c) The regulations in this section shall be enforced by the Commanding Officer, Fort Monroe, Va., and such agencies as he may designate.

§204.50 Chesapeake Bay off Fort Monroe, Va.; restricted area, U.S. Naval Base and Naval Ordnance Laboratory. (a) The danger zone. Beginning at latitude 37°00′30″, longitude 76°18′05″; thence to latitude 37°00′38″, longitude 76°17′42″; thence to latitude 37°01′00″, longitude 76°17′15″; thence to latitude 37°01′00″, longitude 76°16′11″; thence to latitude 36°59′43″, longitude 76°16′11″; thence to latitude 36°59′18″, longitude 76°17′52″; thence to latitude 37°00′05″, longitude 76°18′17″; and thence north along the seawall to the point of beginning.

(b) The regulations. (1) Anchoring, trawling, fishing, and dragging are prohibited in the danger zone, and no object, either attached to a vessel or otherwise, shall be placed on or near the bottom.

(2) This section shall be enforced by the Commander, Naval Base, Norfolk, Virginia, and such agencies as he may designate.

§204.51 Chesapeake Bay, Lynnhaven Roads; danger zones, U.S. Naval Amphibious Base. (a) Underwater demolitions area (prohibited)—(1) The area. A portion of the restricted area for Navy amphibious training operations described in **§207.157, along the south shore of Chesapeake Bay, bounded as follows: Beginning at a point on the mean low-water line at longitude 76°08′59″; thence 200 yards to latitude 36°55′36″, longitude 76°08′57″; thence 400 yards to latitude 36°55′34″, longitude 76°08′43″; thence 200 yards to a point on the mean low-water line at longitude 76°08′45″; and thence approximately 400 yards along the mean low-water line to the point of beginning. The area will be marked by range poles set on shore on the prolongation of the lines forming its eastern and western boundaries.**

(2) The regulations. Vessels other than those owned and operated by the United States shall not enter the prohibited area at any time unless authorized to do so by the enforcing agency.

(b) Small-arms firing range—(1) The Area. Beginning at a point on the shore line at latitude 36°55′27″, longitude 76°08′38″; thence to latitude 36°55′50″, longitude 76°08′37″; thence to latitude 36°57′11″, longitude 76°08′11″; thence to latitude 36°56′53″, longitude 76°07′18″; thence to latitude 36°55′39″, longitude 76°07′46″; thence to latitude 36°55′22″, longitude 76°08′17″; thence along the shore line to the point of beginning.

(2) The regulations. (i) Passage of vessels through the area will not be prohibited at any time, nor will commercial fishermen be prohibited from working fish nets within the area. No loitering or anchoring for other purposes will be permitted.

(ii) A large red warning flag will be flown on shore during periods when firing is in progress. Observers will be on duty and firing will be suspended for the passage of vessels and for the placing and maintenance of fish nets within the area.

(c) This section shall be enforced by the Commanding Officer, U.S. Naval Amphibious Base, Little Creek, Norfolk, Virginia.

PART 205—DUMPING GROUNDS REGULATIONS:

§205.20 Chesapeake Bay off Kent Island, Md. (a) The dumping grounds. The waters of Chesapeake Bay within an area west of the north end of Kent Island bounded as follows: Beginning at latitude 38°59′43″, longitude 76°21′58″; thence to latitude 39°00′44″, longitude 76°21′34″; thence to latitude 39°00′42″, longitude 76°21′23″; thence to latitude 39°03′03″, longitude 76°20′27″; thence to latitude 39°03′05″, longitude 76°19′46″; thence to latitude 38°59′32″, longitude 76°21′12″; and thence to the point of beginning.

(b) The regulations. (1) Materials shall be dumped only in areas more than 40 feet deep at mean low water, and only at such places indicated by buoys within the dumping grounds as may be designated by the District Engineer, U.S. Army Engineer District, Baltimore.

(2) Materials from private or municipal dredging may be dumped under permission previously obtained for each job from the District Engineer. The permittee shall furnish and install such buoys or other marks as may be required by the District Engineer to designate the dumping area.

(3) All deposits in the authorized areas shall be made under the supervision of inspectors appointed by the United States unless, in the opinion of the District Engineer, such supervision is not necessary or desirable. The cost of inspection shall be borne by the permittees.

(4) Any deposits made above the plane of 40 feet below mean low water shall be leveled to that plane by the contractor or responsible person at his own expense within the time specified by the District Engineer, and failure to do so shall constitute a violation of this section.

(5) The route to be followed between the dredging area and the dumping area may be designated by the District Engineer whenever he considers it necessary.

PART 207—NAVIGATION REGULATIONS:

§207.70 Channel of Tuckerton Creek, N.J.; navigation. (a) Power boats or other vessels propelled by machinery shall not proceed at any time within the limits of these waters at a greater speed than 8 statute miles per hour.

§207.80 Channel of Christina River, Del.; navigation. (a) That vessels of over 20 tons capacity, propelled by machinery, shall not proceed at any time within the limits of these waters at a greater speed than 8 statute miles per hour.

§207.90 Delaware River, Pa.; use of Government landing pier at Marcus Hook. (a) This wharf must not be used for storage of material. A clear, unobstructed passageway not less than 14 feet wide must be left at the wharf approach.

(b) The dragging of any heavy articles over or along the wharf is not allowed, nor the dragging of one end of a log or timber the other end of which is carried on trucks.

(c) No load exceeding 1½ tons, exclusive of wagon and team, is allowed to cross the bridge without permission of the officer in charge.

(d) Anyone violating paragraphs (a) to (c) of this section or committing any other acts of carelessness or violence which results in injuring the wharf will be reported to the United States district attorney for prosecution as provided by law.

§207.100 Inland waterway from Delaware River to Chesapeake Bay, Delaware and Maryland (Chesapeake and Delaware Canal); use, administration,

and navigation. These regulations are given in the description of the canal in Chapter 7 of this Coast Pilot.

§207.105 Delaware Bay off Cape Henlopen, Del.; naval restricted area. (a) The area. Beginning at a point on the south shore of Delaware Bay at longitude 75°06′12″; thence to latitude 38°47′25″, longitude 75°06′20″; thence to latitude 38°47′48″, longitude 75°06′00″; thence to latitude 38°50′43″, longitude 75°02′11″; thence to latitude 38°49′16″, longitude 74°59′35″; thence to a point on the shore at latitude 38°46′09″; thence northwesterly and southwesterly along the shore at Cape Henlopen to the point of beginning.

(b) The regulations. (1) Anchoring, trawl fishing, crabbing, dragging, grappling, and towing with hawser on bottom are prohibited in the area and no object attached to a vessel shall be placed on or near the bottom.

(2) This section does not apply to anchored floating navigational aids or to placement or removal of such aids by the Coast Guard.

(3) This section does not apply to vessels engaged in commercial or pleasure boat fishing provided anchors, trawls, and ground tackle are not used.

(4) The regulations in this section shall be enforced by the Commandant, Fourth Naval District, and such agencies as he may designate.

§207.116 Severn River at Annapolis, Md.; experimental test area, U.S. Navy Marine Engineering Laboratory. (a) The restricted area. The waters of Severn River shoreward of a line beginning at the southeasternmost corner of the U.S. Navy Marine Engineering Laboratory sea wall and running thence southwesterly perpendicular to the main Severn River channel, approximately 560 feet, thence northwesterly parallel to and 50 feet shoreward of the edge of the channel, 1,035 feet, and thence northeasterly perpendicular to the channel, approximately 600 feet, to the shore. Spar buoys will mark the corners of the area adjacent to the channel.

(b) The regulations. (1) No vessel or person other than specifically authorized military and naval vessels and persons shall enter or remain in the area during its use for experimental purposes. At all other times vessels and persons may use the area without restriction.

(2) The area will be in use intermittently, and this use will be signified by the presence of white-painted boats or floats, which will be lighted at night.

(3) Upon observing the boats or floats referred to in subparagraph (2) of this paragraph, or upon being warned, vessels and persons shall immediately vacate the area and remain outside the area during the period of use.

(4) The regulations in this section shall be enforced by the Commandant, Severn River Naval Command, and such agencies as he may designate.

§207.117 Severn River, at U.S. Naval Academy Santee Basin, Annapolis, Md.; naval restricted area. (a) The area. The waters within the U.S. Naval Academy Santee Basin and adjacent waters of Severn River inclosed by a line beginning at the northeast corner of Dewey Field seawall; thence to latitude 38°59′03″, longitude 76°28′47.5″; thence to latitude 38°58′58″, longitude 76°28′40″; and thence to the northwest corner of Farragut Field seawall.

(b) The regulations. (1) No person in the water, vessel or other craft shall enter or remain in the restricted area at any time except as authorized by the enforcing agency.

(2) The regulations in this section shall be enforced by the Superintendent, U.S. Naval Academy, Annapolis, Md., and such agencies as he may designate.

§207.125 Patuxent River, Md.; restricted areas, U.S. Naval Air Test Center, Patuxent River, Md. (a) Except in the gut off the tip of Point Patience, no person in the water and no craft shall approach closer than 75 yeards to the beaches, shoreline, or piers of the area formerly occupied by the U.S. Naval Mine Warfare Test Station, or of U.S. Naval Air Station property. A person in the water or a civilian craft shall not approach rafts, barges, or platforms closer than 100 yards.

(b) Diving tenders will exhibit a square red flag with white X when underwater diving takes place from naval small craft. At such times, persons in the water and civilian craft shall stay at least 200 yards clear of these vessels and the civilian craft shall proceed at a speed not greater than five knots when within 1,000 yards thereof.

(c) On occasions, seaplane landings and takeoffs will be practiced in the seadrome area north of the U.S. Naval Air Station, Patuxent River. This area includes those waters of the Patuxent River between Town Point and Hog Point shoreward of a line described as follows: Beginning at a point on the shore just west of Lewis Creek, bearing 161°30′ true, 2,000 yards from Point Patience Light; thence to a point bearing 130° true, 1,850 yards from Point Patience Light; thence to a point bearing 247°30′ true, 3,650 yards from Drum Point Light; thence to a point bearing 235° true, 2,060 yards from Drum Point Light; thence to a point bearing 129° true, 700 yards from Drum Point Light; thence to a point bearing 137° true, 1,060 yards from Drum Point Light; and thence to a point on the shore west of Harper Creek entrance, bearing 158°30′ true, 1,900 yards from Drum Point Light. Operations will be indicated by day by a square white flag with square blue center, and by night by one green light for operations in an easterly direction, or by two vertical green lights for operations in a westerly direction, all signals to be exhibited from Patuxent River Boathouse seawall at the U.S. Naval Air Test Center. In addition, crash boats will patrol the landing lanes during the operations, and by night float lights will mark the landing lanes. At such

times as the above signals are exhibited the following restriction will apply to boating and to persons in the waters adjacent to the U.S. Naval Air Station in the area westward of Fishing Point: Persons in the water and boats will proceed across the seaplane operating area only in accordance with instructions from crash boats; will not enter the seaplane basins; and will not use the areas adjacent to seaplane basins.

(d) The regulations in this section shall be enforced by the Commanding Officer, U.S. Naval Air Station, Patuxent River, Md., and such agencies as he may designate.

§207.126 Gunston Cove, at Whitestone Point, Va.; U.S. Army restricted area. (a) The area. The waters within an area beginning at a point on the shoreline at longitude 77°08′36″; thence to latitude 38°40′22″, longitude 77°08′39″; thence to latitude 38°40′14″, longitude 77°08′22″; thence to a point on the shoreline at longitude 77°08′18″ and thence along the shoreline to the point of beginning.

(b) The regulations. No person, vessel, or other craft shall enter or remain in the area at any time except as authorized by the enforcing agency.

(c) The regulations in this section shall be enforced by the District Engineer, U.S. Army Engineer District, Philadelphia, Pa., and such agencies as he may designate.

§207.128 York River, Va.; naval prohibited and restricted areas. (a) The areas—(1) Naval mine service-testing area (prohibited). A rectangular area surrounding Piers 1 and 2, Naval Weapons Station, and extending upstream therefrom, beginning at a point on the shore line at latitude 37°15′25″ N., longitude 76°32′32″ W.; thence to latitude 37°15′42″ N., longitude 76°32′06″ W.; thence to latitude 37°15′27″ N., longitude 76°31′48″ W.; thence to latitude 37°15′05″ N., longitude 76°31′27″ W.; thence to a point on the shore line at latitude 37°14′51″ N., longitude 76°31′50″ W.; and thence along the shore line to the point of beginning.

(2) Naval mine service-testing area (restricted). A rectangular area adjacent to the northeast boundary of the prohibited area described in subparagraph (1) of this paragraph, beginning at latitude 37°16′00″ N., longitude 76°32′29″ W.; thence to latitude 37°16′23″ N., longitude 76°32′00″ W.; thence to latitude 37°15′27″ N., longitude 76°30′54″ W.; thence to latitude 37°15′05″ N., longitude 76°31′27″ W.; thence to latitude 37°15′27″ N., longitude 76°31′48″ W.; thence to latitude 37°15′42″ N., longitude 76°32′06″ W.; thence to latitude 37°15′40″ N., longitude 76°32′09″ W.; and thence to the point of beginning.

(3) Explosives-Handling Berth (Naval). A circular area of 600 yards radius with its center at latitude 37°13′56″ N., longitude 76°28′48″ W.

(b) The regulations. (1) All persons and all vessels other than naval craft are forbidden to enter the prohibited area described in paragraph (a)(1) of this section.

(2) Trawling, dragging, and net-fishing are prohibited, and no permanent obstructions may at any time be placed in the area described in paragraph (a) (2) of this section. Upon official notification, any vessel anchored in the area and any person in the area will be required to vacate the area during the actual mine-laying operation. Persons and vessels entering the area during mine-laying operations by aircraft must proceed directly through the area without delay, except in case of emergency. Naval authorities are required to publish advance notice of mine-laying and/or retrieving operations scheduled to be carried on in the area, and during such published periods of operation, fishing or other aquatic activities are forbidden in the area. No vessel will be denied passage through the area at any time during either mine-laying or retrieving operations.

(3) The Explosives-Handling Berth (Naval) described in paragraph (a)(3) of this section is reserved for the exclusive use of naval vessels and except in cases of emergency no other vessel shall anchor therein without the permission of local naval authorities, obtained through the Captain of the Port, U.S. Coast Guard, Norfolk, Va. There shall be no restriction on the movement of vessels through the Explosive-Handling Berth.

(4) Vessels shall not be anchored, nor shall persons in the water approach within 300 yards of the perimeter of the Explosives-Handling Berth when that berth is occupied by a vessel handling explosives.

(5) The regulations of this section shall be enforced by the Commander, Naval Base, Norfolk, Virginia, and such agencies as he may designate.

§207.129 York River adjacent to Cheatham Annex Depot, Naval Supply Center, Williamsburg, Virginia; restricted area. (a) The area. The waters of York River bounded as follows: Beginning at a point on shore at Cheatham Annex Depot at latitude 37°17′14″ N., longitude 76°35′38″ W.; thence to a point offshore at latitude 37°17′52″ N., longitude 76°35′20″ W.; thence approximately parallel to the shore to a point at latitude 37°17′23″ N., longitude 76°34′39″ W.; thence to the shore at latitude 37°16′58″ N., longitude 76°35′03″ W.; and thence along the shore at Cheatham Annex Depot to the point of beginning.

(b) The regulations. (1) No loitering will be permitted within the area. Oystermen may work their own leaseholds or public bottom within the area, provided they obtain special permission from the Officer in Charge, Cheatham Annex Depot, Naval Supply Center, Williamsburg, Virginia.

(2) The regulations in this section shall be enforced by the Officer in Charge, Cheatham Annex Depot, U.S. Naval Supply Center, Williamsburg, Virginia.

§207.130 York Spit Channel, Chesapeake Bay; navigation. The use of this channel shall be restricted to vessels and other watercraft passing up or down the bay, and no vessel or other water-

craft shall cross the channel or enter it at any point other than at its ends and in the direction of its axis. Any vessel having entered the channel shall follow the course thereof for its entire length.

§207.140 Thimble Shoal Channel, Chesapeake Bay; navigation. (a) The use of this channel shall be restricted to vessels, tows, and other watercraft drawing 20 feet or more at the time of navigating the channel: Provided, That this restriction shall not apply to passenger-carrying vessels.

(b) Watercraft permitted to use the channel under paragraph (a) of this section shall proceed through at a reasonable speed so as not to endanger other vessels or interfere with any work in connection with maintaining, surveying, or buoying the channel. Vessels shall not anchor in the channel except in cases of emergency, such as fog or accident, which would render progress unsafe or impossible.

(c) This section shall not be construed as prohibiting necessary use of the channel by Government boats while on Government duty, or its use in emergencies by pilot boats,whether steam or sail, or by police boats.

§207.152 James River off the entrance to Skiffes Creek, Va.; Army small-craft testing area. (a) The restricted area. Beginning at latitude 37°10′00″, longitude 76°37′28″; thence to latitude 37°09′13″, longitude 76°37′48″; thence to latitude 37°09′13″, longitude 76°38′08″; thence to latitude 37°10′00″, longitude 76°37′55″; and thence to the point of beginning.

(b) The regulations. (1) No vessels other than Department of the Army vessels and no persons other than persons embarked in such vessels shall enter the restricted area except as provided in subparagraph (2) of this paragraph.

(2) Nothing in this section shall prevent the setting of fish traps within the restricted area under regulations of the Department of the Army, nor will the passage of fishing vessels to and from authorized traps be unreasonably interfered with or restricted.

(3) Vessels anchored in the area shall be so anchored as not to obstruct the arc of visibility of Deep Water Shoals Light.

(4) This section shall be enforced by the Commanding General, Fort Eustis, Virginia, and such agencies as he may designate.

§207.152a James River off Camp Wallace, Va.; Army Transportation School Training Area. (a) The restricted area. Beginning at latitude 37°13′10″ N., longitude 76°39′20″ W.; thence northeasterly about 300 yards to the shore line at latitude 37°13′17.5″ N., longitude 76°39′12″ W.; thence southeasterly along the shore line to latitude 37°12′58″ N., longitude 76°38′30″ W.; thence southwesterly about 300 yards to latitude 37°12′51″ N., longitude 76°38′40″ W.; and thence northwesterly about 1200 yards to the point of beginning.

(b) The regulations. (1) No vessels other than Department of the Army vessels, and no persons other than persons embarked in such vessels, shall remain in or enter the restricted area during periods of its actual use by the Army for training purposes.

(2) Government vessels shall patrol the vicinity to warn other vessels to vacate or keep out of the restricted area when it is about to be or is being used by Army vessels.

(3) The Commander, U.S. Army Transportation Center and Fort Eustis, Fort Eustis, Va., will, to the extent possible, give public notice from time to time through local news media of the schedule of intended Army use of the area.

(4) The continuation of the restricted area for more than 3 years after the date of its establishment shall be dependent upon the outcome of the consideration of a request for its continuance submitted to the District Engineer, U.S. Army Engineer District, Norfolk, Va., by the using agency at least 3 months prior to the expiration of the 3 years.

(5) The regulations in this section shall be enforced by the Commander, U.S. Army Transportation Center and Fort Eustis, Fort Eustis, Va., or such agencies as he may designate.

§207.153 Elizabeth River, Southern Branch, Va., naval restricted areas. (a) The areas—(1) St. Helena Annex Area. Beginning at a point at St. Helena Annex of the Norfolk Naval Shipyard, on the eastern shore of Southern Branch of Elizabeth River, at latitude 36°49′43″, longitude 76°17′26.5″; thence in a southwesterly direction to a point on the eastern boundary of Norfolk Harbor 40-foot channel at latitude 36°49′42″, longitude 76°17′33″; thence in a southerly direction along the eastern boundary of Norfolk Harbor 40-foot channel to latitude 36°49′28″, longitude 76°17′27″; thence easterly to the shore at latitude 36°49′28″, longitude 76°17′22″; and thence, northerly along the shore to the point of beginning.

(2) Norfolk Naval Shipyard Area. Beginning at a point on the shore at the northeast corner of the Norfolk Naval Shipyard, at latitude 36°49′43.5″, longitude 76°17′41.5″; thence due east approximately 100 feet to the western boundary of Elizabeth River channel; thence in a southerly direction along the western boundary of the channel to the point where it passes through the draw of the Norfolk and Portsmouth Belt Line Railroad bridge, thence in a southwesterly direction along the northerly side of the bridge to the western shore of Southern Branch of Elizabeth River; and thence along the shore in a northerly direction to the point of beginning.

(3) Southgate Terminal Area. Beginning at a point at the northeast corner of Southgate Terminal Annex of Norfolk Naval Shipyard, at latitude 36°48′23″, longitude 76°17′39″; thence east to latitude 36°48′23″, longitude 76°17′29″; thence

southerly along the western boundary of Norfolk Harbor 35-foot channel to latitude 36°48′04″, longitude 76°17′33″; thence west to latitude 36°48′04″, longitude 76°17′41″; and thence along the shore in a northerly direction to the point of beginning.

(b) The regulations. (1) No vessels other than Naval vessels and other vessels authorized to move to and from piers at the Norfolk Naval Shipyard and its two annexes described in paragraph (a) (1) and (3) of this section, and no person other than persons embarked in such vessels, shall enter the restricted areas.

(2) This section shall be enforced by the Commander, Norfolk Naval Shipyard, Portsmouth, Va., and such agencies as he may designate.

§207.154 Southern Branch of Elizabeth River; speed. In that part of the Southern Branch of Elizabeth River between the junction of the Southern and Eastern Branches of the Elizabeth River and the Norfolk and Portsmouth Belt Line Railroad Bridge, no vessel shall move at a speed exceeding six knots.

§207.155 Hampton Roads and Willoughby Bay off Norfolk Naval Base; Navy restricted areas. (a) The areas. (1) Beginning at a point on the shore at the Destroyer Submarine Piers at latitude 36°56′00″, longitude 76°19′30″; thence westerly to latitude 36°55′59″, longitude 76°20′08.5″; thence northerly along the eastern limit of Norfolk Harbor Channel to latitude 36°56′17.5″, longitude 76°20′07″; and thence easterly to a point on shore at latitude 36°56′19″, longitude 76°19′46.5″.

(2) Beginning at a point on the Naval Station shore at latitude 36°56′37.5″, longitude 76°19′44″; thence westerly and northerly along the breakwater to its extremity at latitude 36°56′41.5″, longitude 76°19′54″; thence westerly to a point on the eastern limit of Norfolk Harbor Channel at latitude 36°56′41.5″, longitude 76°20′05.5″, thence northerly along the eastern limit of Norfolk Harbor Channel to latitude 36°57′52″; longitude 76°20′00″, thence easterly to latitude 36°57′52″, longitude 76°19′35″; thence to latitude 36°57′47.7″, longitude 76°18′57″; thence southeasterly to latitude 36°57′26″, longitude 76°18′42″; thence easterly to latitude 36°57′26.2″, longitude 76°17′55.2″; thence southerly to latitude 36°57′05″; longitude 76°17′52″; thence southeasterly to latitude 36°56′56.2″; longitude 76°17′27″; thence northeasterly to latitude 36°57′10″, longitude 76°16′29″; and thence to the shoreline at latitude 36°57′18.8″, longitude 76°16′22″ at the Naval Air Station.

(b) The regulations. (1) No vessels other than Naval vessels and other vessels authorized to move to and from piers at the Norfolk Naval Base, and no person other than persons embarked in such vessels, shall enter the restricted areas.

(2) This section shall be enforced by the Commandant, Fifth Naval District, and such agencies as he may designate.

§207.157 Chesapeake Bay, Lynnhaven Roads; Navy amphibious training area. (a) The restricted area. Beginning at latitude 36°55′47″, longitude 76°11′04.5″; thence to latitude 36°59′04″, longitude 76°10′11″; thence to latitude 36°58′28.5″, longitude 76°07′54″; thence to latitude 36°55′27.5″, longitude 76°08′42″; thence westerly along the shore and across the mouth of Little Creek to the point of beginning.

(b) The regulations. (1) No fishpound stakes or structures shall be allowed in the restricted area.

(2) No vessel shall approach within 300 yards of any naval vessel or within 600 yards of any vessel displaying the red "baker" burgee.

(3) This section shall be enforced by the Commandant, Fifth Naval District, and such agencies as he may designate.

§207.157a Little Creek, Va.; speed. No vessel shall proceed at a speed exceeding five knots in that part of Fishermans Cove (Northwest Branch of Little Creek) between the highway bridge on U.S. Route 60 and the mouth of the Cove.

§207.158 Chesapeake Bay entrance; naval restricted area. (a) The area. Beginning at a point on the south shore of Chesapeake Bay at longitude 76°03′06″; thence to latitude 37°01′18″, longitude 76°02′06″; thence to latitude 37°00′18″, longitude 75°55′54″; thence to latitude 36°58′00″, longitude 75°48′24″; thence to latitude 36°51′48″, longitude 75°51′00″; thence to the shore at longitude 75°58′48″, and thence northwesterly and southwesterly along the shore at Cape Henry to the point of beginning.

(b) The regulations. (1) Anchoring, trawling, crabbing, fishing, and dragging in the area are prohibited, and no object attached to a vessel or otherwise shall be placed on or near the bottom.

(2) This section shall be enforced by the Commandant, Fifth Naval District, Norfolk, Va.

§207.900 Restricted areas in vicinity of Maritime Administration Reserve Fleets. (a) The regulations in this section shall govern the use and navigation of waters in the vicinity of the following National Defense Reserve Fleets of the Maritime Administration, Department of Commerce:

(1) Hudson River Reserve Fleet, Jones Point, New York.

(2) James River Reserve Fleet, Fort Eustis, Virginia.

(3) [Reserved]

(4) Mobile Reserve Fleet, Tensaw River near Bay Minette, Alabama.

(5) Beaumont Reserve Fleet, Neches River near Beaumont, Texas.

(6) Suisun Bay Reserve Fleet near Benicia, California.

(7) [Reserved]

(8) Olympia Reserve Fleet, Budd Inlet at Olympia, Washington.

(b) No vessels or other watercraft, except those owned or controlled by the United States Govern-

ment, shall cruise or anchor between Reserve Fleet units, within 500 feet of the end vessels in each Reserve Fleet unit, or within 500 feet of the extreme units of the fleets, unless specific permission to do so has first been granted in each case by the enforcing agency.

(c) The regulations in this section shall be enforced by the respective Fleet Superintendents and such agencies as they may designate.

3. SANDY HOOK TO CAPE HENRY

Between New York Bay and Delaware Bay is the New Jersey coast with its many resorts, its inlets, and its Intracoastal Waterway. Delaware Bay is the approach to Wilmington, Chester, Philadelphia, Camden, and Trenton; below Wilmington is the Delaware River entrance to the Chesapeake and Delaware Canal, the deep inside link between Chesapeake and Delaware Bays. The Delaware-Maryland-Virginia coast has relatively few resorts; the numerous inlets are backed by a shallow inside passage that extends all the way from Delaware Bay to Chesapeake Bay. The last seven chapters, nearly half of this book, are required to describe Chesapeake Bay to Norfolk and Newport News, to Washington and Baltimore, and to Susquehanna River 170 miles north of the Virginia Capes.

A vessel approaching this coast from seaward will be made aware of its nearness by the number of vessels passing up and down in the coastal trade. The coast of New Jersey is studded with large hotels, prominent standpipes, and elevated tanks. South of Delaware Bay, the principal landmarks are the lighthouses and Coast Guard stations.

The general tendency along this mostly sandy coast is for the ocean beaches and the points on the north sides of the entrances to wash away and for the points on the south sides of the entrances to build out. Protective works have done much to stabilize the New Jersey coast, but several lighthouses have been abondoned between Delaware Bay and Chesapeake Bay because of erosion.

The shores of Delaware Bay and Delaware River are mostly low and have few conspicuous marks, other than lights, below the industrial centers along the river. The shores of Chesapeake Bay are low as far north as Patuxent River, then rise to considerable heights at the head of the bay.

Aids to navigation.—Lights are numerous along the section of the coast covered by this Coast Pilot. The Five Fathom Bank Lightship, off the entrance to Delaware Bay, is the only remaining lightship along this section of the coast. Radiobeacons and fog signals are at most of the principal light stations and at the lightship. Marker radiobeacons, low-powered and for local use only, are at the entrances to many of the inlets. Many coastal and harbor buoys are equipped with radar reflectors, which greatly increase the range at which the buoys may be detected on the radarscope. The critical dangers are marked.

Loran-A and **Loran-C** stations provide the mariner with good navigation coverage along this section of the coast.

Radar, though always a valuable navigational aid, is generally of less assistance in navigation along this coast due to the relatively low relief; the accuracy of radar ranges to the beach cannot be relied upon. Coastal buoys equipped with radar reflectors are of help in this regard. It is sometimes possible to obtain a useable radar return from the larger lighthouses, but positive target identification is usually difficult. Radar is of particular importance in detecting other traffic and in the prevention of collisions during periods of inclement weather, and in fog and low visibility.

Boundary lines of inland waters.—At all buoyed entrances from seaward to bays, sounds, rivers, or other estuaries for which specific lines are not described, **Inland Pilot Rules** apply shoreward of the outermost buoy or other aid to navigation of any system of aids; **International Pilot Rules** apply outside the aids. Specific lines are described in **Part 82,** Chapter 2.

Control over movement of vessels.—See **Part 124**, Chapter 2, for regulations requiring advance notice of vessel's time of arrival to Captain of the Port.

Harbor and inlet entrances.—The channels into Delaware and Chesapeake Bays are broad and deep. The entrances to the inlets are comparatively shallow and are more or less obstructed by shifting sandbars. Some of the inlets have been inproved by dredging and by the construction of jetties. On many of the bars the buoys are moved from time to time to mark the shifting channels. The best time to enter most of the inlets is on a rising tide with a smooth sea. Strangers should not attempt to enter the inlets without assistance when the seas are breaking on the bars. The tidal currents have considerable velocity in all of the entrances, and their direction is affected by the force and direction of the wind.

Traffic Separation Schemes (Traffic Lanes) have been established at the entrances to Delaware Bay and Chesapeake Bay, and in the main channel of Chesapeake Bay off Smith Point just south of the entrance to the Potomac River; see Chapters 6, 9, and 12, respectively, for details.

Anchorages.—The only protected anchorage for deepdraft vessels between New York Bay and Chesapeake Bay is outside the channel limits in Delaware Bay according to draft. Absecon Inlet, Cape May Inlet, and some of the others can accommodate light-draft vessels such as trawlers and small yachts, but not medium or deep drafts. Small local craft often seek shelter inside the shallower inlets, but entrance is difficult in heavy weather, and the unimproved inlets are often difficult even in good weather, particularly for strangers.

A number of anchorage areas have been established by Federal Regulations within the area of this Coast Pilot; limits and regulations are given in **Part 110**, Chapter 2.

Dangers.—The principal dangers along this coast are the outlying sand shoals, the fogs, and the doubtful direction and velocity of the currents after heavy gales. Depths of 7 fathoms are found as far as 13 miles from shore. There are many wrecks along this coast, but most of them have been blasted off or cleared to safe navigational depths; the others are marked by obstruction buoys.

Gales from northeast to southeast cause heavy breakers on the beaches and outlying shoals; the sea breaks in 4 to 5 fathoms of water, and shoals of that depth or less usually are marked during easterly gales. The bars across the inlets are then impassable and are defined by breakers even in comparatively smooth water with a light swell. The heaviest surf on the beach is on a rising tide near high water springs; the least surf is encountered on a falling tide near low water. A very heavy surf makes on the beaches after a southeasterly gale followed by a sudden shift of wind to northwest.

Danger zones have been established within the area of this Coast Pilot; see **Part 204,** Chapter 2, for limits and regulations.

Fishweirs are numerous along the outside coast and in Chesapeake Bay and tributaries. The stakes often become broken off and form a hazard to navigation, especially at night. Regulations limiting the areas within which fishweirs may be established have been prescribed by the Chief of Engineers, U.S. Army. The areas within which fishweirs are permitted are shown on charts of 1: 80,000 scale and larger. The exact locations of the weirs within the designated areas are not shown.

Along the outer coasts the limits of fishweir areas are not marked. In Chesapeake Bay and tributaries, black and white horizontal-banded buoys mark the turns of the limits. Strangers should proceed with caution when crossing areas of possible fishweirs, and should avoid crossing such areas at night.

Drawbridges.—Within the area of this Coast Pilot, the general and/or special regulations and the opening signals for drawbridges are given in **117.215 to 117.349,** Chapter 2. Where these regulations apply, references to them are made in the Coast Pilot under the name of the bridge or the waterway over which the bridge crosses. The special regulations, which are prescribed for a number of specific bridges, allow certain drawbridges to be unattended during specified times and dates. Such bridges may not be required to open at all or may open only during specified periods, and normally a specified minimum advance notice must be given to the authorized representative of the bridge owner to have the bridge opened; the exact procedure for contacting this representative must generally be posted on signs at the bridge. Additional information of a very general nature and which applies to all drawbridges is given in **117.1 and 117.1a**, Chapter 2.

Routes.—Deep-draft vessels should stay outside of Barnegat Lighted Horn Buoy B and Five Fathom Bank Lightship between New York Harbor and Delaware Bay, and outside Delaware Lighted Horn Buoy D, Jack Spot Lighted Whistle Buoy 2JS (38°05.3'N., 74°45.1'W.), and Chesapeake Light between Delaware Bay and Chesapeake Bay. Traffic is heavy along this coast and a sharp lookout must be kept to avoid collision. Vessels should approach Delaware Bay and Chesapeake Bay through the Traffic Separation Schemes that have been established off the entrances to these bays.

INSIDE NAVIGATION.—Navigation on the waterways coverd by this volume requires a knowledge of the channel conditions and other factors restricting navigation. General items of interest to the vessel operator are indicated in the paragraphs that follow; details are given in the text.

Federal regulations.—See **207.100**, Chapter 7, for the regulations governing the use, administration and navigation of the Chesapeake and Delaware Canal.

Bends and curves.—In the New Jersey Intracoastal Waterway and adjoining waterways there are many sharp bends which are dangerous to vessels meeting or passing. On approaching a bend a vessel should reduce speed sufficiently to be able to stop within half the distance to a ship coming from the opposite direction. Under no circumstances should a vessel attempt to overtake and pass another at a bend. Even with sufficient view of the channel ahead and after proper exchange and understanding of signals, the overtaken vessel may suddenly sheer from current action. This is even more pronounced with larger vessels and tows.

Cross currents.—Where two streams cross, the current will have a greater velocity in the deeper channel. This is noticeable along the New Jersey Intracoastal Waterway where it follows a dredged canal cutting across a winding stream. Cross currents will also be noticed where either an inlet from the ocean or a drainage canal enter the waterway.

Cross currents are especially strong at Beach Haven Inlet, Absecon Inlet, Townsend Inlet, and Tuckerton Creek. Failure to allow for cross currents when passing these and other inlets has resulted in many rescue calls to the Coast Guard.

Stumps and sunken logs.—Reports are frequently made that vessels have struck shoals or rocks in rivers which have later proved to be stumps or sunken logs. Mariners are warned against navigating too close to the banks of streams where sub-

merged stumps are known or may be expected to exist.

Hurricane moorings.—On receiving an advisory notice of a tropical disturbance, small boats should seek shelter in a small winding stream whose banks are lined with trees, preferably trees with deep roots. Moor with bow and stern lines fastened to the lower branches; if possible snug up with good chafing gear. The knees of the trees will act as fenders and the branches, having more give than the trunks, will ease the shocks of the heavy gusts. If the banks are lined only with small trees or large shrubs, use clumps of them within each hawser loop. Keep clear of any tall pines or other shallow-rooted trees, since they generally are more apt to be blown down.

Tides.—The mean range of tide is 3.5 to 4.5 feet along the coast. In passages away from the inlets, the range may be as little as 0.5 foot. In Delaware River the mean range reaches 6.8 feet at Trenton, while in Chesapeake Bay the mean range is only 1.1 feet at Baltimore.

Currents.—Rotary currents and Gulf Stream currents could be discussed at considerable length, but the important currents are those in the inlets and the inside passages; the tidal currents have considerable velocity in all of the entrances, and their direction is affected by the force and direction of the wind.

Ice.—The intracoastal passages of New Jersey, Delaware, and Maryland usually are closed by ice during ordinary winters; the Virginia passages are closed only during severe winters and then only for short periods. Local vessels use all the inlets and adjacent channels from Sandy Hook to Cape Charles all winter, even when through navigation is blocked.

In Delaware River, ice is present in sufficient amounts even in ordinary winters to be of some concern. The Chesapeake and Delaware Canal is kept open as long as possible but may be closed at times. In severe winters, navigation has been interrupted above Chester but ice breakers and large vessels keep the channels open to Philadelphia. Above Philadelphia, the river may be closed for extended periods in January and February, and navigation is practically suspended during severe winters.

Ice seldom interferes with navigation of full-powered vessels in Hampton Roads even in severe winters. Large vessels can always pass up and down Chesapeake Bay, but ice jams are of frequent occurrence off Baltimore Harbor, and the harbor itself freezes over; ice breakers attempt to keep the channels open but navigation is sometimes blocked for limited periods.

Conditions in other Chesapeake Bay tributaries are somewhat similar to those in the same latitudes along the coast. Ice is not much of a problem in the southerly tributaries. The upper part of Potomac River is closed during severe winters, and Patuxent River is closed nearly to the mouth. Severn River, strangely enough, is said to remain open except for short periods in severe winters. Susquehanna River, at the head of the bay, usually is completely closed for about three months. Ice conditions in the Eastern Shore tributaries correspond roughly to those across the bay.

During some winter months or when threatened by icing conditions, lighted buoys may be removed from station or replaced by unlighted buoys; unlighted buoys, daybeacons, and lights on marine sites also may be removed; see LIGHT LIST.

WEATHER.—The Appendix includes climatological tables for coastal localities, a table of fog signal operations, and meteorological tables for two coastal ocean areas covered in this volume. The meteorological tables were compiled from observations made by ships in passage. Also listed are National Weather Service offices and radio stations which transmit weather information.

Storm warning display locations are listed on the NOS charts and shown on the Marine Weather Services Charts published annually by the National Weather Service. The Marine Weather Services Charts, which contain additional important information, are available for 15 cents a copy from the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402.

General.—The area covered in this Coast Pilot is generally low and flat. Long stretches of sandy beaches and tidewater marshes characterize the New Jersey, Delaware, and Maryland ocean coasts. The eastern shore of Chesapeake Bay consists of low, flat, almost featureless plains, with numerous irregularities and small islands. The western shore is a gently rolling upland. Tidewater Virginia encompasses numerous flat peninsulas, wide estuaries, and many swamps. Topography farther inland rises in an irregular pattern of progressively higher northeast-southwest mountain ranges to the main Appalachian Mountains. Although some distance from the ocean, this mountain barrier exerts an important influence on the winter climatic pattern in the coastal area; it partly blocks the cold continental air from the interior, and this combines with the moderating effect of the ocean to produce a more equable climate than is found in continental locations in the same latitude elsewhere.

The general surface wind pattern along the Atlantic coast is controlled largely by the position and intensity of the Bermuda-Azores high-pressure system. The characteristics and location of this extensive High vary considerably during the year. In the winter, it usually is centered far to the southeast. The major low-pressure storm systems, which develop over the interior, the Gulf of Mexico, and off the southeastern coast, may sweep through the Middle Atlantic States. These ex-

tratropical cyclones usually travel between north and east-northeast, and many are intense and severe, accompanied by strong gusty winds and rain or snow.

Highs from the interior usually follow the passage of these Lows, producing a pattern of rapidly changing air masses and variable winter weather conditions. There are marked temperature fluctuations and an alternation of brief stormy periods with clear crisp days and relatively mild weather.

In the spring, the Bermuda-Azores High, although still centered far to the southeast, begins to affect the southeastern States. The Middle Atlantic area usually is located outside the high-pressure circulation, however, and is still subject to the passage of extratropical cyclones, frontal activity and changing air masses. Warm spells, sometimes with abundant rain, alternate with cool, dry weather.

In the summer, the Bermuda-Azores High reaches its most northerly and westerly position, embracing the entire eastern seaboard within its circulation. The strength of this circulation is moderate but persistent, sufficiently so to hold back the eastward movement of the continental low-pressure system. As a consequence, the daily weather along the coast may not change much for several weeks at a time; it is controlled by the southerly and southwesterly winds bringing moist, warm air from the Gulf. This weather is characterized by frequent instability showers and thunderstorms, uniformally warm temperatures and high humidity, and relatively low wind speeds. However, the summer months also include the beginning of the hurricane season.

In the autumn, the Bermuda-Azores High again shifts southward and eastward, leaving the Atlantic coast in a weak continental high-pressure area. This gradually gives way to the winter weather pattern, bringing increased frontal activity and more frequent passage of cyclones and anticyclones.

Pressure.—The pressure pattern changes considerably from summer to winter. At individual stations along the coast, however, the differences of mean annual pressure are quite small. The highest monthly mean pressure occurs during the winter and the lowest in late spring and early summer. Large short-term variations of pressure are occasionally experienced during tropical cyclones in the late summer and autumn, and during the movement of extratropical cyclones and anticyclones in the winter and spring. The day-to-day changes of pressure in summer are less marked, and average lower than in winter.

Winds.—Prevailing winds at most stations are from northwest during the cooler months, October through March, and from the southwest, May through September. The average wind speeds during the warmer months are generally lower than during the colder seasons, because of the absence of extratropical cyclones. Highest average speeds occur in March and lowest in August.

In the winter, the winds over the open ocean are slightly stronger than those over land. Little difference is apparent in summer. In the warmer season, a daily shift in wind direction occurs when the region is not under the influence of cyclonic storms. During the warmer part of the day winds blow onshore, and during the cooler part, offshore. This land-sea breeze seldom penetrates more than a few miles inland.

Gales (force 8 or higher) are reported in about 6 percent of ships' observations in winter. Gales are generally from the westerly quadrants. Summer gales are rare, but may be encountered during tropical cyclones or local thunderstorms.

Temperatures.—Along the Middle Atlantic Coast temperatures are generally moderate. Mean annual temperatures range from 53.5° F. at Philadelphia to 59.7° F. at Norflok. The lowest mean monthly temperature is 32.3° F. at Philadelphia in January; the highest, 78.8° F. at Norfolk in July. January is the coldest month and July the warmest. Over the open water areas, January mean air temperatures may be several degrees warmer than at coastal points, and in July they may be a few degrees cooler. Over land surfaces, the air warms and cools readily, but over water it does so slowly and relatively little. Land surfaces absorb heat in only a thin surface layer and give it up freely, while water absorbs heat to substantial depths and retains it longer.

The daily temperature range averages from 10° to 20° F. throughout the year, and is generally much less over the water. Readings in the coastal areas rarely exceed 100° F. and the 90° level is reached on only one-third to one-half of the days during summer. Freezing temperatures are probable on one-half or more of the days from November through March, except from Maryland southward where the average is about one in three. Below-zero readings have been recorded during December, January, and February at most stations, except Norfolk where no reading below 2° F. has ever been observed.

Sea-surface temperatures are warmer than air temperatures most of the time, ranging from 4° to 7° F. warmer in winter to about the same temperature in the spring.

Relative humidity.—Throughout the year the relative humidity is high, averaging from 64 to 90 percent at 7 a.m. and from 46 to 62 percent at 7 p.m. Humidities usually are higher with onshore winds (blowing from sea toward land) and lower with offshore winds (blowing from land toward sea).

Cloudiness and precipitation.—At sea in winter, overcast conditions (cloud amount 0.8 or more) are recorded in 45 to 50 percent of observations, while clear conditions (0.2 or less) are recorded in about 30 percent. In summer, some 30 to 35 percent of

observations show overcast and an equal percent, clear skies. The least cloudiness occurs when the air is dominated by the Bermuda-Azores High in late summer and early autumn, and the greatest cloudiness during the frequent winter cyclones. In the coastal area, from one-third to one-half the days are overcast in winter, and 25 to 35 percent in summer.

Precipitation over the coastal sections is moderately heavy and well distributed. Normal monthly totals vary from minima of about 2.5 to 3.0 inches in February or October to maxima of 4.5 to 6.0 inches in August. Annual totals range between 41 and 45 inches. Summer thunderstorms are most frequent over land and near coastal waters in the afternoon; at night they are more frequent over open water. Thunderstorm rainfall is less intense over the ocean, but can severley restrict visibility. Snow may be expected from November through March, maximum fall being in January and February. Snow usually does not remain on the ground for extended periods. On rare occasions, freezing rain, or glaze, is encountered; if prolonged, it can cause damage to rigging. Snow at sea is little more than a severe restriction to visibility.

Visibility.—Although generally good along these coastal States, visibility at any time can be hampered by smoke, haze, fog, and precipitation. The frequency of days with visibility less than 500 yards is 4 to 12 percent annually, mostly during the winter. Over the ocean areas, the percentage frequency of days with visibility less than 5 miles ranges from 5 to 15 percent in the southerly sections to around 20 to 30 percent in the northerly. Advection sea fog occasionally drifts onshore in the warmer months, burning off from the surface and usually lifting by afternoon. This process is reversed over the water area where fog usually dissipates from the top downward. Very shallow steam fog is sometimes experienced in the winter. This fog type, which occurs only in very cold weather when the air is much colder than the water, may hide the hull of a ship while leaving the masts and upper rigging plainly visible.

Fog is more likely to form with light to moderate winds. The most frequent wind forces accompanying heavy sea fog are 2 to 4. Fog rarely forms or persists with gale force winds.

Tropical cyclones.—A tropical cyclone is a warm core, low pressure system that develops over the warm waters of the tropical oceans, and exhibits a rotary, counterclockwise circulation in the northern hemisphere (clockwise in the southern hemisphere). Although relatively small in area coverage, this storm can attain awesome strength, with winds near its center reaching 175 knots or more. Tropical cyclones occur almost entirely in six rather distinct regions of the world; one of these, the **North Atlantic Region** (West Indies, Caribbean Sea, Gulf of Mexico, and waters off the east coast of the U.S.), includes the area covered by this Coast Pilot. In this region, tropical cyclones with winds of 34—63 knots are called **tropical storms**, while tropical cyclones with winds greater than 63 knots are called **hurricanes.** Hurricanes are infrequent in comparison with middle-and high-latitude storms, but they have a record of destruction far exceeding that of any other type of storm. Because of their fury, and the fact that they are predominately oceanic, they merit the special attention of all mariners, whether professional or amateur.

Rarely does the mariner who has experienced a fully developed tropical cyclone (hurricane) at sea wish to encounter a second one. He has learned the wisdom of avoiding them if possible. The uninitiated may be misled by the deceptively small size of a tropical cyclone as it appears on a weather map, and by the fine weather experienced only a few hundred miles from the reported center of such a storm. The rapidity with which the weather can deteriorate with approach of the storm, and the violence of the hurricane, are difficult to visualize if they have not been experienced.

As a tropical cyclone moves out of the tropics to higher latitudes, it normally loses energy slowly, expanding in area until it gradually dissipates or acquires the characteristics of extratropical cyclones. At any stage, a tropical cyclone normally loses energy at a much faster rate if it moves over land. As a general rule, tropical cyclones of the North Atlantic Region move with the prevailing winds of the area. In small hurricanes the diameter of the area of destructive winds may not exceed 25 miles while in some of the greatest storms the diameter may be as much as 400 to 500 miles.

At the center is a comparative calm known as the "eye of the storm". The diameter of this "eye" varies with individual storms and may be as little as 7 miles but is rarely more than 30 miles. The average is 15 to 20 miles. This center is the region of low atmospheric pressure around which winds blow in a more or less circular course, spiraling inward in a counterclockwise direction. Winds at the outer edge of the storm area are light to moderate and gusty, and often increase toward the center to speeds too high for instrument recording. Although the air movement near the center of the hurricane is usually light and fitful, the seas in this area are in most cases very heavy and confused, rendered so by the violent shifting winds which surround it. Furthermore, after the center has passed a vessel, she may expect a sharp renewal of the gales, with winds from a more or less opposite direction. The hurricane may effect an area covering tens of thousands of square miles.

In the North Atlantic, tropical cyclones form over a wide range of ocean between the Cape Verde Islands and the Windward Island, over the

western part of the Caribbean Sea, and the Gulf of Mexico. While some may initially move northward, expecially those that form southeast of Bermuda, the majority take a westerly to northwesterly course. Of these, some curve gradually northward, either east of or above the larger islands of the West Indies, then turn northeastward or eastward for varying distances from the Atlantic Coast of the United States. Others pass over or to the south of the larger islands and enter the Gulf of Mexico, then curve northward or northeastward and strike some part of the east Gulf Coast. Others may continue westward and strike the west Gulf Coast.

The most common path is curved, the storms moving generally in a westward direction at first, turning later to the northwestward and finally to the northeastward. A considerable number, however, remain in low latitudes and do not turn appreciably to the northward. Freak movements are not uncommon, and there have been storms that described loops, hairpin-curved paths, and other irregular patterns. Movement toward the southeast is rare, and in any case of short duration. The entire Caribbean area, the Gulf of Mexico, the coastal regions bordering these bodies of water, and the Atlantic Coast are subject to these storms during the hurricane season.

Hurricanes develop over the southern portions of the North Atlantic, including the Gulf of Mexico, and Caribbean Sea, **mostly from June through October, infrequently in May and November, and rarely in other months**; the hurricane season reaches its peak in September. An average of nine tropical cyclones form each year (reaching at least tropical storm intensity) and five of these reach hurricane strength. June and July storms tend to develop in the northwestern Caribbean or Gulf of Mexico while during August there is an increase in number and intensity, and the area of formation extends east of the Lesser Antilles. September storms develop between 50° W and the Lesser Antilles; in the southern Gulf of Mexico, the western Caribbean, near the Bahamas, and around the Cape Verde Islands. Formation in October shifts primarily to the western Caribbean and off-season storms are widespread with a slight concentration in the southwestern Caribbean.

The average speed of movement of tropical cyclones in the tropics is about 10 to 15 knots. This speed, however, varies considerably according to the location of the storm, its development, and attendant meteorological conditions. The highest rates of progression usually occur when the storm is moving northward or northeastward in the middle or higher latitudes.

Locating and tracking tropical cyclones.—By means of radio, the National Weather Service collects weather observations daily from land stations, ships at sea, and aircraft. When a tropical cyclone is located, usually in its early formative stage, it is followed closely. In the North Atlantic, U.S. Navy, Air Force, and NOAA aircraft make frequent flights to the vicinity of such storms to provide information needed for tracking the tropical cyclone and determining its intensity. Long-range shore radar stations follow the movement of the storm's precipitation area when it is in range. Bulletins are broadcast to ships several times daily, giving information on each storm's location, intensity, and movement. As a further aid, the mariner may obtain weather reports by radio directly from other ships in the vicinity of a tropical cyclone.

Signs of approach.—Although radio reports normally prove adequate for locating and avoiding a tropical cyclone, knowledge of the appearance of the sea and sky in the vicinity of such a storm is useful to the mariner. The passage of a hurricane at sea is an experience not soon to be forgotten.

An early indication of the approach of such a storm is the presence of a long swell. In the absence of a tropical cyclone, the crests of swell in the deep waters of the Atlantic pass at the rate of perhaps eight per minute. Swell generated by a tropical cyclone is about twice as long, the crests passing at the rate of perhaps four per minute. Swell may be observed several days before arrival of the storm.

When the storm center is 500 to 1,000 miles away, the barometer usually rises a little, and the skies are relatively clear. Cumulus clouds, if present at all, are few in number and their vertical development appears suppressed. The barometer usually appears restless, pumping up and down a few hundredths of an inch.

As the tropical cyclone comes nearer, a cloud sequence begins which resembles that associated with the approach of a warm front in middle latitudes. Snow-white, fibrous "mare's tails" (cirrus) appear when the storm is about 300 to 600 miles away. Usually these seem to converge, more or less, in the direction from which the storm is approaching. This convergence is particularly apparent at about the time of sunrise and sunset.

Shortly after the cirrus appears, but sometimes before, the barometer starts a long, slow fall. At first the fall is so gradual that it only appears to alter somewhat the normal daily cycle (two maxima and two minima in the tropics). As the rate of fall increases, the daily pattern is completely lost in the more or less steady fall.

The cirrus becomes more confused and tangled, and then gradually gives way to a continuous veil of cirrostratus. Below this veil, altostratus forms, and then stratocumulus. These clouds gradually become more dense, and as they do so, the weather becomes unsettled. A fine, mist-like rain begins to fall, interrupted from time to time by showers. The barometer has fallen perhaps a tenth of an inch.

As the fall becomes more rapid, the wind increases in gustiness, and its speed becomes greater, reaching a value of perhaps 22 to 40 knots (Beaufort 6-8). On the horizon appears a dark wall of heavy cumulonimbus, the **bar** of the storm. Portions of this heavy cloud become detached from time to time and drift across the sky, accompanied by rain squalls and wind of increasing speed. Between squalls, the cirrostratus can be seen through breaks in the stratocumulus.

As the bar approaches, the barometer falls more rapidly and wind speed increases. The seas, which have been gradually mounting, become tempestuous squall lines, one after the other, sweep past in ever increasing number and intensity.

With the arrival of the bar, the day becomes very dark, squalls become virtually continuous and the barometer falls precipitously, with a rapid increase in the wind speed. The center may still be 100 to 200 miles away in a hurricane. As the center of the storm comes closer, the ever-stronger wind shrieks through the rigging and about the superstructure of the vessel. As the center approaches, rain falls in torrents. The wind fury increases. The seas become mountainous. The tops of huge waves are blown off to mingle with the rain and fill the air with water. Objects at a short distance are not visible. Even the largest and most seaworthy vessels become virtually unmanageable, and may sustain heavy damage. Less sturdy vessels do not survive. Navigation virtually stops as safety of the vessel becomes the prime consideration. The awesome fury of this condition can only be experienced. Words are inadequate to describe it.

If the eye of the storm passes over the vessel, the winds suddenly drop to a breeze as the wall of the eye passes. The rain stops, and skies clear sufficiently to permit the sun to shine through holes in the comparatively thin cloud cover. Visibility improves. Mountainous seas approach from all sides, apparently in complete confusion. The barometer reaches its lowest point, which may be an inch and a half or two inches below normal in hurricanes. As the wall on the opposite side of the eye arrives, the full fury of the wind strikes as suddenly as it ceased, but from the opposite direction. The sequence of conditions that occurred during approach of the storm is reversed, and pass more quickly, as the various parts of the storm are not as wide in the rear of a storm as on its forward side.

Locating the center of a tropical cyclone. — If intelligent action is to be taken to avoid the full fury of a tropical cyclone, early determination of its location and direction of travel relative to the vessel is essential. The bulletins and forecasts are an excellent general guide, but they are not infallible and may be sufficiently in error to induce a mariner in a critical position to alter course so as to unwittingly increase the danger of the vessel. Often it is possible, using only those observations made aboard ship, to obtain a sufficiently close approximation to enable the vessel to maneuver to the best advantage.

As previously stated, the presence of an exceptionally long swell is usually the first visible indication of the existence of a tropical cyclone. In deep water it approaches from the general direction of origin (the position of the storm center when the swell was generated). However, in shoaling water this is a less reliable indication because the direction is changed by refraction, the crests being more nearly parallel to the bottom contours.

When the cirrus clouds appear, their point of convergence provides an indication of the direction of the storm center. If the storm is to pass well to one side of the observer, the point of convergence shifts slowly in the direction of storm movement. If the storm center will pass near the observer, this point remains steady. When the bar becomes visible, it appears to rest upon the horizon for several hours. The darkest part of this cloud is in the direction of the storm center. If the storm is to pass to one side, the bar appears to drift slowly along the horizon. If the storm is heading directly toward the observer, the position of the bar remains fixed. Once within the area of the dense, low clouds, one should observe their direction of movement, which is almost exactly along the isobars, with the center of the storm being 90° from the direction of cloud movement (left of direction of movement in the northern hemisphere).

The winds are probably the best guide to the direction of the center of a tropical cyclone. The circulation is cyclonic, but because of the steep pressure gradient near the center, the winds there blow with greater violence and are more nearly circular than in extratropical cyclones.

According to Buys Ballot's law, an observer who faces into the wind has the center of the low pressure on his right (northern hemisphere) and somewhat behind him. If the wind followed circular isobars exactly, the center would be exactly eight points, or 90°, from dead ahead when facing into the wind. However, the track of the wind is usually inclined somewhat toward the center, so that the angle dead ahead varies between perhaps 8 and 12 points (90° to 135°). The inclination varies in different parts of the same storm. It is least in front of the storm, and greatest in the rear, since the actual wind is the vector sum of that due to the pressure gradient and the motion of the storm along the track. A good average is perhaps ten points in front, and 11 or 12 points in the rear. These values apply when the storm center is still several hundred miles away. Closer to the center, the wind blows more nearly along the isobars, the inclination being reduced by one or two points at the wall of the eye. Since wind direction usually shifts temporarily during a squall, its direction at

this time should not be used for determining the position of the center.

When the center is within radar range, it might be located by this equipment. However, since the radar return is predominately from the rain, results can be deceptive, and other indications should not be neglected.

Distance from the storm center is more difficult to determine than direction. Radar is perhaps the best guide. The rate of fall of the barometer is of some help; this is only a rough indication, however, for the rate of fall may be quite erratic and will vary somewhat with the depth of the low at the center, the speed of the storm center along its track, and the stage in the life cycle of the storm.

Manuevering to avoid the storm center.—The safest procedure with respect to tropical cyclones is to avoid them. If action is taken sufficiently early, this is simply a matter of setting a course that will take the vessel well to one side of the probable track of the storm, and then continuing to plot the position of the storm center, as given in the weather bulletins, revising the course as needed.

However, such action is not always possible. If one finds himself within the storm area, the proper action to take depends in part upon his position relative to the storm center and its direction of travel. It is customary to divide the circular area of the storm into two parts. In the northern hemisphere, that part to the **right** of the storm track (facing in the direction toward which the storm is moving) is called the **dangerous semicircle.** It is considered dangerous because (1) the actual wind **speed** is greater than that due to the pressure gradient alone, since it is augmented by the forward motion of the storm, and (2) the **direction** of the wind and sea is such as to carry a vessel into the path of the storm (in the forward part of the semicircle). The part to the **left** of the storm track is called the **navigable semicircle.** In this part, the wind is decreased by the forward motion of the storm, and the wind blows vessels away from the storm track (in the forward part). Because of the greater wind speed in the dangerous semicircle, the seas are higher here than in the navigable semicircle.

A plot of successive positions of the storm center should indicate the semicircle in which a vessel is located. However, if this is based upon weather bulletins, it is not a reliable guide because of the lag between the observations upon which the bulletin is based and the time of reception of the bulletin, with the ever present possibility of a change in the direction of motion of the storm. The use of radar eliminates this lag, but the return is not always a true indication of the center. Perhaps the most reliable guide is the wind. Within the cyclonic circulation, a **veering wind** (one changing direction to the right in the northern hemisphere and to the left in the southern hemisphere) indicates a position in the dangerous semicircle, and a **backing wind** (one changing in a direction opposite to a veering wind) indicates a position in the navigable semicircle. However, if a vessel is underway, its motion should be considered. If it is outrunning the storm or pulling rapidly toward one side (which is not difficult during the early stages of a storm, when its speed is low), the opposite effect occurs. This should usually be accompanied by a rise in atmospheric pressure, but if motion of the vessel is nearly along an isobar, this may not be a reliable indication. If in doubt, the safest action is usually to stop long enough to determine definitely the semicircle. The loss in valuable time may be more than offset by the minimizing of the possibility of taking the wrong action and increasing the danger to the vessel. If the wind direction remains steady (for a vessel which has stopped), with increasing speed and falling barometer, the vessel is in or near the path of the storm. If it remains steady with decreasing speed and rising barometer, the vessel is on the storm track, behind the center.

The first action to take if one finds himself within the cyclonic circulation, is to determine the position of his vessel with respect to the storm center. **While the vessel can still make considerable way through the water, a course should be selected to take it as far as possible from the center.** If the vessel can move faster than the storm, it is a relatively simple matter to outrun the storm if sea room permits. But when the storm is faster, the solution is not as simple. In this case, the vessel, if ahead of the storm, will approach nearer to the center. The problem is to select a course that will produce the greatest possible minimum distance. This is best determined by means of a relative movement plot.

As a very general rule, for a vessel in the northern hemisphere, safety lies in placing the wind on the starboard bow in the dangerous semicircle and on the starboard quarter in the navigable semicircle. If on the storm track ahead of the storm, the wind should be put about two points on the starboard quarter until the vessel is well within the navigable semicircle, and the rule for that semicircle then followed. With a faster than average vessel, the wind can be brought a little farther aft in each case. However, as the speed of the storm increases along its track, the wind should be brought farther forward. If land interferes with what would otherwise be the best maneuver, the solution should be altered to fit the circumstances. If the speed of the vessel is greater than that of the storm, it is possible for the vessel, if behind the storm, to overtake it. In this case, the only action usually needed is to slow enough to let the storm pull ahead.

In all cases, one should be alert to changes in the direction of movement of the storm center, particularly in the area where the track normally

curves toward the pole. If the storm maintains its direction and speed, the ship's course should be maintained as the wind shifts.

If it becomes necessary for a vessel to heave to, the characteristics of the vessel should be considered. A power vessel is concerned primarily with damage by direct action of the sea. A good general rule is to heave to with head to the sea in the dangerous semicircle or stern to the sea in the navigable semicircle. This will result in greatest amount of headway away from the storm center, and least amount of leeway toward it. If a vessel handles better with the sea astern or on the quarter, it may be placed in this position in the navigable semicircle or in the rear half of the dangerous semicircle, but never in the forward half of the dangerous semicircle. It has been reported that when the wind reaches hurricane speed and the seas become confused, some ships ride out the storm best if the engines are stopped, and the vessel is permitted to seek its own position. In this way, it is said, the ship rides with the storm instead of fighting against it.

In a sailing vessel, while attempting to avoid a storm center, one should steer courses as near as possible to those prescribed above for power vessels. However, if it becomes necessary for such a vessel to heave to, the wind is of greater concern than the sea. A good general rule always is to heave to on whichever tack permits the shifting wind to draw aft. In the northern hemisphere this is the starboard tack in the dangerous semicircle and the port tack in the navigable semicircle.

Practical rules.—When there are indications of a hurricane, vessels should remain in port or seek one if possible. Changes in barometer and wind should be carefully observed and recorded, and every precaution should be taken to avert damage by striking light spars, strengthening moorings, and if a steamer, preparing steam to assist the moorings. In the ports of the southern states hurricanes are generally accompanied by very high tides, and vessels may be endangered by overriding the wharf where moored if the position is at all exposed.

Vessels in the Straits of Florida may not have sea room to maneuver so as to avoid the storm track, and should try to make a harbor, or to stand out of the straits to obtain sea room. Vessels unable to reach a port and having sea room to maneuver usually observe the previously discussed general rules for avoiding the storm center, which, for power-driven vessels, are summarized as follows:

Right or dangerous semicircle.—Bring the wind on the starboard bow (045° relative), hold course and make as much way as possible. If obliged to heave to, do so with head to the sea.

Left or navigable semicircle.—Bring the wind on the starboard quarter (135° relative), hold course and make as much way as possible. If obliged to heave to, do so with stern to the sea.

On storm track, ahead of center.—Bring the wind two points on the starboard quarter (157½° relative), hold course and make as much way as possible. When well within the navigable semicircle, maneuver as indicated above.

On storm track, behind center.—Avoid the center by the best practicable course, keeping in mind the tendency of tropical cyclones to curve northward and eastward.

Coastal effects.—The high winds of a hurricane inflict widespread damage when such a storm leaves the ocean and crosses land. Aids to navigation may be blown out of position or destroyed. Craft in harbors, unless they are properly secured, drag anchor or are blown against obstructions. Ashore, trees are blown over, houses are damaged, power lines are blown down, etc. The greatest damage usually occurs in the dangerous semicircle a short distance from the center, where the strongest winds occur. As the storm continues on across land, its fury subsides faster than it would if it had remained over water.

Along the coast, particularly, greater damage may be inflicted by water than by the wind. There are at least four sources of water damage. First, the unusually high seas generated by the storm winds pound against shore installations and craft in their way. Second, the continued blowing of the wind toward land causes the water level to increase perhaps three to ten feet above its normal level. This **storm tide,** which may begin when the storm center is 500 miles or even farther from the shore, gradually increases until the storm passes. The highest storm tides are caused by a slow-moving hurricane of larger diameter, because both of these effects result in greater duration of wind in the same direction. The effect is greatest in a partly enclosed body of water, such as the Gulf of Mexico, where the concave coastline does not readily permit the escape of water. It is least on small islands, which presents little obstruction to the flow of water. Third, the furious winds which blow around the wall of the eye often create a ridge of water called a **storm surge,** which strikes the coast and often inflicts heavy damage. The effect is similar to that of a **Tsunami (seismic sea wave)** caused by an earthquake in the ocean floor. Both of these waves are popularly called **tidal waves.** Storm surges of 20 feet or more have occurred. About three or four feet of this is due to the decrease of atmosphere pressure, and the rest to winds. Like the damage caused by wind, that due to high seas, the storm tide, and the storm surge is greatest in the dangerous semicircle, near the center. The fourth source of water damage is the heavy rain that accompanies a tropical cyclone. This causes floods that add to the damage caused in other ways.

When proceeding along a shore recently visited by a hurricane, a navigator should remember that time is required to restore aids to navigation which have been blown out of position or destroyed. In some instances the aid may remain but its light, sound apparatus, or radiobeacon may be inoperative. Landmarks may have been damaged or destroyed.

Principal ports.—The ports within the area of this Coast Pilot which have deep-draft commercial traffic are Delaware City, Del.; Wilmington, Del.; Marcus Hook, Pa.; Chester, Pa.; Philadelphia, Pa.; Gloucester City, N.J.; Camden, N.J.; Trenton, N.J.; Norfolk, Va.; Portsmouth, Va.; Newport News, Va.; Richmond, Va.; Piney Point, Md.; Alexandria, Va.; Cambridge, Md.; and Baltimore, Md.

Pilotage is compulsory for all foreign vessels and U.S. vessels under register in the foreign trade. Pilotage is optional for coastwise vessels who have on board a pilot properly licensed by the Federal Government for the waters which the vessel travels.

State pilots for Maryland and Virginia cruise in the pilot cruising area off Cape Henry; pilots for Delaware Bay and River cruise in the pilot cruising area off Cape Henlopen; Maryland state pilots and pilots for Delaware Bay and River also maintain a joint pilot station at Chesapeake City, Md., on the Chesapeake and Delaware Canal. All pilots provide 24-hour service. Arrangements for pilots should be made in advance through ships' agents.

Detailed information on pilotage procedures is given in the text for the ports concerned.

Towage.—Tugs are available at all major ports; they can usually be obtained for the smaller ports on advance notice if none are available locally. Arrangements for tugs should be made in advance through ships' agents or the pilots. See the text for the ports concerned as to the availability of tugs.

Harbormasters, if available, are mentioned in the text. They generally have charge of the anchorage and berthing of vessels.

Supplies.—Water, marine supplies, other supplies and services, and all grades of heavy bunker oil, lubricants and diesel oil are available to large vessels at Hampton Roads ports, Baltimore, and other major ports along the Delaware Bay and River.

Gasoline, diesel fuel, water, and marine supplies and services can also be obtained at most of the smaller ports.

Repairs.—Large oceangoing vessels can be drydocked and have major repair work done at Philadelphia, Chester, Baltimore, Newport News, Norfolk, and Portsmouth. Repair facilities for smaller vessels are also available at many places in the area covered by this Coast Pilot; see text.

Wrecking and salvage equipment is available at Philadelphia, Baltimore, and Norfolk.

Small-craft facilities.—Marine supplies, repair facilities, and other services for small craft are available at all the major ports, and at numerous places on the New Jersey Intracoastal Waterway, and on many of the tributaries of the Chesapeake and Delaware Bays. Many facilities are described in the text; a more complete listing is shown on the small-craft charts.

Sailing vessels and power-driven vessels of less than 65 feet in length, navigating narrow channels, shall not hamper the safe passage of larger steam vessels which can navigate only inside that channel. (Public Law 89-764)

Standard time.—The area covered by this Coast Pilot uses eastern standard time (75°W.), which is 5 hours slow of Greenwich mean time. Example: When it is 1000 at Greenwich it is 0500 at Philadelphia.

Daylight saving time.—Throughout the area of this Coast Pilot, clocks are advanced one hour on the last Sunday in April and are set back to standard time on the last Sunday in October.

Legal public holidays.—New Year's Day, January 1; Washington's Birthday, third Monday in February; Memorial Day, last Monday in May; Independence Day, July 4; Labor Day, first Monday in September; Columbus Day, second Monday in October; Veterans Day, fourth Monday in October; Thanksgiving Day, fourth Thursday in November; and Christmas Day, December 25. The national holidays are observed by employees of the Federal Government and the District of Columbia, and may not be observed by all the states in every case.

In the areas covered by this Coast Pilot, other holidays are observed: Lee-Jackson Day, third Monday in January, in Virginia; Presidential Inauguration Day, January 20, every fourth year in the District of Columbia; Lincoln's Birthday, February 12, in all states except Virginia; Good Friday, in Delaware, New Jersey, Pennsylvania, and Maryland; Maryland Day, March 25, in Maryland; Thomas Jefferson's Birthday, April 13, in Virginia; Confederate Memorial Day, last Monday in May, in Virginia; Flag Day, June 14, in Pennsylvania; Defender's Day, September 12, in Maryland; General Election Day, first Tuesday after the first Monday in November, except in the District of Columbia.

4. NEW JERSEY COAST

This chapter describes the coast of New Jersey from Sandy Hook to Cape May Point, and the various inlets which make into it from the Atlantic Ocean. Also discussed are the resort towns of Atlantic City, Ocean City, and Cape May.

Charts 1215 to 1219.—The coast of New Jersey extends in a general southerly direction for 44 miles from Sandy Hook to Barnegat Inlet, then southwesterly for 66 miles to Cape May Point. From Sandy Hook to Atlantic City the 60-foot curve is 5 to 10 miles from shore; off Delaware Bay the distance has increased to 17 miles.

Deep-draft vessels should stand off the coast in depths of 60 feet or more between New York Bay and Delaware Bay. Light-draft vessels can follow the shore more closely if they pay strict attention to the charts for fishweir areas, shoals, wrecks, and other obstructions. Small craft should wait for favorable weather before attempting an outside run along this coast.

The principal shallow-draft entrances are Shark River Inlet, Manasquan Inlet, Barnegat Inlet, Absecon Inlet, and Cape May Inlet. There are several others that are unimproved. The inlets are, or may be, obstructed by shifting bars, and most require local knowledge to carry the best water. The best time to enter is on a rising tide with a smooth sea; passage is hazardous during easterly gales and heavy seas.

In most cases the aids marking the various inlets are not charted due to the changing conditions.

The greater part of the New Jersey coast is summer-resort area, and the numerous standpipes and elevated tanks are prominent from seaward. The New Jersey Intracoastal Waterway, an inside passage from Manasquan Inlet to Delaware Bay, is described in Chapter 5.

Chart 1215.—Low **Sandy Hook,** on the south side of the entrance to **New York Bay,** is the most northerly part of the New Jersey coast. **Sandy Hook Light (40°27.7′ N., 74°00.1′W.),** 88 feet above the water, is shown from an 85-foot stone tower a mile from the north end of the point. The light, established in 1764, is the oldest in continuous use in the United States.

A Coast Guard station, a standpipe, several towers, and two marine lights are prominent on the northern part of the hook. See Appendix for **New York City** and **Newark climatological tables. Storm warning display** locations are listed on the NOS charts and shown on the Marine Weather Services Charts published annually by the National Weather Service.

Sandy Hook is a Government reservation, and landing is prohibited as far south, approximately, as the bridge over the mouth of Shrewsbury River. Vessels awaiting favorable weather for an outside run can anchor in Sandy Hook Bay south of a line bearing due west from Sandy Hook Light; see also chart 544.

Sandy Hook Bay, Navesink River, and **Shrewsbury River** are described in United States Coast Pilot 2, Atlantic Coast, Cape Cod to Sandy Hook.

The **Highlands of Navesink,** on the northwest side of the approach to Navesink River, are the highest ground along the open Atlantic Coast between Maine and Florida. The 276-foot wooded ridge is 4 miles south of Sandy Hook Light and 0.5 mile back of the outer beach. Abandoned **Navesink Lighthouse** is in a cleared space on the easternmost spur at a ground elevation of 180 feet; the two 73-foot brownstone towers, the north one octagonal and the south square, are connected by a dwelling. A **privately maintained light,** 246 feet above the water, is now shown seasonally from the north tower.

Shrewsbury Rocks, 7.3 miles south of Sandy Hook Light, are 0.4 to a mile offshore and have a least depth of 14 feet; buoys are eastward of the rocks.

Chart 795.—Shark River, which enters the Atlantic Ocean through Shark Inlet 17 miles south of Sandy Hook Light, is the only small-craft harbor between Sandy Hook and Manasquan Inlet. The town of **Avon** fronts the ocean on the north side of the river and **Belmar** is on the south side.

Shark River Inlet is protected by jetties, each marked by a light near its outer end; a fog signal is at the north jetty light. Shark River Coast Guard Station is on the north side of the river, about 0.3 mile above the jetties. **Storm warning signals are displayed;** see chart.

A dredged channel leads through the inlet and river to the Belmar Municipal Boat Basin 1.2 miles above the jetties. In February 1970, the controlling depth to the Belmar Municipal Boat Basin was 6½ feet for a midwidth of 50 feet. The State of New Jersey maintains and marks several channels through the flats north and west of the boat basin; controlling depths were about 3 feet in 1967.

The mean range of tide is 4.0 feet in Shark River Inlet. In stormy weather, breakers form along the bar off the inlet, but entrance can be made in moderately rough weather with some local knowledge. When the winds and the tides are opposed the inlet is difficult to enter. A cross current, strongest on the ebb, may be encountered at Ocean Avenue Bridge at the inner end of the jetties. Vessels for which the closed bridge clearance

is insufficient should not attempt entrance until the drawspan is completely open.

Four bascule drawbridges cross the main or south channel of Shark River. Ocean Avenue Bridge, just inside the jetties, has a clearance of 15 feet; State Route 71 highway bridge, about 0.8 mile above the jetties, has a clearance of 8 feet; and about 0.9 mile above the jetties, the New York and Long Branch Railroad Company Bridge, and State Route 35 highway bridge immediately to the westward, have clearances of 8 feet and 10 feet, respectively. Drawbridge regulations and opening signals for these bridges are given in **117.215 (a) through (g), and (j) (2),** Chapter 2.

The fixed spans of State Route 71 and State Route 35 highway bridges, and of the New York and Long Branch Railroad Company Bridge, cross the upper reach or north channel of Shark River at about the same distances above the jetties as the bascule spans of these bridges; least clearances are 20 feet horizontal and 8 feet vertical.

Overhead power cables cross the main channel and north channel of Shark River close eastward of the New York and Long Branch Railroad Company Bridge and close westward of State Route 35 highway bridge; least clearances are 31 feet over the main channel and 32 feet over the north channel.

There are excellent small-craft and fishing-boat facilities in Shark River inside the inlet. Most of these facilities are on both sides and above the inner bridges, and in the Belmar Municipal Boat Basin. Gasoline, diesel fuel, water, ice, berthing, and marine supplies are available. Hull and engine repairs can be made. Maximum haul-out capacities are: railway, 46 feet; lift, 14 tons.

Chart 1216.—Sea Girt Light (40°08.2′N., 74°01. 6′W.), 60 feet above the water, is shown from a black skeleton tower on a small white house on the beach 20 miles southward of Sandy Hook Light. The **danger zone** of a military firing range extends 2.2 miles seaward from the beach at Sea Girt and is marked by privately maintained buoys; see **204.20,** Chapter 2, for limits and regulations.

Chart 795.—Manasquan Inlet, 22 miles southward of Sandy Hook Light, is the Atlantic entrance to Manasquan River and the northern terminus of the New Jersey Intracoastal Waterway which are described in Chapter 5. A Coast Guard station is on the south side of the inlet, and the jettied entrance is well marked. In April 1970, the controlling depth was 12 feet for a midwidth of 125 feet through the jetties to the New York and Long Branch Railroad Company bascule bridge, about 0.9 mile above the jetties.

Mariners should exercise caution when entering Manasquan Inlet when the winds and tides are opposed; local knowledge is advised.

Charts 1216, 824—SC.—Bay Head, 2 miles south of Manasquan Inlet, is marked by a prominent elevated water tank. From Bay Head south, the resorts are more widely spaced on the low, narrow barrier beach which separates the inside waters from the ocean.

Barnegat Inlet, 21 miles southward of Manasquan Inlet, forms a passage from the Atlantic Ocean through **Oyster Creek Channel** to the New Jersey Intracoastal Waterway and Barnegat Bay. The inlet is protected by two partly submerged jetties, each marked by a light at its outer end. A fog signal is at the south jetty light and a marker radiobeacon is at the Coast Guard station inshore of the south jetty. Abandoned Barnegat Lighthouse, on the south side of the inlet, is the most prominent landmark in the area; it is a 161-foot high brick tower, dark red on its upper half and white on its lower half. The tower, no longer lighted, is maintained by the State of New Jersey as a historical monument. Also prominent well to seaward is a 391-foot high powerplant stack at the head of Oyster Creek, on the west side of Barnegat Bay.

Barnegat Inlet channel and Oyster Creek Channel are subject to continual change due to shoaling. The buoys marking these channels are shifted frequently to mark the best water and therefore not charted. Boatmen needing assistance should lay outside the inlet and contact the local Coast Guard station.

The mean range of tide is 3.1 feet in Barnegat Inlet and 0.6 feet in Oyster Creek Channel. The current velocity is about 2.5 knots in the inlet.

Barnegat Light is a resort town on the south side of Barnegat Inlet. The channel to the small-craft and fishing-boat facilities on the bay side of the town is marked by privately maintained seasonal buoys or markers; these aids are not charted. Gasoline, diesel fuel, water, ice, berths, and marine supplies are available. Hull and engine repairs can be made; maximum haul-out capacities in the area are: railway, 40 feet; lift, 10 tons.

Storm warning signals are displayed; see chart.

Charts 1216, 826—SC.—Beach Haven Inlet (39°30. 0′N., 74°15. 1′W.), 17 miles south-southwestward of Barnegat Inlet, is marked by buoys which are shifted in position to mark the best water; these aids are not charted. In certain conditions of tide and wind, the buoys are drawn under and may not be visible. Due to the changing conditions of the channel, boatmen are advised to seek local knowledge prior to entering. The mean range of tide is 3.7 feet.

The entrance to Beach Haven Inlet should not be mistaken for Little Egg Inlet, which is close southward. Beach Haven Coast Guard Station is inside the barrier beach, 3.2 miles north of Beach Haven Inlet. **Storm warning signals are displayed;** see chart.

Charts 1217, 826—SC.—Little Egg Inlet (39°29. 0′N., 74°17. 5′W.), 19 miles south-southwestward of Barnegat Inlet and close southward of Beach Haven Inlet, is used considerably by local pleasure and fishing boats. Depth over the bar is ample for any vessel that can navigate the inside waters, but in very heavy weather breakers form all the way across the bar. The inlet channels and shoreline are constantly changing; the entrance is well marked but the buoys are not charted because they are frequently shifted in position.

Brigantine Inlet, 22 miles south-southwestward of Barnegat Inlet, has shoaled to such an extent that it is unsafe for even the shallowest drafts. **Brigantine Shoal,** 3 miles south of the inlet, has a least depth of 17 feet and is marked by a buoy.

Brigantine Light (39°23. 9′N., 74°22. 4′W.), 35 feet above the water, is shown from a pipe tower with daymark, 2.5 miles north of the entrance to Absecon Inlet.

Absecon Inlet, 28 miles southwestward of Barnegat Inlet, is on the northeast side of **Atlantic City,** the largest resort on the New Jersey coast. The inlet is protected at the entrance by jetties; a revetment extends along the Atlantic City side of the inlet. Abandoned **Absecon Lighthouse** is a 170-foot conical tower on the southwest side of the inlet; the lower 100 feet of the tower is white, and the upper 70 feet is divided into three horizontal bands of blue, white, and blue.

Atlantic City Light (39°21. 9′N., 74°24. 7′W.), 70 feet above the water, is shown from a white skeleton tower on concrete block on the south side of Absecon Inlet. A light is on the outer end of the south jetty; a marker radiobeacon is on the inshore end of this jetty.

The channel through the inlet is well marked to the entrance to **Clam Creek** and to a junction with the New Jersey Intracoastal Waterway, 1 mile and 1.9 miles, respectively, above the south jetty light. The New Jersey Intracoastal Waterway is described in Chapter 5. In March-April 1970, the controlling depth in Absecon Inlet was 20 feet to Clam Creek, thence 7 feet in Clam Creek channel and basin. The mean range of tide is 4.1 feet on the ocean side and about 3.5 feet inside the inlet. Current velocities are strong in the channel.

Weather.—The climate of Atlantic City is principally continental in character; however, the moderating influence of the Atlantic Ocean is apparent throughout the year. As a result, the summers are relatively cooler and winters milder than elsewhere at the same latitude. Land and sea breezes often prevail. Temperatures of 90° or higher are recorded about three times per year, which are considerably less than locations further inland. The weather tends to remain comparatively mild late into the fall, but on the other hand, warming is retarded in the spring. February is the coldest month and July the warmest. Precipitation, on the average, is moderate and well distributed throughout the year, with June the driest month and August the wettest. Thunderstorms are mostly a warm season phenomena. The bulk of winter precipitation results from storms which move northeasterly along or close to the coast. Snowfall, at about 15 inches per year, is considerably less than elsewhere at the same latitude, and does not remain long on the ground. Ice storms are relatively infrequent. See Appendix for **Atlantic City climatological table.**

Storm warning display locations are listed on the NOS charts and shown on the Marine Weather Services Charts published annually by the National Weather Service.

Atlantic City, on the south side of Absecon Inlet, is a base for a large fleet of fishing vessels and pleasure craft. The city has highway, rail, and air connections with the mainland; highways lead to the coastal towns northward and southward.

The U.S. Public Health Service maintais a **contract physician's** office in Atlantic City; see Appendix for address. The U.S. Bureau of Customs has a customs station at the state marina in Clam Creek; foreign yachts and fishing vessels are inspected.

Starns Dock, 0.9 mile inside Absecon Inlet on the Atlantic City side, has gasoline, diesel fuel, and some marine supplies. A Coast Guard station is on the north side of the entrance to Clam Creek. **Storm warning signals are displayed;** see chart.

Clam Creek, on the south side of Absecon Inlet, has its entrance 1 mile northwestward of the south jetty light. The creek includes **Gardner Basin, Snug Harbor,** and **Delta Basin** on its southerly side, and the small-boat basin of the state marina on its northerly side. The municipal wharf is on the east side of the entrance to the small-boat basin.

Gasoline, diesel fuel, water, ice, and marine supplies can be obtained at the several small-craft facilities in the creek, and in the small-boat basin. Hull and engine repairs can be made at the facilities in Gardner Basin and Snug Harbor; maximum haul-out capacities are: marine railway, 65 feet; lift, 20 tons. The **harbormaster** at the state marina assigns float space in the small-boat basin; a fuel float is on the west side of the basin and the harbormaster's office is on the east side.

The highway bridge, 1.5 miles above Absecon Inlet entrance, has a bascule span with a clearance of 11 feet; see **117.220,** Chapter 2, for drawbridge regulations and opening signals. Care must be exercised when passing through this bridge because of the strong currents; velocities of 2.5 knots have been reported. In 1970, a fixed highway bridge with a design clearance of 60 feet was under construction close southward of the bascule bridge.

Great Egg Harbor Inlet, 7 miles southwest of Absecon Inlet, has a controlling depth of about 6 feet over the bar. The buoys marking the inlet are not charted because they are shifted frequently to mark the best water. The inlet is used by many local fishing and pleasure boats with drafts up to 5 feet. Breakers extend along the bar even in

moderate weather and are hazardous to small boats. Local knowledge is advised at all times in entering the inlet. The mean range of tide is 3.8 feet in the inlet. The bridges, just inside Great Egg Harbor Inlet, are described in Chapter 5 in connection with the New Jersey Intracoastal Waterway.

Ocean City, a large summer resort on the southwest side of Great Egg Harbor Inlet, has rail and highway connectins with the mainland. Supplies and facilities are described in connection with the New Jersey Intracoastal Waterway. A Coast Guard station is in a basin on the inner side of the city. **Storm warning signals are displayed;** see chart.

Corson Inlet, 14 miles southwest of Absecon Inlet, is subject to constant change in depth and should not be used.

Ludlam Beach Light (39°09.7'N., 74°41.0'W.), 45 feet above the water, is shown from a 35-foot red skeleton tower on white house near the northeast end of **Sea Isle City**, 17.5 miles southwestward of Atlantic City Light. A shoal, covered 16 feet and marked by a buoy, is 3 miles southeast of the light. **Avalon Shoal**, covered 26 feet and marked by a lighted gong buoy, is 7 miles southeast of the light.

Townsend Inlet, 20 miles southwest of Absecon Inlet, is subject to considerable changes in position and depth, and is used only by small fishing boats. Channel buoys are not charted because they are shifted frequently to mark the best water. The mean range of tide is 3.8 feet in the inlet. The depth over the bar is about 4 feet.

Townsends Inlet is a small resort on the northeast side of the inlet. A Coast Guard station is on the northeast side of the resort. **Storm warning signals are displayed;** see chart.

The highway bridge over Townsend Inlet has a bascule span with a clearance of 23 feet. See **117.220**, Chapter 2, for drawbridge regulations and opening signals. The route of the New Jersey Intracoastal Waterway is just west of the bridge.

Hereford Inlet, 28 miles southwest of Absecon Inlet, is subject to rapid change, and although the uncharted buoys are shifted frequently they cannot be relied upon to mark the best water. Breakers form at all times on the shoals and in moderate weather on the bar. The approach to the inlet is extremely dangerous with a following sea. The mean range of tide is 4.1 feet in Hereford Inlet. The depth over the bar is about 4 feet, but passage should not be attempted without local knowledge.

Hereford Inlet Light (39°00.4'N., 74°47.5'W.), 70 feet above the water, is shown from a white skeleton tower on the south side of the inlet in front of the abandoned lighthouse and the former Coast Guard station.

Nummy Island is on the inner side of Hereford Inlet; the Intracoastal Waterway passes west of the island. The highway that crosses Nummy Island has drawbridges over **Great Channel**, which leads northward from the inlet, and **Grassy Sound Channel**, which leads westward; both bascule spans have a clearance of 15 feet. Drawbridge regulations and opening signals for the bridge over Great Channel are given in **117.225 (a) through (e), and (f) (11)**, Chapter 2; and for the bridge over Grassy Sound Channel in **117.220**, Chapter 2.

Supplies and facilities at Stone Harbor and Wildwood are described with the New Jersey Intracoastal Waterway, Chapter 5.

Charts 234, 826—SC, 1219—.Cape May Inlet (38°10.0'N., 74°51.8'W.), 34 miles southwest of Absecon Inlet, is protected by jetties whose lights are inshore of the submerged ends. A fog signal is at the west jetty light and a marker radiobeacon is at the inshore end. A 327° lighted range marks the channel between the jetties. Buoys mark the channel inside the harbor. At night the lights on the towers on the east side of the inlet are visible from well offshore.

Boundary lines of inland waters.—The lines established for Delaware Bay Entrance, including Cape May Inlet, are described in **82.25**, Chapter 2.

The **danger area** of a Coast Guard rifle range extends from **Sewell Point** westward from Cape May Inlet; see **204.23**, Chapter 2, for limits and regulations.

Cape May Harbor is used by fishing fleets, pleasure craft, and the Coast Guard. The fishing vessels operate from wharves below and above the bridge at the northeast end of the harbor and from wharves in **Schellenger Creek**, at the west end of the harbor. Pleasure-craft facilities are on the north and west sides of the harbor. The Cape May Coast Guard Base and its attendant facilities are on the south side of the harbor.

The resort town of **Cape May** fronts the ocean 2 miles west of Cape May Inlet. The U. S. Public Health Service maintains a **contract physician's office** here; see Appendix for address. **Quarantine** inspections, when required, are handled by U. S. Public Health Service officers stationed at the Coast Guard base.

In February-June 1969, the controlling depths were 16 feet through Cape May Inlet to the inner ends of the jetties, thence 13 feet to the Coast Guard large wharf on the south side of the harbor, thence in 1965, 13 feet to Schellenger Creek, and thence 12 to 7 feet through the creek and northward in a 10-foot channel that connects with the Cape May Canal. Traffic through Schellenger Creek is restricted by the 38-foot wide bascule span of the highway bridge with a clearance of 5 feet that remains in the closed position; see **117.225 (a)**, and **(f) (11-a)**, Chapter 2, for drawbridge regulations and opening signals. The controlling depth is about 13 feet to the fish wharves above the bridge at the northeast end of the harbor.

The mean range of tide is 4.4 feet in Cape May Harbor. The current velocity is about 2 knots in Cape May Inlet.

Most of the fishing and small-craft facilities are along the northern and western sides of Cape May Harbor, and in Schellenger Creek. Gasoline, diesel fuel, berths, water, ice, marine supplies, and various size lifts and marine railways are available. Hull, engine, and electronic repairs can be made. Maximum haul-out capacities are: marine railway, 110 feet; lift, 60 tons.

The Coast Guard piers on the inner side of Sewell Point are the largest in the harbor and have depths of 15 feet to 10 feet alongside.

The waterway to **Jarvis Sound**, at the northeast end of Cape May Harbor, and through Cape May Canal at the west end, is described with the New Jersey Intracoastal Waterway, Chapter 5.

5. NEW JERSEY INTRACOASTAL WATERWAY

The **New Jersey Intracoastal Waterway** is a toll-free passage which roughly parallels the Atlantic Coast and extends 118 statute miles through bays, lagoons, thorofares, and land cuts from Manasquan Inlet to Delaware Bay at a point 2 miles north of Cape May Light.

In addition to the Intracoastal Waterway and the waters through which it passes, this chapter also describes the several rivers and tributaries that empty into these waters, as well as some of the more important towns and landings along these waterways.

The New Jersey Intracoastal Waterway is used mainly by pleasure craft, and commercial and sport fishing vessels. The U. S. Army Corps of Engineers, Philadelphia Engineer District, has supervision of the waterway's construction, maintenance, and operation; see Appendix for address.

Mileage.—The New Jersey Intracoastal Waterway mileage is zeroed in 40°06′03″N., 74°01′54″W., off the outer ends of the Manasquan Inlet jetties, which are 40 nautical miles by outside run from the Battery, New York.

Distances along the New Jersey Intracoastal Waterway are in statute miles to facilitate reference to the small-craft charts (824—SC, 826—SC); all other distances are nautical miles. Mileage conversion tables are in the Appendix.

Channels.—The channel of the New Jersey Intracoastal Waterway is generally 100 feet wide and has dredged depths of 6 feet from Manasquan Inlet to Cape May Harbor, thence 12 feet through Cape May Canal to Delaware Bay.

Effort is made to maintain a 6-foot controlling depth for the waterway, but due to continuous shoaling, 3 feet or less may be found in places, particularly inside the ocean inlets. The controlling depths for the waterway are tabulated on the charts and changes are published in the Local Notice to Mariners.

Bridges and cables.—Controlling clearances of bridges and cables crossing the New Jersey Intracoastal Waterway are as follows:

From Manasquan Inlet to Absecon Inlet: clearance of overhead cables, 72 feet, Mile 3.0; horizontal clearance, 45 feet at swing bridge, Mile 4.0; vertical clearance, 60 feet at fixed bridge, Mile 37.4.

From Absecon Inlet to Delaware Bay: vertical clearance, 35 feet at fixed bridges, Miles 84.3, 93.6, and 97.4; clearance of overhead cables, 55 feet, Mile 84.3; horizontal clearance, 40 feet at swing bridge, Mile 115.5.

General drawbridge regulations and opening signals for bridges over the New Jersey Intracoastal Waterway are given in **117.220,** Chapter 2. **Special drawbridge** regulations for certain bridges that supplement the general regulations are referenced with the area description of the waterway.

Aids to navigation.—The U.S. Coast Guard maintains the standard aids that mark the inlets and the special aids that mark the Intracoastal Waterway. The special aids have characteristic yellow markings which distinguish them from aids to navigation marking other waters; see U.S. Coast Guard Light Lists or Chart 1 (Nautical Chart Symbols and Abbreviations) for illustrations of special markings.

The Department of Conservation and Economic Development, State of New Jersey, maintains the aids to navigation on the rivers and creeks that empty into the New Jersey Intracoastal Waterway.

Lights and daybeacons should not be passed close aboard because those marking dredged channels are usually placed back from the bottom edge of the channel and others may have riprap mounds around them to protect the structures.

Charts.—Navigation of the New Jersey Intracoastal Waterway can be made easier by the use of the special small-craft series which the National Ocean Survey publishes especially for that purpose.

Tides.—In the inland waters, the tides are greatly affected by the winds both in time and height, westerly winds producing low water and easterly winds high water. In Barnegat Bay, northerly and southerly winds drive the water to the ends of the bay. While the normal range of tide is only about 0.5 foot in sections of the waterway removed from the inlets, strong winds of long duration may cause variations in level of as much as 3 feet below mean low water on 3 feet above mean high water. Near the inlets, the wind has less effect and the normal range of tide is 3 to 4 feet.

Currents.—Current velocities may reach 3 knots in the inlets and in the narrow channels that connect the inlets with the inside waters.

Ice.—The inside waters are completely closed to navigation by ice during extreme winters. In ordinary winters, some of the channels, especially near the inlets where the currents are strong, remain open most of the time, though ice always forms on the flats. The inlets themselves are rarely closed, but passage is often difficult because of running ice. All the principal inlets and adjacent channels are used in winter by local fishing boats, but through navigation is usually blocked.

Weather.—Storm warning signals are displayed at various places along the New Jersey Intracoastal Waterway and connecting channels. Dis-

play locations are listed on the NOS charts and shown on the Marine Weather Services Charts published annually by the National Weather Service.

Facilities.—At communities along or adjacent to the waterway are numerous piers, wharves, and docks, many of which are open to general public use. Fuel, water, and other supplies are readily available. Public and privately-owned boat basins are located in many streams entering the bays and throfares through which the waterway passes. Boat-repair and storage yards with marine railways are also scattered along the waterway. Facilities for icing, storing, and shipping seafood are available at most of the larger communities.

Chart 824—SC (see also chart 795).—**Manasquan Inlet,** 22 miles southward of Sandy Hook Light, is the northern terminus of the New Jersey Intracoastal Waterway, and the Atlantic entrance to shallow **Manasquan River** which flows into the inlet from the westward. The inlet is used by many commercial fishing craft and pleasure craft. Mariners should exercise caution when entering Manasquan Inlet when the wind and tide are opposed; local knowledge is advised. A Coast Guard station is on the south side of the inlet. **Storm warning signals** are displayed; see chart.

A marked dredged channel, protected at the inlet entrance by two jetties, leads through Manasquan Inlet and extends about 5 miles up Manasquan River. In April 1970, the controlling depths were 12 feet for a midwith of 125 feet through the inlet to the first bridge; thence in 1967-October 1969, 5½ feet for a midwidth of 80 feet to a point just north of the entrance to Point Pleasant Canal, thence in 1967, reported centerline depths of 6 feet to third bridge, thence 3 feet for about 1.2 miles to the channel bend at Turkey Point, and thence in 1968, a reported centerline depth of 2½ feet to a small-craft basin at the end of the dredged channel.

The stone jetties at the inlet are marked at their outer ends by a light; a fog signal is at the south jetty light, and a marker radiobeacon is close inshore of the light. Give the jetties a good berth to avoid any loose rocks.

The mean range of tide is 4 feet in Manasquan Inlet and 3.5 feet at the railroad bridge **(Mile 0.9).** The current velocity is about 1.8 knots in the inlet.

The resort towns of **Manasquan** and **Point Pleasant Beach** are on the north and south sides of Manasquan Inlet, respectively, while the towns of **Brielle (Mile 1.1), Point Pleasant (Mile 2.2),** and **Riviera Beach** (3.5 miles above the inlet jetties) are on Manasquan River.

Cooks Creek, Mile 0.4, is an outlet for **Lake Louise** on the southside of Manasquan River. The fixed highway bridge over the creek has a 28-foot channel span with a clearance of 8 feet. Depths are about 6 feet below the bridge decreasing to 2 feet above it.

Crabtown Creek, Mile 0.8, enters Manasquan River on the north side. The staked channel has a controlling depth of about 5 feet for 0.7 mile into the northwest fork. The highway bridge over the creek has a 30-foot bascule span with a clearance of 9 feet; see **117.215,** Chapter 2, for drawbridge regulations and opening signals.

The railroad bridge at **Mile 0.9** has a 48-foot bascule span over Manasquan River with a clearance of 3 feet. **Mile 1.1** highway bridge has a bascule span with a clearance of 30 feet; the overhead power cable on the west side has a clearance of 107 feet. The current velocity is about 2.2 knots at the highway bridge.

The highway bridge over Manasquan River at Riviera Beach has a bascule span with a clearance of 15 feet. Drawbridge regulations and opening signals for the bridges crossing Manasquan River are given in **117.215,** Chapter 2.

Small-craft facilities are along Cooks Creek, Crabtown Creek and tributaries, and up Manasquan River near the two bridges a mile inside Manasquan Inlet, and near Point Pleasant and Riviera Beach. Commercial fishing wharves and other small-craft facilities are along **Wills Hole Thoroughfare,** westward of Cooks Creek; controlling depth is about 8 feet.

Gasoline, diesel fuel, berthing facilities, and marine supplies are available. Hull, engine, and electronic repairs can be made. Maximum haul-out capacities are: marine railway, 70 feet; lift, 25 tons.

From Manasquan Inlet, the New Jersey Intracoastal Waterway follows the dredged channel in Manasquan River to **Mile 2.7** where it turns south into the **Point Pleasant Canal.** The 1.9-mile narrow land cut has bulkheaded sides; vessels are required to pass through at a safe speed to avoid damage to structures and boats. **Currents of 6 to 7 knots may be encountered at the bridges across the canal causing a turbulent effect, particularly at times of maximum ebb and flood; vessels running with the current may experience difficulty in maneuvering at the bridges; other small craft should act accordingly.**

At **Mile 3.0,** a highway bridge crosses the canal to the town of **Point Pleasant,** on the east side of the canal; the bridge has a bascule span with a clearance of 10 feet. An overhead TV cable is on the north side of the bridge, and an overhead power cable is on the south side; least clearance,72 feet. The U.S. Public Health Service maintains a **contract physician's office** in Point Pleasant; see Appendix for address.

A small-boat basin is on the west side of the canal at **Mile 3.6.** Gasoline, marine supplies, and diesel fuel by truck are available. Hull, engine, and electronic repairs can be made; a 10-ton lift is available. In 1970, a vertical-lift highway bridge with a design clearance of 65 feet up and 35 feet down was under construction across the canal at **Mile 3.9.**

Mile 4.0 highway bridge has a swing span with a channel width of 45 feet and a clearance of 14 feet. **Storm warning signals are displayed;** see chart. A small-boat basin is on the west side of the canal just north of the bridge; only mooring facilities are available.

At **Mile 4.6,** the waterway route leaves the canal and passes through **Barnegat Bay,** which has a north-south length of about 25 miles. The western half of the bay has depths of 5 to 10 feet; the eastern half is mostly extensive flats.

Complete fuel, supply, repair, and berthing facilities are available in **Bay Head Harbor** at the north end of Barnegat Bay; maximum haul-out capacities: railway, 80 feet; lift, 30 tons. The mean range of tide is 0.5 foot.

Beaverdam Creek enters the west side of Barnegat Bay opposite **Mile 4.8. The marked channel into the creek has a controlling depth of about 4 feet.** The highway bridge, 0.4 mile from the mouth, has a swing span with a 40-foot channel width and a clearance of 14 feet; see **117.225 (a) through (e), and (f) (3),** Chapter 2, for drawbridge regulations and opening signals. The overhead power cable on the east side of the bridge has a clearance of 62 feet. Gasoline, supplies, and slips are available. Repair facilities are on both sides of the bridge; maximum haul-out capacities: railway 50 feet; lift, 25 tons.

Metedeconk River, separated from Beaverdam Creek by **Wardells Neck,** flows eastward into Barnegat Bay. The northern approach to the river is the same as for Beaverdam Creek; the southern approach is a marked passage between **Herring Island** and **Metedeconk Neck.** The controlling depth into the river is about 4 feet; depths above the entrances are 5 to 8 feet for about 3 miles.

Laurelton, 4 miles up Metedeconk River from the Intracoastal Waterway, has facilities for small craft. Under average conditions, boats drawing as much as 3 feet can maneuver the shallow channel to Laurelton; the mean range of tide is almost negligible, and the wind has much more effect than the tide. Gasoline, berths, and some marine supplies are available. Hull and engine repairs can be made. Largest haul-out capacities: marine railway, 35 feet; lift, 10 tons.

Mile 6.3 highway bridge over Barnegat Bay to **Mantoloking** on the barrier beach has a bascule span with a clearance of 14 feet. There are facilities on the west side of the waterway on both sides of the bridge. Fuel, supplies, repairs, and slips are available; maximum haul-out capacities: railway, 80 feet; lift, 50 tons.

Kettle Creek flows southeastward into Barnegat Bay opposite **Mile 9.6.** The creek has depths of 4 feet to the forks, 1.4 miles above the mouth. Gasoline and some supplies are available. A boatyard on the south side of the creek has a 20-ton lift that can haul out boats up to 42 feet in length for repairs.

Shelter Cove, on the west side of Barnegat Bay at the entrance to **Goose Creek,** opposite Mile 12.8, has gasoline, some supplies, and slips. Repairs can be made; lift, 5 tons. The controlling depth into the cove is about 5 feet.

A marked 6-foot channel follows the inner barrier beach from **Lavallette,** east of **Mile 10.7,** to **Seaside Heights,** east of **Mile 14.1.** The 31-foot wide fixed bridge to **West Point Island,** east of **Mile 12.6,** has a clearance of 10 feet, but can be bypassed through the channel west of the island.

There are many facilities along the inner barrier beach from **Mile 9.5 to Mile 16.0.** Fuel, supplies, repairs, and slips are available; maximum haul-out capacities: railway, 47 feet; lift, 20 tons.

Mile 14.1 highway bridge over Barnegat Bay has a bascule span with a clearance of 30 feet. The fixed span of this bridge between **Pelican Island** and Seaside Heights has a clearance 15 feet. In 1970, a fixed highway bridge, with a design clearance of 60 feet, was under construction just northward of the bascule span between Bay Shore and Pelican Island.

The municipal dock, 0.2 mile south of the bridge on the inner side of Seaside Heights, has depths of about 7 feet at the face.

A **contract physician's office** of the U.S. Public Health Service is at Seaside Heights; see Appendix for address.

Toms River, which empties into the west side of Barnegat Bay at **Mile 14.6,** has midchannel depths of 5 to 7 feet. The mean range of tide is 0.6 foot in the river. The channel is well marked.

Island Heights, on the high wooded point on the north side of Toms River, 1.7 miles above Barnegat Bay, has a public pier with about 5 feet alongside. Fuel, supplies, and slips are available at several facilities. Repairs can be made; largest haul-out capacities: railway, 50 feet; lift 5 tons.

The town of **Toms River,** 4 miles upriver from Barnegat Bay, is the head of navigation; controlling depth to the town is about 5 feet. The town bulkheads provide public berthage. There are complete fuel, supply, repair, and slip facilities; maximum haul-out capacities: railway, 60 feet; lift, 18 tons.

Gasoline, some marine supplies, and slips are available at a marina on **Goodluck Point** at **Mile 16.2.** Repairs can be made; lift, 5 tons.

Cedar Creek, which empties into the west side of Barnegat Bay at **Mile 20.2,** has depths of 3 to 4 feet. There is a light on the south side of the entrance, and the interior channel is marked by daybeacons. Small-craft facilities along the 1.4-mile navigable length of Cedar Creek have gasoline, supplies, and slips; repairs can be made; largest lift; 12 tons.

A 031°30′-211°30′ measured course, 5,280 feet long, maintained by the State of New Jersey, is on the west side of Barnegat Bay at **Mile 21.5.** The front markers are black piles with white square

signs; the rear markers, on shore, are rectangular daymarks.

Forked River, on the west side of Barnegat Bay opposite **Mile 23.8,** is entered by a marked channel which leads to the head of navigation at the town of **Forked River,** about 1.8 miles above the bay. In 1966, the controlling depth was 5 feet. The river forks into three branches about halfway up; the town is on the north side of **North Branch.**

There are several marinas and boatyards on both sides of North Branch. Gasoline, diesel fuel, water, ice, berths, and marine supplies are available. Hull, engine, and electronic repairs can be made. Maximum haul-out capacities: marine railway, 60 feet; lift, 10 tons.

A state marina, at the head of North Branch, can provide gasoline, diesel fuel, water, ice, and marine supplies. The **harbormaster** at this facility assigns transient berths. He will provide mariners with the latest information of conditions on the New Jersey Intracoastal Waterway, and on other waters marked by the State of New Jersey.

Oyster Creek, on the west side of Barnegat Bay opposite **Mile 24.7,** has a navigable length of over 1 mile to Highway 9 bridge. In 1967, the controlling depth through the marked entrance was 6 feet; inside, depths of 7 feet or more can be carried to the bridge. Gasoline, diesel fuel, water, ice, berths, and marine supplies are available at the small-craft facilities on the south side of the creek. Hull, engine, and electronic repairs can be made. Maximum haul-out capacities: marine railway, 72 feet; lift, 15 tons.

At **Mile 25.9,** Oyster Creek Channel leads eastward to Barnegat Inlet. The channel and the inlet were described in Chapter 4.

Waretown, west of **Mile 26.3** on the bay shore, has many small-craft facilities along its easterly shore, and in **Waretown Creek,** on the north side of town, and in the small-boat basin, known as **Sanborn Anchorage,** on the south side of town. Controlling depths are about 4 feet in Waretown Creek, and about 5 feet in Sanborn Anchorage. Most of these facilities can provide gasoline, diesel fuel, water, ice, berths, and marine supplies. Lifts up to 12 tons are available; hull and engine repairs can be made.

Double Creek, southwest of **Mile 28.0,** is protected on the north side of its entrance by a jetty which has a light on its outer end. The creek has channel depths of 4 feet to the fixed highway bridge, 0.7 mile above Barnegat Bay. Gasoline, some diesel fuel, water, ice, berths, and marine supplies can be obtained at the small-craft facilities on the north side of the creek. A 7-ton lift is available; hull and engine repairs can be made.

At **Mile 37.4,** a fixed highway bridge with a clearance of 60 feet over the intracoastal route through **Manahawkin Bay,** connects the westerly shore of the bay with the barrier beach. The bridge also crosses three minor channels; one close to the westerly shore of the bay; one between the two marshy islands on the east side of the bay; and the other between the more easterly island and the barrier beach. Clearances over these minor channels, from north to east, are: 15 feet; width of 27 feet and clearance of 11 feet; and 15 feet, respectively. An overhead power cable, on the north side of the bridge and submerged at the intracoastal route, parallels the bridge for its entire length. Overhead clearances elsewhere are: 19 feet between the westerly shore of Manahawkin Bay and the first island on the east side of the bay; 27 feet between the two islands, and 37 feet between the more easterly island and the barrier beach.

There are many small-craft facilities along the bay shore of **Long Beach** between Barnegat Inlet and Beach Haven Inlet; see also chart 826—SC. Most of these are near the bridge at Mile 37.4; at **Ship Bottom,** Mile 39.0; and at **Beach Haven,** Mile 45.7. Gasoline, diesel fuel, water, ice, berths, and marine supplies can be obtained at most of these facilities. Hull, engine, and electronic repairs can be made. Largest haul-out capacities: marine railway, 42 feet; lift, 25 tons.

A **contract physician's office** of the U.S. Public Health Service is at Beach Haven; see Appendix for address.

Westecunk Creek, 2 miles northwest of Mile 42.5, is marked at the entrance by a light. A marked channel leads from Little Egg Harbor to a public landing 2.5 miles above the mouth of the creek. In 1966, the channel had a reported controlling depth of 6 feet. The town of **West Creek** is 0.3 mile west of the landing. Gasoline, water, ice, berths, and some marine supplies can be obtained at the small-craft facilities on the southwesterly side of the creek. Hull and engine repairs can be made. Largest haul-out capacities: marine railway, 40 feet; lift, 10 tons.

Chart 826—SC.—Little Egg Harbor has general depths of 4 to 6 feet in its northwestern part; in the southern part is a large group of marshy islands surrounded by a shallow area with depths of 1 to 3 feet. Daybeacons mark a race course in the harbor. Between some of these islands are narrow unmarked channels which begin and end abruptly in the shallow areas. The Intracoastal Waterway continues southward along the inner side of the barrier beach.

Parker Cove is on the north side of Little Egg Harbor about 3 miles northwest of **Mile 44.3. Parker Run,** marked by a light on the south side of the entrance, empties into the northwest corner of the cove. Depths of about 4 feet can be carried to a public dock on the north side of Parker Run, 0.3 mile above the entrance. Berthage and gasoline are available at the dock.

Tuckerton Creek empties into the west side of Little Egg Harbor about 4 miles northwest of **Mile 49.4.** A dredged approach, marked by lights, ex-

tends 1.6 miles southeastward from the mouth of the creek to the north end of **Story Island Channel.** In 1966-1967, the controlling depths were 4 feet in the approach channel to the mouth of the creek, thence 5 feet on the centerline to **Parkers Landing** and **Scow Landing,** 0.9 mile and 1.6 miles above the entrance, respectively, and thence 2 feet to the milldam at **Tuckerton,** 1.8 miles above the mouth. An overhead power cable, 0.6 mile above the mouth, has a clearance of 50 feet.

The mean range of tide is 2.4 feet throughout the Tuckerton Creek channel. Cross currents may be experienced in the approach channel. A **speed limit** of 8 miles per hour is prescribed for the channel; see **207.70,** Chapter 2.

There are numerous small-craft facilities along the creek, and on the north side of the approach channel below the entrance to the creek. Gasoline, berths, water, ice, and marine supplies can be obtained at most of the facilities. Hull, engine, and electronic repairs can be made. Largest haul-out capacities: marine railway, 65 feet; lift, 15 tons.

A **057°-237° measured course,** 5,280 feet long, is close northeastward of the dredged approach channel to Tuckerton Creek. The front markers are black piles with white square signs; the rear markers, on shore, are pilings with triangular daymarks.

At **Mile 50.2, Marshelder Channel,** with depths of 7 feet or more, makes northward and around the southwest side of **Story Island** for 2.5 miles to Little Egg Harbor and the dredged approach to Tuckerton Creek.

There are several thorofares through the marsh area south and west of Marshelder Channel, but **Little Sheepshead Creek** is the only one of any importance. This 2-mile winding passage from **Mile 50.7** of the Intracoastal Waterway to the eastern side of Great Bay has a controlling depth of about 3 feet and is used extensively. The fixed highway bridge over Little Sheepshead Creek has an 18-foot channel span with a clearance of 14 feet; overhead power cables have a least clearance of 36 feet.

The waterway route skirts the inner ends of the shoals in **Beach Haven Inlet** and **Little Egg Inlet,** both mentioned in Chapter 4, and continues westward through **Shooting Thorofare** and along the south side of **Great Bay,** which has general depths of 4 to 7 feet.

Big Creek, marked by a light at the entrance, empties into the north side of Great Bay opposite **Mile 55.0.** Depths of about 5 feet can be carried to a large marina 2 miles above the mouth. A highway bridge with a 30-foot fixed span and a clearance of 12 feet crosses the creek 1.2 miles above the mouth. Gasoline, berths, some marine supplies, and a 10-ton lift are available at the marina; hull, engine, and electronic repairs can be made.

Mullica River, which empties into the northwestern part of Great Bay, is navigable to a milldam 20 miles above the bay. A depth of about 4 feet can be carried across the Great Bay flats to the mouth of the river. Once inside the river, the water is deep and the midchannel is clear for a long distance.

Depths of 8 to 4 feet can be carried from the mouth of Mullica River to the bridge 16 miles above the entrance, and thence 2½ feet to within a mile of the milldam. A lighted cutoff, 3 miles above the mouth, has ample depth and reduces distances to points on the upper river by about 2 miles.

The navigation of Mullica River is fairly easy in the lower reaches, but the chart should be followed closely to avoid the unmarked 3-foot shoals in the entrance. The last few miles to the milldam are shallow, difficult, and full of stumps. The river is marked by lights and stake daybeacons as far as the first bridge; stake daybeacons mark the reaches above the bridge.

The fixed highway bridge, 6.5 miles above the mouth of Mullica River, has a clearance of 30 feet; the overhead power cable, 500 feet above the bridge, has a clearance of 67 feet. A boatyard, 0.5 mile below the bridge, has a 10-ton lift; hull and engine repairs can be made and gasoline and marine supplies are available. The highway bridge 13 miles above the mouth has a 30-foot bascule span with a clearance of 6 feet. The highway bridge, 16 miles above the mouth, has a 30-foot bascule span with a clearance of 5 feet. Gasoline, some supplies, and slips are available at small-craft facilities at **Green Bank** and **Sweetwater,** about 16 and 17 miles above the mouth, respectively. Minor repairs can be made; largest lift, 3 tons.

Nacote Creek empties into the southwest side of Mullica River 4 miles above the mouth. Controlling depths are about 5 feet to the highway bridge, 1.6 miles above the mouth of the creek, and thence 3 feet to **Port Republic,** at the head of navigation 3.6 miles from the mouth. The bridge has a 30-foot bascule span with a clearance of 5 feet. The overhead power cable on the east side of the bridge has a clearance of 57 feet. A boatyard is on the north side of the creek just below the bridge. Berths, gasoline, and a 44-foot marine railway are available. Hull and engine repairs can be made.

Bass River, which empties into the north side of Mullica River 5 miles above the mouth, has depths of about 4 feet to **New Gretna,** 2.4 miles above Mullica River. The highway bridge at New Gretna has a 30-foot bascule span with a clearance of 9 feet; see **117.225 (a) through (e), and (f) (8-a),** Chapter 2, for drawbridge regulations. The overhead power cable just below the bridge has a clearance of 42 feet. The fixed highway bridge just upstream has a clearance of 20 feet. Small-craft facilities, on both sides of the creek just below the

bascule bridge, have berths, gasoline, diesel by truck, water, ice, and marine supplies. Hull, engine, and electronic repairs can be made; largest haul-out capacities: marine railway, 48 feet; lift, 20 tons.

Wading River, which empties into the north side of Mullica River 7.5 miles above the mouth, has depths of about 4 feet to the highway bridge 4 miles upstream. The bridge has a 30-foot bascule span with a clearance of 5 feet.

Mott Creek, on the west side of Great Bay, is marked by a light and has depths of about 4 feet to a bulkhead landing 1.5 miles above the mouth; gasoline and some supplies are available. The 2-mile thorofare that winds northward through the marshes from the Mott Creek landing to the mouth of Nacote Creek has a controlling depth of about 2 feet.

Oyster Creek, on the west side of Great Bay 0.7 mile south of Mott Creek, is marked by a light and has depths of 4 feet to the small fishing village of **Oyster Creek,** 0.3 mile from the mouth, and 0.2 mile beyond to a public landing where gasoline, diesel fuel, water, ice, berths, and some marine supplies are available.

The Intracoastal Waterway leaves Great Bay at **Mile 56.8** and follows **Main Marsh Thorofare** to **Little Bay,** and thence along the western side of Little Bay across the mouths of **Hammock Cove,** and **Perch Cove** and westward of **Shad Island.**

At **Mile 60.3,** an alternate route swings eastward in **Brigantine Channel,** which leads to **Brigantine Inlet,** mentioned in Chapter 4. About 1.3 miles along the channel, the alternate route turns southward and follows **Obes Thorofare** along the inner side of Brigantine. The overhead power cable that crosses Obes Thorofare, 1.3 miles from Brigantine Channel, has a clearance of 47 feet.

There are many small-craft facilities along the bay side of **Brigantine.** Gasoline, marine supplies, berths, water, and ice are available; repairs can be made. **Baremore Quarters,** a cove on the inner side of Brigantine 2.3 miles along Obes Thorofare from Brigantine Channel, is a good harbor of refuge. Gasoline, berths, water, ice, and marine supplies can be obtained in the cove. Hull, engine, and electronic repairs can be made; a 15-ton lift is available.

The U.S. Public Health Service maintains a **contract physician's office** at Brigantine; see Appendix for address.

Storm warning signals are displayed; see chart.

From Baremore Quarters, the alternate route follows **Bonita Tideway** along the city waterfront, then swings westward through **Golden Hammock Thorofare** and rejoins the main route at **Mile 64.2.** The total length of the alternate route is 7 miles. Depths of 5 feet or more are on the alternate route along the inner side of Brigantine, but the channel shoals as it nears the main Intracoastal Waterway route and can be navigated only by shallow drafts.

The main route of the waterway leaves Little Bay at **Mile 60.3** and continues along the northwestern side of **Grassy Bay,** a shoal area mostly bare at low water, to **Meadow Cut.** From this short land cut, the route follows the southeastern side of **Reed Bay** to and through **Gull Island Thorofare,** across the mouth of **Broad Creek,** through **Middle Thorofare,** where it is rejoined by the alternate route from Brigantine, and into Absecon Channel at **Mile 64.5,** which leads to Absecon Inlet and the marine facilities in Clam Creek at **Atlantic City;** see Chapter 4.

Absecon Channel, the marked approach to Absecon Creek through Absecon Bay, can be entered at **Mile 64.5** or through **Point Bar Thorofare** at **Mile 65.6. Absecon Bay** is shallow and bares in some places at low water.

Absecon Creek, which flows into the northwest side of the bay, is crossed by three fixed bridges, about 1.5 miles above the mouth, at **Absecon;** least clearance is 3 feet. A marked dredged channel leads across Absecon Bay to the mouth of the creek. In July 1968, the channel had a controlling depth of 5 feet for a midwidth of 80 feet. In 1960, a midchannel depth of 3 feet could be carried in the creek to the bridges; the creek is reported navigable by small outboards for about 2 miles above the bridge. The mean range of tide is 3.6 feet at the mouth of Absecon Creek. A small-craft facility is on the north side of the creek, about 0.5 mile below the bridges. Gasoline, some marine supplies, and a 33-foot marine railway are available; minor repairs can be made.

From Absecon Channel, the Intracoastal Waterway follows **Beach Thorofare** along the northwest side of Atlantic City. The highway bridge, over the thorofare at **Mile 67.2,** has a bascule span with a clearance of 20 feet.

The railroad bridge over Beach Thorofare at **Mile 68.9** has a swing span with a clearance of 5 feet; see **117.220 (a) through (m),** Chapter 2, for drawbridge regulations and opening signals. The overhead power cables 200 yards north of the bridge have a clearance of 110 feet. A fixed highway bridge, 200 feet south of the railroad bridge, has a clearance of 35 feet.

The route of the New Jersey Intracoastal Waterway leaves Beach Thorofare at **Mile 69.5** and continues along the inner side of Atlantic City by way of **Inside Thorofare.** Albany Avenue Bridge, which crosses Inside Thorofare at **Mile 70.0,** has a bascule span with a clearance of 10 feet; see **117.220 (a) through (l), and (n),** Chapter 2 for drawbridge regulations and opening signals. A fuel pier is on the southeast side of the bridge; overnight berthing, gasoline, diesel fuel, and some marine supplies are available.

The highway bridge over the waterway at **Mile 71.2** connects **Ventnor Heights,** on the northwest side, with **Ventnor City,** on the beach; the bridge has a bascule span with a clearance of 9 feet. See

117.220(a) through (1), and (o), Chapter 2, for drawbridge regulations and opening signals. Gasoline, diesel fuel, berths, water, ice, and marine supplies can be obtained at the small-craft facilities below and above the bridge at Ventnor Heights; hull and engine repairs can be made. Largest haul-out capacities: marine railway, 40 feet; lift, 5 tons.

The waterway turns sharply northwestward at **Mile 71.4** and follows **West Canal** along the southwest side of Ventnor Heights to **Mile 72.3,** where it rejoins Beach Thorofare and continues southwestward.

From **Mile 73.3** southwest of **Shelter Island,** a marked channel with a controlling depth of about 3 feet leads northward along the eastern shores of **Shelter Island Bay** and **Lakes Bay** to **West Atlantic City,** 2.2 miles from the waterway. The channel continues along the north shore of Lakes Bay to the municipal boat basin and adjacent yacht club at **Pleasantville,** 3.4 miles from the waterway. Gasoline and some supplies are available.

The highway bridge over Beach Thorofare at **Mile 74.0** has a bascule span with a clearance of 14 feet. **Margate City** is on the beach south of the bridge. The Margate City basins offer gasoline and some supplies. One of the basins has a crane that can handle boats up to 12 tons for repairs.

At **Mile 75.4, Risley Channel** and **Dock Thorofare** leads northward for 2.2 miles to a marine basin near **Northfield.** Small-craft facilities, on the northwesterly side of Dock Thorofare, can provide gasoline, diesel fuel, water, ice, and marine supplies. Hull and engine repairs can be made. Largest haul-out capacities: marine railway, 50 feet; lift, 30 tons.

At **Mile 75.4** there is a choice of two routes to the inner side of Ocean City. The exposed route west of the **Longport** waterfront and across **Great Egg Harbor Inlet** has deeper water, but is restricted by the 25-foot clearance of the fixed highway bridge, 0.2 mile south-southwestward of **Mile 75.4.** Care is necessary when passing through the bridge to avoid the shoal making out into the channel from the west side. Repairs can be made at a boatyard just south of the bridge; lift, 12 tons. Gasoline is available. Currents are strong at the inlet crossing, and the route is exposed to heavy easterly seas. The highway bridge over the inlet, 0.4 mile eastward of **Mile 79.1,** has a bascule span with a clearance of 23 feet at the center.

The protected route is through Risley Channel and **Broad Thorofare,** but the channel is subject to continuous shoaling. The highway bridge over Broad Thorofare at **Mile 78.0** has a 49-foot bascule span with a clearance of 9 feet.

Ship Channel extends northwestward from **Mile 79.1** to Great Egg Harbor Bay. **Bass Harbor,** a narrow channel leading northward from Ship Channel 1.7 miles from the inlet bridge, has depths of about 10 feet in the entrance; the fixed highway bridge, 0.3 mile north of the entrance, has a 14-foot channel span with a clearance of 6 feet.

Somers Point, on the north side of Ship Channel 2 miles from the inlet bridge, is a summer resort with wharves that have depths of 2 to 5 feet at their outer ends.

There are many marinas and boatyards in Bass Harbor and along Somers Point. Berths, gasoline, diesel fuel, water, ice, and marine supplies are available. Hull and engine repairs can be made. Largest haul-out capacities: marine railway, 45 feet; lift, 20 tons.

A 2-mile combination of highway bridges and causeways extends southeastward over the channels and islands in **Great Egg Harbor Bay** from Somers Point to Ocean City. The bascule span over Ship Channel has a clearance of 14 feet. The bascule span over the Intracoastal Waterway at **Mile 80.4,** on the inner side of Ocean City, also has a clearance of 14 feet.

The fixed highway bridge that crosses Great Egg Harbor Bay, 2 miles westward of the bridge crossing the waterway at Mile 80.4, has a central-span clearance of 50 feet. An older highway bridge, 0.2 mile to the westward, has a bascule span with a clearance of 14 feet. About 0.5 mile above the old bridge, an overhead power cable, with a clearance of 76 feet over the channel and 50 feet outside the channel, crosses near the head of the bay.

Patcong Creek, marked on the westerly side of the entrance by a light, empties into the north side of Great Egg Harbor Bay, 2.6 miles northwestward of the bridge at Mile 80.4. The depth over the bar at the entrance is about 3 feet. The highway bridge, 0.5 mile from the mouth of the creek, has a swing span with a channel width of 34 feet and a clearance of 6 feet; the eastern opening should be used because the channel veers sharply to the eastward and passes close to the inner side of the first bend. See **117.225 (a) through (e), and (f)** (9), Chapter 2, for drawbridge regulations.

The fixed highway bridge, 2.3 miles above the entrance to Patcong Creek, has a channel span with a clearance of 8 feet. Another fixed highway bridge, 3 miles above the entrance, has a 30-foot channel span with a clearance of 7 feet; about 100 yards below this bridge, the decomposed piles of a former dam extend westward of midstream and are extremely dangerous. Gasoline, some supplies, and slips are available near the first bridge. Repairs can be made; lift, 10 tons.

Tuckahoe River, marked at the entrance by a light, empties into the south side of Great Egg Harbor 2.7 miles westward of the bridge at Mile 80.4. Controlling depths are about 2 feet across the flats at the entrance, thence 3 feet for 7 miles to the town of **Tuckahoe.** The overhead power cable, one mile below Tuckahoe, has a clearance of 41 feet. A highway bridge at the town has a 30-foot bascule span with a clearance of 9 feet; see **117.225** (a)

through (e), and (f) (10), Chapter 2, for drawbridge regulations.

Just below the bridge is a yacht club and marina; gasoline, and some marine supplies can be obtained.

Cedar Swamp Creek empties into the south side of Tuckahoe River 4.3 miles above the river mouth. The creek has depths of about 4 feet to a highway culvert 2.5 miles from the river where a marine railway can haul out boats up to 25 feet in length for repairs.

Great Egg Harbor River is a northwestward continuation of Great Egg Harbor Bay. The controlling depth is about 4 feet from Great Egg Harbor Bay to Mays Landing, at the head of navigation. The overhead power cables between the bay and Mays Landing have clearances of 65 feet or more. The mean range of tide if 4.0 feet at Mays Landing.

Middle River empties into the southwest side of Great Egg Harbor River 0.5 mile above the bay. Depths of 4 feet can be carried up Middle River for 2 miles.

Powell Creek empties into the east side of Great Egg Harbor River 5 miles above the bay. Depths of about 2½ feet can be taken to the small-craft facilities about 0.5 mile above the mouth. Gasoline, berths, water, ice, and some marine supplies are available. Hull and engine repairs can be made; lift, 15 tons.

A 50-foot marine railway is available on the east side of Great Egg Harbor River, about 7 miles above the mouth. Gasoline, berths, and water can be obtained at a small-craft facility about 1 mile farther up the river.

Mays Landing, at the head of navigation on Great Egg Harbor River, is 12 miles from Great Egg Harbor Bay. The river water is nearly fresh at the town. The town bulkhead has depths of about 5 feet alongside. A marina here can provide gasoline, berths, water, ice, and some marine supplies. Hull and engine repairs can be made; marine railway, 50 feet; lift, 15 tons.

The Intracoastal Waterway continues southerly along the inner side of **Ocean City;** lagoons here accommodate craft drawing up to 5 feet. Gasoline, berths, diesel fuel, water, ice, and marine supplies are available. Hull and engine repairs can be made. Largest haul-out capacities: marine railway, 50 feet; lift, 20 tons. **Storm warning signals are displayed;** see chart.

The waterway follows **Beach Thorofare** to **Peck Bay;** the mudflats bordering the channel through the bay are visible in some places at low water. The highway bridge at **Mile 84.3** has a fixed channel span with a clearance of 35 feet. An overhead power cable, close southward of the bridge, has a clearance of 55 feet.

From Peck Bay, the route follows **Crook Horn Creek.** The railroad bridge over the creek at **Mile 86.6** has a swing span with a clearance of 2 feet. The west opening should be used as the east one is obstructed. The swing span moves slowly.

The waterway enters **Middle Thorofare** at **Mile 88.0,** thence continues through **Ben Hands Thorofare** to **Mile 89.8** in **Main Channel** which leads eastward and northward for 1.5 miles to the inner side of **Strathmere,** just south of Corson Inlet. The highway bridge over the waterfront channel at Strathmere has a bascule span with a clearance of 15 feet. There are several small-craft facilities at Strathmere; gasoline, berths, water, ice, and some marine supplies can be obtained. Engine repairs can be made; marine railway, 14 feet.

The waterway follows Main Channel southwestward, passing into shallow **Ludlam Bay** at **Mile 91.3** and enters **Ludlam Thorofare** at **Mile 92.5.** The fixed highway bridge at **Mile 93.6** has a clearance of 35 feet, and the overhead power cables crossing at **Mile 93.8** have a least clearance of 56 feet.

Sea Isle City, on the barrier beach at the southeast end of the bridge at **Mile 93.6,** has several basins with depths of 3 to 6 feet in the entrances and slightly more inside. Gasoline, berths, water, ice, and marine supplies are available. Hull and engine repairs can be made; largest lift, 20 tons.

A **contract physician's office** of the U.S. Public Health Service is at Sea Isle City; see Appendix for address.

The New Jersey Intracoastal Waterway enters **Townsend Channel** at **Mile 95.3** and follows the inner side of the resort known as **Townsends Inlet.** Gasoline, diesel fuel, water, ice, berths, and marine supplies are available at the small-craft facilities at Townsends Inlet. Engine repairs can be made; marine railway, 35 feet. **Storm warning signals are displayed;** see chart.

At **Mile 96.4,** the waterway is 300 yards west of the highway bridge over **Townsend Inlet,** described in Chapter 4. **Avalon,** on the southwest side of the inlet, is separated from the waterway's **Ingram Thorofare** by a wide marsh area.

Cornell Harbor, a channel with a reported depth of 6 feet in 1968, leads southeastward through the marsh from **Mile 96.8** to Avalon thence along the inner side of the resort.

Pennsylvania Harbor, 0.5 mile southwestward of Cornell Harbor, has 2 feet at the northwesterly entrance with deeper water inside. **Princeton Harbor,** 0.2 mile southwestward of Pennsylvania Harbor, has a depth of 6 feet in the northwesterly entrance, but as little as 2 feet inside. Both waterways lead to the Avalon waterfront. The fixed bridges over the Avalon channel at the inner ends of the two harbors restrict passage between them or to the southwest to an overhead clearance of 4 feet.

Gasoline, diesel fuel, water, ice, berths, some marine supplies, and a 20-ton lift are available at Avalon. Gasoline, berths, water, ice, some marine supplies, and a 2-ton lift are available in Pennsylvania Harbor.

A fixed highway bridge with a clearance of 35 feet crosses Ingram Thorofare at **Mile 98.1.**

The waterway follows Ingram Thorofare westward to **Paddy Thorofare,** thence into shallow **Great Sound** at **Mile 98.9.** At **Mile 100.0,** the route leaves Great Sound and follows **Gull Island Thorofare** southward to the Stone Harbor waterfront.

Stone Harbor is a resort on the northeast side of Hereford Inlet. The highway bridge over the waterway at **Mile 102.0** has a bascule span with an 11-foot clearance.

There are several basins along the Stone Harbor waterfront where gasoline, berths, ice, water, and marine supplies are available. Hull and engine repairs can be made; largest lift, 30 tons.

The waterway follows **Great Channel** southwestward along the Stone Harbor waterfront, then turns sharply westward at **Mile 103.3** and follows the northwestern shore of **Nummy Island.** The bridge over the channel that leads along the east side of Nummy Island to **Hereford Inlet** was described in Chapter 4.

At **Mile 104.6,** the waterway route through **Grassy Sound Channel** is joined by the main channel from Hereford Inlet. The bascule bridge over the inlet channel was described in Chapter 4.

Beach Creek, on the inner side of North Wildwood just south of Hereford Inlet, has depths of about 2 feet in the entrance, but deeper water inside. The fixed bridge, 0.4 mile above the entrance, has a channel width of 17 feet and a clearance of 5 feet.

The highway bridge over the waterway at **Mile 105.2** has a bascule span with an 8-foot clearance. The route enters **Grassy Sound** at **Mile 106.1** and follows a well-marked channel. The railroad bridge over the waterway at **Mile 107.5,** the southwestern end of Grassy Sound, has a bascule span with a 6-foot clearance; the overhead power cable at the bridge has a 100-foot clearance.

East of the bridge at **Mile 107.5,** a 5-foot channel leads along the northeast side of West Wildwood for 0.8 mile to the inner waterfront of **Wildwood.** Passage is limited by the 5-foot clearances of the fixed bridges that connect the two communities.

At **Mile 108.7, Post Creek** extends eastward from the waterway and widens into a small bay between Wildwood and West Wildwood. **Ottens Harbor,** a dredged slip with depths of about 10 feet, extends 0.5 mile southeastward from the mouth of Post Creek. Commercial wharves along the waterway can accommodate vessels up to 150 feet in length.

The highway bridge over the waterway at **Mile 108.9** has a bascule span with a 25-foot clearance.

Sunset Lake, a comparatively deep basin on the inner side of **Wildwood Crest,** can be entered from either **Mile 109.3** or **Mile 110.2** of the Intracoastal route. The controlling depth is about 7 feet in the entrances.

There are many places along the Wildwood waterfront where berths, gasoline, diesel fuel, water, ice, and marine supplies are available. Hull and engine repairs can be made. Largest haul-out capacities: marine railway, 50 feet; lift, 80 tons.

The waterway continues southward through **Jarvis Sound** and **Middle Thorofare.** The highway bridge over Middle Thorofare at **Mile 112.2** has a bascule span with a clearance of 23 feet. Just north of the bridge, **Lower Thorofare** leads eastward from the waterway for 0.3 mile, then turns northward. There is a long marginal fish wharf on the east side of Lower Thorofare; fuel and supplies are available.

The waterway route crosses the inner end of **Cape May Inlet** at **Mile 112.6** and continues westward through Cape May Harbor; the inlet and harbor were described in Chapter 4.

Cape May Canal is entered at **Mile 114.1.** Vessels transiting the canal should limit their speed to 5 knots and should proceed with special care in the vicinity of the bridges; passage of barge tows may be delayed because of tide and current conditions.

The mean range of tide is between 4 and 5 feet in Cape May Canal. The current velocity is 1.9 knots at the east end and 0.9 knots at the west end. In April 1969, the controlling depth in the canal was 10 feet to the east end of the Cape May-Lewes Ferry Terminal, thence 15 feet to Delaware Bay.

The fixed highway bridge, over Cape May Canal at **Mile 114.3,** has a clearance of 55 feet. The railroad bridge at Mile 115.1 has a swing span with a clearance of 4 feet. The overhead power cables on each side of the railroad bridge have a clearance of 75 feet. In 1970, a fixed highway bridge with a design clearance of 55 feet was under construction 200 yards westward of the railroad bridge.

The highway bridge at **Mile 115.5** has a swing span with a 40-foot channel width and a 10-foot clearance. The overhead TV cable just west of the bridge has a clearance of 60 feet.

The Cape May terminal of the **Cape May-Lewes Ferry** is on the north side of Cape May Canal at **Mile 117.3.**

At **Mile 117.7,** Cape May Canal enters Delaware Bay between stone jetties which are 2 miles north of Cape May Light. The outer end of the jetties are marked by lights; a fog signal is on the north jetty.

6. DELAWARE BAY

This chapter describes Delaware Bay and River, and their navigable tributaries, and includes an explanation of the Traffic Separation Scheme at the entrance to the bay. Major ports covered are Wilmington, Chester, Philadelphia, Camden, and Trenton, with major facilities at Delaware City, Deepwater Point, and Marcus Hook. Also described are Christina River and Schuylkill River, the principal tributaries of Delware River, and other minor waterways, including Mispillion, Maurice, and Cohansey Rivers.

Chart 1219.—Delaware Bay and Delaware River form the boundary between the State of New Jersey on the east and the States of Delaware and Pennsylvania on the west. The bay is an expansion of the lower part of Delaware River; the arbitrary dividing line, 42 miles above the Delaware Capes, extends from Liston Point, Del., to Hope Creek, N.J. Deep-draft vessels use the Atlantic entrance, which is about 10 miles wide between Cape May on the northeast and Cape Henlopen on the southwest. Medium-draft vessels can enter Chesapeake Bay on the south through the Chesapeake and Delaware Canal, which is described in Chapter 7.

Mileages shown in this chapter, such as Mile 0.9E, Mile 12W, etc., are the nautical miles above the **Delaware Capes** (or, "the Capes"), referring to a line from Cape May Light to the tip of Cape Henlopen. The letters N, S, E, or W, following the numbers, denote by compass points the side of the river where each feature is located.

The approaches to Delaware Bay have few offlying dangers. An obstruction, unproved as to position and depth, is shown on chart 1109 at 38°40′ N., 73°52′ W., about 58 miles eastward of Cape Henlopen; the obstruction is said to be only 5 fathoms deep, and the area should be avoided.

The 100-fathom curve is 50 to 75 miles off Delaware Bay, and the 20-fathom curve is about 25 miles off. Depths inside the 20-fathom curve are irregular, and in thick weather a deep-draft vessel should not approach the coast closer than depths of 12 fathoms until sure of its position; the safest approach or passing courses would be outside Five Fathom Bank Lightship and Delaware Lighted Horn Buoy D (38°27. 3′N., 74°35. 1′W.).

Cape May is the extensive peninsula on the northeast side of the entrance to Delaware Bay. **Cape May Light (38°56.0′ N., 74°57.6′ W.),** 165 feet above the water, is shown from a 170-foot white tower on Cape May Point.

The shoals off Cape May are mixed clay and sand and have the consistency of hardpan; the ridges run in approximately the same directions as the currents. **Cape May Channel,** a mile southwest of the cape, is an unmarked passage between the shoals. The channel is used by fishing vessels and pleasure craft; local knowledge is required to carry the best water.

The channels have strong currents, and many tide rips form near **Prissy Wicks Shoal,** which has depths as little as 2 feet about 2 miles south of Cape May Light. In Cape May Channel, the current velocity is 1.5 knots on the flood and 2.3 knots on the ebb.

Overfalls Shoal has a depth of 6 feet about 5 miles southwestward of Cape May Light. The 30-foot curve extends 3 miles farther in the general direction of Cape Henlopen and has a depth of 19 feet at its outermost limit.

McCrie Shoal, 7 miles southeast of Cape May Light, has a least charted depth of 18 feet; a lighted whistle buoy is on the southeast side of the shoal.

Five Fathom Bank has a least charted depth of 17 feet about 15 miles eastward of Cape May Light. The area, inclosed by the 30-foot curve, is about 9 miles long, north to south, and about 2 miles wide. The greater part of Five Fathom Bank is within authorized fishtrap limits. Several buoys are moored around the bank.

Five Fathom Bank Lightship (38°47. 3′N., 74°34. 6′W.), with red hull and the name FIVE FATHOM in large white letters on the sides, is about 20 miles east-southeast of Cape May Light; the light is 63 feet above the water. The vessel has a fog signal and a radiobeacon. The code flag and radio call is NNBL. **Daytime storm warning signals are displayed.**

Cape Henlopen (see also chart 411), on the southwest side of the entrance to Delaware Bay, is marked by a number of towers and buildings. About 0.5 mile southward from the tip of the cape is a visual **reporting station** from which vessels are reported to the Philadelphia Maritime Exchange. **Cape Henlopen Radiobeacon (38°47. 6′N., 75°05. 5′W.)** is 100 yards northeast of the station. **Storm warning signals are displayed;** see chart.

A wreck covered 11 feet is reported in 38°48′10″N., 75°04′24″W., about 1.1 miles eastward of the tip of Cape Henlopen; mariners are advised to proceed with caution in this area.

A **naval restricted area** extends northeastward from Cape Henlopen to Overfalls Shoal; see **207.105,** Chapter 2 for limits and regulations.

Hen and Chickens Shoal extends southeastward from the tip of Cape Henlopen. The shoal has depths of 5 feet a mile from the tip and 9 feet 2 miles farther to the southeastward. The southern

limit of the 30-foot curve is marked by a lighted buoy, which is 7 miles from Cape Henlopen and 3.5 miles off Rehoboth Beach.

The Cape May-Lewes Ferry crosses the main channel in Delaware Bay about 4 miles northward of Cape Henlopen.

Delaware Lighted Horn Buoy D (38°27.3'N., (38°27.3'N., 74°35.1'W.), replacing Delaware Lightship, is a large navigational buoy (LNB) about 32 miles southeastward of Cape Henlopen. The buoy is painted red, shows a flashing white light 36 feet above the water, and is equipped with a radar reflector and radiobeacon.

Boundary lines of inland waters.—The lines established for Delaware Bay Entrance are described in **82.25**, Chapter 2.

A **Traffic Separation Scheme** has been established off the entrance to Delaware Bay; see chart 1219.

The scheme is composed basically of **directed traffic areas** each with one way inbound and outbound **traffic lanes** separated by defined **separation zones; a precautionary area;** and a **pilot boat cruising area.** The scheme is recommended for use by vessels approaching or departing Delaware Bay, but is not necessarily intended for tugs, tows, or other small vessels which traditionally operate outside of the usual streamer lanes or close inshore.

The Traffic Separation Scheme has been designed to aid in the prevention of collisions at the approaches to major harbors, but is not intended in any way to supersede or alter the applicable rules of the road. Separation zones are intended to separate inbound and outbound traffic lanes and to be free of ship traffic, and should not be used except for crossing purposes. Mariners should use extreme caution when crossing traffic lanes and separation zones.

The **precautionary area** for Delaware Bay entrance is inscribed by part of a circle with a radius of eight miles centered on Harbor of Refuge Light (38°48.9'N., 75°05.6' W.) and extending from off Cape May Point to the shore south of Cape Henlopen with the traffic lanes fanning out from the circumference of the circle. The outer part of the northeast quadrant of the area is full of shoals, and there are shoal spots covered from 28 to 33 feet in the western extension of the Five Fathom Bank-Cape Henlopen Traffic Lane, about 0.4 mile northward of Delaware Bay Approach Lighted Bell Buoy 2A. A charted wreck, about 1.2 miles north of Lighted Whistle Buoy FB, is jut inside the precautionary area near the western extension of the Five Fathom Bank-Cape Henlopen Traffic Lane. In the southeast quadrant, the eastern limit of Hen and Chickens Shoal is marked by a red sector in Harbor of Refuge Light and Lighted Whistle Buoy 1HC. The usable part of the precautionary area has depths of 33 to over 100 feet. Since the precautionary area is used by both incoming and outgoing vessels, making the transition between Delaware Bay and the traffic lanes, extreme care is advised in navigating within the area.

The **pilot boat** cruising area is about a mile northeastward of Cape Henlopen; see pilotage later in this chapter.

Eastern Directed Traffic Area:

Five Fathom Bank to Cape Henlopen Traffic Lane, Inbound.—The eastward approach to Delaware Bay is north of Five Fathom Bank Lightship (38°47.3'N., 74°34.6' W.) in Five Fathom Bank-Cape Henlopen Traffic Lane that tapers from 2 miles to 1 mile wide in its 16.4-mile length. By entering the traffic lane 1.5 miles north of Five Fathom Bank Lightship, a course of **268°** follows the centerline of the traffic lane to the precautionary area, thence a course of **262°** for about 3.5 miles passing southward of Delaware Bay Approach Lighted Bell Buoy 2A, thence a westerly course for about 2.5 miles to the pilot cruising area. Depths in the traffic lane vary from 37 feet or more in the eastern part to a reported 34 feet at the west end. Shoal spots covered 28 to 33 feet are in the western extension of the lane inside the precautionary area, about 0.4 mile northward of Delaware Bay Approach Lighted Bell Buoy 2A. Avoid the charted wreck 2.9 miles west-northwestward of Five Fathom Bank Lightship, and the charted wreck, about 1.2 miles north of Lighted Whistle Buoy FB, just inside the precautionary area near the western extension of the lane.

Cape Henlopen to Five Fathom Bank Traffic Lane, Outbound.—The eastward exit by outbound vessels is south of Five Fathom Bank Traffic Lane Lighted Whistle Buoy FB (38°47.35 N., 74°55.5' W.) through Cape Henlopen-Five Fathom Bank Traffic Lane that expands from 1 mile to 2 miles wide. By entering the traffic lane 1 mile southward of Lighted Whistle Buoy FB, a course of **091½°** follows the centerline of the outbound traffic lane. When seaward of Five Fathom Bank Lightship steer usual courses to destination. Depths in the traffic lane are 40 feet or more.

Separation Zone.—The eastern separation zone between the inbound and outbound traffic lanes is 1 mile wide centered on a line through Five Fathom Bank Lightship and two lighted whistle buoys 7.5 and 16.4 miles, respectively, westward from the lightship.

Southeastern Directed Traffic Area:

Delaware to Cape Henlopen Traffic Lane, Inbound.— The southeastward approach to Delaware Bay is north of Delaware Lighted Horn Buoy D (38°27.3'N., 74°35.1'W.) in Delaware-Cape Henlopen Traffic Lane that tapers from 2 miles to 1 mile wide in its 24.2-mile length. By entering the traffic lane 1.5 miles northeastward of Delaware Lighted Horn Buoy D, a course of **312°** follows the centerline of the traffic lane to the precautionary area, thence a continuation of the course for an additional 6.5 miles leads to the pilot cruising area. Depths in the traffic lane are 46 feet or more.

Cape Henlopen to Delaware Traffic Lane, Outbound.— The southeastward exit by outbound vessels is southwestward of Delaware Traffic Lane Lighted Whistle Buoy DC (38°43.8'N., 74°57.6'W.) through Cape Henlopen-Delaware Traffic Lane that expands from 1 mile to 2 miles wide. By entering the traffic lane 1 mile southwestward of Lighted Whistle Buoy DC, a course of **134½°** follows the centerline of the outbound traffic lane. When seaward of Delaware Lighted Horn Buoy D, steer usual courses to destination. Depths in the traffic lane are 46 feet or more.

Separation Zone.—The southeastern separation zone between the inbound and outbound traffic lanes is 1 mile wide centered on a line through Delaware Lighted Horn Buoy D and three lighted whistle buoys 7.3, 14.7, and 24.2 miles, respectively, on a bearing of 313° from Delaware Lighted Horn Buoy D.

Channels.—Delaware Bay is shallow along its northeastern and southwestern sides and there are extensive shoal areas close to the main channel. The bay has natural depths of 50 feet or more for a distance of 5 miles above the Capes; thence federal project depths of 40 feet to the upper end of Newbold Island, 110 miles above the Capes, and thence 25 feet to the Trenton Marine Terminal, 115 miles above the Capes. See Notice to Mariners and latest editions of the charts for controlling depths.

Anchorages.—Deep-draft vessels sometimes anchor in various places along the dredged channel through the lower bay, but usually continue to more sheltered areas in the upper bay and river. Defined anchorage areas in Delaware Bay and Delaware River are shown on the chart; see **110.157**, Chapter 2, for limits and regulations.

In bad weather tows and small craft sometimes anchor behind the breakwaters north and west of Cape Henlopen.

Tides.—The mean range of tide is 4.1 feet in Breakwater Harbor, 5.5 feet at Reedy Point, 5.6 feet at Marcus Hook, 5.9 feet at Philadelphia, and 6.8 feet at Trenton. See the Tide Tables for daily predictions for Breakwater Harbor, Reedy Point, and Philadelphia.

Currents.—The current velocity is 1.8 knots in Delaware Bay entrance; see the Tidal Current Tables for daily predictions. The tables also list current differences and other constants for about 55 other places in Delaware Bay and River.

The Tidal Current Charts, Delaware Bay and River, present a comprehensive view of the tidal-current movement in the bay and river, and provide a means of readily determining the direction and velocity of the current at various places throughout the waterway. The charts may be used for any year and are referred to daily predictions for Delaware Bay Entrance.

Weather.—Fogs are most frequent along this part of the Atlantic Coast during December, January, and February, but many be encountered at other times. The fogs come in with easterly winds and are cleared away by westerly and northerly winds. In the late fall, dense fogs are liable to occur and may last through the forenoons for two or three days in succession. Autumn fogs nearly always clear away before noon.

Storm warning display locations are listed on the NOS charts and shown on Marine Weather Services Charts published annually by the National Weather Service.

Ice.—In ordinary winters there is usually sufficient ice in Delaware Bay and River to be of some concern to navigation. Thin ice has been known to form early in December between Chester and Philadelphia, but the heavier ice usually does not begin to run before January. The tidal currents keep the ice in motion, except where it packs in the narrower parts of the river; ice breakers from Philadelphia keep these parts of the river open. The ice usually packs heavier than elsewhere at Ship John Shoal, at Pea Patch Island, at Deepwater Point, and below Gloucester City. Ice is rarely encountered after the early part of March.

In severe winters, navigation has occasionally been interrupted above Chester, but the powerful vessels employed in the foreign and coasting trade keep the channel fairly open. The greatest danger is to wooden vessels, which are liable to be cut through on the waterline if they encounter thin ice.

Freshets.—Freshets are of rare occurrence, except in the vicinity of Trenton, and do not interfere with navigation unless accompanied by ice. Freshets and ice above Philadelphia are discussed further in the latter part of this chapter.

Pilotage on Delaware Bay and Delaware River is compulsory for all foreign vessels and United States vessels under register in the foreign trade. Pilotage is optional for United States vessels in the coastwise trade who have onboard a pilot licensed by the Federal Government for these waters.

Pilot services are provided on a 24-hour basis by the Pilots' Association for the Bay and River Delaware, who maintain an office in Philadelphia. Pilots are generally arranged for in advance through ships' agents, and board incoming vessels from the pilot boat in the pilot cruising area off Cape Henlopen. Pilots normally require an advance notice of 8 hours prior to vessel's arrival off Cape Henlopen.

The pilot boat PHILADELPHIA, has a dark blue hull with white housing and a blue stack with the letter "P" in its center. The pilot boat maintains a 24-hour watch on 2182 kHz and 2738 kHz, and on VHF channels 13 (156.65 MHz), and 16 (156.8 MHz). The pilots carry portable radiotelephones for bridge-to-bridge communications on VHF channel 13 (156.65 MHz).

Reporting stations.—The Philadelphia Maritime Exchange operates a central port operation and ship reporting service for the Port of Philadelphia,

utilizing VHF-FM radio and visual reporting stations.

The Exchange's Port Radio, KEW-845, is operated on a 24-hour basis from the following control points: Marcus Hook Reporting Station, 0600 to 1900 hours; Pilots' Association office in Philadelphia, 1900 to 0600 hours. The visual reporting station is at Cape Henlopen.

Information as to position, estimated time of arrival, docking, or other port operations, can be transmitted to or from ships on VHF channel 14 (156.7 MHz). The control points also monitor VHF channel 16 (156.8 MHz).

To obtain the maximum benefits of this service, ships are requested to monitor VHF channels 14 and 16 while transiting Delaware Bay and River.

Towage.—A large fleet of tugs operating out of Philadelphia, is available at any time of the day or night for any type service required. Most of the tugboat companies will dispatch their vessels to any place in Delaware Bay or its tributaries. Some of the companies also have tugs available for deep-sea towing.

Quarantine.—All inbound vessels subject to quarantine inspection and destined to points above Marcus Hook, unless granted prior radio pratique, are required to anchor off the Marcus Hook boarding station. Detention cases are taken to Philadelphia General Hospital. See **110.157 (a) (8), and (b),** Chapter 2, for quarantine anchorage regulations and limits.

Agriculture quarantine.—Vessels subject to such inspections are usually inspected at their berths. Officials maintain an office in Philadelphia.

Coast Guard.—The office of the **Captain of the Port** is at the Coast Guard Base, Gloucester City, N.J. Vessel **documentation offices** are in Wilmington, Del., and in Philadelphia, Pa.

Customs and Immigration.—The Bureau of Customs and the Immigration and Naturalization Service have district headquarters in Philadelphia.

Supplies.—Bunker oil is available in quantity at Philadelphia and at several other places, including Delaware City, on the north side of the entrance to the Chesapeake and Delaware Canal. Many vessels are bunkered from barges alongside. Fresh water is unlimited in the larger ports. Small craft can obtain fuel and supplies not only in the larger ports, but at many of the smaller cities and towns along the river and bay.

Repairs.—The largest shipyards along Delaware River are at Chester and Philadelphia. Many of the other cities and towns have boatyards for small craft.

Chart 411.—Delaware Breakwater is the popular name for the anchorage areas behind the outer and inner breakwaters north and west of Cape Henlopen. Harbor of Refuge is the outer and deeper of the two areas; Breakwater Harbor is the inner area.

Harbor of Refuge is behind the breakwater that begins 0.7 mile north of Cape Henlopen and extends 1.3 miles in a north-northwestward direction. A line of ice breakers, marked by lights at the outer ends, extends 0.4 mile in a west-by-south direction onto **The Shears** from a position 0.4 mile northwestward of the north end of the breakwater. **Harbor of Refuge Light,** (38°48.9′N., 75°05.6′W.) 72 feet above the water, is shown from a white conical tower on a cylindrical substructure near the south end of the breakwater; the station has a fog signal. A light marks the breakwater near its northern end.

The harbor has depths of 15 to 70 feet between the breakwater and a shoal ridge, 8 to 12 feet deep, a mile to the southwestward. The deepest water is behind the Harbor of Refuge Light. The entrance from southeastward is deep and clear, while that from northwestward across The Shears has depths of 10 feet or less. Harbor of Refuge affords good protection during easterly gales.

Breakwater Harbor, between the inner breakwater and the shore, is excellent for light-draft vessels in all weather except heavy northwesterly gales and even then affords considerable protection.

The inner breakwater begins 0.3 mile southwest of the tip of Cape Henlopen and extends 0.8 mile in a west-northwest direction. **Delaware Breakwater Light** (38°47.8′N., 75°06.0′W.), 61 feet above the water, is shown from a brown conical tower on the east end of the breakwater; the station has a fog signal. A low-power light is shown from a black skeleton tower on the west end of the breakwater.

The Lewes terminal of the **Cape May-Lewes Ferry** is in the basin at the southwest end of Breakwater Harbor, 1.3 miles southwest of Delaware Breakwater Light. The basin is protected on its west side by a breakwater marked by lights and a fog signal.

Two dredged channels lead through Breakwater Harbor to the ferry basin; one leads from the northeastward along the southeast side of the harbor, and the other leads from the northward along the west side of the harbor. In April 1968, the channel leading from the northeastward had a controlling depth of 11 feet; and in 1964, the channel leading from the north had a controlling depth of 17 feet. Depths of about 17 feet are reported in the basin, and depths of 5 to 12 feet are in other parts of Breakwater Harbor.

The large fish piers on the south side of Breakwater Harbor have depths of 15 feet or more at the outer ends. A **naval restricted area** is in the eastern part of the harbor; see **207.105,** Chapter 2, for limits and regulations.

Chart 1218.—The low, marshy southwestern shore of Delaware Bay has few prominent marks above Cape Henlopen. There are scattered groups

of houses, a few observation towers, and the lights and ranges of the tributaries.

The tributaries are narrow and crooked, and vessels have difficulty making some of the turns. These streams are little used except by local fishing boats and by vessels carrying petroleum products to the towns along the banks. Strangers seldom attempt to enter. When entering or leaving these tributaries, allowance should be made for the bay currents which set across the entrances and have considerable velocity at times.

There are many shoal spots with depths as shallow as 2 to 6 feet between Cape Henlopen and Bombay Hook Point (39°18.7'N., 75°26.5'W.). Most of the spots are unmarked and are subject to some change, both in depth and position. Strangers should proceed with caution in any of the passages southwest of the ship channel.

Buoys mark a passage along the southwestern side of Delaware Bay from a point about 11.4 miles northwestward of Cape Henlopen and about 4 miles offshore to the lighted buoy about 1.8 miles off the entrance to Murderkill River. The passage is used by vessels entering or leaving the tributaries. The many fish and oyster stakes in the area are to be avoided. The passage should not be attempted at night.

Vessels entering the southwestern passage from northward usually leave the main ship channel about 2.5 miles below Ship John Light and head in a southerly direction for the vicinity of the lighted buoy off Murderkill River. A depth of 7 feet can be carried through this passage, but care is necessary to avoid the 4-foot spot 2 miles off Little River.

Roosevelt Inlet (chart 411), 3 miles west of Cape Henlopen, is described in Chapter 8.

Mispillion River, protected at the entrance by jetties, empties from the westward into Delaware Bay 13 miles northwest of Cape Henlopen. The jetties, about 200 feet apart, extend about a mile southeastward from shore; the southwest jetty is marked at the end by a light. The river is used by pleasure and fishing craft, and oil barges bound for Milford.

In 1957, the reported controlling depths were 5 feet through the jetties, thence 4½ feet to the fixed highway bridge at **Milford,** 10 miles above the mouth.

The mean range of tide is 4.6 feet in the entrance. The current velocity is 1.5 knots on the flood and 1.0 knot on the ebb. In 1968, an abnormal tidal cycle characterized by a long period at high water and a rapid change to low water, was observed at the entrance to Mispillion River. Occasional periods of lower than normal low water levels were also encountered. Due to these abnormal tide conditions, mariners are advised to use a straight approach to the entrance, and to stay well within the white sector of the southwest jetty light.

Gasoline and water can be obtained at a small landing just inside the mouth of Mispillion River. The oil terminal about a mile below Milford has about 8 feet alongside, and the wharves at Milford have 5 to 7 feet alongside; mud bottom.

The highway bridge about 0.5 mile below Milford has a bascule span with a width of 45 feet and a clearance of 5 feet; see **117.237a,** Chapter 2, for drawbridge regulations. In 1970, a fixed highway bridge with a design clearance of 25 feet was under construction about 0.6 mile below this bridge. An overhead power cable crosses the river about 6 miles above the mouth. Just below the Milford fixed highway bridge, which is the head of navigation, is a marine railway that can haul out boats up to 55 feet for repairs. Marine supplies are available at Milford. Just below the first highway bridge, 0.5 mile below Milford, there is a marine railway that can haul out boats up to 47 feet for repairs.

A **danger zone** of a naval aircraft bombing area extends 2 miles offshore just north of the entrance to Mispillion River; see **204.24,** Chapter 2, for limits and regulations.

Murderkill River, 21 miles northwestward of Cape Henlopen, is used by fishing vessels and a few pleasure craft. In October 1968, the controlling depth was 6 feet through the dredged entrance channel, thence in 1957, reported depths of 4½ feet to **Frederica,** 6.5 miles above the mouth. The mean range of tide is 4.8 feet in the entrance.

A **247°** lighted range and buoys mark the entrance to Murderkill River, and a lighted buoy, about 1.4 miles offshore, marks the approach.

Bowers, a summer resort on the north side of the entrance to Muderkill River, is prominent from offshore. Gasoline and some marine supplies are available. A marine railway across the river from Bowers can handle craft up to 50 feet in length for repairs. The wharves along Murderkill River are used extensively by fishing and oyster boats. The overhead cables crossing the river at Bowers have a clearance of 50 feet, and the overhead power cable crossing about 4.3 miles above the mouth has a clearance of 62 feet. The fixed highway bridge, 6 miles above the mouth, has a clearance of 12 feet.

St. Jones River, 0.5 mile north of Muderkill River, leads to the city of **Dover,** about 9.5 miles above the mouth, the capital of Delaware. In 1965, the controlling depths were less than a foot in the marked entrance channel, thence 4 feet to Lebanon, and about 3 feet to Dover. The mean range of tide is 4.8 feet in the entrance; the current velocity is about 0.7 knot.

An overhead power cable with a clearance of 60 feet crosses the entrance to St. Jones River; another power cable, 2.4 miles above the mouth, has a clearance of 56 feet. A highway bridge at **Barkers Landing,** 3 miles above the mouth, has a bascule span with a clearance of 5 feet. A highway bridge at **Lebanon,** 6 miles above the mouth, has a swing span with a width of 29 feet and a clearance

of 6 feet. The overhead power cable at the drawbridge has a clearance of 50 feet. See **117.237**, Chapter 2, for drawbridge regulations for St. Jones River. The fixed highway bridge 9 miles above the mouth has a clearance of 11 feet. There are no landings at Dover.

Little River (39°09.6'N., 75°24.5'W.) is 26 miles northwest of Cape Henlopen. A **304°02'** lighted range marks the approach to the entrance. In September-October 1969, the controlling depth was 2 feet across the bar and to the fixed highway bridge at the town of **Little Creek,** 2 miles above the river mouth. An overhead power cable with a clearance of 52 feet crosses the river 0.2 mile below the fixed highway bridge. The mean range of tide is 5.4 feet in the entrance.

Mahon River, 27 miles northwest of Cape Henlopen, is used by commercial fishing boats, and small fuel tankers and barges. The controlling depth is about 8 feet in the privately marked entrance channel with deeper water inside. The Dover Air Force Base fuel pier, about 200 feet long with reported depths of 10 feet along both sides, is on the west side of the entrance. Gasoline, diesel fuel, and some marine supplies can be obtained at the landing at **Port Mahon,** 0.8 mile above the mouth.

Leipsic River, 30 miles northwestward of Cape Henlopen, is used occasionally by fishermen. In 1957, the reported controlling depth was 5 feet from Delaware Bay to Leipsic, 7 miles above the mouth. The entrance is marked by a **284°24'** lighted range. The mean range of tide is 5.5 feet in the entrance and 3.5 feet at Leipsic. The wharves at **Leipsic** have depths of 5 to 8 feet alongside; gasoline and some marine supplies are available. The fixed highway bridge at Leipsic has a clearance of 13 feet.

Smyrna River (39°22.0'N., 75°30.7'W.) (see also chart 294), 39 miles northwest of Cape Henlopen, is navigable to **Smyrna Landing,** about 8 miles above the mouth and 1 mile from the town of **Smyrna.** In 1964, the controlling depth was 3 feet to Smyrna Landing.

The jettied entrance to Smyrna River is marked by a **237°** lighted range; a light is on the outer end of the south jetty. Within the river, the best water generally follows a midchannel course or favors the ebbtide bends.

The mean range of tide is 5.8 feet in the entrance to Smyrna River and 3.5 feet at Smyrna Landing. The current velocity is about 1.5 knots in the entrance. The highway bridge at **Flemings Landing,** 3 miles above the mouth, has a swing span with a width of 36 feet and a clearance of 5 feet; see **117.238,** Chapter 2, for drawbridge regulations and opening signals. This bridge is seldom opened as the river is little used above the bridge. Overhead power cables with a least clearance of 48 feet cross the river about 0.8 mile above the bridge. A small marine railway at Flemings Landing can handle craft up to 35 feet in length; gasoline is available.

The New Jersey side of Delaware Bay is low, with few prominent marks. The principal tributaries are Maurice and Cohansey Rivers, which can be used as harbors of refuge by small boats going between Cape May Canal and the Chesapeake and Delaware Canal; there are also many small creeks used mostly by fishing boats. General depths along this side of the bay are 7 to 15 feet, but there are many spots with depths of less than 6 feet. The shoals generally are not marked and some local knowledge is needed to avoid them. Most of the creeks have bars across their mouths.

The channels have strong currents, and many tide rips form near Prissy Wicks Shoal. In unmarked Cape May Channel, the current velocity is 1.5 knots on the flood and 2.3 knots on the ebb. In the channel immediately northwestward of Overfalls Shoal, the velocity is 1.1 knots on the flood and 1.6 knots on the ebb.

Cape May Canal, 2 miles northward of Cape May Light, is described in Chapter 5 in connection with the New Jersey Intracoastal Waterway. Farther north are several creeks. The first of any importance to navigation is **Bidwell Creek** (39°07.7'N., 74°53.4'W.), a drainage canal 12 miles north-northeastward of Cape May Light; a private seasonal light is off the entrance. The creek has depths of about 3 feet at the jettied entrance and deeper water inside to the fixed highway bridge, 1.5 miles above the jetties.

Deadman Shoal, 9.5 miles north-northwestward of Cape May Light, has a minimum depth of 3 feet. The shoal is marked off its northern end by a buoy, and by a lighted buoy, 0.4 mile off its southeasterly side. A ridge with depths of 5 to 7 feet begins a mile westward of Deadman Shoal and extends southward for about 3 miles.

Dennis Creek, 14 miles north-northeastward of Cape May Light, has depths of about 2 feet over the flats at the mouth and much deeper water inside to **Jakes Landing,** about 3 miles upstream. The creek is navigable for a considerable distance, but has no commerce and is little used.

Maurice River flows into the northeast corner of **Maurice River Cove** 17 miles north-northwestward of Cape May Light. A white abandoned lighthouse is prominent on **East Point,** on the east side of the entrance. Large shellfish plants are along the lower part of the river; shipbuilding facilities are located at several of the towns from Leesburg to Millville.

In 1957, the controlling depths were 8 feet in the entrance channel, thence 7 feet to Bivalve, and thence 5 feet to Millville. The entrance channel is marked by buoys and a **346°** lighted range; the river channel above Mauricetown to Millville is marked by seasonal buoys.

For about 15 miles above the mouth of Maurice River, the channel is easily followed, but a sharp lookout is necessary to avoid stakes and dolphins extending into the river, many of which are broken

off and covered at high water. Without local knowledge, it is safer to navigate this part of the river on a rising tide and proceed with caution. The upper part is narrow but not difficult to navigate when the buoys are on station.

The mean range of tide is 5.7 feet in the entrance to Maurice River and 6 feet at Millville. The current velocity is 1 knot in the entrance and 2.3 knots at Mauricetown; at Millville, the flood is very weak and the ebb velocity is 0.4 knot. Owing to dereliction of the dikes along the river, greater current velocities have been reported; extreme care is required in docking.

Ice may be encountered on Maurice River from the latter part of December through the early part of March.

The shellfish industry is concentrated along the lower part of Maurice River with plants at the towns of **Bivalve, Maurice River,** and **Shell Pile,** southeast of Port Norris, about 3 miles above the mouth. The wharves have depths greater than 7 feet alongside. Gasoline is available. **Storm warning signals are displayed;** see chart.

There is a small-craft facility at Bivalve, on the east side of the river about 3 miles above the mouth, and several other facilities on the east side of the river from about 4.5 miles to 6 miles above the mouth. Most of these facilities can provide gasoline, diesel fuel, berths, and marine supplies; hull and engine repairs can be made. The largest marine railway, 50 feet, is at Bivalve.

The shipyard at **Leesburg,** 7 miles above the mouth, has a 120-foot marine railway and lifts up to 20 tons. At **Dorchester,** 9 miles above the mouth, the shipyard has a 165-foot marine railway. A marina at Dorchester has gasoline, slips, a 50-foot marine railway, and a 9-ton lift. Hull and engine repairs can be made at all of the facilities.

Mauricetown, 10 miles above the mouth, has a 65-foot marine railway; hull and engine repairs can be made. The highway bridge over the river at Mauricetown has a swing span with a clearance of 3 feet; the overhead power cable on the south side has a clearance of 67 feet.

In 1970, a fixed highway bridge with a design clearance of 25 feet was under construction about 300 yards north of the swing bridge.

Port Elizabeth, a mile up **Manumuskin River,** 12 miles above the mouth of Maurice River, has a small boatyard with a 45-foot marine railway; repairs and gasoline are available. About 1.5 miles above Port Elizabeth on Maurice River is another boatyard with a 40-foot marine railway; hull and engine repairs can be made.

Millville, 20 miles above the mouth of Maurice River, has several factories but no municipal docks. The head of navigation is the milldam. The overhead power cable a mile south of Millville has a clearance of 67 feet. The first highway bridge has a 35-foot swing span with a clearance of 4 feet, but is kept in a closed position; see **117.225 (a) and (f) (12),** Chapter 2, for drawbridge regulations. The fixed highway bridge 0.2 mile upriver has a clearance of 12 feet. A boatbuilder just below the drawbridge will make emergency repairs to boats up to 55 feet in length.

Egg Island Point (39°10.8′N., 75°08.2′W.), 17 miles north-northwest of Cape May Light, is marked by a light. Southward of the point are **Egg Island Flats,** which have depths as little as 3 feet; the shallowest parts are marked by buoys. The flats are thick with oyster-bed stakes. Between Egg Island Point and the inner end of the flats is a slough, with depths of 7 feet, used by local boats.

Fortescue Creek, 4 miles north-northwestward of Egg Island Point, has a light on the south side of the entrance. The creek is reported to have depths of 3 feet to the highway bridge at **Fortescue,** a small summer settlement on the south side 0.4 mile above the entrance. Gasoline and some supplies can be obtained. Near the bridge are two marine railways that can haul out boats up to 45 feet in length; a nearby machine shop can make hull and gasoline engine repairs.

Nantuxent Point, 8 miles northwestward of Egg Island Point, is on the southeast side of the entrance to **Nantuxent Cove.** A light marks the point and a buoy marks the outer limit of the 5-and 6-foot spots that extend over a mile offshore from the point.

Nantuxent Creek, on the northwest side of Nantuxent Point, has depths of about 5 feet in the mouth and is navigated at high water by local fishing boats for about 5 miles to within a mile of the village of **Newport.** A private seasonal light marks the entrance. A small-craft facility is at **Money Island,** a town about 1.2 miles above the mouth. Gasoline, berths, and marine supplies are available here, and hull and engine repairs can be made; marine railway, 50 feet.

Back Creek, 27 miles northwest of Cape May Light and 2 miles northwestard of Nantuxent Point, is used by local boats as an anchorage. The entrance is marked by a privately maintained light. The creek has depths of about 5 feet over the flats at the entrance and good depths for several miles above. Berths, gasoline, and marine supplies are available at a landing 5 miles above the mouth. Hull and engine repairs can be made; lift, 6 tons.

Ben Davis Point is on the northwest side of the entrance to Nantuxent Cove. It is marked by a light. Shoals to be avoided are the 1-foot spot a mile southwest of the point and 5-foot **Ben Davis Point Shoal,** which is 2.5 miles south by west of the point and within 0.7 mile of the main channel through the bay.

Cohansey River, which empties into the northeast side of Delaware Bay 31 miles northwestward of Cape May Light, is used mostly by pleasure craft, although some petroleum is transported to Bridgeton. **Cohansey Light (39°20.5′N., 75°21.7′W.),** 42 feet above the water, is

shown from a white daymark on a black skeleton tower on the south side near the natural entrance. A dredged cut through the narrow neck of land on which the light stands gives a more direct approach to the river; the cut, 0.3 mile northwest of Cohansey Light, is marked on its west side by lights at the inner and outer ends; seasonal buoys mark the channel above Greenwich Pier, about 4 miles above the mouth, to Bridgeton. In 1970, reported controlling depths were 12 feet to Greenwich, thence 10 feet to Fairton, and thence 5 feet to Bridgeton.

The usual approach to Cohansy River is along the axis of the dredged cut, but the natural channel eastward of Cohansey Light is sometimes used; the latter has a controlling depth of about 7 feet, and unmarked shoals with depths of 4 to 6 feet must be avoided on either side. Within the river, the natural channel has ample width and depth to within a mile of Bridgeton; thence to Bridgeton is a dredged channel which requires some local knowledge to follow.

The mean range of tide is 6.0 feet in the entrance and 6.5 feet at Bridgeton; high water at Bridgeton is about 2 hours later than at the entrance. The current velocity is about 1.3 knots half a mile above the entrance and less than 0.5 knot at Bridgeton.

There are small-craft facilities near **Greenwich Pier,** 4 miles above the mouth, and at **Fairton,** 14 miles above the mouth. Gasoline, diesel fuel, berths, and marine supplies are available; hull and engine repairs can be made. Maximum haul-out capacities are: marine railway, 50 feet; lift, 20 tons.

Bridgeton, 17 miles above the mouth, is an important manufacturing town and rail center, but has no municipal piers or marinas. The 40-foot bascule-span bridge at Bridgeton has a clearance of 6 feet, but is kept in a closed position; see **117.225 (a) and (f) (14),** Chapter 2, for drawbridge regulations. The overhead power cable 0.2 mile below the bridge has a clearance of 44 feet.

Chart 294.—Bay Side (39°22.8′N., 75°24.2′W.) is a fishing resort on the east side of the entrance to **Stow Creek.** The creek has some traffic for 10 miles to Stow Creek Landing. Gasoline and some supplies are available at Bay Side.

The dividing line between **Delaware River** and Delaware Bay is 42 miles above the Delaware Capes. The line, defined arbitrarily by the legislatures of Delaware and New Jersey, extends from a monument on **Liston Point,** Del. to a similar monument on the south side of the entrance to **Hope Creek,** N.J.

The monument on Liston Point was reported destroyed in 1967. Remains of the structure may exist up to 100 feet offshore and may be covered during high tide.

Artificial Island, Mile 44E, is the name given to the peninsula formed by the filled area covering most of **Baker Shoal.**

Local magnetic disturbance.—Differences of as much as 2° to 5° from normal variation have been observed along the channel from Artificial Island to Marcus Hook.

Alloway Creek, Mile 47.5E, has a controlling depth of about 3 feet to Quinton. The approach to Alloway Creek is unmarked. A private seasonal light is just inside the mouth of the creek. The shoals on either side of the mouth must be avoided. Above the mouth, the best water is not always in midstream, and some local knowledge is needed to find it. The mean range of tide is 5.5 feet in the entrance and 4.0 feet at Quinton. The current velocity is 2.1 knots 0.2 mile above the entrance and about 1.4 knots at New Bridge. A marina 1.5 miles above the mouth has berths, gasoline, and some supplies. Hull and engine repairs can be made; lift, 15 tons.

The highway bridge at **Hancocks Bridge,** 4 miles above the mouth of Alloway Creek, has a swing span with a width of 40 feet at the north draw and a clearance of 4 feet. An overhead power cable on the west side of the bridge has a clearance of 50 feet. Upper Hancocks Bridge at **New Bridge,** 5.5 miles above the mouth, has a swing span with a width of 35 feet and a clearance of 3 feet. Drawbridge regulations for these bridges are given in **117.225 (a) through (e) and (f) (15),** Chapter 2. The highway bridge at **Quinton,** 8 miles above the mouth, has a swing span with a width of 30 feet and a clearance of 3 feet; see **117.225 (a) and (f) (15),** Chapter 2, for drawbridge regulations. An overhead power cable on the west side of this bridge has a clearance of 50 feet.

Salem River is entered through **Salem Cove** at Mile 50E, across the Delaware River from the entrance to the Chesapeake and Delaware Canal. Commerce on Salem River is almost entirely in petroleum products. The approach channel follows the southeast side of Salem Cove for about 2 miles to the mouth of the river; it is marked by buoys and a lighted **027°20′** range. Within the river, the channel enters a land cut 0.8 mile above the mouth and returns to the river 1.3 miles from the mouth; the river channel is marked by buoys as far as the cut. In September 1970, the reported controlling depths were 9 feet across Salem Cove, except for shoaling to 5½ feet between Buoys 4 and 5; thence shoaling to 3 feet at the western end of the land cut and shoaling to 1 foot at the eastern end; and thence in 1960-1961, 10 feet to about 500 yards above the bascule bridge at Salem. Above this point, the depths are 2 feet or less.

The mean range of tide is 5.6 feet in the entrance and at Salem; the tides at Salem are about 20 minutes later than at the entrance. The current velocity is about 1.6 knots in the entrance. The maximum expected current in the land cut is 3 knots.

The highway bridge, 1.8 miles above the mouth, has a bascule span with a clearance of 5 feet; see **117.225 (a) through (e) and (f) (15-a),** Chapter 2, for

drawbridge regulations. Overhead power cables above and below the bridge have a least clearance of 50 feet.

Several marinas and boatyards are along the north bend of Salem River and at Salem; slips, gasoline, and some marine supplies are available; hull and engine repairs can be made. Maximum haul-out capacities are: railway, 50 feet; lift, 14 tons.

Appoquinimink River (39°26.9'N., 75°34.7'W.), Mile 44W, has no commerce and is little used except by pleasure craft and a few fishing boats. Controlling depth to Odessa is about 2 feet. The mean range of tide is 5.7 feet in the entrance; the current velocity is about 1.1 knots. The highway bridge, 3 miles above the mouth, has a swing span with a width of 39 feet and a clearance of 7 feet; see **117.236,** Chapter 2, for drawbridge regulations. The swing bridge at **Odessa,** 5.5 miles above the mouth, has a clear opening 40 feet wide and a clearance of 4 feet, but has not been opened for many years. Overhead power cables across the river have a minimum clearance of 52 feet.

Reedy Island, Mile 48W, is the site of a former Federal quarantine and detention station. The pier on the channel side of the island has a depth of 10 feet at the outer end; the current velocity is about 2.5 knots off the pier. A dike extends 3 miles southward from Reedy Island and roughly parallels the western shore; the dike is marked by lights, and a buoy is moored off the submerged southern end.

Port Penn is a village on the western shore opposite Reedy Island. The best approach to the village is through an opening in the Reedy Island dike; the opening, 0.2 mile south of the island, is 5 feet deep and 150 feet wide, and marked on each side by a daybeacon. Approaches to the village from north of Reedy Island or from south of the dike are over flats with depths of 2 feet. Anchorage depths off Port Penn are 15 feet or more, but depths at the piers are relatively shallow.

The **Chesapeake and Delaware Canal,** Mile 51W, is described in Chapter 7.

Pea Patch Island, Mile 53W, is the site of old **Fort Delaware.** The wharf, on the main channel, is marked by a light. A dike, mostly submerged at high water, extends northward along **Bulkhead Shoal** for about 3 miles from Pea Patch Island; the dike is marked by lights and daymarkers. The current velocity is 2.3 knots in the main channel east of the island.

Delaware City is on the southwest side of Delaware River opposite Pea Patch Island. **Delaware City Branch Channel,** which extends southward from the riverfront of the town to the Chesapeake and Delaware Canal, has a controlling depth of about 3 feet. In 1969, shoaling to 1½ feet was reported in the southeast end of the canal near its intersection with the Chesapeake and Delaware Canal. Depths alongside the Delaware City bulkhead are 6 to 2 feet.

A privately dredged cut with a controlling depth of 35 feet in 1965, marked by a privately maintained **306°** lighted range and buoys, extends northwestward through **Bulkhead Shoal Channel** from Delaware River main channel to the Getty Oil Company terminal on the northwest side of Delaware City. The three offshore wharves at the terminal have a combined berthing area of 2,850 feet with dolphins. In 1970, depths of 36 feet were reported alongside; deck height, 14 feet. Fresh water is available on the wharves, and vessels can be bunkered at the rate of 2,000 barrels an hour from each of the three berths.

The current velocity is 2.1 knots between Pea Patch Island and Delaware City.

New Castle, Mile 57W, has little waterborne commerce. The principal public wharf has depths of 15 feet alongside. The yacht basin is reported to go dry at low water and with adverse winds. Several stone fenders that stand about 5 feet above high water protects the wharves from drifting ice.

Pennsville, Mile 58E, has a small marina. Gasoline, slips, and some marine supplies are available. An 8-ton lift can haul out boats for hull and engine repairs.

Delaware Memorial Bridge, Mile 60, has twin suspension spans over the main channel with a clearance of 188 feet for the middle 800 feet.

Salem Canal, at the east end of the bridges, once gave access to the upper part of Salem River. The route is now blocked in several places, the first being at a dam about 300 yards above the mouth.

Deepwater Point, 0.6 mile above the New Jersey end of the Memorial Bridge, is the site of the E.I. duPont Chemical Company plant. The 550-foot offshore wharf (39°41'37"N., 75°30'40"W.) at the plant can provide 600 feet of berthing space with dolphins. Depths of 33 feet are reported alongside; deck height is 10½ feet. Liquid sulfur, acids and chemicals, are handled at the wharf. A railroad car transfer bridge is immediately northward of the wharf.

Pigeon Point, Mile 60.5W, has a railroad car-float bridge. Railroad cars are barged to Deepwater Point and Thompson Point.

Christina River, Mile 61.5W, is the approach to the city of Wilmington and to the towns of Newport and Christiana.

Channels.—A federal project provides for a 35-foot channel from Delaware River to Lobdell Canal and a turning basin of the same depth opposite the Wilmington Marine Terminal. The channel is subject to frequent shoaling. See Notice to Mariners and the latest editions of the charts for controlling depths. A steel sheet-pile jetty, 0.4 mile long and marked at its outer end by a light, is on the south side of the entrance. The channel is marked by a **293°** lighted range and by a lighted bell buoy on the north side of the entrance.

Above Lobdell Canal, the controlling centerline depths in Christina River, in 1960-1971, were 10 feet to a point 3.7 miles above the mouth, thence 5½ feet, via a cutoff channel 5.5 miles above the mouth, to the bascule bridge at Newport. Above this point local knowledge is necessary to carry the best water.

Wilmington Marine Terminal, on the south side of Christina River 0.7 mile above the mouth, is owned and operated by the city of Wilmington. The 3,060-foot marginal wharf at the terminal has reported depths of 35 feet alongside; deck height, 12 feet. The terminal has rail and highway connections, 57,000 square feet of covered storage, 25 acres of open storage, and water and electrical shore-power connections; cranes up to 100 tons, and a bulk loader and unloader that can handle 1,000 tons an hour are available. General cargo, wood products, and solid and liquid bulk products are handled at the terminal.

Port of Wilmington Tanker Berth, on the north side of the south jetty 0.5 mile eastward of Wilmington Marine Terminal, is owned by the city of Wilmington and operated by Sico Company. The wharf has a 60-foot face and can accommodate vessels up to 360 feet in length with dolphins. Depths of 34 feet are reported alongside; deck height, 12 feet. Petroleum products are handled at the berth.

Lobdell Canal, on the south side of Christina River 0.9 mile above the mouth, is not used.

Brandywine Creek, on the northeast side of Christina River 1.6 miles above the mouth, has depths of about 4 feet to the railroad bridge 1 mile above its mouth. The channel is rocky above the railroad bridge, but depths of 1 to 2 feet can be carried 0.7 mile to Market Street bridge, above which there are rapids. The river is used mostly for anchorage and storage of pleasure boats.

The highway bridge over Brandywine Creek, 0.1 mile above the mouth, has a swing span with a width of 48 feet and a clearance of 10 feet; see **117.230,** Chapter 2, for drawbridge regulations and opening signals. The power cable on the lower side of the bridge has a clearance of 59 feet.

The railroad bridge about a mile above the mouth of Brandywine Creek and the highway bridges above it have fixed spans with a minimum width of 40 feet and a clearance of 10 feet. The overhead power cable 300 yards above the railroad bridge has a clearance of 34 feet.

Wilmington, on the north side of Christina River 2.5 miles above the mouth, has large manufacturing interests. Both sides of the river at the city are lined with wharves which support a large traffic in barges. The deep-water facilities, which were described earlier, are on the south side of the river just inside the entrance. For a complete description of the port facilities at Wilmington, refer to the Port Series, a Corps of Engineers publication.

Newport, on the north side 6.8 miles above the mouth, is at the head of practical navigation.

Anchorages.—Vessels must not anchor in Christina River channel within the city limits of Wilmington or tieup at any wharf more than two abreast without permission of the harbor commissioners. An anchorage area is off Deepwater Point, south of the river entrance; see **110.157 (a) (7) and (b),** Chapter 2, for limits and regulations. See Appendix for **Wilmington climatological table.**

Bridges.—There are no bridges or overhead power cables over the deep-water section of Christina River. From Lobdell Canal to just above the bridge at Newport, 6.8 miles above the mouth, the least clearance of drawbridges is 2 feet and fixed bridges, 22 feet; see **117.235,** Chapter 2, for drawbridge regulations and opening signals. The least clearance of overhead power cables is 46 feet. In 1971, a fixed highway bridge with a design clearance of 60 feet was under construction across Christina River, about 1.3 miles above the mouth.

Tides and currents.—The mean range of tide is 5.7 feet at Wilmington. The current velocity is about 0.8 knot.

Quarantine.—The quarantine station is at Marcus Hook, 7 miles up the Delaware River from Wilmington. Vessels with radio pratique may proceed to their berths at Wilmington; other vessels may be required to proceed to the quarantine anchorage off Marcus Hook.

Agriculture quarantine.—Vessels subject to such inspection are usually inspected at their berths by officials from Philadelphia; see Appendix for address.

Customs.—Wilmington is a customs port of entry. Vessels are inspected at their berths; see Appendix for address.

Coast Guard.—The Marine Inspection Office in Philadelphia, Pa. maintains a vessel **documentation office** at the U.S. Customhouse in Wilmington; see Appendix for address.

Immigration.—Vessels are boarded by officials from the Philadelphia office at their berths; see Appendix for address.

Harbor regulations.—The speed of vessels in Christina River is limited to 8 miles per hour; see **207.80,** Chapter 2.

Supplies.—Water can be supplied at the Wilmington Marine Terminal from the city mains. The nearest facilities for supplying deep-draft vessels with bunker oil are at Delaware City and Marcus Hook. Light-draft vessels can obtain fuel at a wharf on the south side of Christina River just above the second bridge; the depth at the wharf is about 8 feet. Small craft can obtain gasoline and supplies at Wilmington near the second bridge over Christina River.

Repairs can be made to light-draft vessels and small craft at the boatyards near the second bridge on Christina River; largest marine railway, 110 feet. Small-craft repairs can also be made at a boatyard above the second bridge on Brandywine Creek.

Communications.—Wilmington is served by three railroads. The principal airport is the New Castle County Airport, 5 miles southwest of Wilmington; regular scheduled passenger service is maintained.

Chart 295.—Carneys Point (39°42.9′N., 75°29.1′W.), Mile 61.8E, across the Delaware River from Christina River, is the site of a powder factory. A tank and a stack are prominent.

Speed.—The Corps of Engineers has requested that masters limit the speed of their vessel when passing wharves and piers so as to avoid damage by suction or wave wash to property or persons.

Penns Grove, Mile 63E, is a railroad terminus. The town wharf had reported depths of about 10 feet at the face in 1970, and is used for the mooring of small craft.

Edgemoor is directly across Delaware River from Penns Grove. The two government piers at Edgemoor have depths of about 6 feet at their ends and in the basin between them. The acid wharf, 400 yards southwestward, has depths of about 13 feet at the outer end.

A dike with its outer end submerged extends 0.3 mile offshore from **Oldmans Point,** on the eastern shore of Delaware River 2 miles above Penns Grove. About 0.3 mile southward of the dike are the ruins of a long pier.

Local magnetic disturbance.—Differences of 2° to 5° from normal variation have been observed astride the Delaware River Channel from Oldmans Point to the mouth of Oldmans Creek.

Oldmans Creek, Mile 66E, has a marked channel leading from the Delaware River to the mouth of the creek. Depths are about 3 feet to the mouth of the creek, thence about 5 feet to **Pedricktown,** 3.6 miles above the mouth. The mean range of tide is 5.6 feet in the entrance.

A vertical-lift bridge and two swing bridges cross the creek between the mouth and Pedricktown; all are kept in a closed position. See **117.225 (a) and (f) (16),** Chapter 2, for drawbridge regulations. The limiting clearance of the bridges is 1 foot at the second bridge and the minimum width is 36 feet at the second bridge.

A small marina at **New Bridge,** 1.7 miles above the mouth, has gasoline and berths; minor hull and engine repairs can be made.

Marcus Hook, Mile 69N, is an important petroleum center where large quantities of crude oil are received and refined petroleum products are shipped. Vessels can be bunkered at the rate of 1,500 to 5,000 barrels per hour and the companies also operate barges for bunkering in the stream or alongside other wharves.

A federal **quarantine station** for Delaware River ports is maintained at the foot of Market Street in Marcus Hook by the U.S. Public Health Service. The station wharf has a depth of 14 feet at the outer end. Regulations governing use of the wharf are given in **207.90,** Chapter 2.

A daytime **reporting station** of the Philadelphia Maritime Exchange is on the Sun Oil Wharf at the lower end of the city waterfront at 39°48′23″N., 75°25′10″W.

On the southeast side of the main ship channel opposite Marcus Hook is a preferential **anchorage** for vessels awaiting quarantine inspection; see **110.157 (a) (8) and (b),** Chapter 2, for limits and regulations. The current velocity is about 1.7 knots.

Customs, immigration, quarantine, and agriculture quarantine inspections are usually made at the berth. Customs matters are handled by officials from Chester, Pa.; immigration and agriculture quarantine matters are handled by officials from Philadelphia.

Wharves.—There are deep-draft wharves and piers along the Delaware River at Marcus Hook, Pa., and adjacent Claymont, Del. All have direct highway and railroad connections and water and electrical shore power. The alongside depths are reported; for information on the latest depths contact the operator. Only deep-draft facilities are described; for a complete description of the port facilities refer to the Wilmington, Del. Port Series, a Corps of Engineers publication.

Texaco Delaware River Terminal (39°48′06″N., 75°26′00″W.): southwest side 898 feet long, 450 feet usable, 22 feet alongside; deck height, 14 feet; east side 905 feet long, 400 feet usable, 17 feet alongside, deck height, 10 feet; 992,000-barrel storage capcity; owned and operated by Texaco, Inc.

General Chemical Corp. Pier: 200 yards northeastward of Texaco Terminal; southwest side 381 feet long, 275 feet usable; 30 to 14 feet alongside; deck height, 11 feet; conveyor belt system to storage silos; receipt of caustic soda and benzene; owned and operated by General Chemical Corp.

Sunoco Wharf 3 (39°48′23″N., 75°25′10″W.): face 71 feet long, 265 feet usable with dolphins; northeast side 504 feet long; 32 feet alongside; deck height, 12 feet; 12.5-million barrel storage capacity; receipt and shipment petroleum products, bunkering vessels; owned and operated by Sun Oil Co.

Sunoco Wharf 2: 250 yards northeastward of Wharf 3; face 90 feet long, 265 feet usable with dolphins; southwest side 345 feet long, 300 feet usable; northwest side 500 feet long, 440 feet usable; 32 feet alongside; deck height, 12 feet; receipt and shipment petroleum products, bunkering vessels; owned and operated by Sun Oil Co.

Sunoco Wharf 1: 250 yards northeastward of Wharf 2; face 80 feet long, 265 feet usable with dolphins, 26 feet alongside; southwest side 500 feet long, 470 feet usable, 26 to 20 feet alongside; northeast side 470 feet long, 26 feet alongside; deck height, 12 feet; receipt and shipment of petroleum products, bunkering vessels; owned and operated by Sun Oil Co.

Sinclair Refining Co. Terminal (39°48.8′N., 75°24.5′W.): three offshore wharves connected by catwalks provide 1,145 feet of berthing space with dolphins, 34 feet alongside; rear of face, 650 feet long, 520 feet usable, 20 feet alongside; deck height, 10½ feet; storage capacity 5.5 million barrels; receipt and shipment of petroleum products; bunkering vessels; owned and operated by Sinclair Refining Co.

Opposite Marcus Hook, at Mile 69S, (39°48′05″N., 75°24′14″W.) is the Monsanto Plant offshore wharf with 252 feet of berthing space. Depths of 37 feet are reported alongside and deck height is 15 feet. It is used for the receipt and shipment of liquid chemicals.

Raccoon Creek, Mile 70S, is the approach to the towns of Bridgeport and Swedesboro. The creek carries some traffic in fertilizer and fertilizer materials. The approach to Raccoon Creek is a dredged channel that extends west-southwestward through the shallow flats for 1.1 miles from the mouth. In 1957–1965, controlling depths were 7 feet in the entrance channel, thence 4 feet centerline to Bridgeport, and thence 3 feet to Swedesboro.

The approach channel is marked by buoys, and a light marks the outer end of the rock jetty on the south side of the entrance. The mean range of tide is 5.7 feet in the entrance.

The highway bridge at **Bridgeport,** 1.5 miles above the mouth, has a vertical-lift span with clearance of 4 feet down and 64 feet up. The railroad bridge, 0.3 mile above the highway bridge, has a swing span with a width of 38 feet and a clearance of 7 feet; see **117.225 (a) through (e) and (f) (16-a),** Chapter 2, for drawbridge regulations. Gasoline is available at a small marina adjacent to the highway bridge. A boatyard just south of the railroad bridge has a marine railway that can haul out vessels up to 50 feet in length for minor hull and engine repairs.

Between Bridgeport and **Swedesboro,** 7.1 miles above the mouth, the least bridge clearances are: swing bridge, 50 feet horizontal, 6 feet vertical; fixed bridges, 33 feet horizontal, 8 feet vertical. Overhead power cables crossing the creek between the mouth and Swedesboro have a least clearance of 64 feet.

An overhead power cable across Delaware River at Mile 70.5, near the northeast end of Marcus Hook Range, has a clearance of 210 feet.

In 1970, a fixed highway bridge with a design clearance of 188 feet over the main channel was under construction across the Delaware River between Chester and Bridgeport at Mile 71.

A ferry landing on the southeast side of Delaware River, 0.7 mile above Raccoon Creek, serves the cross-river passenger and vehicular ferry to Chester.

Chester, Mile 72N, is an important manufacturing center, and many of its industries use the wharf facilities along the 3-mile waterfront. The nearest designated anchorage is off Marcus Hook. Chester is a **customs port of entry.** Vessels subject to quarantine examination that have received radio pratique usually proceed to their berths, all others subject to examination are inspected at the quarantine anchorage off Marcus Hook. **Customs, immigration, and agriculture quarantine** officials usually board vessels at their berths.

Waterborne traffic to the wharves and piers in Chester consists mainly of barge traffic and light-draft vessels. The wharves have depths of 15 to 20 feet alongside; and some have as little as 5 feet. There are storage facilities, mechanical transfer equipment, and most have rail and highway connections. Water is piped to most facilities.

Complete repairs to large vessels can be made at the Sun Shipbuilding and Drydock Company yard at Chester (39°50.9′N., 75°20.7′W.). The largest floating drydock has a length of 775 feet and a width of 137 feet, with 32 feet over the blocks, and a lifting capacity of 38,000 tons. Cranes up to 100-ton capacity are available.

Chester Creek empties into Delaware River about at the midpoint of the city waterfront. The railroad bridge just above the mouth has a swing span with a clearance of 1½ feet; see **117.229,** Chapter 2, for drawbridge regulations.

Above that point, navigation is restricted by the 6-foot minimum clearance of the fixed bridges. The controlling depth is about 2 feet to the second bridge, 0.2 mile above the entrance. The mean range of tide is 5.7 feet in the entrance.

The current velocity is 1.7 knots on the flood and 2.2 knots on the ebb off **Eddystone,** Mile 73N.

Darby Creek, Mile 74N, has a controlling depth of about 7 feet to the highway bridge 1.2 miles above the mouth. The railroad bridges, 0.3 mile above the mouth, have bascule spans with minimum clearances of 3 feet; see **117.228,** Chapter 2, for drawbridge regulations. The fixed highway bridge just above the railroad bridges has a clearance of 22 feet. In 1970, a fixed highway bridge with a design clearance of 22 feet was under construction across the creek about 0.2 mile above the fixed highway bridge. Parallel fixed highway bridges, 1.2 miles above the mouth, have a least clearance of 4 feet. Oil barges and small tankers go to the wharf with about 7 feet alongside just below the railroad bridges; above this point, the creek is used only by small pleasure craft. The overhead power cable, 3.7 miles above the mouth of the creek, has a clearance of 29 feet. A lighted buoy at the entrance of the creek is privately maintained from April 1 to November 1.

Essington, Mile 75N, is the center and fitting-out point for the majority of the yachts in the Philadelphia area. Between Essington and Delaware River main channel is marshy **Little Tinicum Island,**

which is about 2 miles long. There is a dike along the north shore of the passage east and north of Little Tinicum Island. An unmarked channel parallel to and about 450 feet from the centerline of the dike has a controlling depth of about 5½ feet; shoals are on both sides of the channel. Local vessels usually pass around the west end of the island where the controlling depth is about 9 feet.

A special small-craft anchorage area is between the Essington waterfront and Little Tinicum Island; see **110.1** and **110.67,** Chapter 2, for limits and regulations. Depths are 9 to 16 feet in the anchorage. The current velocity is about 1.3 knots.

Gasoline, diesel fuel, water, ice, berths, and marine supplies are available along the Essington waterfront eastward of Darby Creek. Maximum haul-out capacities are: railway, 125 feet; lift, 15 tons.

A railroad car-float bridge is on **Thompson Point** on the New Jersey side opposite the west end of Little Tinicum Island. Between Thompson Point and **Crab Point,** 0.5 mile to the eastward, are the large buildings of the E.I. duPont Chemical Plant. The plant has two wharves which provide 680 feet of berthing space with depths of 26 to 32 feet reported alongside; deck height is 10 feet. There are water and electrical shore-power connections and rail and highway connections. It is used for receipt and shipment of chemicals.

A general anchorage area is between Thompson Point and Crab Point, and the south side of the main channel; see **110.157 (a)(9) and (b),** Chapter 2, for limits and regulations. The current velocity is about 2 knots a half-mile east of Crab Point.

There are several large petroleum facilities at **Paulsboro,** Mile 77S. All have railroad and highway connections, fresh water, and all except Humble Refinery Wharf have electrical shore-power connections.

The Mobile refinery, on **Bramell Point,** at the west end of the Paulsboro waterfront, has a 2,453-foot marginal wharf providing 2,254 feet of berthing space. Depths of 34 feet are reported alongside and deck height is 12½ feet. There is a 6.2-million barrel storage capacity. It is used for the receipt and shipment of petroleum products and bunkering vessels.

The Humble refinery, 0.9 mile eastward of Bramell Point, has an offshore wharf which provides 205 feet of berthing space with dolphins. Depths of 36 to 40 feet are reported alongside and deck height is 13 feet. There is a 1.6-million barrel storage capacity. It is used for receipt and shipment of petroleum products.

Sinclair (BP) refinery, 1.5 miles eastward of Bramell Point has two offshore wharves which provide 1,053 feet of berthing space. Depths of 35 feet are reported alongside and deck heights are 11 and 12 feet. There is a 3.5-million barrel storage capacity. It is used for receipt and shipment of petroleum products and bunkering vessels.

Mantua Creek, Mile 78S, passes on the east side of Paulsboro and meanders southeastward to the vicinity of **Mantua,** 7.6 miles above the mouth. There is waterborne traffic in chemicals and paper to the first bridge; above which the creek is used only by small boats.

The Mantua Creek entrance jetties are marked by lights and the entrance channel is marked by buoys. Centerline depths in the dredged channel were 18 feet in May 1970, for about 0.7 mile above the mouth, thence in 1966-May 1970, 6 feet to **Friars Landing,** 2.3 miles above the mouth, thence in 1966, 4½ feet to **Parkers Landing,** 4.5 miles above the mouth, and thence less than a foot to Mantua. In May 1970, depths of 11 feet were available, with local knowledge, to a point just above the second bridge, 1.5 miles above the mouth. The mean range of tide is 5.7 feet in the entrance.

The railroad bridge 1.3 miles above the mouth has a 32-foot-wide swing span with a clearance of 1 foot. The highway bridge, 1.5 miles above the mouth, has a vertical-lift span with clearance of 5 feet down and 64 feet up. Above this point the fixed bridges and overhead cables have minimum clearances of 10 feet and 50 feet, respectively.

The wharves below the first bridge on Mantua Creek have depths of 20 to 12 feet alongside.

The **general anchorage area** is on the southeasterly side of the main channel above the entrance to Mantua Creek; see **110.157 (a) (10) and (b),** Chapter 2, for limits and regulations. The current velocity is about 2 knots in the channel opposite the anchorage.

On the northeast side of the Delaware River at Mile 78N, there are two petroleum terminals both of which have railroad and highway connections and water.

The Hog Island Wharf of Gulf Oil Corp. (39°51′46″N., 75°14′15″W.) provides 2,754 feet of berthing space with dolphins. Depths of 37 feet are reported alongside and deck height is 16 feet. There is a 5.5-million barrel storage capacity. It is used for receipt and shipment of petroleum products.

The Atlantic Pipe Line Co. Wharf (39°52′12″N., 75°13′05″W.) provides 1,271 feet of berthing space with dolphins. Depths of 40 feet are reported alongside and deck height is 15 feet. There is a 570,000-barrel storage capacity. It is used for receipt and shipment of petroleum products.

Old **Fort Mifflin,** Mile 79.5N, is the site of the Corps of Engineers wharves which have depths of 15 to 30 feet at their outer ends.

Woodbury Creek, Mile 79.5S, is used only by small craft. The entrance is buoyed, but local knowledge is needed. The approach must be made from the northeast or west-southwest because of the 2-foot shoal directly off the creek. At low water the channel within the creek is well defined. The controlling depth is about 2½ feet in the en-

trance with depths of 6 to 3 feet inside to the second bridge, 1½ miles above the mouth. Above this point, depths are less than 1 foot to Woodbury, 2.7 miles above the mouth. The mean range of tide is 5.7 feet in the entrance. The highway bridge 0.8 mile above the mouth has a swing span with a width of 39 feet and a clearance of 5 feet; see **117.225 (a) through (e) and (f) (17)**, Chapter 2, for drawbridge regulations. An overhead power cable close westward of the bridge has a clearance of 35 feet. Above this point, fixed bridges and overhead cables have a minimum clearance of 4 feet and 45 feet, respectively.

Chart 280. Philadelphia, one of the chief ports of the United States, is at the junction of Delaware and Schuylkill Rivers. The mid-harbor point along Delaware River is at Chestnut Street, Mile 86.5W.

The Port of Philadelphia, as defined for Customs purposes, comprises such waters of the Delaware and Schuylkill Rivers bordering on the municipality as are navigable; the municipal limits on Delaware River extend from Fort Mifflin on the south to Poquessing Creek on the north, a distance of about 20 miles.

Large quantities of general cargo are handled at the port in both foreign and domestic trade. In addition, crude petroleum and petroleum products, sugar, and ore are imported, while coal, grain, and refined petroleum products are exported. Coastwise receipts are mostly crude petroleum and petroleum products, and shipments consist chiefly of refined petroleum products.

Channels.—A federal project provides for a channel 40 feet deep from the sea through the main channel in Delaware Bay and River to the Philadelphia Naval Shipyard, Mile 81, thence 40 feet on the west side and 37 feet on the east side through Philadelphia Harbor to Allegheny Avenue, Mile 89, thence 40 feet to the U.S. Steel basin opposite Newbold Island, Mile 110, and thence dredging depths of 25 feet to the Trenton Marine Terminal, Mile 115. See Notice to Mariners and the latest editions of the charts for controlling depths.

Note.—In the Philadelphia-Trenton section of the river, masters are especially requested to limit speed of their vessels when passing wharves and piers so as to avoid damage by suction or wave wash to property or persons.

Anchorages.—See **110.157**, Chapter 2, for limits and regulations.

Bridges.—Walt Whitman Bridge, Mile 84, a highway suspension bridge connecting Philadelphia with Gloucester City, has a clearance of 150 feet at the center of the main span, and minimum clearance of 139 feet under the full width of the main span. **Benjamin Franklin Bridge,** Mile 86.8, 0.3 mile above Chestnut Street, has a suspension span with a clearance of 135 feet for the middle 800 feet of the main span and 129 feet under the rest of the span.

Tides.—The mean range of tide is 5.9 feet at Philadelphia; see the Tide Tables for daily predictions.

Towage.—A large fleet of tugs up to 2,200 hp. is available at Philadelphia, day and night, for any type service required. As a general rule, tugs are not required for vessels moving between Philadelphia and the sea; most vessels traverse this distance under their own power.

Weather.—The proximity of Philadelphia to Delaware Bay probably has some effects on temperature conditions locally. Periods of extended cold weather are relatively rare, with below zero readings reported only 24 times since official records began. Sustained periods of very high or low temperatures seldom last more than 3 or 4 days as conditions change fairly rapidly. Due to the prevalence of maritime air during the summer months, the humidity adds to the discomfort of the high temperatures. Fog can be expected during the autumn and winter months.

Precipitation is fairly evenly distributed throughout the year with maximum amounts during the late summer months. Much of the summer rainfall is in connection with local thunderstorms. Single snow storms of 10 inches or more occur about every five years.

The prevailing wind direction for the summer months is from the southwest, while northwesterly winds prevail during the winter. The annual prevailing direction is from the west-southwest. Destructive velocities are comparatively rare and occur mostly in gusts during summer thunderstorms. High winds occurring in the winter months, as a rule, come with the advance of cold air after the passage of a deep low-pressure area. Only rarely have hurricanes in the vicinity caused widespread damage, then primarily through flooding.

Flood stages in the Schuylkill River normally occur about twice a year. Flood stages seldom last over 12 hours and usually occur after excessive falls of precipitation during summer thunderstorms. Flood stages in the Delaware River are caused by abnormally high tides that occur due to the water "backing up" under the influence of strong south or southeast winds.

The office of the National Weather Service is at the Philadelphia International Airport at the southwestern end of the city. **Barometers** may be compared there or checked by telephone; see Appendix for number. See Appendix for **Philadelphia climatological table.**

Quarantine.—The national quarantine station at Marcus Hook is maintained by the U.S. Public Health Service primarily as a boarding station. Vessels with radio pratique proceed directly to their berths. Administrative offices and an **outpatient clinic** of the U.S. Public Health Service are in Philadelphia; see Appendix for addresses.

Customs.—Philadelphia is a **customs port of entry** and a customs district headquarters. Vessels are usually inspected at their berths; see Appendix for address.

Agriculture quarantine.—Vessels subject to such inspections are usually inspected at their berths; see Appendix for address.

Coast Guard.—The Marine Inspection Office maintains a **vessel documentation** office in the U.S. Customhouse.

The U.S. Coast Guard **Captain of the Port** maintains an office at the Coast Guard Base in Gloucester City (39°53.9′N., 75°07.7′W.).

Immigration.—The Immigration and Naturalization Service maintains a district office and an entry and departure office in Philadelphia; vessels are inspected at their berths; see Appendix for address.

Harbor regulations.—Local rules and regulations are enforced by the Navigation Commission for the Delaware River (Pennsylvania). The authority of the Commission extends from the Pennsylvania-Delaware boundary line on the south to the head of the navigable waters of Delaware River on the north.

Wharves.—Philadelphia has more than 45 deep-water piers and wharves along its Delaware River waterfront and along Schuylkill River. Most of the piers and wharves have highway and railroad connections. The port is served by three rail lines: Baltimore and Ohio Railroad, Penn Central, and the Reading Co. Each of these carriers connect with tracks of the Philadelphia Belt Line Railroad which extends along the main part of the port's Delaware River waterfront. Fresh water is piped to most piers and wharves; electrical shore-power connections, if available, are mentioned under the particular facility.

The Schuylkill River wharves and piers are mostly used to handle bulk petroleum products. Most of the general cargo piers and wharves are between the Walt Whitman Bridge and Port Pichmond, 2 miles above the Benjamin Franklin Bridge, and at Ten Mile Point, 7 miles above the Benjamin Franklin Bridge.

Coal and ore are handled at the facilities south of Greenwich Point, just below the Walt Whitman Bridge. Coal, ore, grain, and other bulk cargoes are also handled at Port Richmond.

Cargo is generally handled by ships' tackle; special handling equipment, if available, is mentioned in the description of the particular facility. A floating derrick with a 125-ton capacity is available. Arrangements can be made with the Philadelphia Navy Yard on League Island for the use of the 350-ton hammerhead crane.

The alongside depths for each facility are reported; for information on the latest depths contact the Port of Philadelphia or the private operator. Only the major deep-draft facilities are described; for a complete description of the port facilities, refer to the Port Series, a Corps of Engineers publication.

Facilities in Schuylkill River, East Bank:

Girard Point Pier 1: about 0.64 mile below Penrose Avenue Bridge (39°53′52″N., 75°12′44″W.); west side 1,092 feet long; 31 feet alongside; deck height, 11 feet; two 28-ton gantry cranes; 135,000 square feet of open storage; receipt and shipment of general cargo, bulk ores, shipment of scrap metal; owned and operated by Lavino Shipping Co.

Girard Point Pier 2: about 0.58 mile below Penrose Avenue Bridge; face 260 feet long, 36 to 28 feet alongside; east side, 1,036 feet long, 28 feet alongside; west side, 927 feet long, 36 to 34 feet alongside; deck height, 11 feet; 48,000 square feet of covered storage; receipt of clays and stone; owned and operated by Independent Pier and Terminal Co.

Girard Point Grain Elevator Pier 3: about 0.55 mile below Penrose Avenue Bridge; east side 882 feet long, 35 to 30 feet alongside; west side 400 feet long, 31 to 27 feet alongside; deck height, 11 feet; pneumatic unloading tubes can unload 8,500 bushels of grain per hour; 8 loading spouts can load 60,000 bushels per hour; grain elevator has 2.25-million bushel capacity; receipt and shipment of bulk grains; electrical shore-power connections; owned and operated by Tidewater Grain Co.

Gulf Oil Wharves 1 and 3: about 0.28 mile below Penrose Avenue Bridge; 1,475 foot face; 32 feet alongside; deck height, 12 feet; electrical shore-power connections; receipt and shipment of petroleum products; bunkering vessels; owned and operated by Gulf Oil Corp.

Gulf Oil Wharf 2: about 0.2 mile below Penrose Avenue Bridge; 300-foot face; 32 feet alongside; deck height 12 feet; 5.7-million barrel storage capacity; electrical shore-power connections; receipt and shipment of petroleum products; owned and operated by Gulf Oil Corp.

Atlantic-Richfield Co. Atlantic Wharf: adjacent to lower side of Passyunk Avenue Bridge (39°59′10″N., 75°12′08″W.); 1,775 feet with dolphins; 39 to 30 feet alongside; deck heights, 17 and 12 feet; receipt and shipment of petroleum products; bunkering vessels; owned and operated by the Atlantic-Richfield Co.

Facilities in Schuylkill River, West Bank:

U.S. Gypsum Co. Wharf: about 0.9 mile above Passyunk Avenue Bridge; 472-foot face; 26 to 22 feet alongside; deck heights, 8 and 12½ feet; 5-ton crane; conveyor unloading system, rate 700 tons per hour; receipt of gypsum rock; owned and operated by U.S. Gypsum Co.

Atlantic-Richfield Co. West Yard Ballast Wharf; Berth 3: about 0.22 mile below Passyunk Avenue Bridge; 20-foot face; 440 feet with dolphins; 26 to 20 feet alongside; deck height, 12 feet; receipt and shipment of petroleum products; owned and operated by Atlantic-Richfield Co.

Atlantic-Richfield Co. West Yard Ballast Wharf, Berth 4: about 0.27 mile below Passyunk Avenue Bridge; 380 feet with dolphins; 30 to 29 feet along-

side; deck height, 17 feet; receipt and shipment of petroleum products; bunkering vessels; owned and operated by Atlantic-Richfield Co.

Esso Steamer Pier 1: about 0.5 mile above Penrose Avenue Bridge; 180 feet with dolphins; 33 feet alongside; deck height, 10 feet; 975,000-barrel storage capacity; receipt and shipment of petroleum products; owned and operated by Humble Oil and Refining Co.

Facilities in Delaware River, south of Benjamin Franklin Bridge (38°57′10″N., 75°08′07″W.):

Greenwich Coal Pier 124S: about 0.66 mile south of Walt Whitman Bridge (39°54′18″N., 75°09′47″W.); 168-foot face, 30 feet alongside; south side 1,073 feet long; 37 to 32 feet alongside; north side 1,073 feet long, 27 to 15 feet alongside; deck height, 11 feet; shipment of coal; receipt of diesel fuel; owned and operated by Penn Central.

Greenwich Ore Pier 122S: about 0.58 mile southward of Walt Whitman Bridge; north and south sides 850 feet long; 37 feet alongside south side; 42 feet alongside north side; deck height, 12 feet; four cranes, unloading rate 1,200 tons per hour; 3-million ton iron ore open storage; receipt of ore; owned by Penn Central and operated by Pennsylvania Tidewater Dock Co.

Packer Ave. Marine Terminal: adjacent to south end of Walt Whitman Bridge; 2,010 feet with dolphins; 35 feet alongside; deck height, 13 feet; 33 acres open storage; 267,000 square feet covered storage; cold-storage warehouses; receipt and shipment of general cargo and containers; electrical shore-power connections; owned by Philadelphia Port Corp. and operated by Lavino Shipping Co.

Pier 108S: about 250 yards northward of Walt Whitman Bridge; south side 810 feet with dolphins; 30 feet alongside, deck height, 11 feet; 350,000-barrel storage capacity; receipt of bulk molasses and fuel oil; owned and operated by Publicker Industries, Inc.

Pier 106S: about 0.1 mile northward of Walt Whitman Bridge; 100-foot face, 410 feet with dolphins; 30 feet alongside; deck height, 12 feet; receipt and shipment of alcohol and bulk liquids; owned and operated by Publicker Industries, Inc.

Pier 103S; about 0.17 mile northward of Walt Whitman Bridge; south side 220 feet long; 27 to 17 feet alongside; north side 470 feet long, 27 feet alongside; deck height, 11 feet; receipt of molasses and fuel oil, shipment of alcohol; owned and operated by Publicker Industries, Inc.

Pier 100S: about 0.22 mile northward of Walt Whitman Bridge; north side 1,140 feet long; 30 feet alongside; deck height, 13 feet; receipt and shipment of general cargo, steel, and automobiles; owned by the U.S. Government and operated by Rainbow Terminal Corp.

Pier 98S: northward of Pier 100S; 290-foot face; south side 1,500 feet long; north side 1,485 feet long; 30 feet alongside; deck height, 14 feet; 290,000 square feet covered storage; receipt and shipment of general cargo; electrical shore-power connections; owned by the U.S. Government and operated by Rainbow Terminal Corp.

Pier 96S: northward of Pier 98S; 280-foot face; north and south sides 1,320 feet long; 30 feet alongside; deck height, 14 feet; 92,000 square feet covered storage; 130,000 square feet open storage; electrical shore-power connections; receipt and shipment of general cargo; owned by the U.S. Government and operated by Rainbow Terminal Corp.

Pier 84S: northward of Pier 96S; 385-foot face; south side 839 feet long; north side 876 feet long; 30 feet alongside; deck height, 10 feet; 458,000 square feet of covered storage; receipt and shipment of general cargo; receipt of newsprint; electrical shore-power connections; owned by Philadelphia Port Corp. and operated by Luckenbach Steamship Co.

Pier 82S: northward of Pier 84S; 345-foot face, 32 to 30 feet alongside, deck height, 11.7 feet; south side 852 feet long, 32 to 31 feet alongside, deck height, 7.7 feet; north side 1,155 feet long, 31 feet alongside, deck height, 11.7 feet; two 20-ton cranes can be used together for 35-ton lifts; 53,000 square feet covered storage; owned by Philadelphia Port Corp. and operated by Lavino Shipping Co.

Pier 80S: northward of Pier 82S; 358-foot face; south side 1,150 feet long; north side 1,003 feet long; 35 to 30 feet alongside; deck height, 11 feet; 254,000 square feet covered storage; two 9-ton cranes; electrical shore-power connections; receipt and shipment of general cargo; owned by Philadelphia Port Corp. and operated by U.S. Lines Co.

Pier 78S: northward of Pier 80S; 290-foot face, 30 to 29 feet alongside; south side 846 feet long, 28 feet alongside; north side 900 feet long, 30 feet alongside; deck height, 11.7 feet; 312,000 square feet covered storage; electrical shore-power connections; receipt and shipment of general cargo; owned by Philadelphia Port Corp; various operators.

Pier 60S: (39°55′42″N., 75°08′22″W.): south side 542 feet long; 33 feet alongside; deck height, 12.6 feet; unloaders serve conveyor-belt system; 39,000 square feet covered storage; receipt of bulk raw sugar and fuel oil; owned and operated by American Sugar Sugas Co.

Pier 55S: northward of Pier 60S; 155-foot face, 31 to 30 feet alongside; south side 490 feet long, 25 feet alongside; north side 644 feet long, 31 to 30 feet alongside; deck height, 11 feet; 105,000 square feet of covered storage; receipt and shipment of general cargo; owned and operated by Independent Pier Co.

Pier 48S: northward of Pier 55S; 105-foot face, 30 feet alongside; south side 686 feet long, 28 feet alongside; north side 676 feet long, 26 feet alongside; deck height, 11 feet; 52,000 square feet of covered storage; receipt and shipment of general

cargo; owned by Philadelphia Port Corp. and operated by Furness, Withy & Co., Ltd.

Pier 38-40S: northward of Pier 48 S; 635-foot face, 35 feet alongside, south side 551 feet long, 35 to 30 feet alongside; north side 519 feet long, 35 to 30 feet alongside; deck height, 13 feet; 89,000 square feet of covered storage; electrical shore-power connections; receipt and shipment of general cargo; owned by Philadelphia Port Corp. and operated by Atlantic and Gulf Stevedores.

Facilities in Delaware River, north of Benjamin Franklin Bridge:

Pier 19N (39°57′21″N, 75°08′15″W.) 166-foot face, 33 feet alongside; south side 565 feet long, 30 feet alongside; north side 577 feet long, 25 to 20 feet alongside; deck height, 11 feet; 72,000 square feet covered storage; receipt and shipment of general cargo; owned by Philadelphia Port Corp. and operated by Independent Pier Co.

Pier 24N: northward of Pier 19N; 150-foot face; south side 562 feet long; north side 510 feet long; 31 feet alongside; deck height, 12 feet; 77,000 square feet covered storage; receipt and shipment of general cargo; owned and operated by Jarka Terminal Corp.

Pier 27N: 200 yards northward of Pier 24N; 179-foot face; 33 feet alongside south side 530 feet long, 30 feet alongside; north side 550 feet long, 33 feet alongside; deck height, 12 feet; 73,000 square feet covered storage; receipt and shipment of general cargo; owned by Reading Co. and operated by Atlantic and Gulf Stevedores, Inc.

Piers 42-43N (39°57′45″N., 75°17′57″W.): 115-foot face, 130 feet with dolphins; 30 feet alongside; deck height, 11 feet; receipt of molasses; owned and operated by the Reading Co.

Facilities at Port Richmond:

Pier 18 (39°58′16″N., 75°06′49″W.): 70-foot face, 30 feet alongside; southwest side 875 feet long, 30 feet alongside; northeast side 765 feet long, 25 feet alongside; deck height, 10 feet; railraod car dumper and cargo trimmer with capacity of 35 cars per hour; shipment of coal and ore; owned and operated by Reading Co.

Pier 14: northeastward of Pier 18; 147 foot face, 35 feet alongside; southwest side 764 feet long; 30 feet alongside; northeast side 764 feet long, 40 feet alongside; deck height, 15 feet; cranes up to 50-ton capacity; unloading rate 600 tons per hour; receipt of ore, sugar, ties, and rolled sheet steel; shipment of scrap and pig iron; owned and operated by Reading Co.

Pier 11: northeastward of Pier 14; 61-foot face, 35 feet alongside; southwest side 758 feet long, 24 feet alongside; northeast side 758 feet long, 16 feet alongside; deck height, 10 feet; conveyor-belt loading system; shipment of coal; owned and operated by Reading Co.

Pier A (39°58′29″N., 75°06′18″W.): 187-foot face, 30 feet alongside, deck height, 12 feet; west side 900 feet long, 25 feet alongside, deck height, 12 feet; northeast side 682 feet long, 27 feet alongside, deck height, 8 feet; 114,000 square feet of covered storage; use of cranes from Pier 14, 3-ton outriggers for tackle; electrical shore-power connections; receipt and shipment of general cargo; owned by Reading Co. and operated by Delaware Terminal and Stevedoring Co., Inc.

Pier B: northeastward of Pier A; 122-foot face, 30 feet alongside, deck height, 15 feet; southwest side 726 feet long, 27 feet alongside, deck height, 15 feet; northeast side 600 feet long, 26 feet alongside, deck height, 10 feet; use of cranes from Pier 14, 5-ton outriggers for tackle; electrical shore-power connections; receipt and shipment of general cargo; owned by Reading Co. and operated by Delaware Terminal and Stevedoring Co., Inc.

Pier C: northeastward of Pier B; 150-foot face, 30 feet alongside; southwest side 646 feet long, 26 feet alongside; northeast side 620 feet long, 26 feet alongside; deck height, 10 feet; 78,000 square feet covered storage, 5-ton outriggers for tackle; receipt and shipment of general cargo; owned by Reading Co. and operated by Delaware Terminal and Stevedoring Co., Inc.

Pier D: northeastward of Pier C; 216-foot face, 35 feet alongside, deck height, 10 feet; northeast side 715 feet long, 27 feet alongside, deck height, 13 feet; 197,000 square feet covered storage; 3-ton outriggers for tackle; electrical shore-power connections; receipt and shipment of general cargo; owned by the Reading Co. and operated by Delaware Terminal and Stevedoring Co., Inc.

Pier E: northeastward of Pier D; 52-foot face, 35 feet alongside; southwest side 850 feet long, 30 feet alongside; northeast side 850 feet long, 35 feet alongside; deck height, 10 feet; six unloading spouts each side, marine leg southwest side; loading rate 50,000 bushels per hour; unloading rate 7,000 to 8,000 bushels per hour; elevator capacity 2.5 million bushels; electrical shore-power connections; receipt and shipment of grain; owned by Reading Co. and operated by Bunge Corp.

Pier G: northeastward of Pier E; 161-foot face, 36 feet alongside, deck height, 10 feet; southwest side 796 feet long, 36 feet alongside, deck height, 12 feet; northeast side 627 feet long, 30 feet alongside, deck height, 10 feet; 80-ton derrick; three 50-ton cranes; electrical shore-power connections; receipt and shipment of iron and steel, molasses, and bulk liquids; owned and operated by Reading Co.

Pier H: northeastward of Pier G; 107-foot face, 35 feet alongside; southwest side 731 feet long, 35 feet alongside; northeast side 300 feet long, 10 feet alongside; deck height, 10 feet; two 10-ton cranes; electrical shore-power connections; receipt and shipment of bulk cargoes; owned by Reading Co. and operated by Reading Co. and National Molasses Co.

Delaware River Terminal, Berths 1 and 2: (39°58′36″N., 75°05′41″W.); 720-foot face, 32 feet

alongside; northeast side 615 feet long, 32 feet alongside; southwest side 626 feet long (being dredged in 1970); deck height, 10.6 feet; two 27½-ton container cranes; electrical shore-power connections; receipt and shipment of containerized cargo; owned by Delaware River Terminal, Inc. and operated by Sea-Land Services, Inc.

Pier 179N (39°58′39″N., 75°05′33″W.); 118-foot face, 29 feet alongside; west side 641 feet long, 23 feet alongside; east side 641 feet long, 23 feet alongside; deck height, 10 feet; lumber carriers and forklift trucks; receipt and shipment of lumber, steel products, chemicals, and petroleum products; owned and operated by Delaware River Terminal, Inc.

Tioga Street Terminal (39°58′42″N., 75°05′10″W.) was under construction in 1970; design provides for about 3,000 feet marginal berthing space; 35 feet alongside; deck height, 12 feet; will be used for receipt and shipment of general cargo; to be leased to Philadelphia Port Corp.

Upper Delaware River (chart 296):

Philadelphia Coke Pier (39°59′32″N., 75°03′55″W.): 44-foot face, 14 feet alongside; southwest side 495 feet long, 14 feet alongside; northeast side 520 feet long, 28 feet alongside; deck height, 11 feet; traveling crane and conveyor system; unloading capacity 450 tons of coal per hour; loading capacity 150 tons coke per hour; electrical shore-power connections; receipt of coking coal, pumice, and petroleum products and shipment of coke and tar; owned and operated by Philadelphia Coke Co.

Northern Metal Co. Upper Pier (40°01′16″N., 75°01′16″W.): 200-foot face, 32 feet alongside; southwest side 478 feet long, 30 feet alongside; northeast side 873 feet long, 32 feet alongside; deck height, 12 feet; cranes with 10-to 75-ton capacities; electrical shore-power connections; receipt and shipment of general cargo; owned and operated by Northern Metal Co.

Northern Metal Co. River Wharf: northeastward of Northern Metal Co. Upper Pier; face and southwest side 1, 200 feet long; 30 feet alongside; deck height, 14 feet; 180,000 square feet covered storage; 140-acres open storage; cranes with 10-to 70-ton capacities; receipt and shipment of general cargo; owned and operated by Northern Metal Co.

Supplies. —All types of marine supplies and services are available in the Philadelphia area. Bunker oil and diesel oil can be obtained at terminals along the Schuylkill River. Other bunkering terminals are at Delaware City, Marcus Hook, Paulsboro, Eagle Point, Petty Island, and Fisher Point Dike. Many vessels receive fuel from barges alongside.

Repairs. —Major repairs to large vessels can be made at the Sun Shipbuilding and Drydock Co. at Chester, Pa., previously discussed in this chapter, or at the Philadelphia Shipyards, Inc. (39°58′08″N., 75°07′12″W.), which has a graving dock with a length of 640 feet, 90 feet wide, and a depth of 32 feet over the sill. A 40-ton crane is available at the dock.

There are several shore-based firms engaged in the field of general ship repairs; work is done on the vessel or in the company shops. Repairs to small vessels can be made at shipyards on Cooper Point in Camden. Small-craft repair facilities are at Essington, Pa., described earlier in this chapter.

Communications. —Philadelphia is served by three major railroad systems. More than 100 steamship lines operate to and from the port. Several major airlines provide frequent scheduled service between Philadelphia International Airport, 5.5 miles southwest of City Hall, and domestic and overseas points.

Schuylkill River, Mile 80N, is navigable for 7.3 miles to **Fairmount Dam** and is an important outlet for a part of the commerce of Philadelphia.

The federal project provides for a channel 33 feet deep to Passyunk Avenue bridge, 3.1 miles above the mouth, thence 26 feet deep to Gibson Point, 4 miles above the mouth, and thence 22 feet deep to University Avenue bridge, 5.3 miles above the mouth. Above that point most of the wharves have depths of about 12 feet at their faces. See Notice to Mariners and latest edition of the chart for controlling depths.

A light marks the outer end of a sunken jetty on the east side of the entrance to Schuylkill River and a fog signal is on the west side. An **021°30′** lighted range marks the entrance, and lights and buoys mark the channel within the river as far as the railroad bridge, 4.5 miles above the mouth.

Within its project limits, Schuylkill River is crossed by five bridges, the first of which, the Penrose Avenue highway bridge, 1.3 miles above the mouth, has a fixed span with a clearance of 135 feet. The others, all drawbridges, have a minimum clearance of 15 feet; see **117.227**, Chapter 2, for drawbridge regulations and opening signals. In 1970, a fixed highway bridge, with a design clearance of 135 feet, was under construction about 0.75 mile below the Penrose Avenue bridge.

Above the University Avenue bridge, the limiting clearance of the fixed bridges is 16 feet. The railroad bridge, 5.6 miles above the mouth, has a swing span with a clearance of 26 feet; see **117.227**, Chapter 2, for drawbridge regulations and opening signals.

The overhead power cable 250 yards below the Passyunk Avenue bridge has a clearance of 137 feet. The overhead cables above the University Avenue bridge have a minimum clearance of 70 feet.

The mean range of tide is 5.7 feet in Schuylkill River. The current velocity is about 0.5 knot in the entrance.

The shores of Schuylkill River have become the center of the petroleum industry at the Port of Philadelphia. The deep-draft piers and wharves

along the river were described previously in this chapter under Wharves. Most of the other wharves and piers along the river have depths of 9 to 12 feet at their faces.

League Island, now a part of the mainland at the junction of Delaware and Schuylkill Rivers, is the site of the **Philadelphia Naval Shipyard.** The reservation has a frontage of 0.6 mile on the east side of Schuylkill River and 2 miles on the north side of Delaware River. **Reserve Basin,** in the northwest part of the reservation, is used to store vessels of the reserve fleet. A ferry operates across Delaware River from midway along the League Island waterfront to National Park, N.J.

A petroleum terminal (39°52′43″N., 75°09′30″W.), east of **Eagle Point,** Mile 81.8S, has an offshore wharf which provides 1,380 feet of berthing space. Depths of 40 feet are reported alongside and deck heights are 6 and 16 feet. There are railroad and highway connections and water and electrical shore-power connections. Vessels can be bunkered at the rate of 1,500 barrels per hour.

Big Timber Creek, Mile 82.9S, has a dredged entrance channel which in 1961, had a controlling depth of 4½ feet through the buoyed flats at the entrance, thence 12 feet to the fixed highway bridge at Westville, a mile above the mouth. Local knowledge is needed to navigate the channel beyond the buoys. The minimum clearance of the fixed bridges at **Westville,** a mile above the mouth, is 14 feet. Above Westville, the fixed bridges have a least clearance of 8 feet. The overhead cables crossing the creek have a least clearance of 30 feet.

The oil and chemical barge wharves on the northeast side of the entrance to Big Timber Creek have depths of about 12 feet at their faces. Above here, the creek is little used except by pleasure craft. Several marinas are along the creek; slips, gasoline, and some marine supplies are available. Hull and engine repairs can be made. Maximum haul-out capacities: railway, 48 feet, lift, 10 tons.

Gloucester City, Mile 83.5, is the site of large manufacturing plants. A Coast Guard base is about midway along the 1.3-mile waterfront. The three deepwater facilities along the waterfront, which are described below, have railroad and highway connections, water, and electrical shore power.

A petroleum terminal (39°53′41″N., 75°07′52″W.), about 0.6 mile south of Walt Whitman Bridge, has a T-head pier providing 840 feet of berthing space with dolphins. Depths of 35 feet are reported alongside; deck height, 12 feet.

A cork company pier, about 1,070 yards north-northeastward of the petroleum terminal, has 444 feet of berthing space on its southwest side. Depths of 24 feet are reported alongside; deck height, 10 feet. It is used for receipt of baled cork.

A general cargo pier, about 0.8 mile north-northeastward of the petroleum terminal, has 914 feet of berthing space along the north side. Depths of 31 to 27 feet are reported alongside; deck height, 10 feet.

Several barge wharves and piers with depths of 5 to 15 feet alongside are at Gloucester City.

The current velocity is about 2.1 knots of Gloucester City.

Newton Creek, Mile 84.2E, forms the boundary between Gloucester City and Camden. Navigation is blocked 500 yards above the mouth by low fixed bridges.

Camden, N.J., is an important manufacturing center directly opposite Philadelphia, with which its industrial and shipping activities are closely allied. The South Jersey Port Commission, with headquarters at Camden, has jurisdiction over the New Jersey ports bordering Delaware River and Bay from Trenton to the ocean.

Quarantine, customs, agriculture quarantine, and immigration matters are handled by officials from Philadelphia.

Camden is served by the Penn Central and Reading Railway.

Camden Marine Terminals (39°56′16″N., 75°07′55″W.), at Mile 86E, has a 1,550-foot marginal wharf; 30 to 35 feet reported alongside; deck height, 11 feet; 74,500 square feet of covered storage; 40 acres of open storage; cranes up to 25-ton capacities; conveyor-belt system for bulk cargoes; railroad and highway connections; water and electrical shore-power connections; used for receipt and shipment of general cargo; receipt of lumber, fertilizers, ores, and dry bulk commodities; owned and operated by South Jersey Port Commission.

An offshore wharf, about 0.4 mile southward of Camden Marine Terminal, has a 410-foot face, 30 feet reported alongside, and deck height, 11 feet. A conveyor system unloads gypsum rock at the rate of 600 tons per hour.

Most of the other wharves along the Camden waterfront have depths of 6 to 25 feet at their faces; some of the bulkheads are dry or nearly so at low water.

There are no major repair facilities at Camden for large vessels. The nearest facilities are at Chester, Pa. and Philadelphia, Pa., which were discussed earlier in this chapter.

There are several shipyards at **Cooper Point,** above the Benjamin Franklin Bridge, that can make all kinds of above and below water repairs to small vessels. The largest floating drydock has a capacity of 1,000 tons, is 182 feet long, 66½ feet wide, and has a depth of 12 feet over the keel blocks. The largest marine railway has a haul-out capacity of 1,000 tons with a 225-foot cradle.

A petroleum terminal on the north side of Petty Island, Mile 89S, has a marginal wharf providing 750 feet of berthing space. Depths of 33 to 36 feet are reported alongside; deck height, 11 feet. There are railroad and highway connections; it is used for

receipt and shipment of petroleum products and petrochemicals. Vessels are bunkered at the rate of 5,000 barrels per hour.

The channel between Petty Island and the New Jersey shore has a controlling depth of about 10 feet; both entrances are buoyed, but care is necessary to avoid the foul ground extending from both shores. The railroad-highway bridge over the northeastern end of the channel has a bascule span with a clearance of 12 feet; see **117.227 and 117.225 (a) through (e) and (f) (18)**, Chapter 2, for drawbridge regulations and opening signals. Most of the boatyards along the New Jersey shore southward of Petty Island are inactive.

Cooper River empties into the south side of the channel back of Petty Island, 0.6 mile above the southwest entrance. In 1963, the dredged channel had a centerline controlling depth of 12 feet through the entrance to the railroad bridge, about 0.9 mile above the mouth, thence 8 feet for about 0.4 mile to the end of the dredged channel. The channel through the flats at the entrance is buoyed. The mean range of tide is 5.9 feet in the entrance. The drawbridges over this section of the river have a minimum width of 20 feet and a clearance of 3 feet; see **117.225 (a) through (e) and (f) (17-a)**, Chapter 2 for drawbridge regulations. The petroleum wharf near the railroad bridge has a reported depth of 5 feet at its face.

There are two petroleum terminals on **Fisher Point Dike,** Mile 90S. Both have rail and highway connections and water is available. Both are used for the receipt and shipment of petroleum products. Vessels are bunkered at the rate of 3,500 barrels per hour.

The westernmost dock has 175 feet of berthing space with dolphins, 40 feet reported alongside, and a deck height of 12 feet. The dock about 1,200 yards to the eastward has 260 feet of berthing space with dolphins, 28 to 33 feet reported alongside, and a deck height of 12½ feet.

Chart 296.—Above Philadelphia, the 40-foot dredged channel continues to Newbold Island, Mile 110, thence the dredging depths are 25 feet to the Trenton Marine Terminal. Depths above Newbold Island may be considerably below dredging depths; see Notice to Mariners and latest edition of chart for controlling depths. Above Trenton Marine Terminal, depths are about 8 feet to the railroad bridge.

The mean range of tide is 6.0 feet at Bridesburg and 6.8 feet at Trenton. Above Philadelphia the river usually is closed by ice for extended periods during January and February, and in severe winters navigation is practically suspended during these months; ice seldom forms before January.

During March and April, **freshets** 10 to 20 feet in height above mean low water may be expected at Trenton. The highest level is reached during the ice breakup in the spring; heavy rains do not ordinarily raise the level to more than 9 feet above mean low water. Freshets usually are not dangerous to shipping unless accompanied by ice. The 1903 freshet, highest on record, reached heights above low water of 21½ feet at Trenton, 19½ feet at Bordentown, and 13 feet at Bristol.

See Appendix for **Trenton Climatological table.**

The Penn Central railroad bridge, which crosses Delaware River from Bridesburg, Pa. to Delair, N.J., Mile 90.6, has a vertical-lift span with a clearance of 49 feet down and 135 feet up; see **117.227**, Chapter 2, for drawbridge regulations and opening signals. An overhead power cable at the bridge has a clearance of 140 feet. The current velocity is 1.6 knots at the bridge.

A fixed highway bridge with a design clearance of 135 feet is under construction across the Delaware River at Mile 90.8.

The highway bridge that crosses Delaware River from Tacony, Pa., to Palmyra, N.J., Mile 93.0, has a bascule span with a clearance of 53 feet; see **117.227**, Chapter 2, for drawbridge regulations and opening signals.

Gasoline and some supplies are available at a small boatyard on the west side of the bridge at Tacony; minor engine repairs can be made.

Dredge Harbor, Mile 96S, is a base for sand and gravel dredging equipment and yachts. The eastern entrance is closed by shoals. The western entrance has depths of about 10 feet, thence up to 15 feet inside. The sand and gravel wharves on the northeast side of the harbor have depths of 8 to 10 feet at their outer ends. Berths, gasoline, diesel fuel, and marine supplies are available at several marinas in the harbor. Hull and engine repairs can be made. Maximum haul-out capacity: lift, 30 tons.

Rancocas Creek, Mile 96S, has some sand and gravel barge traffic as far as the first bridge; above this point the creek is used only by pleasure boats. Depths are about 5 feet to **Centerton** 6 miles above the mouth. The channel is narrow and crooked above Bridgeboro, and in general follows ebb-tide bends back and forth between shoals; navigation is difficult without local knowledge. The entrance to the creek is marked by a buoy. The current velocity is about 1 knot in the entrance. There are small-craft facilities near the first bridge and at **Bridgeboro.** Berths, gasoline, and some marine supplies are available. A small-craft facility at Bridgeboro has a 30-ton mobile hoist that can haul out vessels for hull and engine repairs.

The highway bridge, 1.3 miles above the mouth, has a swing span with a clearance of 4 feet. The railroad bridge, 0.2 mile above the highway bridge, has a swing span with a width of 42 feet and a clearance of 3 feet. The highway bridge at Bridgeboro, 2.6 miles above the mouth, has a bascule span with a clearance of 8 feet; overhead power and TV cables above and below the bridge have a least clearance of 51 feet. Centerton bridge, 6 miles above the mouth, has a swing span with a

width of 48 feet in the south opening and a clearance of 6 feet; see **117.225 (a) through (e) and (f) (19)**, Chapter 2, for drawbridge regulations. Above this point, navigation is limited by fixed bridges, the least clearance being 6 feet at the Mount Holly bridge, 11.5 miles above the mouth.

Poquessing Creek, Mile 97N, forms the upper boundary of the city of Philadelphia. The yacht club at **Torresdale,** a part of the city on the lower side of the creek, has a float landing where gasoline, diesel fuel, and some marine supplies can be obtained; depths at the float are 10 to 14 feet.

Mud Island, just above Poquessing Creek, is a flat which is partly submerged at high water and is covered with marsh grass in the summer. The channel between Mud Island and the Pennsylvania mainland has a controlling depth of about 7 feet. The lower part of the channel is used considerably as a small-boat anchorage.

Andalusia, Mile 97.5N, is a suburban residential community with few industries along the waterfront. A marina back of Mud Island has berths, gasoline, diesel fuel, and some marine supplies. A 20-ton mobile hoist is available for hauling out vessels. A yacht club at **Cornwells Heights,** a mile eastward of Andalusia, has a float landing with about 10 feet alongside; gasoline, berths, and water are available.

A wharf of a gypsum plant, with 783 feet of berthing space, extends 150 yards off the New Jersey side just west of Beverly, Mile 99S. Depths of 32 feet are reported alongside and deck height is 10 feet. A conveyor system unloads gypsum rock. There are railroad and highway connections, fresh water, and electrical shore-power connections.

Neshaminy Creek, Mile 100N, has depths of about 7 feet to the fixed bridge 0.7 mile above the mouth, thence 3 feet to the fixed railroad bridge 1.2 miles above the mouth. The fixed highway bridge has a clearance of 9 feet. There are several boatyards and marinas along the creek. Berths, gasoline, diesel fuel, water, and some marine supplies are available. Hull and engine repairs can be made. Maximum haul-out capacities: railway, 60 feet; lift, 35 tons.

At Mile 100.1N, a dredged channel leads to a small-craft basin used as an anchorage at **Neshaminy State Park.** In 1969, reported depths of 3 feet were available in the entrance and basin. The entrance is marked by a light and daybeacon.

The power cable over Delaware River at Mile 101.7 has a clearance of 140 feet. A highway bridge at Mile 102.1 has a vertical-lift span with clearances of 62 feet down and 134 feet up; see **117.227**, Chapter 2, for drawbridge regulations and opening signals.

Burlington, Mile 102.5S, fronts in part on the main channel of Delaware River and part on the auxiliary channel southeast of Burlington Island. Several industries are located at Burlington and its suburb, **East Burlington,** which is centered a mile along the auxiliary channel. **Storm warning signals are displayed;** see chart.

The Delaware River main channel continues along the northwest side of Burlington Island, and the auxiliary channel extends along the southeast side for 1.2 miles to a turning basin at the upper end of the U.S. Pipe and Foundry Company. In November 1966, the midchannel controlling depth was 11 feet in the auxiliary channel to the turning basin; depths in the turning basin range from bare in the northwestern half to 13 feet in the southeastern half. Eastward of the turning basin, the back channel has natural depths of about 11 feet through the northeast entrance.

The overhead power cable about 0.3 mile northeast of the turning basin has a clearance of 45 feet.

The current velocity is 1.4 knots in the main channel west of Burlington Island. In the back channel east of the island, the velocity is 0.9 knot on the flood and 1.8 knots on the ebb.

The public utilities wharf at the lower end of Burlington has reported depths of 20 feet at the face; other wharves have depths ranging from 7 to 12 feet. The foundry wharf at East Burlington has depths of about 20 feet at the face and the oil wharf, above the turning basin, has depths of about 12 feet at the outer face. A marina at the entrance to **Assiscunk Creek** has berths, gasoline, and some marine supplies. A 7-ton mobile hoist is available for hauling out vessels for hull and engine repairs.

Bristol, Mile 103.5N, was the terminus of the **Delaware and Lehigh Canal,** which was abandoned in 1931; the former Bristol entrance from the river is filled in. The public wharf at the lower end of the town has depths of about 6 feet at the face. A yacht club near the upper end of Bristol has float landings with 14 feet alongside; gasoline and water are available; members or guests may use the club railway to haul out boats up to 38 feet in length, but must make their own repairs.

At Mile 104.5S, a gypsum company operates a wharf which provides 420 feet of berthing space. Depths of 31 feet are reported alongside; deck height, 9 feet. There is a conveyor system for unloading gypsum rock and railroad and highway connections.

The fixed highway bridge at Mile 105.1 has a clearance of 135 feet.

Florence, Mile 107W, is a manufacturing community with no waterborne commerce.

Roebling, at Mile 108S, is a privately owned port which operates an extensive wire cable plant. The main wharf has depths of about 12 feet at the face.

Newbold Island, just above the Roebling main wharf, is 1.5 miles long, with a greatest width of 0.7 mile. The main channel of Delaware River is along the north side of Newbold Island.

The back channel between the island and the New Jersey mainland has a controlling depth of

about 4 feet from the upstream end of the island to the salvage yard 0.3 mile inside. West of the yard, the channel is impassable except for small boats at high water, as the natural channel has a bare shoal across its entire width centered in 40°07′16.5″N., 74°45′22.5″W.

At Mile 109N is a basin where sand and gravel are handled. The wharves have depths of about 10 feet at their faces.

A slip of the Fairless Works, U.S. Steel Co., Mile 109.4N, (40°08′12″N., 74°45′15″W.), opposite Newbold Island, provides about 4,000 feet of berthing space. Depths of 40 feet are reported alongside and deck heights are 16½ and 18½ feet. There are cranes up to 25-ton capacities and a conveyor system with an unloading rate of 1,000 tons bulk ore per hour. There are railroad and highway connections.

Fieldsboro, Mile 110.5S, is a residential community but there are some industrial activities along the waterfront. The offshore pier of a chemical plant extends 250 feet from shore at the lower end of the town. It provides 120 feet berthing space with dolphins, depths of 27 feet reported alongside, and deck height, 12 feet. There are rail and highway connections; the facility is used for receipt of molasses.

The current velocity off Fieldsboro is 1.4 knots on the ebb; the flood current is weak and of short duration.

Crosswicks Creek, Mile 111.1S, is used extensively by pleasure craft. Berths and gasoline can be obtained at one of the yacht clubs at Bordentown, near the mouth of the creek.

Bordentown, on the high bank on the southeast side of the entrance to Crosswicks Creek, was the terminus of the **Delaware and Raritan Canal,** which was abandoned in 1933.

On **Duck Island,** Mile 113E, there are two oil-receiving piers with 14 feet reported alongside, and a public utility coal pier with 25 feet reported alongside. Vessels stay in the main channel until north of the coal pier before heading toward shore and southward to the oil terminals to avoid the shoal area between the main channel and the terminals.

On the New Jersey shore between Duck Island and Trenton are several small-craft facilities where gasoline, berths, and some marine supplies are available. A 10-ton crane is available for hauling out vessels for hull and engine repairs.

A power cable with a clearance of 166 feet crosses the Delaware River at Mile 114.

Trenton, the capital of New Jersey, is at the railroad bridge crossing the river at Mile 116. The railroad bridge is the head of powerboat navigation. The city is an important manufacturing center.

The **Trenton Marine Terminal** (40°11′20″N., 74°45′22″W.), one mile below the railroad bridge, has a 1,200-foot marginal wharf. Depth of 15 feet is reported alongside and deck height is 15½ feet. There are 44,000 square feet of covered storage; cranes up to 25-ton capacities; railroad and highway connections; fresh water and electrical shore-power connections; the terminal is used for the receipt and shipment of general cargo.

Just below the railroad bridge there is an oil-receiving wharf with depths of 10 to 15 feet alongside.

7. CHESAPEAKE AND DELAWARE CANAL

Chart 570.—The **Chesapeake and Delaware Canal** is a sea-level waterway that extends from Delaware River to Reedy Point, Delaware, to **Back Creek** at Chesapeake City, Maryland, thence down Back Creek to Elk River and Chesapeake Bay. The Reedy Point entrance is 51 miles above the Delaware Capes, 35.5 miles below Philadelphia, 62 miles from Baltimore, and 187.5 miles from the Virginia Capes. **Miles** in the following text are the distances in nautical miles along the canal from the middle of Delaware River. **Reedy Point,** at Mile 0.7 on the north side of the Delaware entrance, is jettied and is marked by a light; the jetty on the south side is similarly marked.

Note.—The system of marking the channel with buoys and lights is from each entrance and reverses at Chesapeake City. Even numbers and flashing red lights are on the north side and odd numbers and flashing white lights are on the south side between the Delaware Bay entrance and Chesapeake City. Even numbers and flashing red lights are on the south side and odd numbers and flashing white or green lights are on the north side from Chesapeake City to the west end of the canal.

In addition to the navigational aids, both banks of the canal are lighted by mercury vapor lights located about 140 feet from the edge of the channel. The lights are about 250 feet apart.

Navigation regulations.—The following regulations are from the Code of Federal Regulations, Title 33, Navigation and Navigable Waters:

§207.100 Inland waterway from Delaware River to Chesapeake Bay, Delaware and Maryland (Chesapeake and Delaware Canal); use, administration, and navigation. (a) Applicability. This section is applicable to that part of the Inland Waterway from Delaware River to Chesapeake Bay, Delaware and Maryland, between the Delaware River and Elk River, including the Chesapeake and Delaware Canal and the Delaware City Branch Channel which extends from the Delaware River at Delaware City to its junction with the canal about 1.5 miles west of Reedy Point.

(b) Supervision. The District Engineer, Corps of Engineers, Philadelphia, Pennsylvania, has administrative supervision over the waterway and is charged with the enforcement of this section. The District Engineer from time to time will prescribe the dimensions of vessels which may transit the waterway, and the special conditions which shall govern the movements of vessels using the waterway. The District Engineer's representative is the Canal Superintendent. All orders in aiding and directing traffic and in enforcing this section will be issued by the Superintendent through the dispatcher and the patrolmen on duty.

(c) Safe navigation required. Permission for any vessel to enter or pass through any part of the waterway will be contingent on the vessel's being properly equipped in personnel, machinery, and operative devices for safe navigation. In the event of question as to the ability of any vessel to navigate the waterway in safety, a ruling thereon will be made by the dispatcher. An appeal from the dispatcher's ruling may be taken by the owner, agent, master, or other person in charge of the vessel concerned to the District Engineer whose decision shall be final. The granting of permission for any vessel to proceed through the waterway shall not relieve the owners, agents, and operators of the vessel of full responsibility for its safe passage.

(d) Anchorage, mooring, and wharfage facilities. The anchorage basin on the south side of the waterway at Chesapeake City, mooring basins and tie-up dolphins on the north side of the waterway at Reedy Point and in Back Creek about one mile west of Chesapeake City, and free wharfage facilities on the west side of the anchorage basin at Chesapeake City and on the north side of the Branch Channel at Delaware City, are of limited capacity, and permission to occupy them for periods exceeding 24 hours must be obtained in advance from the dispatcher at Chesapeake City. The mooring dolphins provided on each side of the vertical lift bridges shall be used for mooring in emergencies only. Any craft using these anchorage, mooring, and wharfage facilities must have on board at all times a crew adequate to care properly for the vessel, and the United States assumes no responsibility for damages which may be sustained while using such facilities.

(e) Projections from vessels. No vessel carrying a deck load which overhangs or projects beyond the sides of the vessel will be permitted to enter or pass through the waterway. Vessels carrying rods, poles, or other gear extending above the top of the vessel's mast will be required to lower such equipment to a level with the top of the mast before entering the waterway.

(f) Speed. No vessel in the waterway or approaches shall be raced or crowded alongside another vessel, or be moved at such speed as will cause excessive swells or wash. Speed shall be kept at a minimum consistent with safe navigation. All vessels, when passing other vessels, mooring dolphins, wharves, landings, dredging plant, or other working craft, shall proceed with caution to avoid wave or suction damage. When approaching any bridge the speed of vessels shall be so regulated that they will be under full control and, in the

event the span cannot be raised immediately, be able to stop and tie up at the emergency dolphins.

(g) Tows. All ships or tugs engaged in towing vessels not equipped with a rudder, whether light or loaded, shall use two towlines or a bridle on one towline. If the vessel in tow is equipped with a rudder one towline without a bridle may be used. All towlines must be hauled as short as practicable for safe handling of the tows. No towboat will be permitted to enter the waterway with more than two loaded, or three light, barges. Two or more barges or other vessels, not self-propelled, shall be towed abreast and not in tandem, using two towlines unless the towboat is made fast alongside the tow. Such tows shall have a combined beam of not more than 105 feet, including the towboat if made fast alongside.

(h) Right of way. All vessels proceeding with the current shall have the right of way over those proceeding against the current. Vessels up to 150 feet in length shall be operated so as not to interfere with the operation of vessels of greater length at bridges and bends. Large vessels or tows must not overtake and attempt to pass other large vessels or tows in the waterway.

(i) Traffic lights. (1) Navigation in and through the waterway shall be governed by the following system of traffic control lights. These lights, which are of fixed type, are located on the outer end of the north jetty at the eastern entrance to the waterway, at Summit Bridge approximately 1.5 miles west of the Pennsylvania Railroad bridge, on the Chesapeake City bridge, Chesapeake City, Md., and at Old Town Point wharf, Maryland.

(i) Green light. Waterway open to navigation. Vessel may proceed.

(ii) Amber light. Caution. Traffic restricted.

(iii) Red light. Waterway closed to traffic. Vessel must stop.

(2) In addition to the above system of lights, navigation shall be governed by the lights installed at the drawbridges crossing the waterway as described in paragraph (j) of this section.

(j) Drawbridges—(1) Signals. When at any time during the day or night any vessel, tug, or other watercraft unable to pass under a closed drawbridge, approaches it with the intention of passing through the draw, the signal for the draw to be opened shall be three blasts of a whistle or horn blown on the vessel or craft. If the drawspan is to be opened immediately when the signal is given on the vessel or craft, the bridgetender will reply with one blast of a whistle or horn indicating he is preparing to open the bridge. If at any time after signal from the vessel the drawbridge is not ready to be opened, the bridgetender will immediately sound four blasts of a whistle or horn. When the bridge is open and clear for vessel passage, the bridgetender will sound two blasts of a whistle or horn. (Signals are repeated in **117.235a**, Chapter 2).

(2) Lights. The foregoing whistle or horn signals by the bridgetender will be supplemented by the following lights in the center of the drawspan, on both the upstream and downstream sides of the bridge:

(i) Supplementary bridge operating lights—(a) Fixed amber light. Bridge being prepared for opening.

(b) Flashing red light. Bridge opening to be delayed.

(ii) Fixed navigation lights required by the Coast Guard—(a) Fixed red light. Bridge closed to navigation. Vessel unable to pass under closed drawspan must be kept under control so it can be stopped if necessary.

(b) Fixed green light. Bridge open to navigation. Vessel may proceed.

(iii) The fixed navigation lights referred to in subdivision (ii) of this subparagraph are those prescribed by the Coast Guard under Part 68 of this title. The supplementary bridge operating lights referred to in subdivision (i) of this subparagraph shall be of such visibility and placed at such locations as are satisfactory to the Coast Guard, so as not to conflict with the locations and intended purpose of the fixed lights. Supplementary bridge lighting is not required at the drawbridge across Branch Channel at Delaware City, Del.

(3) [Reserved]

(4) The bridge crossing Branch Channel at Delaware City need not be opened for the passage of vessels.

(k) Stopping in waterway. Whenever a vessel stops in the land cut elsewhere than at the mooring dolphins, it shall be fastened securely to one bank and only at such place and under such conditions as will not obstruct the passage of other vessels or craft. When thus tied up all vessels must be moored by not less than two lines each, and no vessel shall be tied up abreast of another. Sufficient crew to care properly for such vessels shall remain on board at all times. Vessels that have been tied up or anchored in or at the entrance to the waterway shall not proceed until given clearance by the dispatcher. Stoppages in the improved portions of the waterway shall be only for such periods as may be necessary, and no vessel or craft will be allowed to use such portions of the waterway as a permanent or semipermanent place of mooring without the permission of the District Engineer. Vessels may anchor in Elk River, but they shall not anchor in the channel, and during the night they shall display lights as required by the Federal Pilot Rules.

(l) Refuse. The placing of any ashes, refuse, or other material likely to cause an obstruction in the waterway or upon the banks or rights of way thereof is prohibited.

(m) Trespass upon or injury to waterway property. Trespass upon the waterway property or injury to the waterway, lands, banks, bridges, jet-

ties, piers, fences, houses, trees, telephone lines, or any other property of the United States pertaining to the waterway is prohibited.

(n) Fish and game. The fish and game laws of the United States and of the States of Delaware and Maryland, within their respective bounds, will be enforced upon the waters and lands pertaining to the waterway owned by the United States. The use of traps and nets upon the property is forbidden except on written permission from the District Engineer.

(o) Grounded, wrecked, or damaged vessels. In the event a vessel is grounded or wrecked in the waterway or is so damaged by accident as to render it likely to become an obstruction in the waterway, the District Engineer shall supervise and direct all operations that may be necessary to float the vessel, clear the wreckage, or move the damaged vessel to a safe locality.

(p) Commercial statistics. Masters or pursers of vessels shall furnish the District Engineer or his authorized representative, on each passage through the waterway, such written statement of passengers, freight, and vessel data as may be indicated by blank forms furnished for this purpose. Failure to furnish this statement will result in denial to the offending vessel of the privilege of using the waterway. Blank forms may be obtained from the following:

(1) District Engineer, U.S. Army Engineer District, Philadelphia, P.O. Box 8679, Philadelphia, Pa.

(2) District Engineer, U.S. Army Engineer District, Baltimore, 24th Street and Maryland Avenue, Baltimore 18, Md.

(3) Resident Engineer, Chesapeake City Suboffice, Philadelphia District, Corps of Engineers, Chesapeake City, Maryland.

(4) Patrol boats in the waterway.

(5) Pilots.

Local regulations.—The following rules governing traffic through the Chesapeake and Delaware Canal were issued by the Philadelphia District Engineer on September 15, 1970, effective September 18, 1970, and supplement the rules and regulations in 207.100, governing the use, administration, and navigation of the waterway. Copies of the approved rules and regulations may be obtained upon request to the District Engineer.

The traffic through the Canal will be monitored by the dispatcher at Chesapeake City. Vessels transiting the Canal are subject to the following conditions:

a. The maximum overall length of vessels, tugs and tows other than integrated pusher-type tows which may transit the Canal is limited to 710 feet during daylight hours and to 675 feet during darkness and periods of poor visibility. The maximum overall length of integrated pusher-type tows which may transit the Canal is limited to 750 feet at all times.

b. Vessels, tugs and tows other than integrated pusher-type tows (up to 600 feet in overall length) and integrated pusher-type tows (up to 750 feet in overall length) having a combined extreme breadth of not more than 160 feet are permitted to pass each other between Reedy Point and Town Point, except as mentioned in paragraph c. below.

c. Vessels, tugs and tows, including integrated pusher-type tows, over 375 feet in overall length will not pass each other between the Chesapeake City Resident Office and Long Creek, Md.

d. Vessels which are observed by the pilot or master in charge to be difficult to handle or which are known to have handled badly on previous trips must transit the Canal during daylight hours and must have tug assistance. Such vessels must obtain permission from the dispatcher to enter the Canal and must be provided with the number of tugs sufficient to afford safe passage. Agents must make their own arrangements for tug assistance. Such eastbound vessels must clear Reedy Point Bridge and such westbound vessels the Chesapeake City Bridge before dark.

e. Vessels, tugs and tows, or any combination thereof, which exceed 375 feet in overall length or 70 feet in beam are required to have radio equipment compatible with the dispatcher at Chesapeake City. The equipment must be operative, reliable, and adequate in all respects. These vessels will not enter the Canal until a radio communication is established with the dispatcher at Chesapeake City and a clearance is received. Radio communication shall be established on 2350 kHz, 156.65 MHz, or 156.9 MHz. The dispatcher at Chesapeake City will monitor 156.8 MHz for the purpose of responding to transmissions of emergency nature. All communications with the dispatcher on these frequencies shall be confined to that necessary to transit the Chesapeake and Delaware Canal.

Navigation is advised that it is the intent of the Government to abandon the existing radio systems, 2350 kHz, and 156.9 MHz at the canal at sometime in the future and utilize VHF-FM operating on 156.65 MHz and 156.8 MHz. In view of this, vessels which require radio equipment for use with the dispatching system are encouraged to install VHF-FM equipment. The foregoing describes the radio requirements for vessels, tugs and tows, or any combination thereof, over 375 feet in overall length, or 70 feet in beam transiting the Canal; however, it is urged that all other craft which customarily use the Canal install the radio equipment described.

The traffic lights located at Reedy Point and Town Point are equipped with green, amber, and red lights. The lights are defined as follows:

a. **Green Light**—Waterway open to navigation.

b. **Amber Light**—Caution. Traffic restricted to vessels, tugs and tows, or any combination thereof, which are less than 375 feet in overall length and having beam width of less than 80 feet.

c. **Red Light**—Waterway closed to traffic. All vessels must stop.

A clearance by the dispatcher for a vessel passage through the Canal shall not relieve the owner, agents, or operators of the vessels of full responsibility for its safe passage.

Traffic checkers are stationed at the Reedy Point entrance of the Canal and at Town Point Wharf for the purpose of vessel identification and to assist the dispatcher in implementing the Canal rules and regulations.

Vessels of all types, including pleasure craft, are required to travel at all times at a safe speed throughout the Canal and its approaches so as to avoid damage by suction or wave wash to wharves, landings, riprap protection, or other boats, or injury to persons. All pilots transiting the Canal and its approaches are warned that violation of this rule may result in their suspension for 30 days as canal pilots, and flagrant or repeated offenses will be followed by their citation to the Coast Guard for reckless navigation. Passages of all vessels through the Canal will be recorded and determination will be made of those vessels which appear to travel at excessive speeds in addition to investigating specific cases where damage by suction or wave wash does occur.

Owners of yachts, motorboats, rowboats, and other craft moored or anchored in the Canal or its approaches are cautioned to secure their vessels in such manner as to avoid damage from the passages of ships at reasonable speed.

Water skiing in the Canal is prohibited between the Delaware River and Welch Point, Maryland.

Owners, designated agents, or pilots of vessels transiting the Canal will furnish statistical data on cargo and passengers by completing Waterway Traffic Report, ENG Form 3102-R, which will be mailed or delivered to the Philadelphia District Engineer at the above address. This form may be obtained from the District Engineer or Resident Engineer at Chesapeake City. Failure to furnish this form may result in denying the offender the privilege of using the Waterway.

Channels.—The federal project for the canal provides for a channel 35 feet deep and 450 feet wide. In 1970, work was being continued to provide these dimensions by dredging and straightening some of the bends. As it will take several years to complete the project, extreme caution will continue to be necessary when transiting the canal. Dredging equipment may be located along the waterway and the marine lights may be discontinued or replaced by buoys.

In 1970, the midchannel controlling depth was 26 feet and the least width was 250 feet. See Notice to Mariners and latest edition of the chart for latest controlling depths.

The **Delaware City Branch Channel** extends northward from the canal at Mile 2.5 for 1.5 miles to the Delaware River at Delaware City; the controlling depth is about 3 feet. In 1969, shoaling to 1½ feet was reported at the south end of the channel near its intersection with the Chesapeake and Delaware Canal.

A highway bridge over the Delaware City Branch Channel about a mile northward of the canal has a bascule span with a clearance of 6 feet; the span is kept in a closed position and need not be opened for the passage of vessels. The overhead telephone cable extending along the southwest side of the bridge has a clearance of 30 feet; an overhead power cable 500 feet north of the bridge has a clearance of 64 feet.

Delaware City has been described in Chapter 6.

Anchorages.—An anchorage basin is provided on the south side of the canal at Mile 12.8, opposite Chesapeake City; the controlling depths are about 4 to 10 feet in the entrance and 14 feet inside the basin. Free wharfage is available at the government wharf on the west side of the basin.

Mooring basins are provided on the north side of the canal west of Reedy Point at Mile 1.4, and west of Chesapeake City at the east end of Back Creek, Mile 13.6; each basin is 1,700 feet long and is provided with tie-up dolphins spaced 50 feet on centers. Controlling depths are about 14 feet in the Reedy Point basin and 30 feet in the Back Creek basin.

Regulations for the use of the anchorage and mooring basins are given in **207.100,** referred to previously in this chapter.

A special **small-vessel anchorage,** with depths of 3 to 4 feet, is on the southeast side of the canal at Mile 16.3, northeastward of Courthouse Point; see **110.1** and **110.70,** Chapter 2, for limits and regulations.

Local magnetic disturbance.—Differences of as much as 6° from the normal variation have been observed in Elk River Channel from Courthouse Point to Old Town Point.

Bridges and cables.—The canal is crossed by two vertical-lift bridges and four high-level fixed bridges. The fixed highway bridge at Mile 1.6 has a clearance of 135 feet. The Reedy Point highway bridge about 100 yards to the westward has a vertical-lift span with clearances of 6 feet down and 135 feet up. An overhead power cable with a clearance of 161 feet crosses the canal at Mile 3.5. The fixed highway bridge at St. Georges, Mile 5.0, has a clearance of 135 feet.

The Penn Central Railraod Bridge across the canal at **Canal Station,** Mile 7.5, has a vertical-lift span with a clearance of 45 feet down and 133 feet up. The overhead pipeline a mile west of the bridge at Mile 8.5 has a clearance of 135 feet, and an overhead power cable about 150 yards westward has a clearance of 159 feet.

The fixed highway bridge just west of the town of **Summit Bridge,** at Mile 9.2, has a clearance of 135 feet. Overhead power cables between this bridge and Chesapeake City have minimum clearances of 157 feet.

The fixed highway bridge at **Chesapeake City,** Mile 13.0, has a clearance of 135 feet.

Operation regulations and opening signals for the bridges with drawspans are given in **207.100(j),** referred to previously in this chapter, and repeated in **117.235a,** Chapter 2.

Tides.—The normal range of tide is 5.5 feet at the Delaware River end of the canal and 2.6 feet at Chesapeake City. High and low waters in Delaware River are about 2 hours later than in Elk River. The heights of high and low waters are greatly affected by the winds; northeast storms raise the level and westerly storms lower it. See the Tide Tables for daily predictions for Reedy Point.

Staff gages, with zeroes set at **canal datum,** are at numerous places along the canal, including the bridges and both ends. The datum is 2 feet below local mean low water at the mouth of Back Creek and about ½ foot below at Delaware River.

Currents.—The current velocity is 2.6 knots on the flood and 2.1 knots on the ebb at the Reedy Point bridge, and about 2 knots at the Chesapeake City bridge; see the Tidal Current Tables for daily predictions for Chesapeake City. Storms may increase these velocities to 3.0 knots or more; at such times, tows usually have dificulty in making headway against the current.

Storm warning signals are displayed; see chart.

Ice sufficient to interfere with the navigation of small craft may be expected at any time between December and April and is worst during January and February. The canal is kept open as long as possible. During mild winters, local vessels use the canal throughout most of the season, but strangers should make inquiries before attempting passage. Wooden vessels passing through thin ice are liable to be cut through at the waterline. Vessels with low hp. are cautioned against transiting the canal in heavy ice.

Pilotage through the canal from Delaware River to Chesapeake City is provided by the Delaware Bay and River pilots; see Chapter 6. Pilotage from Chesapeake City to Maryland ports and to Washington, D.C. is provided by the Maryland pilots; see Chapter 15. Both pilot associations maintain a common station on the north bank of the canal at Chesapeake City. A white motor launch is used for exchanging pilots at Chesapeake City.

The Maryland state pilots are replaced by Virginia state pilots off the mouth of Severn River (approach to Annapolis, Md.) by prearrangements made well in advance when vessels proceed to Virginia ports.

All pilots carry radiotelephones for bridge-to-bridge communications and for communications with the canal traffic dispatcher at Chesapeake City. Delaware Bay and River pilots use VHF channel 13 (156.65 MHz), and the Maryland pilots use VHF channel 18A (156.9 MHz).

The traffic dispatcher at Chesapeake City also monitors VHF channel 16 (156.8 MHz), and 2350 kHz on a 24-hour basis. The dispatcher reports that 2350 kHz is unreliable and difficult to receive.

Supplies and repairs.—Small vessels can obtain berths, gasoline, diesel fuel, and some marine supplies at Chesapeake City. The principal wharves and slips have depths of 7 to 20 feet at their faces.

The largest marine railway in the area is on the north side of the canal at Mile 13.4, 0.5 mile west of the Chesapeake City bridge. The railway can handle vessels up to 110 feet in length for hull and engine repairs.

At Mile 16.2, 0.4 mile eastward of **Courthouse Point,** a privately marked channel leads to a marina. In 1963, the channel had a reported controlling depth of 5 feet. Berths, gasoline, diesel fuel, and marine supplies are available. Hull and engine repairs can be made; hoist, 12 tons. A boatyard on Courthouse Point has gasoline and a 6-ton lift; minor hull and engine repairs can be made.

For discussion of Elk River and the upper part of Chesapeake Bay, see Chapter 15.

8. DELAWARE-MARYLAND-VIRGINIA COAST

This chapter describes that section of the Delaware, Maryland, and Virginia coastline extending from Cape Henlopen to Cape Charles and the Virginia Inside Passage. Included in the discussion is Roosevelt Inlet, the Delaware Bay entrance to the Lewes and Rehoboth Canal, Indian River Inlet, Assawoman Canal and Bay, Isle of Wight Bay, Ocean City Inlet, Chincoteague Bay and Inlet, and the various inlets that lead through the barrier beach to the Virginia Inside Passage.

Also described are the cities of Lewes, Rehoboth, Ocean City, and Chincoteague, and several of the smaller communities on these waterways.

Charts 1219 to 1222. —The coast extends southward for 21 miles from Cape Henlopen to the Delaware-Maryland boundary line, thence south-southwestward for 27 miles to the Maryland-Virginia boundary, and thence 63 miles to Cape Charles. The low sand beaches are backed by bays, rivers, and creeks which are bordered by marsh and woodland. Broken ground fringes the coast, and depths of 36 feet or less are found as far as 12 miles from shore.

Visible from seaward are the summer resorts of Rehoboth Beach, Bethany Beach, and Ocean City, all within 30 miles of Cape Henlopen. The most prominent marks south of Ocean City are the light structures and the Coast Guard stations.

The bays and connecting channels back of the barrier beaches form a continuous inside passage from Delaware Bay to Chesapeake Bay, but Assawoman Canal and Little Assawoman Bay are now navigable only for rowboats and outboards.

There are no harbors of refuge for deep-draft vessels along this coast. The inlets are subject to frequent change and their navigation requires local knowledge.

Fishtraps along the coast from Cape Henlopen to Cape Charles are limited by federal regulations to certain areas which are shown on the charts. Numerous pile remains of former traps are said to menace inshore navigation.

Navigational aids.—Most of the navigable inlets are marked by buoys, but the channels shift and the buoys cannot always be depended upon to mark the best water. Breakers form on the shoals even in ordinary weather and are good marks. Some of the interior channels are marked by daybeacons and lights, but others are marked only by bush stakes. The channels through the flats can be followed best at low water when the flats are visible.

Tides.—The mean range of tide varies from 3.5 to 4.4 feet along the coast; high and low waters occur at about the same time as at Sandy Hook. Levels in the inside waters are greatly affected by winds, westerly winds producing low water and easterly winds high water. In Assawoman, Isle of Wight, Sinepuxent, and Chincoteague Bays, northerly and southerly winds drive the water to the ends of the bays. With strong winds of long duration, depths may be as much as 3 feet above or below the normal level.

Currents.—The currents have considerable velocity in the inlets and in the narrow channels connecting the inlets with adjacent bays and sounds. Velocities of as much as 3 knots may be encountered at times in places where the currents are strongest.

Ice.—The inside waters north of Chincoteague Bay occasionally are closed by ice during ordinary winters. The tributary waters south of the bay are closed during several winters, but remain so only for short periods. The principal inlets are rarely closed and are used by local boats throughout the winter.

Chart 411.—Cape Henlopen, on the southwest side of the entrance to Delaware Bay, is described in Chapter 6.

Roosevelt Inlet, 3 miles west of Cape Henlopen, is the Delaware Bay entrance to the Lewes and Rehoboth Canal and to Broadkill River. The inlet is protected by jetties, each marked by a light on its outer end; a fog signal operates at the southeast light, and a lighted range marks the centerline of the entrance channel. The mean range of tide is 4.4 feet in Roosevelt Inlet; the current velocity is about 0.9 knot. In August 1969, the controlling depth in the dredged entrance channel between the jetties was 10 feet. During the summer months a Coast Guard unit is stationed just inside the inlet at its junction with Broadkill River and Canary Creek. Gasoline and diesel fuel can be obtained at a wharf on the southeast side of the inlet.

Broadkill River is entered by way of an inside passage that extends northwestward for 2 miles from the Roosevelt Inlet jetties to the old mouth of the river; the river then extends 9 miles westward to the town of **Milton.** In 1965-October 1968, the controlling depths were 5 feet from the junction with Roosevelt Inlet to the twin fixed highway bridges 7.1 miles above the inlet, thence in 1965, 4½ feet to Milton.

These twin fixed highway bridges over Broadkill River have a clearance of 18 feet. The overhead power cable just northwestward of the bridges has a clearance of 64 feet. Above the bridges, the river has numerous snags and there is much floating debris.

The **Lewes and Rehoboth Canal** is a tidal waterway that extends southeastward and southward for 8 miles from Roosevelt Inlet to Rehoboth Bay. The canal passes northeastward of Lewes and westward of Rehoboth Beach; the entrance to Rehoboth Bay is between stone jetties a mile southwest of Dewey Beach. The mean range of tide in the canal is 3.6 feet at Lewes and 0.5 foot at Rehoboth Beach. In August 1969, the controlling depth was 7½ feet from Roosevelt Inlet to the turning basin at Lewes, thence in 1968, 2 feet to Rehoboth Bay. The posted **speed limit** is 4 miles per hour in the canal.

Lewes, 1.7 miles inside Roosevelt Inlet, has rail connections and is the southern terminal for the Cape May-Lewes ferry. The U.S. Public Health Service maintains a **contract physician's office** in Lewes; see Appendix for address.

Several small-craft facilities are in the vicinity of the first and second bridges at Lewes. Gasoline, diesel fuel, berths, and marine supplies can be obtained, and hull and engine repairs can be made; marine railway, 65 feet.

Bridges and cables.—The highway bridge over the canal at Lewes has a 46-foot bascule span with a clearance of 6 feet. The overhead power cable to the west of the bridge has a clearance of 68 feet. The railroad bridge, 0.2 mile southeastward of the highway bridge, has a 46-foot swing span with a clearance of 10 feet; the span remains in the open position except for infrequent passage of trains; the overhead cable at the bridge has a clearance of 68 feet. A fixed highway bridge 100 yards southeastward of the railroad bridge has a 46-foot span with a clearance of 35 feet.

These bridges restrict the normal water flow in the canal and produce very strong currents. Small craft should proceed with caution in these areas.

The highway bridge over the canal at Rehoboth Beach, 6.5 miles from Roosevelt Inlet, has a 49-foot bascule span with a clearance of 16 feet; the overhead power cables on the north side of the bridge have a least clearance of 70 feet. The highway bridge, 0.3 mile farther southward, has a bascule span with a clearance of 14 feet; the overhead power cables on the south side of the bridge have a least clearance of 58 feet. Drawbridge regulations and opening signals are given in **117.240** and **117.237b,** Chapter 2.

A yacht club at which slips, gasoline, and some marine supplies are available is in a basin on the east side of the canal 4 miles southeastward of Lewes. Minor hull and engine repairs can be made; marine railway, 40 feet.

Rehoboth Bay has depths of 3 to 7 feet. The 5-mile route down Rehoboth Bay from the Lewes and Rehoboth Canal to Indian River Bay is marked by lights, daybeacons, and buoys. Reported depths of 5 feet can be carried through the marked-bay channel to near Light 9, thence in September-October 1969, 3 feet in the dredged section of the channel which leads between the islands separating the two bays. Gasoline, some supplies, and slips are available at the northeast end of Rehoboth Bay at **Dewey Beach.**

Love Creek, at the northwest corner of Rehoboth Bay, is navigable for small craft to a milldam near **Robinsonville,** 4 miles above the mouth. The fixed highway bridge 2.3 miles above the mouth has an 18-foot channel span with a clearance of 7 feet. Above the bridge are berthing facilities in depths of 1 to 2 feet. The controlling depth is about 2½ feet from Rehoboth Bay to the bridge.

Herring Creek, at the southwest corner of Rehoboth Bay, has depths of 3 to 5 feet to the forks 2 miles above the mouth, thence 1 to 3 feet for 0.5 mile up the northern prong and 3 to 5 feet for a mile up the southern prong. The creek is little used except by local residents.

Indian River Inlet, 12 miles south of Cape Henlopen, is the first opening in the barrier beach south of Delaware Bay. The entrance is marked by buoys; lights are on the jetties and a marker radiobeacon is on the north side of the entrance. A Coast Guard station is on the north side 0.5 mile inside the inlet. **Storm warning signals are displayed;** see chart.

A channel leads from Indian River Inlet through Indian River Bay and up Indian River to Millsboro, 12 miles above the inlet. In 1966-March 1970, the controlling depths were 15 feet through the dredged entrance channel between the jetties to the fixed bridge, thence 6½ feet to the small-boat harbor west of the bridge, thence 3 feet to Old Landing, and thence 2½ feet to Millsboro. Buoys mark the shifting channel between the entrance and the junction light, and daybeacons mark the channel to Millsboro.

The mean range of tide is 3.9 feet at the ocean end of Indian River Inlet and 2.6 feet at the highway bridge over the inlet. The current velocity is about 2 knots; caution is necessary because the buoys sometimes tow under.

The fixed highway bridge over Indian River Inlet has a clearance of 35 feet for a midwidth of 100 feet or 32 feet for a width of 200 feet. The stub ends of a former drawbridge, now used as fishing piers, are close westward of the bridge. An overhead power cable with a clearance of 105 feet crosses the inlet about 100 yards westward of the bridge.

Gasoline, diesel fuel, slips, and some marine supplies are available in the small-boat basin on the north side, 0.8 mile inside Indian River Inlet, and at a marina on the south side 0.9 mile inside the inlet. Hull and engine repairs can be made at both facilities. The boat basin has a 10-ton lift, and the marina a 25-ton lift.

A special small-vessel **anchorage area** is on the south side of Indian River Inlet 1.2 miles above the jetties; see **110.1** and **110.65,** Chapter 2, for limits and regulations.

Indian River Bay, a shallow lagoon with depths of 1 to 6 feet, extends for about 5 miles west of Indian River Inlet, then becomes **Indian River**, which is navigable for an additional 7 miles to Millsboro. The 5-mile route down the bay from Rehoboth Bay to Assawoman Canal is marked by daybeacons; the controlling depth is about 2 feet.

Pepper Creek, on the south side of Indian River Bay near its western end, has a dredged channel marked by daybeacons extending for 3 miles above the entrance. In 1964, the channel had a controlling depth of 6 feet. A clam plant is at the upper end of the creek. Gasoline and slips are available 2 miles above the entrance; repairs can be made; marine railway, 60 feet.

Most of the piers and facilities on the north side of Indian River are private.

Millsboro, on the south side of Indian River at the head of navigation, has a town bulkhead; gasoline and some supplies are available. About 100 yards below the causeway at Millsboro, there is an overhead power cable with a clearance of 43 feet. The town has railroad-freight service.

White Creek is on the south side of Indian River Bay 1.5 miles back of the outer beach. A 2-foot channel marked by daybeacons passes through the bay and creek to Assawoman Canal and **Ocean View** where gasoline and some supplies are available.

Chart 1219.—Assawoman Canal, a 3-mile land cut that connects White Creek with the north end of Little Assawoman Bay, has a controlling depth of about 2½ feet. Three fixed highway bridges over the canal have a minimum width of 14 feet and clearance of 4 feet. The power cables over the canal have a clearance of 36 feet.

The **danger zone** of an antiaircraft artillery firing area extends about 6 miles offshore from a point about 6 miles south of Indian River Inlet; see **204.25**, Chapter 2, for limits and regulations.

Little Assawoman Bay, behind the barrier beach of **Fenwick Island**, is 3 miles long and extends southward almost to Fenwick Island Light. The bay has depths of 2 to 4 feet is some places, but is bare in others and is seldom used. The only route markings are random stakes set by local residents.

Chart 1220.—Fenwick Island Light (38°27.1′ N., 75°03.3′ W.), 83 feet above the water, is shown from an 87-foot white tower, about 0.3 mile back of the beach. The tower, just north of the Delaware-Maryland boundary line, is 9 miles south of Indian River Inlet and 21 miles south of Cape Henlopen.

Fenwick Shoal, 6 miles eastward of Fenwick Island Light, has a least depth of 14 feet, but the westerly of two wrecks near the crest of the shoal is covered only 6 feet. A lighted whistle buoy marks the southwest end of the shoal and another is moored 8 miles east by south of the shoal. Deep-draft vessels normally pass to eastward of the outer buoy.

Isle of Wight Shoal, 7 miles southeastward of Fenwick Island Light, has a depth of 21 feet and is marked on its west side by a buoy. A 24-foot shoal is about midway between Isle of Wight Shoal and Fenwick Shoal.

A narrow thorofare, 0.4 mile west of Fenwick Island Light, links Little Assawoman Bay with Assawoman Bay; the controlling depth is about 2 feet. It is navigable by small boats with local knowledge. The fixed highway bridge near the north end of the thorofare has a width of 37 feet and a clearance of 11 feet.

Assawoman Bay and **Isle of Wight Bay** form a continuous lagoon that extends from the vicinity of Fenwick Island Light to Ocean City. The bays have depths of 4 to 6 feet along their western sides, and are frequented by boats from Ocean City.

In 1970, a fixed highway bridge with a design clearance of 35 feet was under construction across Isle of Wight Bay between Isle of Wight and Fenwick Island.

Ocean City Inlet (38°19.4′N., 75°05.2′W.), between Fenwick Island and Assateague Island, is 29 miles south of Cape Henlopen and is the only break in the barrier beach between Indian River Inlet and Chincoteague Inlet. The entrance is between stone jetties, but the north jetty and the outer end of the south jetty are covered at high water. A 0.1-mile long fishing pier is 0.2 mile north of the north jetty. A Coast Guard station is 0.6 mile inside the inlet on the southwest side of Ocean City; **storm warning signals are displayed**; see chart.

Little Gull Bank, 3 miles southeastward of Ocean City Inlet, has a depth of 15 feet and is marked at its southwest end by a buoy. **Great Gull Bank**, 5 miles southeastward of the inlet, has a depth of 17 feet at its southwest end and is marked at its northern end by a lighted whistle buoy.

Ocean City, that part of Fenwick Island barrier beach in Maryland, is a large summer resort visited by many small boats, and is a shipping point for a large amount of seafood and produce.

Ocean City Inlet is subject to continual change. A dredged channel leads westward from about 0.5 mile inside the inlet to the head of Commercial Fish Harbor. In April 1970, the controlling depth was 10 feet to the harbor, thence in 1969, 9 feet to the head of the harbor. Another dredged channel leads northward from inside the inlet along the inner side of Ocean City to Isle of Wight Bay. In 1970, the channel had a controlling depth of 9 feet to North Eighth Street, 0.5 mile above the highway bridge, thence 4½ feet for another 0.5 mile to Isle of Wight Bay.

The entrance to Ocean City Inlet is marked by a fog signal near the outer end of the north jetty, a light and marker radiobeacon atop the tower inshore, and lighted buoys that are shifted in position with changing channel conditions. Lights and daybeacons mark the channel to Isle of Wight Bay. The mean range of tide is 3.4 feet.

The highway bridge over Isle of Wight Bay from the mainland to Ocean City, 0.9 mile above the entrance jetties, has a bascule span with a clearance of 18 feet; see **117.240**, and **117.245 (a) through (e), and (f) (16)**, Chapter 2, for drawbridge regulations and opening signals. Pile remains of an abandoned highway bridge are 0.2 mile south of the bridge.

There are numerous privately owned pile and timber piers and bulkhead wharves on the inner side of Ocean City. The **Commercial Fish Harbor,** on the mainland side a mile directly back of the inlet, has a 1,000-foot public bulkhead landing and several private bulkhead wharves open to the public for transaction of business with the owners.

There are several small-craft facilities at Ocean City and in Commercial Fish Harbor. Gasoline, diesel fuel, water, berths, and marine supplies can be obtained at most of the facilities, and hull and engine repairs can be made at some. A 65-foot marine railway is available at a boatyard just south of the highway bridge at Ocean City.

Busses operate to and from Ocean City. The Baltimore and Eastern Railroad has a freight siding at the Commercial Fish Harbor.

The U.S. Public Health Service maintains a **contract physician's office** in Ocean City; see Appendix for address.

Sinepuxent Bay, narrow and mostly shoal, and **Chincoteague Bay,** with depths of 4 to 7 feet along its western side but shoal along its eastern side, are behind **Assateague Island** and provide a 30-mile inside route for small boats from Ocean City to Chincoteague. The bays are used by fishing and pleasure boats. The Maryland-Virginia boundary line is marked by orange-bordered daymarks on piles. **Storm warning signals are displayed;** see chart.

A dredged channel, marked by lights and daybeacons, extends 12 miles through Sinepuxent Bay to open water in Chincoteague Bay where the route to Chincoteague follows lights marking the shoal areas. In 1963-1966, the controlling depth was 4½ feet between Ocean City and Chincoteague Bay; however, the Sinepuxent Bay channel is subject to frequent shoaling and lesser depths may be encountered.

A fixed highway bridge across Sinepuxent Bay has a clearance of 38 feet; the overhead cables have a least clearance of 52 feet over the dredged channel.

Public Landing (38°08.9'N., 75°17.2'W.), on the mainland side of Chincoteague Bay 15 miles from Ocean City Inlet, has a public wharf, private landings, and fish piers; all have depths of about 4 feet alongside. A highway leads westward from the landing to **Snow Hill** on Pocomoke River. A small-boat basin with depths of 3 feet and a launching ramp is entered just north of the piers; gasoline, diesel fuel, slips, and some marine supplies are available. Hull and engine repairs can be made; lift, 10 tons.

A marina at the entrance to **Tanhouse Creek**, a mile south of Public Landing, has gasoline and an 8-ton fixed lift for hauling out boats for minor hull and engine repairs. The entrance to the creek is marked by a light and daybeacon.

George Island Landing is a small town on the mainland 0.8 mile northward of **Purnell Point** (38°01.7'N., 75°21.6'W.). The public wharf at the town is reached from the southward from Chincoteague Bay through a private channel marked by lights and private daybeacons. In 1970, depths of 5 feet were reported in the channel and alongside the wharf. Gasoline and some marine supplies are available; minor hull and engine repairs can be made. An overhead power cable with a clearance of 28 feet crosses the channel near the wharf.

Greenbackville, 1.5 miles southwestward of Purnell Point, is a village on the mainland side of Chincoteague Bay just south of the Maryland-Virginia boundary line and 4 miles north of Chincoteague. The village has substantial trade in shellfish. The channel into the harbor, marked by lights, had a controlling depth of 5 feet in 1966-1967. The mean range of tide is 0.6 foot. A boatyard in the harbor has a marine railway that can handle craft up to 45 feet in length for hull and engine repairs; gasoline and a launching ramp are available.

The narrow dredged channel marked by lights and daybeacons, 4.5 miles south of Purnell Point, is usually used to reach Chincoteague from Chincoteague Bay. In April 1970, the midchannel controlling depth was 3½ feet. The other passages between Chincoteague Bay and Chincoteague Inlet through marshy islands west of Chincoteague Island are used only by small boats with local knowledge. Controlling depths through these passages range from 1 to 6 feet and the fixed bridges over them have clearances of 4 to 12 feet.

Assateague Light (37° 54.7'N., 75°21.4'W.), 154 feet above the water, is shown from a 142-foot red conical tower 3 miles from the south end of Assateague Island. The light stands well above the surrounding trees.

Winter Quarter Shoal, 11 miles east-northeast of Assateague Light, has depths of 10 to 17 feet, but a wreck just west of the highest part is covered only 5 feet; a buoy is on the west side of the wreck; another buoy is east of the shoal area.

Blackfish Bank, about 6 miles eastward of the south end of Assateague Island, has several depths of 11 to 16 feet along its 5-mile length, and near its southwest end is a depth of 11 feet over a wreck. A bell buoy is 0.6 mile south of the wreck. A 25-foot shoal 2.5 miles east of the wreck is marked on its east side by a lighted whistle buoy. Coasting vessels seeking protection from westerly weather pass westward of Blackfish Bank.

Chincoteague Shoals, extending about 3 miles east and south of the lower end of Assateague Island, have depths of 5 to 18 feet. An unlighted buoy and a lighted bell buoy are near the 5-fathom curve southerly of the shoals.

Chincoteague Inlet (see also chart 1221), between Assateague Island and Wallops Island, is 30 miles south-southwestward from Ocean City Inlet. The entrance channel is marked by buoys that are shifted in position with changing conditions; lights also mark the inner channel through the narrow passage eastward of **Chincoteague Point** and **Chincoteague Channel.** The controlling depth to Chincoteague is about 6 feet.

Assateague Light, Assateague Beach Light, and the red lights on the tall television tower a mile southward of Chincoteague, are good marks for approaching Chincoteague Inlet.

Fishing Point, the hook-shaped sandspit forming the south side of **Toms Cove,** is continually making out to the westward, requiring caution when in the vicinity.

Chincoteague, occupying most of **Chincoteague Island,** is between the mainland and the south end of Assateague Island. The highway bridge to Chincoteague has a swing span with a clearance of 15 feet over the main channel; see **117.240,** Chapter 2, for drawbridge regulations and opening signals. The town is principally a shellfish and fishing center, but pleasure craft operate from here during the summer. The wharves and piers along the waterfront have depths of 3 to 10 feet alongside. There are numerous small-craft facilities at Chincoteague that can provide gasoline, diesel fuel, water, berths, and marine supplies. Hull and engine repairs can be made. The largest marine railway in the area can handle craft up to 80 feet in length.

A Coast Guard station is on the east side of Chincoteague Channel, 0.3 mile south of the highway bridge. **Storm warning signals are displayed;** see chart.

A **contract physician's office** of the U.S. Public Health Service is at Chincoteague; see Appendix for address.

Chart 1221.—The 35-mile stretch of coast between Chincoteague Inlet and Great Machipongo Inlet is formed by six islands of about equal length. The islands are separated from each other by narrow inlets and from the mainland by marsh and flats through which are numerous sloughs and channels.

Wallops Island, northernmost of the six, is on the southwest side of Chincoteague Inlet.

A **danger zone** extends for about 5 miles off the coast of Wallops Island and covers the entrance to Chincoteague Inlet; see **204.27,** Chapter 2, for limits and regulations.

Assawoman Inlet, the ocean entrance between **Wallops Island** and **Assawoman Island,** is very shallow and is not used. **Gargathy Inlet,** the ocean inlet separating Assawoman Island and **Metomkin Island,** is not used.

Metomkin Inlet, the ocean entrance between Metomkin Island and **Cedar Island,** is used by some small local fishing and oyster boats. The changeable entrance channel is marked, but it should not be entered without local knowledge.

Porpoise Banks, 10 miles offshore from Metomkin Inlet, have irregular bottom with depths of 34 to 40 feet.

Wachapreague Inlet, between Cedar Island and **Parramore Island,** is 20 miles south-southwestward of Chincoteague Inlet. The entrance is marked by a lighted bell buoy and unlighted buoys that are shifted in position with changing channel conditions. The controlling depth is about 5 feet through the inlet which is used by many fishing boats and by some boats seeking shelter, but should be entered only with local knowledge. The best anchorage is in **Horseshoe Lead,** southwest of the entrance, where there are depths of 20 to 30 feet west of the middle ground. **Parramore Beach Coast Guard Station** is on the inner side of Parramore Island 0.5 mile south of the inlet. A marker radiobeacon is atop the lookout tower at the Coast Guard station.

Parramore Banks extend about 8 miles offshore from Wachapreague Inlet. The area is lumpy and has numerous depths of 18 to 30 feet. A lighted whistle buoy is east of the banks.

Wachapreague, a town on the mainland about 4 miles west-northwest of Wachapreague Inlet, is an oystering and fishing center, and is a base for some pleasure boats during the summer. A depth of about 4 feet can be carried from Wachapreague Inlet through **Hummock Channel** and **Wachapreague Channel,** marked by lights, to the wharves and several marinas at the town. Gasoline, diesel fuel, water, berths, and marine supplies can be obtained. Hull and engine repairs can be made; largest marine railway, 65 feet.

Quinby Inlet, the ocean entrance between Parramore Island and Hog Island, has a fan of breakers across the entrance. The inlet is marked but should not be used without local knowledge. The controlling depth is about 2½ feet over the bar.

Quinby is a village on the mainland about 6 miles north-northwest of Quinby Inlet. A channel to the village, marked by lights, and buoys, follows **Sandy Island Channel** to **Upshur Bay,** thence through a slough in the mudflats to a dredged channel leading to a basin that has a public terminal and landing; gasoline, diesel fuel, berths, and some marine supplies are available. In February-December 1968, the controlling depth in the dredged channel was 8 feet.

Great Machipongo Inlet, the ocean entrance between Hog Island and **Cobb Island,** has breakers that form on the shoals on either side of the entrance at all times, but on the bar only in heavy weather. The inlet is marked by buoys that are shifted in position with changing channel conditions. The controlling depth is about 12 feet over the bar.

Great Machipongo Channel extends northwestward through Hog Island Bay from the inlet to the mainland where it continues as **Machipongo River. Willis Wharf,** a town on the west bank of **Parting Creek** a mile above the junction with Machipongo River, is a base for shellfish and fishing boats. Gasoline and diesel fuel are available. Marine railways here can handle craft up to 60 feet in length for hull and engine repairs. In 1966, the controlling depth was 6½ feet to the wharves at Willis Wharf.

Chart 563.—Sand Shoal Inlet, the ocean entrance between Cobb Island and **Wreck Island,** may be entered through three channels. **Northeast Channel,** protected by extensive shoaling to northward and marked by buoys shifted in position with changing channel conditions, leads along the south end of Cobb Island; the controlling depth is about 10 feet over the bar. **Southeast Channel** is straight, but the bar breaks in heavy weather; the controlling depth is about 10 feet over the bar. **South Channel,** east of Wreck Island, has a controlling depth of about 8 feet. The latter two channels are not marked and should not be used by strangers.

A good fair-weather anchorage is in the channel near the discontinued Coast Guard station east of **Little Cobb Island** for boats able to cross the entrance bar with 3 feet over it.

Sand Shoal Channel, marked by lights and daybeacons, extends westward from Sand Shoal Inlet for 6 miles where it joins a marked dredged channel leading to the wharves and public bulkhead at **Oyster** on the mainland. In January-February 1971, the dredged channel had a midchannel controlling depth of 6 feet.

Oyster is the shipping point for a large amount of seafood. Gasoline, diesel fuel, and some marine supplies are available. A marine railway is available to haul out vessels up to 45 feet in length for hull and engine repairs.

Storm warning signals are displayed; see chart.

Ship Shoal Inlet, the ocean entrance between Ship Shoal Island and **Myrtle Island,** is shallow and unmarked; it is used only by local oyster boats. There is deep water back of the inlet but the channels to the inside passages are shallow and tortuous.

The **danger zone** of a bombing and gunnery range is centered on Myrtle Island, 6 miles northeastward of Cape Charles Light; see **204.48,** Chapter 2, for limits and regulations.

Little Inlet, between Myrtle Island and Smith Island, is shallow and is little used. Small boats can connect with the inside passage at high water.

Cape Charles and the islands on the north side of the entrance to Chesapeake Bay are described in Chapter 9.

Smith Island Inlet, between Smith Island and Fishermans Island, is fairly wide but the narrow, changeable channel lies between sandbars and breakers. The inlet is used by many local boats with drafts of 3 to 4 feet, but it is unmarked and should not be used by strangers. The controlling depth over the bar is said to be 1½ feet.

Charts 1220 to 1222.—Virginia Inside Passage is between the barrier beach along the Atlantic Ocean on the east and the Virginia portion of the mainland peninsula on the west. The passage extends 74 miles from the south end of Chincoteague Bay through creeks, thorofares, marshy cuts, and bays to enter Chesapeake Bay at Cape Charles. The route is marked with lights and daybeacons which have daymarks with white reflector borders to distinguish them from aids to navigation marking other waterways. Buoys are temporarily established from time to time to mark destroyed aids or critical places.

The federal project depth is 6 feet for the waterway. Maintenance dredging is performed to provide a 6-foot controlling depth, but due to continuous shoaling 3 feet or less may be found in places, particularly inside the ocean inlets. The overhead clearance is limited only by the 40-foot fixed bridge across Cat Creek, 8 miles southward of Chincoteague, the 50-foot clearance of the power cable over Longboat Creek inshore from Metomkin Inlet, 22 miles southward of Chincoteague, and the 40-foot fixed bridge at Cape Charles.

The mean range of tide varies from 2.5 to 4.5 feet in the inlets along the Virginia coast; greater fluctuations in the water level in the inside waters are caused by high winds and storms.

Gasoline, diesel fuel, some marine supplies, and hull and engine repairs can be obtained at Wachapreague, 29 miles south of Chincoteague; at Quinby, 33 miles south of Chincoteague; at Willis Wharf, 37 miles south of Chincoteague; and at Oyster, 60 miles south of Chincoteague and 12 miles north of Cape Charles.

From Chincoteague, the Virginia Inside Passage follows Chincoteague Channel across Chincoteague Inlet to **Walker Point,** thence through **Ballast Narrows, Island Hole Narrows,** the dredged cut in **Bogues Bay,** and **Cat Creek** to the sloughs marked by lights and daybeacons back of Assawoman Inlet, 10 miles southwestward of Chincoteague. The fixed highway bridge over Cat Creek has a clearance of 40 feet. The overhead power cable just north of the bridge has a clearance of 60 feet.

From a mile back of Assawoman Inlet, the inside passage continues through **Northam Narrows,** thence through dredged cuts in **Kegotank Bay** and back of Gargathy Inlet to **Wire Passage,** 15 miles southwestward of Chincoteague.

From Gargathy Inlet, the inside passage goes through Wire Passage into a dredged cut in **Metomkin Bay** and enters Folly Creek westward of Metomkin Inlet. From junction Light "PC", a dredged channel with a controlling depth of 1½

feet for a width of 40 feet in April 1970, extends some 350 yards up **Parker Creek.** The creek is marked by daybeacons. **Folly Creek,** which leads westward from the south end of Metomkin Bay, has a depth of 1 foot to the landing at its head, 3 miles above the mouth.

The passage continues through a dredged cut from Folly Creek into **Longboat Creek** which has a power cable over its northern part with a clearance of 50 feet, thence through cuts in **Cedar Island Bay, Teagles Ditch,** and **Burtons Bay** into Wachapreague Channel which leads to Wachapreague, 29 miles southward of Chincoteague. Supplies and repair facilities are available at Wachapreague; refer to previous description in this chapter.

From Wachapreague Channel, the passage continues through a cut in **Bradford Bay,** a part of **Millstone Creek,** a cut in **Swash Bay,** a part of **The Swash,** and **Little Sloop Channel** to Sandy Island Channel, 3 miles inside Quinby Inlet and 36 miles southward of Chincoteague.

The passage southward of Quinby Inlet follows **Sloop Channel** and a dredged cut into **Cunjer Channel,** thence westward in **North Channel** at the north end of **Hog Island Bay** to Great Machipongo Channel, 43 miles southward of Chincoteague.

After passing through Great Machipongo Channel to a point 2 miles inside Great Machipongo Inlet, the route goes westward through **Gull Marsh Channel,** thence southwestward through a natural channel and cut in **Outlet Bay** and **Spidercrab Bay** to **Eckichy Channel,** thence southeastward to Sand Shoal Channel, 1.5 miles inside Sand Shoal Inlet, 56 miles southward of Chincoteague.

From inside of Sand Shoal Inlet, the passage continues westward through Sand Shoal Channel and southward through **Mockhorn Channel** to Magothy Bay.

Magothy Bay, which extends southward from Mockhorn Channel to Smith Island Inlet, is shallow except in the well marked inside passage which passes through the bay to Cape Charles. **Magotha,** a village on the west side of the bay 3.5 miles northwestward of Cape Charles Light, handles oysters at the wharves; a depth of about 2 feet can be carried to these facilities.

From the southern part of Magothy Bay, the passage continues southwestward through a dredged cut across Cape Charles into the deep water in Chesapeake Bay. The fixed highway bridge over the passage from Cape Charles to Fishermans Island has a clearance of 40 feet.

9. CHESAPEAKE BAY ENTRANCE

This chapter describes the deep-draft southerly entrance to Chesapeake Bay from the Atlantic Ocean; the waters of Lynnhaven Roads, Lynnhaven Inlet, Little Creek, Hampton Roads, Willoughby Bay, Lafayette River, and Elizabeth River, including Western, Eastern, and Southern Branches; and the ports of Hampton, Newport News, Norfolk, Berkley, Portsmouth, and Chesapeake.

Chart 1222.—Chesapeake Bay, the largest inland body of water along the Atlantic coast of the United States, is 168 miles long with a greatest width of 23 miles. The bay is the approach to Norfolk, Newport News, Baltimore, and many lesser ports. Deep-draft vessels use the Atlantic entrance, which is about 10 miles wide between Fishermans Island on the north and Cape Henry on the south. Medium-draft vessels can enter from Delaware Bay on the north via Chesapeake and Delaware Canal, and light-draft vessels can enter from Albemarle Sound on the south via the Intracoastal Waterway.

Mileages.—Many of the distances in this and later Chesapeake Bay chapters are given in nautical miles above the **Virginia Capes**, or "the **Capes**," which is a short way of referring to a line from Cape Charles Light to Cape Henry Light.

Chesapeake Light (36°54.3′N., 75°42.8′W.), 117 feet above the water, is shown from a blue tower with white superstructure on four piles, 14 miles eastward of Cape Henry. The name CHESAPEAKE is displayed on all sides. A fog signal and radiobeacon are operated at the station; **storm warning signals** are displayed during the daytime only. A fish haven, consisting of sunken fishing-boat hulls, is about 0.8 mile southwestward of the light.

Cape Charles, on the north side of the entrance, is low and bare, but the land back of it is high and wooded. **Wise Point** is the most southerly mainland tip of the cape. Low **Fishermans Island**, a National Wildlife Refuge, is a mile south of Wise Point.

The southwest end of **Smith Island** is 2 miles eastward of Wise Point; the island is 6 miles long, is low and sparsely wooded, and is awash at half tide midway along its length.

Cape Charles Light (37°07.4′ N., 75°54.4′ W.), 180 feet above the water, is shown from a 191-foot octagonal, pyramidal skeleton tower, upper part black and lower part white, on the southwestern part of Smith Island. The ruins of the old lighthouse are in shallow water 0.7 mile eastward of the light.

Smith Island Shoal, which breaks in heavy weather, has depths of 21 feet 7.5 miles east-by-south of Cape Charles Light. Depths less than 40 feet extend another 5 miles northeastward. Outer limits of the shoal area are marked by a lighted buoy.

Nautilus Shoal, which extends 4 miles southeastward from Fishermans Island, has patches with depths of 6 to 11 feet. The buoyed channel along the southwest side of Nautilus Shoal, thence northward between Fishermans Island and **Inner Middle Ground**, has a controlling depth of about 18 feet; the channel is used by local vessels drawing up to 12 feet, but is not recommended for strangers.

Chart 562.—Cape Henry, on the south side of the entrance, has a prominent range of sand hills about 80 feet high.

Cape Henry Light (36°55.6′N., 76°00.4′ W.), 164 feet above the water, is shown from a 163-foot octagonal, pyramidal tower, upper and lower half of each face alternately black and white, on the beach near the turn of the cape; the light station has a radiobeacon and a fog signal. This station also is equipped for special radio-direction-finder calibration; see Light List for operational information.

The gray octagonal, pyramidal tower 110 yards southwest of Cape Henry Light is the abandoned 1791 lighthouse. At the signal tower 0.3 mile northwest of the light, the Hampton Roads Maritime Association, in co-operation with the National Weather Service, maintains a **reporting station** from which vessels are reported to Hampton Roads; vessels can communicate with the station by signal light in International Code or through the marine telephone operator; messages from or to vessels can be relayed by the station. **Storm warning signals** are displayed; see chart.

Local magnetic disturbance.—Differences of as much as 6° from the normal variation have been observed 3 to 17 miles offshore from Cape Henry to Currituck Beach Light.

A **naval restricted area** extends northward and eastward from Cape Henry; see **207.158**, Chapter 2, for limits and regulations.

The summer resort of **Virginia Beach** is about 5 miles southward of Cape Henry Light. Many high-rise buildings and two water tanks are prominent. Some of these are lighted at night. The cupola of the Cavalier Hotel, 3.4 miles south of Cape Henry Light, is distinctive.

The **Chesapeake Bay Bridge-Tunnel** extends from Cape Charles across the bay entrance to a point 6 miles westward of Cape Henry. The 15-mile crossing has vehicular tunnels under Chesapeake Channel and Thimble Shoal Channel with fixed

bridges over Fishermans Inlet and secondary channels. In addition to the channel buoys and lights, daybeacons and fog signals mark the openings at Chesapeake and Thimble Shoal Channels. At night the floodlighted tunnel houses are more prominent than the privately maintained lights marking the channels.

Caution.—The Chesapeake Bay Bridge-Tunnel complex has on several occasions suffered damage from vessels. In every case, adverse weather prevailed with accompanying strong winds from the northwest quadrant generally related to a frontal system. Weather deterioration in the lower bay is quite often sudden and violent and constitutes an extreme hazard to vessels operating or anchoring in this area. The proximity of the bridge-tunnel complex to main shipping channels and anchorages adds to the danger. Currents in excess of 3.0 knots can be expected in the area.

Normal precautions dictated by prudent seamanship are expected of all vessels. Mariners transiting this area are, however, urged to be particularly alert in regards to the weather situation. To assist in this respect, the National Weather Service provides 24-hour weather broadcasting on 162.55 MHz. The local Marine Operator also transmits weather information at 0000, 0600, 1200, and 1800 local time on 2538 kHz and 2450 kHz. Information of a pending weather frontal passage should be met with advance preparations. Engines readied for short notice maneuvering and anchor details alerted are considered minimum prudent precautions. Maneuvering in close proximity of the bridge-tunnel complex is also discouraged.

Boundary lines of inland waters.—The lines established for Chesapeake Bay Entrance are described in **82.30,** Chapter 2.

A **Traffic Separation Scheme** has been established for the control of maritime traffic at the entrance of Chesapeake Bay and off Smith Point Light (37°52.8′N., 76°11.0′W.). It has been designed to aid in the prevention of collisions, but is not intended in any way to supersede or alter the applicable Rules of the Road.

The scheme provides for inbound-outbound traffic lanes marked by fairway buoys to enter or depart Chesapeake Bay from the northeastward and from the southeastward. **All traffic will leave these fairways buoys on their port hand entering or leaving Chesapeake Bay.**

The northeasterly inbound-outbound traffic lanes are separated by a line of five fairway buoys on bearing 250°-070°. The outermost buoy in the line is 6.4 miles 313° from Chesapeake Light and the innermost buoy is 2.5 miles 083° from Cape Henry Light.

The southeasterly inbound-outbound traffic lanes are separated by a line of five fairway buoys on bearing 312°-132°. The outermost buoy in the line is 7.1 miles 246° from Chesapeake Light and the innermost buoy is 2.5 miles 083° from Cape Henry Light.

Exercise extreme caution where the two routes converge off Cape Henry.

The turn in the main channel in Chesapeake Bay off Smith Point is marked by a fairway buoy 1.5 miles 090° from Smith Point Light. Northbound traffic will pass eastward of the buoy and southbound traffic will pass westward of the buoy.

Channels.—The deepest route to and from Chesapeake Bay is south of Chesapeake Light through the buoyed southeasterly traffic lanes. The inbound traffic lane has a controlling depth of about 50 feet and the outbound lane has about 49 feet, except for a 43-foot spot near the entrance buoy "CB". The route north of Chesapeake Light through the buoyed northeasterly traffic lanes has a controlling depth of about 35 feet for the inbound lane and about 34 feet in the outbound lane. Federal project main channel depths are 42 feet from the Virginia Capes to Baltimore and 45 feet from the Capes to Hampton Roads; see Notice to Mariners and latest editions of charts for controlling depths.

The well-marked channel to Baltimore is discussed further in Chapters 11 to 15.

Bridges.—See **117.240,** Chapter 2, for general operating regulations and opening signals of drawbridges across Chesapeake Bay tributaries; special regulations are given in **117.245** to **117.349,** Chapter 2.

Tides.—The mean range of tide is 2.8 feet at Cape Henry.

Currents.—The current velocity is 1.0 knot on the flood and 1.5 knots on the ebb in Chesapeake Bay Entrance; see the Tidal Current Tables for daily predictions.

Pilotage is compulsory for all foreign vessels and for United States vessels under register in the foreign trade. Pilotage is optional for United States vessels under enrollment in the coastwise trade if they have on board a pilot licensed by the Federal Government to operate in these waters.

Virginia and Maryland pilot boats are stationed in the entrance off Cape Henry; pilots board day or night. Virginia pilots are taken to any port in Virginia and Maryland pilots to any port in Maryland, but vessels bound for Washington, D. C. may take either. Whistle signals are one long and one short blast for a Virginia pilot and three longs and one short blast for a Maryland pilot. Both pilot boats maintain a 24-hour watch on 2638 kHz and 2738 kHz, and on VHF channels 16(156.8 MHz) and 18A (156.9 MHz). Virginia and Maryland pilots carry portable radiotelephones for bridge-to-bridge communications on 156.9 MHz.

Charts 481, 562.—Thimble Shoal Channel, the improved approach to Hampton Roads, begins 2 miles northwest of Cape Henry Light and extends 10 miles west-northwestward; a federal project provides for a 45-foot deep channel with a 32-foot deep auxiliary channel on each side of the main channel. See Notice to Mariners and latest editions

of the charts for controlling depths. Navigation regulations are given in **207.140**, Chapter 2.

Naval and merchant-vessel **anchorages** have been established south of Thimble Shoal Channel; see **110.168 (g) and (h)**, Chapter 2, for limits and regulations.

Lynnhaven Roads, an open bight westward of Cape Henry, is protected from southerly winds and is sometimes used as an anchorage. The former dumping-gound area in the western part of the bight has shoals and obstructions with depths as little as 12 feet; elsewhere, general depths are 20 to 28 feet. Eastward of Lynnhaven Inlet, the 18-foot curve is no more than 0.3 mile from shore; westward of the inlet, the shoaling is gradual and depths of 18 feet can be found 0.8 mile from shore.

There are two small-craft openings in the Chesapeake Bay Bridge-Tunnel south of Thimble Shoal Channel. Each fixed span has a clearance of 21 feet.

Lynnhaven Inlet, 4 miles westward of Cape Henry Light, is subject to continual change. A lighted buoy marks the entrance; the entrance buoys are not charted because they are frequently shifted in position. The twin fixed highway bridges over the inlet have a clearance of 35 feet. Overhead power cables close southward of the bridges have clearances of 49 feet. **Lynnhaven Bay,** south of the inlet, has depths of 1 to 10 feet.

A dredged channel leads eastward from the inlet to Broad Bay from a turning basin just south of the twin highway bridges over the inlet. In October 1969-November 1970, the controlling depth from the basin to Broad Bay was 8½ feet for a midwidth of 45 feet; depths of 10 feet were available in the basin. The fixed highway bridge over the channel 1.2 miles from the twin bridges over the inlet has a clearance of 35 feet; nearby overhead power and telephone cables have a clearance of 55 feet.

Depths are about 7 feet in Broad Bay. A marked channel with a controlling depth of 6 feet in August 1969, leads southeastward through **The Narrows** to the southern end of **Linkhorn Bay** near Virginia Beach.

Extreme caution is necessary when operating in the waterways inside Lynnhaven Inlet, because of the many visible and submerged obstructions.

Small-craft supplies, fuel, and berths are available inside Lynnhaven Inlet and in both forks of Linkhorn Bay. Repairs can be made; largest marine railway, 30 feet; lift, 2½ tons.

Little Creek is entered between jetties 8 miles westward of Cape Henry Light. Most of the creek comprises the **U. S. Naval Amphibious Base,** but the Penn Central Railroad operates car floats from the south end terminal to the town of Cape Charles on the Delmarva Peninsula; small craft use the west arm.

A dredged channel in Little Creek leads to a basin off the Penn Central Railroad terminal, 1.2 miles south of the jetties. In March 1970, controlling depths were 18 feet in the dredged channel, thence 20 feet in the basin. The channel is marked by a **177°30′** lighted entrance range and by lights; a fog signal is on the east jetty. A Coast Guard station is eastward of the railroad terminal. **Storm warning signals are displayed;** see chart.

Fishermans Cove, on the west side of Little Creek, has fuel and berthing facilities for small craft. Supplies are available and repairs can be made; largest marine railway, 55 feet; lift, 25 tons. A **speed limit** of 5 knots is prescribed for Fishermans Cove; see **207.157a,** Chapter 2.

Navy **danger zones** and **restricted areas** extend northward from the vicinity of Little Creek to the edge of Thimble Shoal Channel; see **204.51** and **207.157**, Chapter 2, for limits and regulations.

Chart 400.—Hampton Roads, at the southwest corner of Chesapeake Bay, is entered 16 miles westward of the Virginia Capes. It includes the Port of Norfolk, encompassing the cities of Norfolk, Portsmouth, and Chesapeake, and the Port of Newport News, which takes in the cities of Newport News and Hampton.

Hampton Roads is the world's foremost bulk cargo harbor. Coal, petroleum products, grain, sand and gravel, and fertilizer constitute more than 90 percent of the heavy traffic movement by water, although an increasing amount of general cargo is handled by the Hampton Roads ports.

Channels.—The approach to Hampton Roads is through the 45-foot Thimble Shoal Channel. There are natural depths of 80 to 20 feet in the main part of Hampton Roads, but the harbor shoals to less than 10 feet toward the shores. Dredged channels lead to the principal ports.

Federal project depth is 45 feet in the two main channels in Hampton Roads which are well marked by lighted buoys. One leads southward along the waterfronts of Norfolk, Portsmouth, and Chesapeake to the first bridge across the Southern Branch of Elizabeth River, and the other leads westward to the waterfront at Newport News at the entrance to James River. See Notice to Mariners and latest editions of the charts for controlling depths.

Anchorages.—Numerous anchorages have been established in Hampton Roads and Elizabeth River; see **110.168,** Chapter 2, for limits and regulations. The areas are shown on charts 400 and 452.

Tides.—The mean range of tide is 2.5 feet in Hampton Roads. See Tide Tables for daily predictions of tides at Sewells Point.

Currents.—Information for several places in Hampton Roads and Elizabeth River is given in the Tidal Current Tables. The currents are influenced considerably by the winds and at times attain velocities in excess of the tabulated values. The current velocity is 1.1 knots in Hampton Roads and 0.6 knot in Elizabeth River.

Ice.—Hampton Roads is free of ice. In severe winters the upper part of Southern Branch, Elizabeth River, is sometimes closed for short periods.

Weather.—**Storm warning display** locations are listed on the NOS charts and shown on the Marine Weather Services Charts published annually by the National Weather Service.

The National Weather Service maintains an office in the Customhouse at Norfolk, Va.; **barometers** in the Hampton Roads area can be compared there or checked by telephone.

Pilotage for Hampton Roads ports is performed exclusively by the Virginia Pilot Association; refer to discussion at beginning of chapter.

Towage.—Vessels usually proceed from Cape Henry to points in the Hampton Roads port area under their own power and without assistance. A large fleet of tugs is available at Norfolk to assist in docking or undocking and in shifting within the harbor.

Quarantine.—The quarantine station is at Fort Monroe on Old Point Comfort. Arriving vessels subject to quarantine and bound for Hampton Roads ports or Richmond, unless granted prior radio pratique, must remain at the quarantine anchorage southwestward of Old Point Comfort until granted clearance. The U.S. Public Health Service has a hospital in Norfolk, and maintains a **contract physician's office** in Newport News; see Appendix for addresses. The U.S. Naval Hospital is in Portsmouth.

Agriculture quarantine.—Vessels subject to such inspections are usually inspected at their berths by officials from Norfolk and Newport News; see Appendix for addresses.

Customs.—Hampton Roads is a customs port of entry. Vessels are usually inspected on arrival at their berths by officials from Norfolk or Newport News. See Appendix for addresses.

Coast Guard.—The office of the Hampton Roads Area Captain of the Port is in Berkley. Vessel documentation offices of the U.S. Coast Guard are located in Norfolk and Newport News. See Appendix for addresses.

Immigration.—Vessels are boarded by immigration officers at the quarantine anchorage southwest of Old Point Comfort unless vessels have received radio pratique, in which case they are boarded at their berths; see Appendix for address.

Harbor regulations.—Port regulations are principally concerned with grain, coal handling, port charges, and pilotage and stevedoring rates. Copies of these regulations may be obtained from the Hampton Roads Maritime Association, 127-129 Bank Street, Norfolk, Va.

Anchorage regulations are given in **110.168,** Chapter 2.

Wharves.—The Hampton Roads area has more than 200 piers and wharves along more than 30 miles of improved waterfront; only the major deepwater facilities are described. Included are coal piers; containerized-cargo berths; oil storage and bunkering facilities; general-cargo, grain, and ore piers; and marine railways and drydocks. Available depths are 30 to 35 feet at the general-cargo, ore, and grain piers; 35 to 36 feet at the coal piers; and 30 to 45 feet at the oil-storage and bunkering facilities.

Supplies.—The principal coal-handling and bunkering piers are those of the Norfolk and Western Railway at Lambert Point, Norfolk, and of the Chesapeake and Ohio Railway at Newport News. Bunker oil is available at Sewells Point, in Southern Branch of Elizabeth River, and at Newport News, or it can be delivered from barges in the stream. Fresh water is available on the principal piers and can be supplied from barges. The area also has numerous ship chandlers and marine suppliers.

Repairs.—Hampton Roads has extensive facilities for drydocking and making major repairs to large deep-draft vessels. The largest floating drydock at Norfolk has a capacity of 15,000 tons, and the largest marine railway can handle 6,000 tons. The shipyard at Newport News is one of the largest and best equipped in the United States; the principal graving dock has a length of 1,100 feet on the keel blocks. There are many other yards that are especially equipped to handle small vessels. More details on these repair facilities are given with the discussion of the waterway or port in which they are located.

Wrecking and salvage work is not a specialty of the Hampton Roads shipyards, but they have the equipment for such service if the need arises. Additional gear can also be brought in from New York.

Communications.—Hampton Roads ports are served by a terminal beltline, several large railroads, and by more than 50 motor carriers. In addition, over 90 steamship lines connect Hampton Roads with the principal United States and foreign ports; most of the lines have regular sailings and others maintain frequent but irregular service. Three airlines offer prompt airfreight, express, and passenger service from Norfolk and Newport News to major United States cities with connecting service overseas.

Thimble Shoal Light (37°00.9′ N., 76°14.4′W.), 55 feet above the water, is shown from a red conical tower on a brown cylindrical pier on the eastern edge of the shoal; a fog signal is sounded from the station. The light is 12.3 miles from the Virginia Capes. Thimble Shoal is the southern edge of the **Horseshoe,** which is described in chapter 11.

The entrance to Hampton Roads is between Willoughby Spit and Old Point Comfort, 2 miles to the northward.

Old Point Comfort is the site of **Fort Monroe** and the quarantine station for the Hampton Roads port. The Chamberlin Hotel is an excellent landmark. **Old Point Comfort Light (37°00.1′N., 76°18.4′W.)**, 54 feet above the water, is shown from a white tower. A fog signal is sounded from the knuckle of the seawall about 200 yards eastward of the light. **Storm warning signals are displayed;** see chart. Only government craft can tieup at the wharf on the south waterfront of Old Point Comfort.

A Naval Ordnance Laboratory **restricted area** extends eastward and southward of Old Point Comfort, and a **danger zone** of an army firing range extends to seaward from a point 1.5 miles northward of the point; see **204.50,** and **204.49a,** Chapter 2, respectively, for limits and regulations.

Hampton Bar begins about 200 yards southwestward of Old Point Comfort and extends 2 miles southwestward; depths on the bar are 1 to 5 feet. The bar is marked by two lights and by buoys along its southern edge. These lights, together with one on Hampton Flats, aid vessels in mooring in the naval and other anchorages northward of the main channel.

A dredged channel, marked by buoys and daybeacons, leads along the west side of Old Point Comfort to the fish wharves at **Phoebus.** In March 1970, the channel had a controlling depth of 11 feet. The wharves have depths of 8 to 12 feet at their outer ends, but are in poor condition. Small craft can anchor in depths of 8 to 20 feet along the sides of the channel. The Fort Monroe yacht piers are on the east side of the channel 0.4 mile above Old Point Comfort.

Hampton River, 1.5 miles westward of Old Point Comfort, is entered by a marked channel through Hampton Bar and Flats. In 1966-1968, the controlling depth was 11 feet across Hampton Bar and Flats and up Hampton River to the highway bridge at Hampton. Some small craft also enter west of Hampton Bar. **Hampton,** on the west side of the river 2 miles above the channel entrance, is an important seafood center. Traffic on the river consists of seafood and petroleum products, sand and gravel, and building materials. The residential and commercial areas of Hampton are on the west side of Hampton River; **Hampton Institute** and a Veterans Hospital are on the east side.

Sunset Creek, on the west side just above the Hampton River mouth, is entered by a marked dredged channel leading westward from the channel in the river. In 1967, the controlling depth was 12 feet to the head of the creek.

The principal commercial wharves at Hampton, just below the bridge, have depths of 7 to 12 feet at their faces. The public landing 500 yards below the bridge has depths of 8 feet at the face; small boats anchor between the public landing and the bridge. The wharves along Sunset Creek have depths of 4 to 9 feet at their outer ends.

Supplies and fuel are available at Hampton. A yacht club and several marinas here have berthing space. Repairs can be made; largest marine railway, 120 feet; lift, 35 tons.

Jones Creek, on the east side of Hampton River 300 yards above the mouth, has depths of 8 to 11 feet. The bulkheads have depths of 3 to 10 feet alongside and are controlled by the Veterans Hospital on the south and Hampton Institute on the north.

Salters Creek, 4 miles west-southwestward of Old Point Comfort, has a narrow unmarked approach channel with depths of 2 feet. The fixed highway bridge over the entrance has a channel width of 24 feet and a clearance of 9 feet. Numerous small craft moor in a basin above the bridge that has depths of about 5 feet.

The 45-foot project channel to Newport News was discussed earlier. Depths along the edges of the dredged section are 19 to 25 feet. The currents do not always set fair with the channel, especially with strong winds, and deep-draft vessels sometimes find it difficult to stay in the channel.

Newport News Middle Ground Light (36°56.7′N., 76°23.5′W.), 52 feet above the water, is shown from a brown conical tower on a brown cylindrical pier in 15 feet of water near the western end of the shoal; a fog signal is sounded from the station.

Newport News Point (36°57.8′N., 76°24.7′W.) on the north side of the entrance to James River, is 21.5 miles from the Virginia Capes. The city of **Newport News** extends several miles along the northeast bank of James River.

Newport News Creek, just west of Newport News Point is a city-owned small-boat harbor used by fishing boats, pleasure craft, and petroleum barges. In June 1968, the controlling depth was 10 feet in the dredged channel for 0.6 mile above the mouth. A privately maintained light marks the west side of the entrance. The bulkheads in the harbor have depths of 7 to 12 feet alongside. Fuel, supplies, and slips are available and repairs can be made; marine railway, 90 feet.

Wharves.—The deepwater piers and wharves at Newport News extend from Newport News Point for 2.5 miles up James River. Only the major facilities are described. All have access to highways and railroads, fresh water connections, and electric shore-power connections. Unless otherwise indicated, these facilities are owned and operated by the Chesapeake and Ohio Railway Co. The alongside depths given for each facility described are reported; for information on the latest depths contact the operator. For a complete description of the port facilities at Newport News, refer to the Port Series, a Corps of Engineers publication.

Chart 400:

C. & O. Pier 2 (37°58′24″N., 76°26′00″W.): north and south sides 591 feet long; 35 feet alongside; deck height, 8 feet; two 30-ton electric gantry

cranes, can be coupled for 56-ton lifts; receipt and shipment of general and bulk cargoes.

C. & O. Pier B: about 200 yards southeastward of C. & O. Pier 2; 543-foot face, north and south sides 620 feet long; 35 feet alongside, deck height, 8 feet; 250,000 square feet covered storage; one 50-ton mobile gantry crane and one 35-ton container carrier; receipt and shipment of containerized, bulk, and general cargoes.

C. & O. Pier 6: about 420 yards southeastward of C. & O. Pier 2; 200-foot face, north and south sides 708 feet long; 35 feet alongside; deck height, 8 feet; 95,000 square feet covered storage; 5-ton mobile cranes; forklift trucks; receipt and shipment of general and bulk cargoes.

C. & O. Pier 8: about 700 yards southeastward of C. & O. Pier 2; 210-foot face; north and south sides 823 feet long; 35 feet alongside; deck height, 15 feet; 120,000 square feet covered storage; 5-ton mobile cranes, forklift trucks; receipt and shipment of general and bulk cargoes.

C. & O. Pier 9 (Ore Pier): southeastward of C. & O. Pier 8; north and south sides 1,198 feet with dolphins; 40 feet alongside; deck height, 12 feet; three ore-unloaders with 86-foot outboard reach serve conveyor system, unloading rate 1,400 tons per hour each; receipt of bulk ore.

C. & O. Pier 14: southeastward of C. & O. Pier 9; east and west sides 1,090 feet long; 38 feet alongside; deck height, 11½ feet; four traveling coal-loading towers, 9,000 tons per hour capacity each; shipment of coal, oil bunkering of vessels.

C. & O. Pier 15: eastward of C. & O. Pier 14: east and west sides 1,000 feet long; 38 feet alongside east side, 35 feet alongside west side; deck height, 9½ feet; one fixed coal-loading tower on each side of the pier, ship-positioning winches; shipment of coal, oil bunkering of vessels.

Humble Oil and Refining Co. Tanker Dock: about 200 yards eastward of C. & O. Pier 15; offshore wharf, 203 feet with platform; 37 feet alongside; deck height, 13 feet; receipt and shipment of petroleum products, bunkering vessels; owned and operated by Humble Oil and Refining Co.

The facilities of the Newport News Shipbuilding and Drydock Company begin 1.7 miles northwest of Newport News Point and extend a mile upriver. The company operates eight outfitting piers; three drydocks, the largest being 862 feet long, 118 feet wide, and a depth of 32 feet over the sill; and two graving docks used for ship construction, the largest being 1,100 feet long, 140 feet wide, and a depth over the sill of 40 feet. A 310-ton gantry crane serves the graving docks. The shipyard also has three inclining shipways with lengths up to 715 feet and capacities up to 15,000 tons. The largest shaft produced by the shipyard is 42 feet by 44 inches. Most of the outfitting piers are equipped with cranes; largest has a capacity of 140 tons. Floating derricks up to 67-ton capacity are available at the yard.

Willoughby Spit, on the south side of the entrance to Hampton Roads, is a narrow barrier beach 1.3 miles long in an east-west direction. About midway between the spit and Old Point Comfort, on the opposite side of the entrance, is **Fort Wool,** which is on the south edge of the main ship channel; a light is shown from a small gray house on the north side of the island.

A 45-foot wide small-boat opening about midway in the south approach bridge to Hampton Roads Tunnel has a clearance of 10 feet.

Willoughby Bank, with depths of 3 to 7 feet, extends east-northeastward along the edge of the main channel for about 2.5 miles from Fort Wool.

Willoughby Bay, on the inner side of Willoughby Spit, has general depths of 7 to 12 feet. On the south side of the bay are the prominent buildings of the Norfolk Naval Base and the Naval Air Station. A marked channel, 0.4 mile westward of Fort Wool, leads to a small-boat harbor behind the hook of Willoughby Spit. In November 1968, the channel had a controlling depth of 6 feet. Some supplies, fuel, and berthing are available. Repairs can be made; largest marine railway, 40 feet.

The western and southern part of Willoughby Bay is a **restricted area;** see **207.155,** Chapter 2, for limits and regulations. The northern part of the bay has been designated as a yacht **anchorage;** see **110.168 (f) and (h)),** Chapter 2, for limits and regulations.

In 1970, a fixed highway bridge with a design clearance of 25 feet was under construction across the yacht anchorage in the northern part of Willoughby Bay.

Charts 400, 452.—Norfolk Harbor comprises a portion of the southern and eastern shores of Hampton Roads and both shores of **Elizabeth River** and its Eastern, Southern, and Western Branches, on which the cities of Norfolk, Portsmouth, and Chesapeake are located.

The harbor extends from off Sewells Point south in Elizabeth River to a point 0.4 mile south of the fifth bridge over Southern Branch, a distance of 13.5 miles; it extends 1.5 miles up Western Branch to a point 0.5 mile above the West Norfolk highway bridge, and up Eastern Branch for 2.5 miles to the Norfolk and Western Railway Bridge.

The main part of Norfolk is on the east side of Elizabeth River north of Eastern Branch, with Berkley, a subdivision, to the southward between Eastern and Southern Branches. South of Berkley is the city of Chesapeake. Portsmouth is opposite Norfolk and its waterfront extends along the west shore of Southern Branch and the south shore of Western Branch. These cities form practically a single community, united by the same commercial interests and served by the same ship channel.

Weather.—Norfolk, with an average elevation of 13 feet above sea level and almost surrounded by water, has a modified marine climate. The city's geographic position with respect to the principal

storm tracks is especially favorable, being south of the average path of storms originating in the higher latitudes and north of the usual track of hurricanes and other tropical storms. These features combine to place Norfolk in one of the favored climatic regions of the world. The winters are mild, while autumn and spring seasons usually are delightful. Summers, though warm and long, frequently are tempered by cool periods, often associated with northeasterly winds off the Atlantic. Temperatures of 100° or higher are of very infrequent occurance. Cold waves seldom penetrate to this area and during the period of continuous official record now available, a temperature of zero has never been recorded in Norfolk. Occasional winters pass without a measurable amount of snowfall. Most of Norfolk's snow generally occurs in light falls, which usually melts and disappears within 24 hours. The average date of the last freezing temperature in the spring is March 23, while the average date of the first in autumn is November 18. The average annual amount of rainfall is about 45 inches and considerably more than one-half of it falls in well distributed amounts during April to October, inclusive. See Appendix for **Norfolk climatological table.**

Chart 400.—Sewells Point (36°57.8′N., 76°19.6′W.), on the east side of the entrance to Elizabeth River, is 18 miles from the Virginia Capes. A breakwater, marked by a light on its outer end, extends about 0.3 mile westward from the point. The piers of the **Norfolk Naval Base** and its annex extend southward from the breakwater along the east bank of the river. Depths at the naval piers are 28 to 40 feet. A jettied basin at the naval base, 0.6 mile south of Sewells Point, affords protection for navy service craft in depths of 21 to 29 feet.

Sewells Point Spit, covered 3 to 6 feet, extends north-northeastward from the point for 1.4 miles to the outer end of Willoughby Channel.

A buoyed channel extends eastward and southward through Sewells Point Spit for about 1.2 miles to an enclosed boat basin used by small navy boats. In 1965-1966, the channel had a controlling depth of 5 feet on the centerline; depths of 4 to 7 feet were available in the basin.

The approach to the naval piers is a **restricted area;** see **207.155,** Chapter 2, for limits and regulations.

Wharves.—Norfolk Harbor has numerous wharves and piers of all types, the majority of which are privately owned and operated; only the major deepwater facilities are described. These facilities are located southward of Sewells Point, between the Norfolk Naval Base and Tanner Point; on Lambert Point; on Pinner Point; and on Eastern Branch and Southern Branch of Elizabeth River. All have fresh water connections, access to highways and railroads, and most have electrical shore-power connections. Cargo is generally handled by ship's tackle; special cargo-handling equipment, if available, is mentioned in the description of the particular facility. The alongside depths given for each facility described are reported; for information on the latest depths, contact the operator. A complete description of the wharves and piers in Norfolk Harbor may be obtained from the Port Series, a Corps of Engineers publication.

Facilities southward of Sewells Point, between Norfolk Naval Base and Tanner Point (chart 400):

Continental Grain Co. Wharf (36°55′57″N., 76°19′41″W.): face 993 feet usable; 34 to 36 feet alongside; deck height 9 feet; face of wharf in line and contiguous with Virginia Ports Authority Pier B to the westward; 3.3-million-bushel grain elevator; railroad car and truck dumpers; loading tower, marine leg, and pneumatic system, combined loading rate 75,000 bushels per hour; receipt and shipment of grains; owned by Norfolk and Western Railway Co. and operated by Continental Grain Co.

Virginia Ports Authority, Piers A and B: immediately westward of Continental Grain Co. Wharf; 489-foot face, 35 to 32 feet alongside; Pier B (north side) 1,600 feet long, 35 feet alongside; Pier A (south side) 1,193 feet long, 32 feet alongside; deck height, 9½ feet; 155,000 square feet covered storage; cranes up to 15-ton capacity; receipt and shipment of general cargo; owned by Virginia Ports Authority and operated by Lambert Point Docks, Inc.

Universal Atlas Cement Pier: 150 yards southward of Virginia Ports Authority Piers; 40-foot face, 205 feet with dolphins; 33 feet alongside; deck height, 11½ feet; 175,000-barrel storage capacity; unloading rate 3,200 barrels per hour; receipt of bulk cement; owned by U.S. Steel Corp. and operated by Universal Atlas Cement Co.

Humble Oil Co. Pier (36°55′39″N., 76°20′00″W.): about 0.2 mile southward of Virginia Ports Authority Piers; north side 900 feet; 40 to 20 feet alongside; south side 800 feet; 35 to 32 feet alongside; deck height, 9 feet; receipt and shipment of petroleum products, bunkering vessels; owned and operated by Humble Oil and Refining Co.

Norfolk International Terminals: 413,000 square feet covered storage; 12 acres open storage; forklifts and straddle trucks; deck heights, 9½ feet; receipt and shipment of general and containerized cargo; owned by Virginia Ports Authority and operated by Norfolk Terminal Corp.

Pier 2 (36°55′02″N., 76°19′56″W.): 334-foot face, 30 feet alongside; north and south sides 1,328 feet long, 32 to 21 feet alongside north side, 30 to 28 feet alongside south side; cranes up to 15-ton capacity.

Pier 1: about 200 yards southward of Pier 2; 300-foot face, 36 to 34 feet alongside; north and south sides 1,328 feet long, 31 to 28 feet alongside north side, 36 to 34 feet alongside south side; cranes up to 15-ton capacity; fumigation chambers.

Container Berths 1 and 2: immediately southward of Pier 1; 1,580-foot marginal berth; 35 feet alongside; two 30-ton rail-mounted cranes, four 40-ton traveling container carriers.

Facilities at Lambert Point (chart 452):

Norfolk and Western Railway Co. Piers: owned and operated by Norfolk and Western Railway Co.; shipment of coal.

Pier 6 (36°52′45″N., 76°19′54″W.): 88-foot face; 45 feet alongside; north and south sides 1,600 feet, 1,800 feet with dolphins, 45 feet along north side, 45 to 33 feet along south side; deck height, 11 feet; 2 electric shiploaders, loading rate 8,000 to 10,000 tons per hour.

Pier 5: about 200 yards southward of Pier 6; 74-foot face; north side 875 feet, 980 feet with dolphins; south side 1,000 feet; 36 feet alongside; deck height, 11 feet; loading capacity, thirty 70-ton railroad cars per hour.

Virginia Ports Authority Terminal, Piers N, L, and P: 569,000 square feet covered storage; 100,000 cubic feet cold storage space; fumigation chambers; forklift trucks and other portable mechanized cargo-handling equipment; cranes up to 37½ -ton capacity; receipt and shipment of general and containerized cargo; owned by Virginia Ports Authority and operated by Lambert Point Docks, Inc.

Pier N (76°52′00″N., 76°19′06″W.): 390-foot face, 24 feet alongside; north and south sides 1,100 feet long, 32 feet alongside; deck height, 11.8 feet.

Pier L: about 200 yards southeastward of Pier N; 243-foot face; north side 1,190 feet, south side 1,130 feet long; 32 feet alongside; deck height, 9 feet.

Pier P: about 600 yards southeastward of Pier N; 394-foot face; north and south sides 1,196 feet long; 32 feet alongside; deck height, 11 feet.

Norfolk Ocean Pier (36°51′02″N., 76°17′50″W.): 83-foot face; south side 475 feet; north side not used; 25 feet alongside; deck height, 12 feet; receipt of newsprint; owned by Chesapeake and Ohio Railway Co. and operated by Southgate Terminal Co.

Old West India Fruit and Steamship Piers No. 1 and 2: 300 yards southward of Norfolk Ocean Pier; 120-foot face; 23 to 21 feet alongside; north side 990 feet, 23 to 15 feet alongside; south side 745 feet, 21 to 15 feet alongside; deck height, 12 feet; receipt of bulk and bagged salt, bananas; owned by City of Norfolk and operated by Southern Salt and Banana Distributing Co.

Facilities in Eastern Branch of Elizabeth River (chart 452):

Imperial Tobacco Co. Piers: 16,000 square feet covered storage area; shipment of tobacco and receipt of general cargo; owned and operated by the Imperial Tobacco Co.

Pier No. 2 (36°50′20″N., 76°17′24″W.): face 159 and 135 feet long, east side 476 feet long; 27 feet alongside; deck height, 8 feet.

Pier No. 3: about 150 yards eastward of Pier 2; 103-foot face, west side 424 feet long; 27 feet alongside; deck height, 8 feet.

Norfolk, Baltimore, and Carolina Line Terminal: 13,000 square feet covered storage area; a portion of the terminal has been converted for the accommodation of trailerships, parking space for approximately 250 trailers is available; receipt and shipment of general cargo in the intracoastal trade; owned and operated by the Norfolk, Baltimore, and Carolina Line, Inc.

Pier No. 2 (36°50′33″N., 76°17′07″W.): 68-foot face, 20 to 30 feet alongside; east side 220 feet long, 30 to 9 feet alongside; deck height, 8 feet.

Pier No. 1: about 50 yards eastward of Pier 2; 46-foot face, 30 feet alongside; west side 180 feet long, 30 to 12 feet alongside; east side 150 and 50 feet long, 17 to 12 feet alongside; roll-on/roll-off ramp, 9 to 12 feet alongside; deck height, 8 feet.

Southgate Terminal Warehouse Co. Wharf (36°50′31″N., 76°16′54″W.): 345-foot marginal wharf; 20 feet alongside; deck height, 8 feet; receipt and shipment of general cargo; owned and operated by Southgate Terminal Warehouse Co.

Facilities in Southern Branch of Elizabeth River, Berkley, Chesapeake, and Portsmouth (chart 452):

U.S. Gypsum Co. Wharf (36°49′18″N., 76°17′23″W.): 40-foot offshore wharf, 370 feet with dolphins; 30 feet alongside; deck height, 10 feet; receipt of gypsum rock; owned and operated by U. S. Gypsum Co.

Amerada Hess Corp. Wharf (36°49′14″N., 76°17′24″W.): 40-foot T-head pier, 175 feet with dolphins; 30 feet alongside; deck height, 6 feet; 220,000-barrel storage capacity; receipt and shipment of petroleum products; owned and operated by Amerada Hess Corp.

Mobil Oil Co. Tanker Wharf: 175 yards south of Amerada Hess Wharf; 45-foot T-head wharf, 315 feet with dolphins; 35 feet alongside; deck height, 12 feet; receipt and shipment petroleum products, bunkering vessels; 1.2-million-barrel storage facility; owned by Mobil Oil Co.; operated by Mobil and Union Oil Companies.

Gulf Oil Corp. Wharf: 200 yards south of Mobil Oil Wharf; 1,000-foot face, 30 feet alongside; deck height, 12 feet; receipt and shipment of petroleum products, bunkering vessels; 867,000-barrel storage facility; owned and operated by Gulf Oil Corp.

Royster Guano Co. Wharf (36°48′46″N., 76°17′24″W.): marginal type wharf, 430 feet with dolphins; 30 feet alongside; deck height, 9 feet; receipt of sulfur, phosphates and fertilizer products; owned and operated by F. S. Royster Co.

American Oil Co. Wharf (36°48′21″N., 76°17′22″W.): 60-foot T-head pier, 228 feet with dolphins; 30 feet alongside; deck height, 9 feet; 681,000-barrel storage facility; receipt and shipment of petroleum products and bunkering vessels; owned and operated by American Oil Co.

Cargill Grain Elevator Wharf (36°48′08″N., 76°17′26″W.): 280ifoot offshore wharf, 415 feet with dolphins; 40 feet alongside; deck height, 10 feet; 5.8-million bushel elevator; elevator loading rate 1,000 long tons grain per hour; receipt and shipment of grain and agriculture products; owned and operated by Cargill Inc.

Texaco Inc. Wharf (36°47′55″N., 76°17′34″W.): offshore wharf, 490 feet long; 37 feet alongside; deck height, 12 feet; 889,000-barrel storage capacity; receipt and shipment of petroleum products and bunkering vessels; owned and operated by Texaco Inc.

Conoca Wharf (36°47′44″N., 76°17′32″W.): 145-foot T-head wharf, 445 feet with dolphins; 32 feet alongside; deck height, 10 feet; receipt and shipment of petroleum products; 750,000-barrel storage facility; owned by Continental Oil Co. and operated by Conoca and Shell Oil Companies.

Southern Block and Pipe Corp Pier (36°47′27″N., 76°17′50″W.): north side 435 feet long; 30 feet alongside; deck height, 12 feet; receipt and shipment dry bulk cargoes, shipment of sand; owned and operated by Southern Block and Pipe Corp.

Tennaco Oil Co. Pier (36°47′38″N., 76°18′07″W.); 55-foot face, 205 feet with dolphins; 27 feet alongside; deck height, 10 feet; receipt and shipment petroleum products; owned and operated by Tennaco Oil Co.

Elizabeth River Terminals Wharf (36°46′40″N., 76°18′05″W.): 600-foot face; 32 feet alongside; deck height, 8½ feet; receipt and shipment of dry bulk chemicals and liquid sulfur; owned by City of Norfolk, operated by Elizabeth River Terminals Inc.

Chilean Nitrate Wharf (36°46.6′N., 76°17.7′W.): 350-foot offshore wharf, 395 feet with dolphins; 35 feet alongside; deck height, 11 feet; receipt of bulk fertilizers; owned and operated by the Chilean Nitrate Sales Corp.

Borden Chemical Wharf (36°46′26″N., 76°17′42″W.): 370-foot face, 40 feet alongside; north side of slip 405 feet long, 25 to 14 feet alongside; deck height, 12 feet; receipt of bulk chemicals; shipment of inks; owned and operated by Borden Chemical Co.

Weaver Fertilizer Co. Wharf (36°46′14″N., 76°17′43″W.): 40-foot face, 125 feet with dolphins; 30 to 25 feet alongside, deck height, 10 feet; receipt of acids, shipment of bulk fertilizers; owned and operated by Weaver Fertilizer Co.

Portsmouth Power Station Wharf (36°46′11″N., 76°17′55″W.): 50-foot face, 810 feet with dolphins; 35 feet alongside; deck height, 10 feet; receipt of fuel oils for plant consumption; owned and operated by Virginia Electric and Power Co.

Phillips Petroleum Co. Wharf (36°46′36″N., 76°18′25″W.): 50-foot T-head pier, 350 feet with dolphins; 32 feet alongside; deck height, 12 feet; 235,000-barrel storage facility; receipt of petroleum products; owned and operated by Phillips Petroleum Co.

BP Oil Co. Wharf (36°47′56″N., 76°17′45″W.): offshore wharf, 317 feet long; 32 feet alongside; deck height, 12 feet; receipt of petroleum products; owned and operated by the British Petroleum Oil Corp.

Allied Mills Wharf (36°48′00″N., 76°17′46″W.): 76-foot face, 250 feet with dolphins; 24 feet alongside; deck height, 12 feet; receipt of sacked grains and bulk molasses; 375,000-bushel grain elevator, 2.1-million-gallon molasses storage tank; owned by Allied Mills of Virgina, operated by Allied Mills of Virginia, and Southgate Molasses Co. Inc.

Portsmouth Marine Terminal (36°51′27″N., 76°19′27″W.): 1,300-foot face, 65-foot roll-on/roll-off ramp; 32 feet alongside; deck height, 12 feet; 60,000 square feet covered storage, 37 acres open storage; cranes to 110 tons, container cranes to 34 tons; fumigation chambers; receipt and shipment of general and containerized cargoes; owned by Virginia Ports Authority and operated by Portsmouth Terminal Inc.

Lafayette River empties into the east side of Elizabeth River 4 miles south of Sewells Point and 22 miles from the Virginia Capes. The river, used exclusively by pleasure and recreational craft, is entered by a marked dredged channel between **Tanner Point** and Lambert Point, 1.5 miles to the southward. A light, 0.6 mile south of Tanner Point, marks the channel entrance. The dredged channel leads for 1.1 miles to a point about 0.3 mile westward of the Hampton Boulevard Bridge. From this point, a marked natural channel leads for about 2.4 miles to where the river divides into two forks. In 1966, the controlling depth was 8 feet in the dredged section; thence depths of about 6 feet to the forks, and 2 to 4 feet up each fork; the chart is the best guide. The dredged channel turns sharply at the light off **Lawless Point,** a mile above the entrance, and vessels must be on the alert to avoid grounding. Defined anchorage areas extend up Lafayette River to the first bridge; see **110.168 (c) and (h),** Chapter 2, for limits and regulations.

Hampton Boulevard Bridge, 1.5 miles above the entrance to Lafayette River, has a fixed channel span with a clearance of 26 feet. A yacht club is just below the north end of the bridge.

Knitting Mill Creek, on the south side of Lafayette River 3 miles above the mouth, had in 1968, a controlling depth of 6 feet to the head. Some supplies, gasoline, and berths are available within the creek. Repairs can be made; largest marine railway, 40 feet; lift, 10 tons.

Granby Street Bridge, 3.5 miles above the entrance to Lafayette River, has a 40-foot bascule span with a clearance of 14 feet; the bridge is kept in the closed position. See **117.245 (f) (23-a),** Chapter 2, for drawbridge regulations.

Just above Granby Street Bridge (chart 452), Lafayette River divides into two forks, both unmarked. A fixed highway bridge over the mouth of the north fork has a channel width of 30 feet and a

clearance of 10 feet. A fixed highway bridge over the south fork, a mile from Granby Street Bridge, has a channel width of 27 feet and a clearance of 9 feet; another fixed highway bridge 0.3 mile farther up the south fork has a channel width of 28 feet and a clearance of 3 feet.

Chart 452.—Craney Island, now a part of the mainland, is on the west side of Elizabeth River 4.5 miles south of Sewells Point. The low and thinly wooded area is the site of a navy fuel depot, and the offshore wharf and piers, all on the eastern side, are used only by government vessels. Two daybeacons close off the northeast end of Craney Island mark submerged rocks. The offshore wharf and piers have depths of 22 to 47 feet alongside. A submerged water main crosses from Craney Island to the north side of Lambert Point; vessels are cautioned not to anchor in the vicinity of the lighted range that marks the crossing.

Lambert Point, on the east side of Elizabeth River 5.3 miles south of Sewells Point, is the site of several deepwater piers. These facilities were described earlier in this chapter under Wharves, Norfolk Harbor.

Western Branch (36°52.0′N., 76°19.7′W.) empties into the southwest side of Elizabeth River 5.8 miles south of Sewells Point and 23.8 miles from the capes. A marked channel leads from the main channel in Elizabeth River for 4.5 miles upstream. The centerline controlling depth is about 14 feet to the second bridge, thence 7 feet to **Drum Point,** 0.5 mile above the third bridge.

The highway bridge a mile above the entrance to Western Branch has a swing span with a clearance of 4 feet; the channel is through the north opening. See **117.240,** Chapter 2, for drawbridge regulations and opening signals. An overhead power cable with a clearance of 140 feet crosses the branch 0.25 mile eastward of this bridge.

West Norfolk, at the north end of the first bridge, has a shipyard and small-craft facilities. Supplies, fuel, and slips are available. Repairs can be made; largest marine railway, 220 feet.

Churchland fixed highway bridge, 2.3 miles above the entrance to Western Branch, has a clearance of 38 feet. The overhead power cable on the upper side of the bridge has a clearance of 45 feet; the transmission towers are marked by lights.

The Seaboard Coast Line Railroad Bridge at **Bruce,** 4 miles above the entrance, has a swing span with a clearance of 4 feet; see **117.240 and 117.245 (a) through (e), and (f) (25),** Chapter 2, for drawbridge regulations and opening signals. The overhead power cable close southward of this bridge has a clearance of 47 feet. **Hodges Ferry** highway bridge, 4.7 miles above the entrance, has a 32-foot bascule span with a clearance of 5 feet; see **117.240 and 117.245 (a) through (e), and (f) (26),** Chapter 2, for drawbridge regulations and opening signals. The overhead power cable on the upstream side of the Hodges Ferry bridge has a clearance of 37 feet.

Pinner Point (36°51.3′N., 76°19.1′W.) is on the southwest side of Elizabeth River, 6.8 miles from Sewells Point. Most of the piers at the point have been destroyed by fire or are in poor condition; they are presently being razed or renovated. The Portsmouth Marine Terminals, Inc. operates the facilities at the Portsmouth Marine Terminal about 0.3 mile northwestward of Pinner Point. A marked dredged channel, with a controlling depth of 32 feet in 1969, leads from Elizabeth River to the terminal. The facilities of the Portsmouth Marine Terminal and those at Pinner Point were described earlier in this chapter under Wharves, Norfolk Harbor.

Scott Creek (36°51.1′N., 76°18.5′W.), on the southwest side of Elizabeth River 7.3 miles from Sewells Point, is entered through a privately marked channel which had a centerline controlling depth of 8 feet in 1960. The channel leads to old fishing wharves now used by pleasure craft. A marina is on the point on the south side of the creek, about 0.9 mile above the channel entrance. Berths, water, a 60-foot marine railway, and a 3½-ton fixed lift are available; hull repairs can be made.

Hospital Point, on the southwest side of Elizabeth River 7.5 miles from Sewells Point, is the site of a U.S. Naval Hospital. The main hospital building, the largest structure along the southwest side of Elizabeth River, is visible for many miles. The hospital landing has depths of about 18 feet at the face.

Norfolk, or parts of it, has been described at some length in the preceding text. The midpoint of the downtown section can be taken as the **City Wharf (36°50.9′N., 76°17.8′W.)** at the foot of West Main Street, which is on the northwest side of Elizabeth River 7.7 miles from Sewells Point and 25.7 miles from the Virginia Capes. City Wharf has depths of 15 feet at the face but is in poor condition. The wharves northwest and southwest of West Main Street have depths of 14 to 20 feet alongside.

See Appendix for **Norfolk climatological table.** A **weather** summary for Norfolk is given in the preceeding text under Norfolk Harbor.

Smith Creek, opposite Hospital Point 7.5 miles from Sewells Point, has entrance depths of about 3 feet with deeper water inside, but the entrance is restricted by a 48-foot wide fixed highway bridge with a clearance of 13 feet. Small-boat **anchorage areas** have been defined for Smith Creek; see **110.168 (c) (4) and (h),** Chapter 2, for limits and regulations.

A fuel pier with depths of 8 to 15 feet at its face and some berths are on the west side of the entrance, south of the bridge; some supplies are available.

The **Atlantic Marine Center,** the Atlantic shipbase of the National Ocean Survey, is on the east side of the entrance to Smith Creek. There are 200-, 250-, and 300-foot berths along the bulkhead wharf which has depths of 20 feet alongside.

Eastern Branch (36°50.5'N., 76°17.6'W.) empties into the east side of Elizabeth River 8 miles from Sewells Point and 26 miles from the Virginia Capes.

A federal project provides for a channel 25 feet deep to the Norfolk and Western Railway Bridge, 2.5 miles above the entrance. The channel is maintained at or near project depth and is marked at the critical points. See Notice to Mariners and latest edition of the charts for controlling depths.

Above the Norfolk and Western Railway Bridge, the natural channel has depths of 10 to 18 feet to the forks 3.3 miles from the entrance, and usually is marked by bush stakes.

Anchorage areas have been established in Eastern Branch; see **110.168 (e) and (h),** Chapter 2, for limits and regulations.

Downtown Norfolk is on the north side of Eastern Branch, and **Berkley,** a subdivision, is on the south side. Traffic is fairly heavy as far as Campostella Bridge. Depths at most of the piers on both sides of the branch range from 14 to 25 feet.

The highway bridge, 0.4 mile above the entrance to Eastern Branch, has a bascule span with a clearance of 48 feet; see **117.349,** Chapter 2, for drawbridge regulations and opening signals. The Norfolk and Western Railway Bridge, 1 mile above the entrance, has a bascule span with a clearance of 4 feet; see **117.240,** Chapter 2, for drawbridge regulations and opening signals. An overhead power cable 200 yards east of this bridge has a clearance of 150 feet.

Campostella Bridge, 1.4 miles above the entrance to Eastern Branch, has a bascule span with a clearance of 14 feet. The Norfolk and Western Railway Bridge, 2.5 miles above the entrance, has a swing span with a clearance of 6 feet. Drawbridge regulations and opening signals are given in **117.240 and 117.245 (a) through (e), and (f) (24),** Chapter 2, for the Campostella Bridge, and in **117.240,** Chapter 2, for the Norfolk and Western Railway Bridge.

There are several shipyards along Eastern Branch: the largest floating drydock has a 4,000-ton capacity and handles vessels up to 360 feet in length; the largest crandall railway dock has 6,000-ton capacity and can drydock vessels up to 450 feet in length.

Southern Branch, the continuation of Elizabeth River south of the junction with Eastern Branch, is a part of the **Intracoastal Waterway** route southward to Albemarle Sound. The waterway is described at length in **United States Coast Pilot 4, Atlantic Coast, Cape Henry to Key West.**

The federal project for Southern Branch provides for a channel 40 feet deep to the third bridge, thence 35 feet deep to a turning basin 0.4 mile south of the fifth bridge. The channel is maintained at or near project dimensions, and is well marked. See Notice to Mariners and latest edition of the charts for controlling depths.

A **speed limit** of 6 knots is prescribed by **207.154,** Chapter 2, for that part of Southern Branch between Eastern Branch and the first bridge.

The Norfolk and Portsmouth Belt Line Railroad Bridge, 1.9 miles south of the junction with Eastern Branch and 9.9 miles from Sewells Point, has a vertical-lift span with a clearance of 6 feet down and 142 feet up. State Route 337 highway bridge, 0.2 mile southward of the Norfolk and Portsmouth Belt Line Railroad Bridge, has a vertical-lift span with a clearance of 15 feet down and 145 feet up. The Norfolk and Western Railway Bridge, 10.9 miles from Sewells Point, has a swing span with a clearance of 9 feet. Drawbridge regulations and opening signals for the above named bridges are given in **117.240,** Chapter 2.

U.S. Routes 13 and 460 highway bridge and the Norfolk and Western Railway Bridge, immediately to the southward, 13.1 miles from Sewells Point, have bascule spans with a least clearance of 7 feet. Drawbridge regulations and opening signals are given in **117.240 and 117.245 (a) through (e), and (f) (26-a),** Chapter 2, for U.S. Routes 13 and 460 highway bridge; and in **117.240,** Chapter 2, for the Norfolk and Western Railway Bridge. Large vessels must exercise caution when making the turns to these bridges because of the current.

The facilities on the east side of Southern Branch are mostly shipyards, oil terminals, and bulk-cargo piers, while government installations front most of the west side.

Holiday Harbor is a large marina on the Portsmouth side of Southern Branch, 0.3 mile southwestward of Town Point near the junction of Eastern Branch. Privately maintained lights, on the end of the breakwater and on each end of the detached jetty, mark the entrance to the marina. Depths of 6 feet are available to the fuel pier and most berths. Berthage with electricity, gasoline, diesel fuel, and some marine supplies are available; limited electronic and engine repairs can be made.

The port facilities on the Berkley side of Southern Branch were described earlier in this chapter under Wharves, Norfolk Harbor.

The shipyard at Berkley has five piers that can accommodate vessels up to 750 feet in length. A floating drydock which has a capacity of 15,000 tons and a marine railway with a capacity of 1,200 tons are available at the shipyard; cranes up to 65 tons are also available. The largest shaft the shipyard is able to produce is 30 feet by 20 inches.

The **Coast Guard Base** is on the Portsmouth side of Southern Branch 8.7 miles from Sewells Point. The **Norfolk Naval Shipyard** occupies about 2 miles of the Portsmouth waterfront south of the Coast

Guard Base. There are naval **restricted areas** along this reach; see **207.153,** chapter 2, for limits and regulations.

Most of the oil terminals are at **Chesapeake,** on the east side of Southern Branch, 10 miles from Sewells Point and 28 miles from the Capes. These facilities, as well as the deep-draft bulk cargo, grain, chemical, and fertilizer piers and wharves, were described earlier in this chapter under Wharves, Norfolk Harbor.

10. CHESAPEAKE BAY, JAMES RIVER

This chapter describes the James River and several of its tributaries of which the Nansemond, Chickahominy, and Appomattox Rivers are the more important. Also discussed are the ports of Richmond and Hopewell, as well as several of the minor ports and landings on these waterways.

Storm warning display locations are listed on the NOS charts and shown on the Marine Weather Services Charts published annually by the National Weather Service.

Charts 529, 530, 531.—James River rises in the Allegheny Mountains near Clifton Forge, Va., and flows 295 miles southeastward to Hampton Roads at Newport News, 21.5 miles by main channel from the Virginia Capes. The head of commercial navigation is at Richmond, 78 miles above the mouth. The river varies in width from 1,000 feet at Richmond to 4.3 miles at the mouth. Traffic consists chiefly of general cargo, chemicals, livestock, tobacco, and paper products. Drafts of vessels using the river above Newport News generally do not exceed 15 feet, but vessels drawing 24 feet or more navigate it occasionally.

Mileages shown in this chapter as Mile 0.9N, Mile 12W, etc., are the nautical miles above the mouth of James River; the letters N, S, E, and W denote by compass points the side of the river where each feature is located. Mile 0.0 is a point in the main channel on a line between Pig Point and Newport News Point; the midchannel point is 21.5 miles from the Virginia Capes.

Channels.—The federal project for James River provides for dredging depths of 25 feet to the Richmond Deepwater Terminal and in the Richmond Deepwater Terminal Turning Basin, 74 miles above the mouth, thence 18 feet to and in the Richmond Harbor Turning Basin, 77 miles above the mouth, and thence 18 feet to the Richmond Lock at Richmond, 78 miles above the mouth. The river is well marked. See Notice to Mariners and latest editions of the charts for controlling depths.

Anchorages.—Defined anchorage grounds extend for about 7 miles above the mouth; see **110.168 (b) and (h)**, Chapter 2, for limits and regulations.

Dangers.—Numerous stakes, piling, wrecks, and other obstructions are on both sides of the main channel in James River.

Tides.—The mean range of tide is 2.6 feet at Newport News and Hopewell, and 3.2 feet at Richmond.

Currents.—The currents in James River follow the general direction of the channel, except between Hog Island and Jamestown Island, 25 miles above the mouth, where they set across Goose Hill Flats. In the lower reaches, the velocity of flood is about equal to that of ebb. Near Richmond, the drainage flow predominates and the current seldom, if ever, sets upstream. These normal conditions are subject to change by wind and freshets.

During severe winters some drift **ice** appears, and at times the river freezes over, but navigation to Richmond hardly ever is suspended because the ice is broken up by a tug.

Freshets occur irregularly in the fall, winter, and spring; their height at Richmond ranges from 6 to 32 feet, though the latter is exceptional. The maximum freshet heights usually occur between the middle of March and the middle of April; the freshets occurring at other times usually reach heights not greater than about 6 feet above the normal high water. The number of freshets that cause the water to rise above the level of the wharves along the main channel at Richmond averages about one per year; the water seldom rises above the level of the city wharf. The flood heights diminish rapidly below Richmond; the extreme is about 11 feet less at Dutch Gap, and the rise is not felt at Hopewell. The cutoffs have reduced the freshet height at Richmond about one foot.

Pilotage on the James River is compulsory for all foreign vessels and for United States vessels under register in the foreign trade. Pilotage is optional for United States vessels in the coastwise trade which have on board a pilot licensed by the Federal Government to operate in these waters. Pilotage to ports on the James River is provided by the Virginia Pilots Association; pilot service for the upper 38 miles of the river is available only during daylight hours. See Chapter 9, for additional information on pilotage for the James River, and for ports in the Hampton Roads area.

The principal places for **supplies** above Newport News are Hopewell and Richmond. **Repair** facilities are limited; small marine railways operate in Chuckatuck Creek, Pagan River, Appomattox River, and at Falling Creek.

Chart 529.—The entrance to James River is between Pig Point (36°54.3′N., 76°26.5′W.) and **Newport News Point,** 3.6 miles to the north-northeastward; the midchannel point is 21.5 miles from the Virginia Capes and is close to the Newport News Wharves, described in Chapter 9.

Nansemond River empties into the mouth of James River between Pig Point and **Barrel Point,** 2 miles to the west-by-northward. Traffic on Nansemond River consists chiefly of clays, sand and

gravel, concrete and clay products, and petroleum products. The river is used considerably by vessels with drafts of 9 feet and has been navigated with drafts of as much as 11 feet.

A narrow channel leads to Suffolk, 15 miles above the mouth of Nansemond River. In 1951, the controlling depth to Suffolk was 12 feet. The channel is well marked to Western Branch, 10 miles above the mouth. Local knowledge is necessary to navigate the narrow unmarked channel above Western Branch. A dam 0.5 mile above the bridge in Suffolk is the head of navigation.

The mean range of tide in Nansemond River is about 2.8 feet at the entrance and 3.8 feet at Suffolk. The current velocity is 1.0 knot and follows the general direction of the channel.

Pig Point, on the south side of the entrance to James River and the east side of the entrance to Nansemond River, is the site of an inactive Marine Corps supply depot. The unmarked channel to the wharf had a controlling depth of 4 feet in 1960. The twin tanks 0.4 mile east of the wharf are prominent. The remains of an old wharf extend northward 0.7 mile from the vicinity of the tanks and are marked at the outer end by a light.

From Pig Point to Hollidays Point, 6.5 miles upstream, Nansemond River is wide, but the channel is crooked and leads between extensive shoals that are almost bare at low water in some places. Threre are many fish stakes on the shoals near the mouth. Above Hollidays Point, the river is narrow and crooked, but the midchannel is clear to Suffolk.

The highway toll bridge over Nansemond River at **Town Point,** on the south side 2.4 miles above the mouth, has a bascule span with a clearance of 20 feet at the center; see **117.240,** Chapter 2, for drawbridge regulations and opening signals. An overhead power cable with a clearance of 96 feet over the main channel crosses the river about 0.8 mile above the bridge. About 0.6 mile eastward of the bridge, a marked narrow channel with a controlling depth of 5 feet in 1959, leads southward into **Bennett Creek.** The creek has deeper water inside to the highway swing bridge, which has a clearance of 8 feet; see **117.240,** Chapter 2, for drawbridge regulations and opening signals. Gasoline is available at a small-boat basin just below the bridge.

Great Shoal, on the northwest side of the channel a mile up Nansemond River from the bridge, has an oyster bar that bares ½ foot at low water; it is marked by bush stakes.

The highway toll bridge over the river at **Hollidays Point,** on the north side 6.5 miles above the mouth, has a swing span with a clearance of 7 feet; see **117.240,** Chapter 2, for drawbridge regulations and opening signals. The dredged basin to a sand and gravel plant, 0.2 mile west of Hollidays Point, has depths of about 5 feet.

Western Branch, which empties into the west side of Nansemond River, 10 miles above the mouth, in June 1968, had a controlling depth of 7 feet to the fixed highway bridge at **Reids Ferry,** 1.6 miles above the mouth. The channel entrance is marked by buoys and daybeacons for about 700 feet above the junction with the Nansemond River. A seasonal marina, 0.7 mile from the main Nansemond channel, has a pier with a depth of about 10 feet at the face. Gasoline and a 45-foot marine railway are available but no repair facilities. In 1967, a submerged obstruction was reported near the mouth of Western Branch in 36°47′20″N., 76°33′47″W.

Suffolk is an important rail center on the south side of Nansemond River, 15 miles above the mouth. The highway bridge at Suffolk has a bascule span with a width of 40 feet and a clearance of 4½ feet; see **117.240 and 117.245 (a) through (e), and (f) (28-a),** Chapter 2, for drawbridge regulations and opening signals. The overhead power and telephone cables at the bridge have a clearance of 40 feet. The oil wharves just above and below the bridge have main-channel depths at their faces. Supplies may be obtained in town.

Batten Bay, on the west side of James River just north of Nansemond River, has general depths of 2 to 6 feet. **Ragged Island Creek,** at the north side of the bay, is shallow and little used.

Chuckatuck Creek, which empties into Batten Bay from southwestward, has depths of about 4 feet in the approach through the bay and deeper water inside for about 1.7 miles. The channel through the bay is marked by a light and daybeacon; the channel edges usually are marked by bush stakes.

The highway bridge over Chuckatuck Creek, 0.8 mile above the mouth, has a bascule span with a clearance of 21 feet; see **117.240 and 117.245 (a) through (e), and (f) (23),** Chapter 2, for drawbridge regulations and opening signals. Some supplies and fuel can be obtained at **Crittenden,** on the south side of the creek just eastward of the bridge. There is a 22-ton marine railway at one of the oyster-house piers.

James River Bridge, Mile 4, extends 4 miles from shore to shore in a northeast-southwest direction. The main channel vertical-lift span, 1 mile from the northeast shore, has a clearance of 50 feet down and 145 feet up; see **117.240,** Chapter 2, for drawbridge regulations and opening signals. A fixed span midway between the two shores has a clearance of 22 feet. The overhead power cable crossing the river close northward of the bridge has a clearance of 172 feet at the lift span and 100 feet at the fixed span. Both of the piers that protect the two cable suspension towers just north of the lift span are each marked by three fixed red lights.

Mariners' Museum, Mile 6E, is at the western side of **Lake Maury.**

White Shoal, on the southwest side of the main channel at Mile 7, is marked near its southeast end by the tower of an abandoned lighthouse. A secondary channel on the opposite side of the shoal also is marked.

Pagan River empties into James River at Mile 7W. Traffic on this river consists chiefly of shellfish, sand, and gravel. In 1955-1958, the controlling depths were 6½ feet for a width of 80 feet to Battery Park, thence 5 feet for a width of 60 feet to Smithfield.

The approach to Pagan River through the dredged channel southeast of White Shoal is well marked; the river inside is also marked to within a mile of Smithfield. The mean range of tide is 2.6 feet at the entrance.

Jones Creek, on the south side of Pagan River 0.7 mile above the mouth and marked by a light at the entrance, has depths of about 2 feet or more across the flats at the entrance. The fixed highway bridge, 0.6 mile above the mouth, has a width of 30 feet and a clearance of 10 feet. An overhead power cable close southward of the bridge has a clearance of 32 feet. A marina and fish pier are just below the bridge; some supplies and fuel are available; repairs can be made. A 45-foot marine railway is just above the bridge. The fixed highway bridge, 2.5 miles above the mouth, has a width of 40 feet and a clearance of 7 feet.

Battery Park is on the south side of Pagan River a mile above the mouth. Some supplies and fuel can be obtained at the boat basin near the oyster plant. Repairs can be made at a boatyard 100 yards upstream from the boat basin; marine railway, 60 feet.

Cypress Creek, on the south side of Pagan River 4 miles above the mouth, has depths of 4 feet or more for 2 miles. The highway bridge over the entrance has a 40-foot bascule span with a clearance of 4 feet; see **117.240 and 117.245 (a) through (e), and (f) (28-b),** Chapter 2, for drawbridge regulations and opening signals. An overhead power cable with a clearance of 36 feet crosses the creek about 0.8 mile above the bridge.

Gasoline is available at a small-boat basin on the south side of Pagan River just west of Cypress Creek.

Smithfield, on the southwest side of Pagan River 4.5 miles above the mouth, is famous for its hams. The fixed highway bridge just above the town has a width of 30 feet and a clearance of 15 feet. An overhead power cable at the bridge and one 0.4 mile west of the bridge have clearances of 30 feet. Local boats tieup at the town wharves below the bridge.

Deep Creek, Mile 8E, is used as an overnight anchorage by many oyster boats with drafts up to 6 feet. A dredged marked channel leads from James River to a turning basin opposite Menchville. In 1966, the controlling depth was 5 feet or 6½ feet for a midwidth of 50 feet to the turning basin, thence 6 feet in the basin. Traffic consists of some shellfish, sand, and gravel.

Menchville is on the northwest side of the entrance to Deep Creek. The landings at the town have depths of about 5 feet alongside. Numerous pleasure craft use Deep Creek during the summer. Gasoline, supplies, and a 60-foot marine railway are available.

Warwick River, marked by privately maintained daybeacons to a point about 2.5 miles above the mouth, is entered just north of Deep Creek; depths of 4 feet or more can be carried to **Fort Eustis,** 7 miles above the mouth. The mouth of the river is sometimes used as an anchorage by small oyster boats.

Point of Shoals, Mile 12W, is an extensive shallow area in **Burwell Bay.** There are also wide areas of unmarked shoals between the channel and the northeastern shore. The main channel formerly circled around Point of Shoals, but is now through the dredged cut known as **Rocklanding Shoal Channel.** The old channel has shoaled but is still buoyed; the current velocity is 0.8 knot. The several small landings along the shore of Burwell Bay have depths of about 4 feet at their outer ends.

Burwell Bay is used as an anchorage for a Maritime Administration Reserve Fleet; see **207.900,** Chapter 2, for regulations **restricting navigation** in the vicinity of the decommissioned ships.

A small-craft harbor of refuge is on the west side of Burwell Bay at **Tylers Beach** (37°04.9′N., 76°40.0′W.). A dredged channel, marked by lights and daybeacons, leads from James River to the harbor basin. In April 1970, the controlling depths were 2½ feet in the channel, thence in March 1969, 5½ feet in the basin. Gasoline, water, and limited float space are available in the basin. An overhead power cable at the entrance to the basin has a clearance of 37 feet.

At Mile 16.2E, a privately maintained channel, marked by a lighted range, lights, and daybeacons, leads from James River to a boat basin of the U.S. Maritime Administration reservation at **Fort Eustis.** In 1970, the channel and basin had reported depths of 9 feet. The ruins of an army pier are visible close northward of the channel. Decommissioned ships are moored on either side of the channel.

Deep Water Shoals Light (37°08.9′N., 76°38.2′W.), Mile 16. 9E, 34 feet above the water, is shown from a red and white checkered rectangular daymark on skeleton tower on piles, in depths of 2 feet. A seasonal fog signal is at the light.

Skiffes Creek, Mile 17.8E, has a privately maintained channel at the entrance leading to an army pier and turning basin, and to a small-boat basin to the northward. The channel is marked by lighted and unlighted buoys, and by a directional light. In 1970, reported depths of 17 feet were available at midchannel to the turning basin, thence 20 feet in

the turning basin and alongside the pier, and thence 16 feet in the small-boat basin; a shoal, covered less than 10 feet, was reported on the south side of the channel in the vicinity of Buoy 4. Two large decommissioned ships, used by the army for stevedore training, are moored on the north side of the pier. Numerous landing craft floats are in the small boat basin.

Storm warning signals are displayed; see chart.

An army small-craft **testing area** is at the entrance to the Skiffes Creek channel; see **207.152,** Chapter 2, for limits and regulations.

A privately marked barge channel with a reported depth of 12 feet, in January 1968, leads to the Surry Power Station on the west side of James River opposite Skiffes Creek. The nuclear power station is operated by the Virginia Electric and Power Co. A 120-foot high nuclear reactor tower at the station is prominent from all directions on the river.

A **restricted area** is at Mile 21.1E; see **207.152a,** Chapter 2, for limits and regulations.

College Creek, Mile 22.5N, has depths of 1 foot across the flats at the mouth, 4 feet inside for 2 miles, thence 2 feet for 0.5 mile to **Williamsburg Landing,** a mile from the town of **Williamsburg.** The creek is difficult to navigate without local knowledge. The fixed highway bridge across the mouth of the creek has a clearance of 10 feet. Privately maintained daybeacons mark the creek and its approach over the flats.

Cobham Bay, a wide bight at Mile 25.6S, has general depths of 5 to 7 feet.

Jamestown Island, at Mile 26N, is the site of historic **Jamestown,** which was settled by Capt. John Smith and his 105 cavaliers in 1607. The town is on **Church Point,** Mile 28N, the northwest end of the island. The Jamestown white monument is prominent; the ruins of the old church are hidden by trees.

The Thorofare is a shallow 4-mile passage which separates Jamestown Island from the mainland and connects with James River at both ends. It is a shallow bay in the eastern part, narrow and winding in the middle, and widens at the western end where it forms a small basin. A narrow channel, marked by daybeacons, leads through the extensive mudflats in the eastern part of The Thorofare. The controlling depths in The Thorofare are about 2 feet in the eastern part, thence about 4 feet to the highway bridge across the western entrance, and thence about 2 feet across the bar to deep water in James River. The passage over the bar is marked by private daybeacons. In 1971, extensive shoaling was reported on the bar between Daybeacons 1, 2, and 3.

An overhead power cable across the narrow middle portion of The Thorofare, formerly known as **Back River,** has a clearance of about 30 feet. The fixed highway bridge at the western entrance has a width of 48 feet and a clearance of 12 feet. A small island is about 200 yards northward of the bridge; leave the island to the northward.

Mill Creek, which empties into the eastern part of The Thorofare from the northward, has a depth of 1 foot at the entrance and 2 or more feet to a landing 1.5 miles above the mouth. Above the landing, the creek is foul with snags and obstructions. The fixed highway bridge across the mouth of the creek has a clearance of 10 feet.

Powhatan Creek, used by fishermen and small pleasure craft during the summer, empties from the northward into the basin formed by the western part of The Thorofare. The mouth of the creek is about 0.3 mile above the fixed highway bridge that crosses the western entrance to The Thorofare; the bridge has a width of 48 feet and a clearance of 12 feet. In April 1970, depths of 4 feet were reported at the mouth of the creek, thence 6 feet to a marina near the highway bridge, about 0.4 mile above the mouth. The fixed bridge has a width of 25 feet and a clearance of 12 feet. A current is reported noticeable at both bridges. Gasoline, water, some marine supplies, and a 17-ton lift are available at the marina; minor hull and engine repairs can be made. The numerous snags along the banks of the creek can be avoided by staying in midstream, and the island 0.3 mile above the mouth should be left to the northward.

The approach to Powhatan Creek (chart 530) through the basin formed by the western part of The Thorofare is marked by privately maintained daybeacons and uncharted stakes, but local knowledge is required to carry the best water.

Chart 530.—Scotland (37°11.0′N., 76°47.2′W.), Mile 27.5S, is the mainland terminus of the Jamestown Ferry, which operates to **Glass House Point,** 1 mile northwest of the monument at Jamestown, across the river. Ferry slip depths are about 11 feet on the Scotland side and 20 feet on the Jamestown side. The pier at Scotland extends channelward for 700 feet, and at Glass House Point, marked by lights and a fog signal, for 1,600 feet. The partly submerged remains of the old Scotland wharf are about 100 yards southeast of the slips.

Grays Creek, Mile 28.2S, is entered through a shallow bay. A marked 3-foot channel leads to deeper water inside. An overhead power cable at the entrance has a clearance of 42 feet. There are many snags and obstructions in the creek. A marina is a mile above the mouth.

Chickahominy River, Mile 33N, has a controlling depth of 6 feet in the entrance channel, thence 10 feet or more to the head of tidewater navigation at Walkers Dan 19 miles above the mouth. The lock in the dam has a length of 60 feet, a width of 15 feet, and a depth of 4 feet over the sill. The lock gates are hand operated; there is no tender. Obstruction lights mark the dam spillway.

The buoyed channel through the broad flats at the entrance to Chickahominy River is entered 0.7 mile westward of Glass House Point; daybeacons mark the critical points inside. The river is used by only a few local fishermen and pleasure boatmen. The mean range of tide is 1.9 feet at the entrance.

Wharf ruins extend out about 200 yards from shore 0.5 mile above **Barrets Point,** on the east side of the entrance. A sunken barge lies on the eastern edge of the channel 0.8 mile above the point.

Barrets Ferry highway bridge, 1.3 miles above the mouth, has a swing span with a clearance of 12 feet; see **117.240,** Chapter 2, for drawbridge regulations and opening signals. A pier with a depth of 7 feet at the face extends 100 yards into the river from the east bank just north of the bridge. Gasoline and some supplies are available.

Wright Island Landing, on the east side of Chickahominy River 6.5 miles above the mouth, has a fish wharf with 10 feet at the face; the buildings at the wharf are prominent from downstream. **Shipyard Landing** is on the same side of the river about 500 yards above Wright Island Landing. A state concrete launching ramp is on the north side of the river 2 miles above Wright Island Landing.

An overhead power cable with a clearance of 44 feet crosses the river about 9.4 miles above the mouth.

The Thorofare is an unmarked cut leading through the bend of the river 10 miles above the mouth; the controlling depth is 5 feet. Small boats able to pass through the cut can save 1.2 miles.

A pier on the west side 11 miles above the mouth, just north of **Mt. Airy,** has a depth of 9 feet at the face. Gasoline and some supplies are available.

Lanexa, on the east side 15 miles above the mouth, has a landing in poor condition with depths of about 5 feet alongside.

The former ferry slip and piers at **Claremont,** Mile 37.5S, are in ruins and the bottom area to the southeastward near **Sloop Point** (37°13.8′N., 76°57.0′W.) is foul. The former ferry slip across the river at **Sandy Point** is also in ruins.

Upper Chippokes Creek, Mile 38.5S, has depths of about 5 feet for 3 miles, thence 2 feet for 1 mile to the head of navigation. The channel into the creek is close along the south bank. An overhead power cable about 3.5 miles above the mouth has a clearance of 56 feet. A wreck, marked by a light, is off the creek entrance close to the southwest side of James River main channel; the wreck extends about 2 feet above high water.

Brandon wharf, Mile 39.3W, is a landing with depths of 20 feet alongside.

Sturgeon Point, Mile 42.5N, is the site of an abandoned brickyard. The point is marked by a light.

Wards Creek empties into James River at Mile 46S. A depth of 2 feet can be carried across the mudflats at the entrance by following the east bank at a distance of about 75 yards. Above the mouth, depths are 4 to 10 feet for 1.7 miles. The creek is an excellent storm anchorage for any boat able to enter. **Pope Wharf** on the south side of the James River, west of Wards Creek entrance, has depths of 5 feet at the face.

Fort Powhatan (37°16.2′N., 77°04.6′W.), Mile 46.8S, is marked by a light.

Ruffins Wharf, Mile 48.2E, has depths of about 16 feet at the face.

Wilcox Wharf, Mile 50N, is in poor condition. The far end of the pier is in ruins.

Powell Creek, Mile 53S, has depths of 7 feet through a narrow channel across the mudflats at the entrance and for 2 miles upstream. The creek is a good storm anchorage.

A highway lift bridge with a clearance of 50 feet down and 145 feet up crosses the James River at **Jordan Point,** Mile 56.4S; see **117.240,** Chapter 2, for drawbridge regulations and opening signals.

Jordan Point Marina, on the east side of Jordan Point at the south end of the bridge, may be reached through a channel marked by dolphins. Gasoline, diesel fuel, water, and some marine supplies are available.

Chart 531.—Hopewell, Mile 59W, is the site of several industries and the terminus of a branch railroad to Petersburg. The Allied Chemical Company Pier (37°18′26″N., 77°16′00″W.), about 0.8 miles southeastward of **City Point,** is 530 feet long and has berthing on both the north and south sides. In April 1970, depths of 27 feet were reported alongside.

The Continental Can Company Pier, 650 yards southward of the chemical pier, has a 20-foot face with 138 feet of berthing space provided by dolphins. The pier is used by petroleum barges. In April 1970, depths of 15 feet were reported alongside.

Other wharves along the waterfront southeastward of City Point are in poor condition. Limited amounts of supplies can be obtained in Hopewell.

Appomattox River, Mile 59.5W, is navigable to Petersburg, 10 miles above the entrance. In 1967-March 1969, the controlling depth was 6 feet to the fixed bridge at Petersburg, except for shoaling in the vicinity of Pye Alley in about 37°17′18″N., 77°21′22″W. The difficult part of the channel through the flats at the mouth is marked by lights and daybeacons; a general midchannel course is best through the remainder of the river. The mean range of tide is 2.9 feet at Petersburg.

The highway bridge, 1.2 miles above the mouth of Appomattox River, has a fixed span with a clearance of 40 feet. The Hopewell Yacht Club, on the south side 0.2 mile west of the bridge, has a small-boat basin with depths of about 6 feet off the

T-pier. Gasoline and some supplies are available; diesel fuel by truck. Repairs can be made; marine railway, 60 feet.

The railroad bridge, 2.4 miles above the mouth, has a swing span with a clearance of 10 feet; see **117.240 and 117.245 (a) through (e), and (f) (29),** Chapter 2, for drawbridge regulations and opening signals. An overhead power cable 0.8 mile above the bridge has a clearance of 113 feet.

There is a small-boat harbor 7.5 miles above the entrance of Appomattox River. Some supplies, gasoline, and berths are available; diesel fuel by truck. Repairs can be made; marine railway, 100 feet.

A conveyor belt with a 50-foot movable span and an overhead clearance of 11 feet crosses the river 8.1 miles above the mouth. A small marina with a marine railway is 0.2 mile above the conveyor crossing; gasoline and water are available.

The channel in Appomattox River is blocked above the fixed highway bridge at Petersburg by silt from construction work. An overhead power cable 0.2 mile below the bridge has a clearance of 51 feet.

Petersburg, at the head of tidewater navigation 10 miles above the mouth of Appomattox River, is an important rail center and **customs** port of entry. Customs officials maintain an office in the Federal Building at Richmond, and their services are arranged for in advance through vessel's agent. The bulkheads at the city are in poor condition. Fuel and supplies are not available at the waterfront, but all kinds of small craft supplies may be obtained in the city.

Above its junction with Appomattox River, James River becomes narrow and winding. The bends are often referred to as the **Curles of the River,** and the 14-mile section from Hopewell to Wilton has been called **The Corkscrew.**

Turkey Island Bend, 2 miles north of Hopewell, has depths of 10 to 30 feet around its 6-mile length, but is seldom used except by pleasure boats because the main channel now leads northwestward through Turkey Island Cutoff; most of the landings along the bend are in ruins. The north and west sections of the bend afford excellent anchorages because the river current has been greatly diminished by the cutoff and winds from any direction have little effect; the bottom is mostly soft mud.

Turkey Island Cutoff, Mile 61, is a mile long and well marked by lights. A cable ferry crosses the lower part of the cutoff; vessels must proceed with caution when the ferry is underway, as the cable comes to the surface. **Jones Neck Cutoff,** Mile 64, extends about a mile northward and westward; the cutoff is well marked by lights. The old river bend around **Jones Neck** has depths of 13 to 44 feet along its 4.5-mile length, but is now little used; most of the landings are in ruins.

Dutch Gap, Mile 66.5, the first canal dug in the United States, was cut through in 1611. The main channel extends west-northwestward through **Dutch Gap Cutoff (Aiken Swamp-Dutch Gap Cutoff),** which is about a mile long and is marked by lights at both ends. There is a gravel basin in **Hatcher Island,** on the north side of the cutoff.

The old river bend around Hatcher Island has depths of 7 to 25 feet along its 2-mile length. **Richmond Yacht Basin,** North of Hatcher Island, has piers with depths of about 12 feet at their outer ends; the small marine railway can haul out boats up to 40 feet in length for repairs. There is a gasoline pump on one of the piers. A fixed highway bridge over the western entrance to the bend has a width of 40 feet and a clearance of 21 feet.

The old channel southward from Dutch Gap has depths of 9 feet or more for over a mile to the gravel basin in **Farrar Island.**

A concrete-and-steel wharf of the Virginia Electric and Power Company (37°22′57″N., 77°22′44″W.), at Mile 67.5S, has main channel depths at the face. A privately maintained light is shown from the end of the wharf. The overhead cable just above the wharf has a clearance of 165 feet. About 300 yards westward is another cable with a clearance of 166 feet.

At a small marina at Mile 68.6N, gasoline and slips are available. A chemical plant pier at Mile 71.3S has depths of 20 feet alongside.

The oil wharf at **Drewrys Bluff,** Mile 71.7W., is of concrete construction and has main-channel depths at the face. The wharf is marked by lights; mooring dolphins are available.

The entrance to **Falling Creek** (37°26.2′N., 77°25.7′W.) is at Mile 72.4W, where there is a marina with depths of 6 feet at the fuel pier. Some supplies, fuel, and slips are available. Repairs can be made; marine railway, 65 feet.

Richmond, the capital of Virginia, is at Mile 78E. Traffic to and from the city consists chiefly of petroleum products, sand and gravel, sulfur, and newsprint. Commercial navigation in the river proper ends at the city wharves, but small boats can go a mile farther. The turnpike fixed highway bridge just below **Mayos Island** has a clearance of 40 feet.

Weather.—Richmond's climate might be classified as modified continental. Summers are warm and humid and winters generally mild. The mountains to the west act as a partial barrier to outbreaks of cold, continental air in winter, the coldest air being delayed long enough to be modified, then further warmed as it subsides in its approach to Richmond. The open waters of the Chesapeake Bay and Atlantic Ocean contribute to the humid summers and mild winters. The coldest weather normally occurs in late December and in January, when low temperatures usually average in the upper twenties and the high temperatures in the upper forties. Temperatures seldom lower to zero.

Precipitation is rather uniformly distributed throughout the year. However, dry periods lasting several weeks do occur, especially in autumn when long periods of pleasant, mild weather are most common. There is considerable variability in total monthly amounts from year to year so that no one month can be depended upon to be normal. Snow has been recorded during seven of the twelve months. Snowfalls of 4 inches or more occur on an average of once a year. Snow usually remains on the ground only 1 or 2 days at a time. Ice storms (freezing rain or glaze) are not uncommon in winter, but they are seldom severe enough to do any considerable damage. The James River reaches tidewater at Richmond where flooding has occurred in every month of the year, most frequently in March (28 times in the past 61 years), and only twice in July. Hurricanes and less severe storms of tropical origin have been responsible for most of the flooding during the summer and early fall months. Damaging storms occur mainly from snow and freezing rain in winter and from hurricanes, tornadoes, and severe thunderstorms at other seasons. Damage may be from wind, flooding, or rain, or from any combination of these. See Appendix for **Richmond climatological table.**

Storm warning display locations are listed on the NOS charts and shown on the Marine Weather Services Charts published annually by the National Weather Service.

The National Weather Service maintains an office at Byrd Field; **barometers** can be compared there or checked by telephone.

Towage.—A city-owned tug, 250 hp., is available for docking and undocking, if desired.

Quarantine.—Vessels subject to quarantine and agriculture quarantine inspection are inspected at Fort Monroe in Hampton Roads. The U. S. Public Health Service maintains a contract physician's office in Richmond; see Appendix for address.

Customs and Immigration.—Richmond is a customs port of entry. Vessels subject to customs and immigration inspections are inspected at their berths. Officials maintain offices in the Federal Building in Richmond.

The Port of Richmond's **harbormaster** maintains an office at the Richmond Deepwater Terminal at Warwick. He is responsible within the port for the assignment of berths and anchorages and the use of the city-owned tug.

Wharves.—Only the city-owned facilities at the Port of Richmond are described. These facilities are operated by Richmond Waterfront Terminals, Inc., and include the Richmond Deepwater Terminal, and the Richmond Upper Marine Terminal; turning basins front both facilities. The terminals are served by trunk railway and major highways, and have water and electric shore-power connections. All types of fuel can be obtained by tank truck. The alongside depths given for each facility described are reported; for the latest controlling depths contact the operator.

Richmond Deepwater Terminal: at Warwick, Mile 74W; 1,250-foot marginal wharf; 25 feet alongside; deck height, 22 feet; livestock pens; 190,000 square feet of covered storage, 60,000 square feet of bulk storage space, and 300 acres of open storage area; one 10-ton traveling electric crane, modern fork trucks, and caterpillar cranes up to 40 tons capacity; facility handles bulk cargo and livestock.

Richmond Upper Marine Terminal: on the east side of James River, about 4 miles northward of the Deepwater Terminal; 750-foot marginal wharf; 18 feet alongside; deck height, 12 feet; 80,000 square feet of warehouse and transit space; modern cargo-handling equipment; facility handles mostly general cargo.

There are several privately owned and operated barge wharves just southward of the Richmond Upper Marine Terminal. Gravel and construction material are handled at these facilities.

Supplies.—Gasoline and diesel fuel are available by tank truck. Some marine supplies may be obtained in Richmond, but major supplies must be obtained in the Hampton Roads area.

Repairs.—There are no drydocking or major repair facilities in the Port of Richmond; the nearest such facilities are in the Hampton Roads area.

The **Kanawha Ship Canal,** at the north end of the Richmond waterfront, is reached through a masonary lock with a length of 156 feet, a width of 35 feet, and a vertical lift of 23 feet; the lock is operated by hand from 0800 to 1600, Monday through Friday. A 24-hour advance notice to the Port of Richmond harbormaster is required. The canal is said to have depths of about 12 feet, but is now little used except by small private boats. The railroad bridge about 150 yards above the lock has a 30-foot bascule span with a clearance of about 2 feet; 8 hours' advance notice to the harbormaster is required to open the span.

11. CHESAPEAKE BAY, YORK AND RAPPAHANNOCK RIVERS

This chapter describes the western shore of Chesapeake Bay from Old Point Comfort to the Potomac River including its principal tributaries Back, Poquoson, York, Piankatank, Rappahannock, and Great Wicomico Rivers, and Mobjack Bay. Also discussed are the ports of Yorktown, Fredericksburg, West Point, Tappahannock, Kilmarnock, and Reedville, as well as several of the smaller ports and landings on these waterways.

Charts 1222, 1223.—The western shore of Chesapeake Bay from Old Point Comfort to the Potomac River is mostly low. York and Rappahannock Rivers are broad and deep at their entrances and are navigable for long distances.

Fishtraps are thicker in this area than in any other part of the bay. **Ice** is seldom encountered this far south in the bay, but may be found in the upper parts of some of the tributaries.

Channels.—The federal project for Chesapeake Bay provides for a depth of 42 feet in the main channel between the Virginia Capes and Fort McHenry, Baltimore. There are three dredged sections in the lower Chesapeake Bay: the first off Cape Henry, just above the Virginia Capes; the second off York Spit, 11 to 22 miles above the Capes, and the third off Rappahannock Spit, 40 to 46 miles above the Capes; they are well marked. See Notice to Mariners and latest editions of the charts for controlling depths.

York Spit Channel begins 11 miles above the Capes and extends northward another 11 miles; see **207.130**, Chapter 2, for **navigation regulations** of the channel. The current velocity is about 1.0 knot in the channel.

Chart 562.—The **Horseshoe** is a shoal that extends several miles out from the shore between Old Point Comfort and Back River, 6.5 miles to the northward. The southern edge of the shoal lies along the north side of the main channel into Hampton Roads; the eastern half has depths of 13 to 18 feet, and the western half, 6 to 11 feet. Local vessels drawing 7 feet or less use the lanes through the fishtraps on the Horseshoe when navigating between Hampton Roads and York River or Mobjack Bay. The tidal current velocity is 0.5 knot over the Horseshoe and is rotary, turning clockwise.

A Naval Ordnance Laboratory **restricted area** extends eastward and southward of Old Point Comfort, and a **danger zone** of an army firing range extends to seaward from a point 1.5 miles northward of the point; see **204.50** and **204.49a**, Chapter 2, for limits and regulations, respectively.

Storm warning signals are displayed at Old Point Comfort.

Back River empties into the west side of Chesapeake Bay 7 miles northward of Old Point Comfort between **Northend Point** and **Plumtree Point**, a mile to the northward. A firing and bombing **danger zone** is north of the entrance to Back River; see **204.49**, chapter 2, for limits and regulations. The approach to Back River, from southeastward through a line in the fishtraps, is well marked. The mean range of tide is 2.3 feet at the entrance.

About 2 miles above the mouth, Back River divides into **Northwest Branch** and **Southwest Branch**, which have general depths of 2 to 5 feet. The **Langley Field** hangars, water tanks, and wind tunnel back of Willoughby Point, between the branches, can be seen for many miles. The marked channel that extends 3 miles from the mouth of the river to the Langley Field fuel pier on the west side of Southwest Branch has a controlling depth of about 12 feet. In 1970, shoaling was reported in the channel between Lights 13 and 17; extent of shoaling is not known. The Langley Yacht Club, just south of the fuel pier, has gasoline and supplies; the depth in the basin is about 4 feet. A marked side channel to the Langley Field boathouse, on the south side of Northwest Branch 3 miles above the river mouth, has a controlling depth of about 7 feet.

A marina on the south side of Back River, just east of **Windmill Point** a mile above the mouth, has gasoline and supplies; marine railways can haulout boats up to 40 feet. The depth to the marina is about 3 feet.

Harris River, on the south side of Back River west of **Windmill Point**, has depths of 6 feet in a marked channel that leads to a marina inside **Stony Point**. Some supplies, fuel, and berths are available. Repairs can be made; marine railway, 30 feet; lift, 10 tons.

Gasoline and some supplies can be obtained at **Messick Point**, on the north side of Back River 1.5 miles above the mouth. Repairs can be made; marine railway, 40 feet.

The side-by-side highway and rail bridges over Southwest Branch, 1.5 miles above Willoughby Point, have fixed spans with a minimum width of 18 feet and a clearance of 6 feet.

Between Back River and Poquoson River are shoals that extend 1 to 3 miles from shore; on the shoals are scattered oyster rocks that bare, or nearly bare, at low water. Strangers should stay outside the 6-foot curve.

Chart 494.—Poquoson River, which empties into Chesapeake Bay 5 miles northwest of Back River,

has depths of 7 feet to the village of **Yorkville,** on the west side 2.5 miles above the mouth. The marked approach to the river is from northeastward, and is clear of fishtraps for a width of 400 yards. There is a light on either side of the entrance. The mean range of tide is 2.4 feet.

Bennett Creek, on the southeast side of the Poquoson River mouth, has depths of 6 feet or more for 1.3 miles to **Easton Cove,** which makes off to the eastward. The channel is marked as far as White House Cove, on the west side of Bennett Creek 0.8 mile above the mouth; the channel in White House Cove is marked by two daybeacons and has depths of 8 to 2 feet for 0.7 mile above the mouth. A marine railway at the boat basin on the north side of the cove entrance can haul out boats up to 50 feet in length for hull repairs. Gasoline is available at a wharf near the south end of the cove.

Chisman Creek, on the north side of the Poquoson River mouth, has depths of 9 feet or more in a narrow channel for 1.3 miles above its entrance. There are boatyards a mile above the entrance; the largest marine railway can haul out boats up to 90 feet in length for repairs. The creek is marked by daybeacons and a light.

Back Creek, 1.5 miles south of York River, has depths of 7 feet for 2 miles. The entrance is marked by a lighted buoy, lights, and daybeacons. The creek is used by oystering and fishing boats. A State-owned wharf on the south side, 1.4 miles above the mouth, has a depth of about 9 feet at the face. Gasoline is available at a fishhouse on the south side, 1.8 miles above the mouth.

Passage northward from Back Creek to York River can be made through the **Thorofare,** about 0.8 mile from the mouth of Back Creek. The dredged channel is marked by lights and daybeacons, and had a controlling depth of 4 feet for a midwidth of 60 feet in July 1968.

Charts 494, 492, 495, 496.—York River, formed by the junction of Mattaponi and Pamunkey Rivers 29 miles about the mouth, is 15 miles northward of Old Point Comfort and 26 miles by the main channel from the Virginia Capes. Traffic on York River consists chiefly of pulpwood, petroleum products, military supplies, and shellfish. Drafts of vessels using the river are mostly 18 feet or less, but deep-draft vessels navigate the lower reaches.

York River has a broad and fairly straight channel, is well marked and easily followed. Depths are as much as 80 feet off Yorktown, and the controlling depth to West Point was 17 feet in 1966. Vessels can anchor in the wider parts of York River channel aside from the naval areas described later.

The mean range of tide is 2.4 feet at the entrance to York River and at Yorktown, and 3 feet at West Point. The currents in York River follow the general direction of the channel except in the narrowest parts where there is a tendency to set a vessel onto the shoals. The velocity varies throughout the river; the times of slack water and strengths of current become later going up the river. The normal conditions are subject to change by winds and freshets.

Ice sometimes interferes with navigation of York River for short periods during severe winters, but in ordinary winters there is no interruption below West Point.

Caution.—Ships and craft underway in York River are to proceed at reduced speed and exercise extreme caution in order to reduce generated water motion and to prevent damage to the Virginia Fisheries Laboratory equipment and facilities located downstream from the Coleman Memorial Bridge, in the vicinity of Gloucester Point, ships and craft loading volatile fuels at the American Oil Co. refinery pier, and other craft and property close to the shores of the river. In no instance should the **speed** of ships underway upriver from the Tue Marshes Light exceed 12 knots.

Pilotage on the York River is compulsory for all foreign vessels and for United States vessels under register in the foreign trade. Pilotage is optional for United States vessels in the coastwise trade which have on board a pilot licensed by the Federal Government to operate in these waters.

Pilots for York River are provided by the Virginia Pilots Association; see Chapter 10 for further details. Pilot service on the river is available on a 24-hour basis only as far as Cheatham Annex; service above this point is available only during daylight hours.

Supplies are available at Yorktown, West Point, and at other places described in this chapter. **Repairs** can be made to small vessels in Perrin River, Sarah Creek, and at other places.

Chart 494.—York Spit extends outward along the northeast side of the York River approach channel for 7 miles from Guinea Marshes; the inner half of the spit has depths of 1 to 6 feet, and the outer half 10 to 20 feet.

York Spit Light (37°12.6′N., 76°15.3′W.), 37 feet above the water, is shown from a white daymark with red vertical stripe on brown piles, in depths of 12 feet near the outer end of the spit; a fog signal is sounded at the light. The light is 19.8 miles above the Capes.

The York River approach channel, extending from about 7 miles southeast of York Spit Light to about 3 miles northwest of the light, has a controlling depth of about 37 feet and is well marked. There are natural depths in excess of 37 feet from the north end of the dredged section to the naval installation 5 miles above Yorktown bridge, except for a 34-foot spot 0.6 mile northeastward of Tue Marshes Light.

About 1.5 miles northwest of York Spit Light, a buoyed lane extends northeastward through the fishtraps. The lane has depths of 15 feet or more

and can be used by medium-draft vessels approaching York River from northward.

The swash channel through York Spit about 5 miles northwest of York Spit Light has a controlling depth of about 8 feet; it is marked by a light and buoys. The channel shows up well on a bright day.

Chart 492.—The entrance to York River is between **Tue Point** and **Guinea Marshes,** 25.9 miles above the Virginia Capes.

Tue Marshes Light (37°14.1'N., 76°23.2'W.), 41 feet above the water, is shown from a red and white checkered diamond daymark on a white square house on brown piles, in depths of 4 feet 0.3 mile north of Tue Point; a fog signal is sounded at the light.

Perrin River, on the north side of York River 2 miles above the mouth, has depths of 6 feet or more in the approach and through a narrow marked channel to the wharf at **Perrin,** on the north side 0.3 mile above the entrance. A marine railway at the wharf can handle vessels up to 100 feet in length. A marina has fuel and some supplies. Gasoline can be obtained at the oysterhouse wharves, on the east side of the river entrance; depths of 4 to 7 feet are alongside the wharves.

The American Oil Company offshore pier, on the south side of York River 3.3 miles above the mouth, has depths of 40 feet along the 1,000-foot long outer face. The pier, connected to shore by a long catwalk, is marked at its easterly end by a private light.

The intake for an electric powerplant, on the south side of the river 4.2 miles above the mouth, is marked by two lights.

Wormley Creek and **West Branch** have a common entrance on the south side of York River, 4.5 miles above the mouth; a light marks the entrance. A privately dredged channel leads through the entrance to a Coast Guard basin and pier on the north side of West Branch 0.8 mile above the entrance light. In 1965, the channel to the Coast Guard basin, marked by daybeacons, had a reported controlling depth of 6 feet. Gasoline, berths, water, ice, a 20-ton mobile lift, and marine supplies can be obtained at a marina on the east side of Wormley Creek just above the entrance; hull and engine repairs can be made.

The Coast Guard T-pier (37°13.6'N., 76°28.7'W.), on the south side of York River 5 miles above the mouth, has depths of 35 feet or more at the outer end.

A **naval explosives handling berth** is northward of the Coast Guard pier; see **207.128 (a) (3) and (b) (3) through (5),** Chapter 2, for limits and regulations.

Sarah Creek, on the north side of York River 6 miles above the mouth, has depths of 7 feet through the marked entrance channel and for about 0.8 mile up both its branches. A large yacht haven, on the west side 0.3 mile above the entrance, has supplies, fuel, and berths. Repairs can be made at a boatyard 0.3 mile up Northwest Branch; marine railway, 70 feet; lift, 20 tons.

Yorktown, The historic Revolutionary War town, is on the southwest side of York River 6.7 miles above the mouth. High on the bluff in the southerly part is the **Yorktown Monument,** and a group of buildings is prominent on the shore back of the wharves. The main part of the town is not visible from the river. **George P. Coleman Memorial Bridge,** from Yorktown to Gloucester Point, has twin spans with clearance of 60 feet; the two spans open clockwise simultaneously; see **117.240,** chapter 2, for drawbridge regulations and opening signals.

The public wharf at the Yorktown end of the bridge has depths of 6 feet at its face, but depths of 20 feet or more are only 5 feet off of it. The post office is at the wharf. Supplies are available nearby.

Gloucester Point is a village at the northeast end of Coleman Bridge. There are several piers and buildings and some conspicuous oil tanks on the low point, and the red brick building of the Virginia Institute of Marine Science is about 500 yards northeastward. The long T-head pier (37°14'46"N., 76°30'02"W.), owned by the Institute, has reported depths of 11 feet at the face. A shorter pier of the Institute is about 150 yards to the northward; depths of 6 feet are reported at the face. An oil pier is about 250 yards southwestward of the T-head pier; depths of about 12 feet are alongside.

The **Yorktown Naval Weapons Station** piers on the southwest side of York River, 8 miles above the mouth, have depths of about 39 feet at their outer ends. A **prohibited area** and a **restricted area** for mine service testing are off the piers; see **207.128 (a) (1) and (2), and (b) (1), (2), and (5),** Chapter 2, for limits and regulations. A **naval anchorage area** begins off the Naval Weapons Station piers and extends upriver about 4 miles; see **110.166,** Chapter 2, for limits and regulations.

The **Naval Supply Center** piers at **Cheatham Annex Depot,** on the southwest side of York River 11.5 miles above the mouth, have depths of 36 feet and more at the southeasterly T-pier and 39 feet and more at the northwesterly L-pier. The piers are within a **Naval restricted area;** see **207.129,** Chapter 2, for limits and regulations.

Chart 495.—Queen Creek (37°18.1'N., 76°36.9'W.), on the southwest side of York River 13 miles above the mouth, has depths of about 5 feet with local knowledge through a marked channel across the flats at the entrance and deeper water through a narrow channel inside for 2.7 miles to **Hawtree Landing,** the site of a seasonal fishing camp. The channel inside is marked by daybeacons to a point about 0.6 mile below Hawtree Landing. Gasoline is available at a marina on the north side of the creek a mile inside the en-

trance. Stakes on either side of the entrance mark the limits of the State's experimental oyster beds.

Aberdeen Creek, on the northeast side of York River 14 miles above the mouth, has a marked dredged channel leading to a turning basin and public landing 0.4 mile above the entrance. In 1966, the controlling depths were 4 feet in the channel and 6 feet in the basin.

The long T-head pier at **Clay Bank,** on the northeast side of York River 15 miles above the mouth, is used by barges; depths at the face are about 15 feet.

Poropotank Bay, on the northeast side of York River 22 miles above the mouth, has depths of 5 feet at the entrance; the best water favors the eastern side which is marked by bush stakes. From the entrance, depths of about 5 feet can be carried 4 miles through **Morris Bay** and **Poropotank River** to **Miller Landing.** There are several other landings along the river. The channel is usually marked by bush stakes, but is crooked and narrow in places and difficult to navigate without local knowledge.

West Point, at the junction of Mattaponi and Pamunkey Rivers 29 miles above the mouth of York River, has waterborne commerce in pulpwood, paper products, and petroleum. The town is the terminus of a Southern Railway branch line. The pulp, paper, and paperboard wharves just below the Eltham Bridge have depths of 13 to 25 feet alongide.

At West Point the current velocity is about 1.4 knots in Mattaponi River, and about 1.8 knots in Pamunkey River. Broken-off piling extends off the south side of West Point.

A public pier is at the southeast end of West Point, at the mouth of Mattaponi River. Gasoline is available at an oil wharf with depths of 5 to 15 feet alongside 0.4 mile south of the Lord Delaware Bridge; diesel fuel can be delivered by truck. An oil pier 0.2 mile above the bridge has depths of 18 feet alongside. Supplies can be obtained in town.

Chart 496.—Mattaponi River which empties into York River eastward of West Point (37°31.7′N., 76°47.7′W.), is one of two tributaries that combine to form York River. Traffic on Mattaponi River consists chiefly of pulpwood. Drafts of vessels using the river above West Point usually do not exceed 10 feet.

Controlling depths in Mattaponi River are as follows: 12 feet to **Courthouse Landing,** 13 miles above the mouth; thence 9 feet for 10 miles to **Locust Grove;** and thence 2 feet to **Aylett,** 32 miles above the mouth.

The channel in Mattaponi River is unmarked and is difficult to navigate without local knowledge. The mean range of tide is 3 feet at West Point and 3.9 feet at Walkerton. Freshets occur at irregular intervals, being more severe in March and April, and have reached a height of 17 feet above low water at Aylett, though this is exceptional; the freshet rise is negligible at and below West Point.

The Lord Delaware Bridge over Mattaponi River at West Point has a swing span with a clearance of 12 feet; the eastern opening is used as there are no fenders on the western opening. See **117.240,** Chapter 2, for drawbridge regulations and opening signals. Overhead power cables about 1.8 miles and 14.2 miles above the mouth have clearances of 62 feet and 90 feet, respectively.

The **Walkerton** highway bridge, 24.5 miles above the mouth of Mattaponi River, has a swing span with a clearance of 6 feet through the southerly opening which has fenders; see **117.245 (a) through (e) and (f) (22-a),** Chapter 2, for drawbridge regulations and opening signals. Two fixed bridges cross the river at Aylett, 32 miles above the mouth; minimum clearance is 20 feet. The minimum clearance of the overhead power cables between the bridges at Walkerton and Aylett is 42 feet.

Pamunkey River, the westerly of the two tributaries that form York River, has many landings along its banks. Traffic on the river consists chiefly of pulpwood; there is a grain elevator platform at **Port Richmond,** 2 miles above the mouth. Vessels with drafts up to 12 feet navigate the river above West Point.

Controlling depths in Pamunkey River are about 12 feet from the mouth to **Cumberland Landing,** 20 miles above the mouth, thence 8 feet to **White House,** 28 miles above the mouth, and 4 feet to the **Newcastle Bridges,** 46 miles above the mouth. The mean range of tide is 2.7 feet at **Sweet Hall Landing,** 15 miles above the mouth, and 3.3 feet at **Northbury,** 35 miles above the mouth. Freshets occur at irregular intervals, being more severe in March and April.

Pamunkey River is easy to navigate as far as **Brickhouse Landing,** 16 miles above the mouth; farther up, navigation is difficult without local knowledge. Fresh water is available at some of the landings, and the river water is fresh above Cumberland Landing. Several narrow cutoffs have depths enough for small boats, but their use requires local knowledge. Above **Retreat,** 36 miles above the mouth, the river is covered with floating debris and snags.

The Eltham Bridge over Pamunkey River at West Point has a swing span with a clearance of 10 feet; the southwest opening is preferred, as there are no fenders along the northeast opening. Power cables crossing the river about 2 and 14.6 miles above the mouth have clearances of 60 and 90 feet, respectively. The railroad bridge at White House has a swing span with a clearance of 4 feet; the easterly opening is used. Drawbridge regulations and opening signals for the Eltham Bridge and the bridge crossing at White House are given in **117.240,** Chapter 2.

Chart 494.—Mobjack Bay, which is entered between Guinea Marshes at the shore end of York Spit, and New Point Comfort, 4 miles east-northeastward, includes several tributaries, the

most important being East, North, Ware, and Severn Rivers, the bay is obstructed by extensive shoals, but has depths of 22 feet in the entrance and 15 feet for considerable distances into the tributaries. Many of the shoals are marked by lights and buoys.

The only prominent marks in the approach to Mobjack Bay are York Spit Light on the south and the white tower of the abandoned lighthouse on New Point Comfort on the north. The approach channel extends between fishtrap buoys; numerous crab pots exist shoreward of these buoys. Good anchorage, sheltered from all but southerly and southeasterly winds, can be found in the bay. Small craft find safe anchorage in the bight westward of New Point Comfort and in the rivers and creeks. The mean range of tide is 2.3 feet at the entrance.

New Point Comfort is the south end of a low, partly wooded island which is separated from the mainland by **Deep Creek,** a crooked and unmarked natural channel which is impassable at low water because of grass. The pile remains of **Bayside wharf,** visible at high water 1.5 miles northwest of New Point Comfort, extend about 0.4 mile channelward.

Davis Creek, 1.6 miles northwest of New Point Comfort, has a marked dredged channel leading to a public landing in the western arm about 0.8 mile above the entrance. In August 1970-January 1971, the channel had a controlling depth of 10 feet for a width of 80 feet. Depths of 12 feet are alongside the face of the public landing. Several fishhouses are on the shore near the upper part of the creek.

Pepper Creek, 3 miles northwest of New Point Comfort, has depths of 4 feet for about 0.7 mile above the entrance. The approach is marked by daybeacons.

East River, 5 miles northwest of New Point Comfort, has a marked narrow channel with depths of 10 feet for 3.5 miles above the entrance, and thence 4 feet for another 2 miles to the head. Shoals, sometimes marked by bush stakes, extend for some distance off many of the points above the entrance, but the midchannel is clear.

Diggs Wharf, on the east side of East River just inside the entrance is in ruins. Across the river at **Mobjack** is **Philpots Wharf,** which has a depth of 8 feet at the outer face. Fuel and supplies are obtainable. An oil company receiving dock and storage depot are at Mobjack.

Williams Wharf, on the northeast side of East River about 2.5 miles above the entrance, has depths of about 8 feet alongside the oysterhouse bulkhead. The oil wharf is used only for discharging petroleum products; a depth of 12 feet is at the outer end. Fuel can be brought in by truck. An oysterhouse and landing are on the western shore opposite Williams Wharf.

North River, which empties into the head of the Mobjack Bay from northward, is wide, but has long shoals making off from many of the points. The channel has depths of 12 feet for 4 miles and is well marked; depths of 7 feet can be carried 2 miles farther. **Blackwater Creek** empties into North River 3 miles above the mouth. Depths of 7 feet can be carried for a half mile to a boatyard just inside the entrance of **Greenmansion Cove;** gasoline and some supplies are available. The depth at the face of the dock is 5 feet. Repairs are made; marine railway, 60 feet.

Ware River, which flows into the head of Mobjack Bay from northwestward, has depths of 15 feet to the mouth of **Wilson Creek,** on the west side 3 miles above the entrance, and 7 feet for another 2 miles. Long shoals, some of which are marked by lights and daybeacons, extend off many of the points. The only commercial landing on Ware River is the Texas Oil Company wharf, on the east side about 4 miles above the entrance, which has a depth of about 5 feet off the end; fuel and some supplies are available. **Schley,** 0.5 mile inland from the wharf, has a store.

Severn River, on the west side of Mobjack Bay, has depths of 18 feet to the junction with **Northwest Branch** and **Southwest Branch,** 8 feet for 1.3 miles in Southwest Branch, and 8 feet for 1.8 miles in Northwest Branch. The most prominent shoals are marked by lights and daybeacons.

A wharf at **Glass,** on the north side of Southwest Branch 1.1 miles above the fork, has depths of about 7 feet to the outer end. Caution is necessary to avoid the 1-foot shoal extending from the point 0.4 mile eastward of the wharf. Gasoline is pumped to the wharf and diesel fuel is trucked in; supplies are available. Repairs are made; marine railway, 90 feet.

Browns Bay, a mile south of Severn River, is marked by lights at the entrance and by bush stakes inside. Gasoline is available at a wharf, with a depth of 4 feet at the end, at the head of the bay. A store is at **Severn,** about a mile westward of the wharf.

Dyer Creek, which empties into Chesapeake Bay 2 miles north of New Point Comfort, has depths of 3 feet in the entrance and 4 to 5 feet inside. The creek is bush-staked, but local knowledge is essential. Overhead power cables across the creek have a least clearance of 17 feet.

Horn Harbor is entered through a dredged channel marked by lights 2.4 miles northward of New Point Comfort; lights and daybeacons mark the channel in the upper part of the harbor. In 1962-68, the controlling depth was 7 feet in the dredged channel decreasing to about 5 feet at a point 3.5 miles above the entrance. A cluster of submerged piling of a former fishhouse is on the east side of the channel about a mile above the entrance. Traffic consists chiefly of fish, shellfish, and pleasure craft.

Depths of 5 feet are available to the fish wharf at **New Point,** 0.7 mile above the Horn Harbor entrance. A marina, 3.5 miles above the entrance, has some supplies and gasoline. An 80-foot marine railway can haul out boats for repairs.

Winter Harbor is entered through a dredged channel marked by lights and daybeacons 4.3 miles northward of New Point Comfort. The channel, with a midchannel controlling depth of 7½ feet in May 1969, leads to a turning basin and public landing 1.5 miles above the entrance. Depths in the turning basin were 5½ feet in the southerly 300 feet with shoaling to 2½ feet in the northerly 100 feet. Traffic in the harbor consists chiefly of fish and shellfish.

Wolf Trap, the area of broken ground 6 miles northward of New Point Comfort, has numerous shoal spots 5 to 10 feet deep which extend as much as 3 miles from the western shore of Chesapeake Bay. All the shoal area lies in the fishtrap limits. **Wolf Trap Light (37°23.4′N., 76°11.4′W.),** 52 feet above the water, is shown from an octagonal red-brick dwelling with a square tower on a brown cylinder, in depths of 16 feet near the outer end of the shoal area; a fog signal and radiobeacon are at the light. The light is 5 miles due west of a point in the main channel 28.8 miles above the Capes.

Chart 1223.—The **danger zone** of a naval firing range begins about 4 miles north-northeastward of Wolf Trap Light and extends northward to Tangier Sound Light; see **204.46,** Chapter 2, for limits and regulations.

The control house of a former degaussing range is 6.2 miles eastward of Wolf Trap Light; the obstruction is marked by a light and fog signal 0.8 mile westward of the abandoned platform.

Chart 534.—Piankatank River is 11 miles northward of Wolf Trap Light. The entrance is between **Cherry Point,** at the north end of **Gwynn Island,** and **Stingray Point,** 2.5 miles to the northward. The entrance point is 45.3 miles above the Virginia Capes. **Stingray Point Light 37°33.7′N., 76°16.2′ W.),** 34 feet above the water, is shown from a skeleton tower with daymark on piles in depths of 6 feet 1.3 miles east of the point; a fog signal is sounded at the light.

Traffic on Piankatank River consists of fish and shellfish, petroleum products, shells, and pulpwood. Drafts of vessels using the river are mostly 6 feet, but drafts up to 11 feet are on record. The river has depths of about 18 feet in the approach from northeastward through a buoyed lane in the fishtraps, 16 feet or more to the fixed bridge 9 miles above the mouth, and 7 feet to Freeport, 13.5 miles above the mouth. Lights and buoys mark the lower 6 miles of the river channel.

The mean range of tide is 1.2 feet in the lower part of Piankatank River. During severe winters, the river is sometimes closed by ice for short periods. Repairs can be made to medium-size vessels in Fishing Bay.

Jackson Creek, on the north side of Piankatank River a mile above the mouth, has a dredged entrance channel marked by a light and daybeacons. The controlling depth in July 1970, was 8 feet in the entrance, with natural depths of 8 to 10 feet inside. Stakes usually define the channel edges. **Deltaville** is at the head of the north arm.

There are places along Jackson Creek where fuel, supplies, and berths can be obtained. The largest marine railway can haul out boats up to 55 feet in length for repairs.

Hills Bay, on the south side of Piankatank River 2 miles above the mouth, has general depths of 14 to 20 feet, and is the approach to Queens Creek and Milford Haven.

Queens Creek, at the head of Hills bay, is entered by a dredged channel that leads across the bar at the entrance and thence to a turning basin about 0.6 mile above the entrance. In October 1968, the controlling depth was 6 feet in the channel and turning basin. The channel across the bar and to the turning basin is marked by lights and daybeacons. A few broken piles that remain of the wooden jetty on the north side of the entrance are marked at the outer end by a daybeacon.

Milford Haven, the strait between Gwynn Island and the mainland to the southwestward, is entered from the head of Hills Bay. Traffic on the waterway consists chiefly of fish and shellfish carried in vessels drawing up to 7 feet. A marked channel with a controlling depth of about 8 feet leads from Hills Bay to natural depths of 15 to 8 feet in Milford Haven.

The jetty on **Narrows Point,** at the north side of the Hills Bay entrance to Milford Haven, is marked by a light. The highway bridge from the mainland to Gwynn Island has a swing span with a clearance of 12 feet in the north opening; see **117.240** and **117.343,** Chapter 2, for drawbridge regulations and opening signals.

A marina just west of the bridge affords supplies, fuel, and berths; repairs can be made; lift 24 tons. Do not dock on the south end of the fuel pier because of a submerged powerline and shoal water. Gasoline is available at a public landing pier just east of the bridge.

Callis Wharf at **Grimstead,** on the Gwynn Island side of Milford Haven 0.7 mile from the jetty, has depths of 9 feet at the face. Gasoline and some other supplies are available. A marine railway on the southeast side of the entrance to **Edwards Creek,** 0.5 mile eastward of Callis Wharf, can haul-out boats up to 35 feet in length for repairs.

A wharf at **Cricket Hill,** on the mainland side of Milford Haven 0.8 mile from the jetty, has depths of 8 feet at the face.

Milford Haven can also be entered from Chesapeake Bay at the south end of Gwynn Island. This paggage, known as **Hole in the Wall,** has a con-

trolling depth of about 3 feet and is used by small local boats, but it is exposed to heavy seas. A light marks the south side of the entrance.

Stutts Creek enters the southern part of Milford Haven from the southwestward. There are depths of 6 feet or more from Milford Haven to a pier on the north side of Stutts Creek, 1.8 miles above the mouth; gasoline and some supplies can be obtained.

Fishing Bay, on the north side of Piankatank River 4 miles above the mouth, has depths of 12 to 30 feet. On the east side of the bay is narrow 1-mile long **Stove Point Neck.** A private 700-foot long pier with a depth of 8 feet at the outer end extends westward from the middle of the neck. Repairs can be made at boatyards at the north end of the bay; largest marine railway, 150 feet; lift, 20 tons. Fuel and supplies are available.

Cobbs Creek is on the south side of Piankatank River, 7 miles above the mouth. A channel marked with daybeacons at the entrance and with depths of about 8 feet leads to a marina 0.2 mile inside on the west side of the creek. Limited supplies, marine supplies, fuel, and berths are available; repairs can be made; 45-foot marine railway. An overhead power cable with a clearance of 50 feet crosses the creek about 0.4 mile above the mouth.

Dixie, a village on the south side of Piankatank River 9 miles above the mouth, has gasoline and some supplies. The oil wharf has depths of about 10 feet off its outer end. The fixed highway bridge just west of the village has a clearance of 43 feet; an overhead power cable close westward of the bridge has a clearance of 68 feet.

A pier at **Freeport,** used by petroleum barges, is on the south side of the river 13.5 miles above the mouth. Depths of 6 feet are at the face; gasoline, and some supplies are available.

Charts 534, 605—SC.—Rappahannock River flows into the west side of Chesapeake Bay 45.7 miles by channel from the Virginia Capes. Fredericksburg, 93 miles above the mouth, is the head of practical navigation.

Traffic on the river consists chiefly of pulpwood, shellfish and shells, chemicals, and some sand and gravel. Drafts of vessels using the river seldom exceed 11 feet and are mostly 6 feet or less.

Mileages on Rappahannock River, such as Mile 15N, Mile 32W, etc., are the nautical miles above the midchannel point on a line drawn from Stingray Point to Windmill Point. The letters N, S, E, or W following the numbers denote by compass points the side of the river where each feature is located.

The river has natural depths of 15 feet or more to the bridge at Tappahannock, 37.4 miles above the mouth. Above this point, a federal project provides for dredging of the bars to provide a channel 12 feet deep to Fredericksburg. In June 1970, the controlling depth was 12 feet from the bridge at Tappahannock to the Port Royal Bridge, Mile 68.5, thence in January 1970, 9 feet to the Gulf Refining Company Wharf at Fredericksburg, and thence 6 feet across Fredericksburg Bar. A submerged obstruction is reported in the river at about Mile 87.8 in 38°14.9'N., 77°22.3'W.

In general, vessels can anchor anywhere near the channel of Rappahannock River where the bottom is soft and the depth suitable. Deep-draft vessels will find good anchorage 3 to 5 miles from the mouth. Carter and Urbanna Creeks are used extensively as harbors by small craft.

The channel from the mouth of Rappahannock River to Tappahannock is comparatively straight, but gradually decreases in width and leads between shoals that make out from both banks. The principal dangers are marked. Strangers can take a draft of 10 feet to Tappahannock by day with the aid of the chart, but navigation of the narrow, crooked channel farther up requires local knowledge. There are rocks in places on both sides of the channel for 4 miles below Fredericksburg, and the shores should be given a good berth. Strangers can safely carry a draft of 5 feet to Fredericksburg with the aid of the chart.

The mean range of **tide** is 1.2 feet at the mouth of Rappahannock River, 1.6 feet at Tappahannock, and 2.8 feet at Fredericksburg. The river water is fresh above Port Royal.

The **currents** follow the general direction of the channel. The velocities throughout the river are usually weak, averaging less than 1 knot at the entrance to 1.3 knots at Tappahannock. Times of slack water and strength of current become later going upriver. These normal conditions are subject to change by winds and changes in drainage flow.

During severe winters, **ice** closes the river nearly to Tappahannock, but in ordinary winters the channels are usually kept open by the river traffic. Ice sufficient to interfere with navigation of small craft will usually be encountered in January and February, particularly above Port Royal.

Freshets occur during the spring and fall, but are of short duration and ordinarily are not dangerous to shipping. The highest level on record was 33 feet above low water at Fredericksburg, but the usual height due to freshets is not more than 9 to 12 feet and only occasionally rises above the wharves. The freshet effect on the water level decreases rapidly below Fredericksburg and is ordinarily negligible 11 miles downriver.

The principal places along Rappahannock River for supplies and small-vessel **repairs** are Broad Creek, Carter Creek, and Urbanna Creek.

Chart 534.—The entrance to Rappahannock River is between Stingray Point and Windmill Point, 45.7 miles above the Capes. This is the Mile 0.0 for distances on the Rappahannock. The shores on both sides of the entrance are wooded; the two

lights, off Stingray and Windmill Points, are the most prominent landmarks.

Rappahannock Spit extends southeastward from Windmill Point for about 4.5 miles, and has depths of 4 to 18 feet. **Windmill Point Light (37°35.8′ N., 76°14.2′ W.)**, 36 feet above the water, is shown from a skeleton tower with daymark on piles, in depths of 12 feet on the spit 2.3 miles from the point; a fog signal is sounded at the light.

Depths of 10 feet can be carried across Rappahannock Spit anywhere outside Windmill Point Light. About 0.4 mile outside the light, a buoyed lane that extends southwestward through the fishtraps is a short cut for lightdraft vessels approaching the river from northward.

A 6-foot marked channel leads to a marina basin on the south side of **Fleets Island** west of Windmill Point. Some supplies, fuel, and berths are available. Repairs can be made to small craft. **Storm warning signals are displayed;** see chart.

Broad Creek, Mile 0.7S, is used by oystermen, fishing boats, and yachts. A dredged entrance channel, marked by lights and daybeacons, leads from Rappahannock River to natural depths of 9 to 5 feet inside the creek. In January-February 1969, the controlling depth was 6 feet in the entrance channel; shoaling has been reported at the turn in the channel between Light 6 and Daybeacon 8. There are several boatyards and marinas in the creek; gasoline, diesel fuel, water, ice, and marine supplies are available. Hull and engine repairs can be made. Maximum haul—out capacities are: marine railway, 100 feet; lift, 20 tons.

At Mile 5.0S, a dredged channel, marked by a light, leads to a turning basin and wharf 0.5 mile eastward of **Mill Creek** entrance. In 1964, the controlling depth to and in the basin was 10 feet. The wharf is used by fishing boats.

Locklies Creek, Mile 6.0S, has depths of about 5 feet through a marked entrance with depths decreasing to about 2 feet inside. An overhead power cable near the head has a clearance of 34 feet. There is a marina on the north side near the entrance. The largest marine railway on the south side of the creek can haul out craft up to 45 feet in length for repairs. Some marine supplies, gasoline, and berths are available.

A dredged channel westward of Parrott Island forms an inside passage between Mill Creek and Locklies Creek. In 1960, the channel had a reported depth of 1½ feet.

An inactive fish factory and wharf with depths of 18 feet at the face are on **Cherry Point,** Mile 6.3N. The elevator on the point is prominent.

A fixed highway bridge crosses the river at Mile 7.0; the channel span has a clearance of 110 feet.

Carter Creek, Mile 8.3N, is the approach to the villages of **Weems** on the west side and **Irvington** on the east side. Traffic on the creek consists chiefly of petroleum products, sand and gravel, shellfish and shells. Drafts using the creek seldom exceed 11 feet and are mostly 6 feet or less.

Controlling depths of the channels in Carter Creek are about 15 feet in the entrance, 12 feet in Eastern Branch to the wharves at Irvington, and 9 feet in **Carter Cove,** the western branch. The entrance is marked by lights and daybeacons. The mean range of tide is 1.4 feet.

There are several oysterhouses and yacht facilities in Carter Creek. Most vessels go alongside the wharves with depths of about 8 feet, but the creek also is used as an anchorage. Supplies, fuel, and berths are available along the three branches. Most repair facilities are in Carter Cove; largest marine railway, 125 feet.

Corrotoman River, Mile 10.0N, has depths of 18 feet or more for 4 miles to the junction of Eastern and Western Branches. The river channel is obstructed by shoal spits and middle grounds, but the principal shoals as far as the fork, and for 0.5 mile above in Western Branch, are marked. The mean range of tide is 1.3 feet in the river.

Whitehouse Creek, on the west side of Corrotoman River 0.8 mile above the mouth, has depths of 7 feet to the landing at **Bertrand,** on the north side 0.5 mile from the entrance. **Town Creek,** on the west side of Corrotoman River 2 miles above the mouth, has depths of 2 to 4 feet. Gasoline is available near the head; marine railway, 42 feet. **Taylor Creek, on the** east side of Corrotoman River 2.5 miles above the mouth, has depths of 4 to 8 feet. Repairs can be made in a branch on the north side; marine railway, 45 feet.

Eastern Branch of Corrotoman River has depths of 13 feet for 1.4 miles, thence 8 feet for 1.5 miles. **Western Branch** has depths of 12 feet or more for 2.5 miles, thence 5 feet for 2 miles. A cable ferry operates, daytime only, from **Ottoman Wharf,** on the southwest side of Western Branch 1.3 miles above the fork, to **Merry Point,** on the opposite side.

Whiting Creek, Mile 10.5S, is entered from Rappahannock River by a dredged channel marked by daybeacons. In July 1970, the channel had a controlling depth of 4 feet on the centerline. An unmarked sunken work boat visible at low tide is on the easterly edge of the channel about 0.35 mile above the entrance.

Chart 605—SC.—Urbanna Creek, Mile 13.8W, is used by many pleasure craft. The town of **Urbanna** is on the west bank, near the entrance.

A dredged channel leads from Rappahannock River to a turning basin and wharves just below the bridge. In April 1970, the controlling depth in the channel was 8½ feet. Above this point, depths are 6 feet or more for about 0.7 mile, and small craft can go another mile upstream. The marked entrance is protected by a riprap jetty on the north. The mean range of tide is 1.6 feet.

The wharves at Urbanna have depths of 7 to 14 feet alongside. Complete supplies, fuel, and berths for small craft are available. Repairs are made; largest marine railway, 60 feet; lift, 45 tons.

The highway bridge over Urbanna Creek 0.7 mile above the entrance has a 40-foot fixed channel span with a clearance of 21 feet.

Robinson Creek, Mile 14.1W, has depths of 5 feet through the entrance to the head. **Remlik Wharf,** on the south side of the entrance, is about 900 feet long with depths of 6 feet at the outer end.

Lagrange Creek, Mile 14.8W, has depths of 7 feet in the marked entrance and 4 feet for a mile to a boatyard on the southwest side. Marine railway, 50 feet; a machine shop is available. Gasoline and some supplies are obtainable. The wharf has depths of 4 feet at the outer end.

Greenvale Creek, Mile 16.9E, is used mostly by local fishermen. A dredged channel, marked by a light and daybeacons from the entrance to a landing 0.3 mile above the mouth, in July 1970, had a controlling depth of 1½ feet for a midwidth of 40 feet. The oysterhouse landings on the west side have depths of 4 feet alongside; gasoline and some supplies are available. An overhead power cable across the creek about 0.1 mile above the mouth has a clearance of 42 feet.

Parrotts Creek, Mile 20.0W, has a dredged channel marked by lights and daybeacons from the entrance to the public landing at **Waterview,** 0.5 mile above the mouth. The controlling depth was 3½ feet for a midwidth of 50 feet in July 1970. An overhead power cable across the creek just above the mouth has a clearance of 50 feet. Oyster wharves near the entrance have depths of 5 to 8 feet at their faces; gasoline is available.

Deep Creek, Mile 21.0E, has depths of 2 feet across the flats at the entrance and 3 to 5 feet in the several branches. The creek usually is bush-staked. The overhead power cables have a minimum clearance of 30 feet. Some supplies and fuel are available at **Boer** on the south side of the creek.

Mulberry Creek, Mile 22.4N, has depths of 6 feet in the dredged cut at the entrance, and 4 feet for a mile upstream. A light marks the west side of the entrance, and a shell islet awash at high water is at the inner end of the channel cut. A daybeacon marks a submerged shell pile 0.3 mile southwestward of the light. Gasoline and some supplies are obtainable at **Morattico,** on the northwest side of the entrance.

Lancaster Creek, Mile 23.5N, has depths of 5 feet in the marked entrance, and thence from 4 to 2 feet for 4 miles to **Woodhouse Landing.** About 2 miles above the entrance, the creek is crossed by an overhead power cable with a clearance of 27 feet. A boatyard on the west side of the entrance has about 3 feet in its basin; some supplies and gasoline are available. Repairs are made; marine railway, 20 feet. Some supplies and gasoline are also available on the northeast side of the peninsula separating Lancaster Creek and **Morattico Creek;** repairs can be made; lift, 10 tons.

A small-boat harbor is at **Wildwood Beach,** Mile 28.3W. The entrance to the harbor is protected on the north side by a 300-foot long jetty, and on the south side by a point of land extending to seaward about the same distance. The outer end of the jetty and of the point of land are privately marked by a light and a marker, respectively. The controlling depth into the harbor is about 5 feet. Gasoline, diesel fuel, water, ice, some marine supplies, and a 45-foot marine railway and an 8-ton lift are available; minor hull and engine repairs can be made.

Bowlers Rock Light (37°49.5'N., 76°44.0'W.), 23 feet above the water, is shown from a black skeleton tower on a cylindrical base in depths of 6 feet at Mile 28.5; a fog signal is sounded at the light. **Bowlers Rock,** covered 7 feet and buoyed, is on the east side of the channel 500 yards east-southeastward of the light. A submerged wreck is on the southwest edge of the channel 100 yards north-northeastward of the light; and foul ground extends upriver along the southwest edge of the channel for 1.3 miles from the light.

Totuskey Creek, Mile 30.8N, is entered by a marked dredged channel which leads to a turning basin below the Totuskey Bridge, 4 miles above the mouth. In September 1969, the channel had a controlling depth of 10 feet. The channel is narrow in places and difficult to follow without local knowledge. A timber-and-bush dike on the northeast side, 2.5 miles above the entrance, is barely visible. An overhead power cable about 3.2 miles above the entrance has a clearance of 75 feet. **Totuskey Bridge** is a fixed concrete span with a width of 24 feet and a clearance of 10 feet. A good landing on the southeast bank, just below the bridge, has depths of 10 feet at the face and is used by small oil tankers and grain barges. Barges load pulpwood at a landing on the opposite shore, about 0.2 mile below the bridge.

An overhead power cable over the Rappahannock River at Mile 32.1 has a clearance of 80 feet over the main channel and 50 feet elsewhere.

Piscataway Creek, Mile 35.OW, has depths of 4 feet in the entrance with greater depths for 5 miles upstream. A privately maintained seasonal light on the southern side of the creek 0.2 mile above the mouth marks a ski-jump ramp. A highway bridge, 4 miles above the entrance, has a fixed span with a width of 30 feet and a clearance of 8 feet. Overhead power cables between the entrance and the bridge have a mimimum clearance of 16 feet.

Hoskins Creek is at Mile 36.8W. A marked dredged channel extends from the entrance to the highway bridge, 0.6 mile above the mouth. In October 1970, the controlling depth was 6 feet to just below the highway bridge. A grain depot is near the bridge, and there is a public wharf about 0.3

mile below the bridge. The highway bridge has a 34-foot fixed channel span with a clearance of 8 feet; the nearby overhead power cable has a clearance of 43 feet. A marina near the first bend has gasoline and some supplies; diesel fuel is trucked in. Repairs are made; a small marine railway and a 3-ton lift are in service here.

Tappahannock is at Mile 37.4W. The highway bridge over the river at Tappahannock has a fixed span with a clearance of 50 feet. A wharf just below the bridge has depths of 5 feet at the outer end, but is in poor condition. Just south of this wharf are mooring dolphins of an oil terminal; depths at the dolphins are about 9 feet.

A privately marked channel with a depth of about 4 feet leads to a small-boat basin at Tappahannock, 0.2 mile above the bridge. Some supplies and gasoline are available; repairs can be made.

Mount Landing Creek, Mile 38.4W, has depths of 3 feet across the flats at the entrance and deeper water inside for 3.5 miles. Twin fixed highway bridges cross the creek near its entrance; minimum width is 30 feet and clearance is 9 feet. The overhead power cable just north of the bridges has a clearance of 18 feet. The creek is used by fishermen.

Cat Point Creek, Mile 39.5E, has depths of about 4 feet across the bar at the entrance and deeper water inside for 7 miles. A highway bridge over the entrance has a retractile span with a width of 31 feet and a clearance of 7 feet; see **117.240,** Chapter 2, for drawbridge regulations and opening signals. An overhead power cable 200 yards above the bridge has a clearance of 21 feet. The cutoff, 1.7 miles above the mouth, has depths of 4 feet. The highway bridge 6 miles above the entrance has a 31-foot swing span with a clearance of 4 feet; it remains in the closed position; see **117.245 (a) and (f) (22),** Chapter 2, for drawbridge regulations.

Occupacia Creek, Mile 44.2W, has depths of 3 feet across the bar at the entrance and 4 feet for 6 miles up the middle branch; an overhead cable 2.5 miles above the entrance has a clearance of 35 feet, and the overhead cable 6 miles above the entrance has a clearance of about 30 feet. **Bridge Creek,** the eastern branch, has depths of 2 feet to a fixed bridge a mile above the entrance.

Layton is at Mile 50.5W. The lower pier has tieup dolphins; the upper pier is in ruins. A pier and tieup dolphins are at **Leedstown,** Mile 52.4N.

Port Royal is at Mile 68.5S; the pier is in ruins. The highway bridge from Port Royal to **Port Conway** has a swing span with a clearance of 8 feet; the northeast opening is used. See **117.240 and 117.340,** Chapter 2, for drawbridge regulations and opening signals.

Newton Rock, Mile 91.2S, is 50 feet from shore and almost awash at high tide; the best water is 100 feet off the rock, which is marked by a buoy.

Fredericksburg, Mile 93.5W, the historic colonial city, has some trade by water, mostly in motor vessels and barges drawing 8 to 10 feet. Practical navigation terminates at the wharf at the southern end of the city, but small boats can go about a mile farther upriver. Anchorage space is limited, so vessels usually make fast to the wharf, which has 7 feet at the face and is in poor condition. The fixed railroad bridge just above the wharf has a clearance of 37 feet. The fixed highway bridge, 700 yards farther up, has a clearance of 50 feet.

Chart 534.—Fleets Bay, just northward of Rappahannock River entrance, is the approach to Little Bay and Antipoison, Tabbs, Dymer, and Indian Creeks.

Depths of 8 feet can be taken through **Little Bay,** on the south side of Fleets Bay, westward in a narrow channel into **Antipoison Creek** and upstream for over a mile. The bay and creek are used by boats with drafts up to 6 feet. A marina on the north side of the entrance to Antipoison Creek at **Clark Point** has fuel, supplies, and berths for small craft. Repairs can be made; lift, 15 tons. A herring processing plant on the south side of Antipoison Creek 0.6 mile above the entrance has a wharf with depths of 10 feet at the face; another plant directly across the creek has a wharf with depths of 6 feet at the face.

Tabbs Creek, on the west side of Fleets Bay 1.5 miles northward of Antipoison Creek, has depths of 2 feet with local knowledge over the bar at the entrance, thence 7 or more feet for about a mile.

Dymer Creek, on the west side of Fleets Bay 2 miles northward of Antipoison Creek, has depths of 13 feet for a mile and 8 feet for another mile. The approach through Fleets Bay is well marked. The fish factory on the south side of the creek a mile above the entrance has a wharf with depths of 14 feet along the west side; the area along the east side is awash at low water. The boatyard in **Poplar Neck Creek,** just below the fish factory, makes repairs; marine railway, 75 feet. Gasoline is available.

Indian Creek, at the northwest corner of Fleets Bay 3 miles northward of Antipoison Creek, has depths of 16 feet in the approach, thence 11 feet for 2 miles above the entrance, and then shoals to 6 feet 0.8 mile farther up. Traffic on the creek consists chiefly of pulpwood, petroleum products, shellfish, and shell. Drafts of vessels using the creek seldom exceed 13 feet and are mostly 6 feet or less. The approach through Fleets Bay and the channel in the creek are well marked.

A country club pier is about a mile above the mouth of Indian Creek, on the northeast side in a cove. Gasoline, diesel fuel, and some supplies are available. The pier has depths of about 6 feet at the face. **Kilmarnock Wharf,** on the west side 2 miles above the entrance, is at the foot of a paved road

that leads 1.5 miles inland to the town of **Kilmarnock.**

Depths of 12 feet are at the dock and boat-basin landing; fuel, supplies, and berths are available. There are oil wharves just above and below the basin, and a grain wharf with 10 feet alongside above it. General boat repairs can be made at the landing; marine railway, 45 feet. Depths of 6 feet can be carried for 0.5 mile up the western branch above Kilmarnock Wharf to a marine railway that can haul-out boats up to 40 feet in length for repairs. The U.S. Public Health Service maintains a **contract physician's office** in Kilmarnock; see Appendix for address.

Dividing Creek is 8.7 miles north-northwestward of Windmill Point Light. The creek has depths of 14 feet in the approach, thence 13 feet for 1.4 miles above the entrance, and then shoals gradually to depths of 8 feet 1.5 miles farther up. The creek is used by boats with drafts of 5 feet or less. The approach between the shoals off the entrance is well marked by lights and daybeacons. The overhead power cable over the upper reach has a clearance of 30 feet.

Chart 1223.—In addition to the danger zone of a naval firing range that extends from north of Wolf Trap Light to south of Tangier Sound Light, previously described, several danger areas are in Chesapeake Bay between Windmill Point Light and Smith Point Light.

San Marcos Wreck, 10.5 miles northeast of Windmill Point Light, is covered by about 20 feet of water, but the depth over it is subject to change, due to the shifting steel.

The **danger zone** of a naval guided missiles test operations area is centered 14.5 miles northeasterly of Windmill Point Light; see **204.44,** Chapter 2, for limits and regulations. Sunken ships and other obstructions are within the area.

Chart 534.—Great Wicomico River, on the west side of Chesapeake Bay 13 miles northward of Windmill Point Light, is entered between **Dameron Marsh** and **Bull Neck,** 1.7 miles to the northward. The principal marks for the entrance are Great Wicomico River Light and the buildings at Fleeton, on Bull Neck.

Great Wicomoco River Light 37°48.2′N., 76°16.1′W.), 42 feet above the water, is shown from a red and white checkered diamond daymark on a skeleton tower, in depths of 9 feet 0.6 mile southeast of Bull Neck; a fog signal is sounded at the light. The light is 4.5 miles due west of a point on the main channel 56 miles above the Capes.

Great Wicomico River has depths of 17 feet or more for 5.5 miles above the entrance, and thence 9 feet or more for 3 miles. The river is navigable for small craft for another 2 miles. Vessels seeking shelter usually anchor in depths of 15 to 20 feet off and in the entrance to Cockrell Creek. Fishtraps usually will be found on the shoals at the entrance; the approach can be made on a due west course between the buoys marking the trap areas.

The channel in Great Wicomico River is marked by lights for 4 miles from the entrance. The mean range of tide is 1.1 feet at the entrance. **Ice** does not close the river to navigation except in severe winters, and then only for brief periods; Cockrell Creek is considered a secure harbor from ice.

Cockrell Creek, on the northeast side of Great Wicomico River a mile above the mouth, is entered between Fleet Point on the south and Cockrell Point on the north; a light marks the entrance. There are depths of 15 feet for 1.5 miles above the entrance, thence gradual shoaling to 6 feet a mile farther up. Traffic consists chiefly of fish, shellfish, construction material, and petroleum products. Numerous fish factories operate along its shores. Drafts of vessels are mostly 12 feet and under, but drafts up to 14 feet use the creek. There are depths of 8 to 15 feet at the faces of the wharves.

A menhaden fleet bases on the peninsula on the east side of Cockrell Creek, about 1 mile above Fleet Point.

Fleeton is on the southeast side of the entrance to Cockrell Creek. The pier of a marine service station has 14 feet at its face; gasoline, diesel fuel, and some marine supplies are available.

Reedville, on the east side of Cockrell Creek 1.5 miles above the entrance, is a **customs** port of entry. The U. S. Public Health Service maintains a **contract physician's office** in town; see Appendix for address. A petroleum pier, and a barge wharf with depths of about 8 feet alongside are on the east side of the peninsula at Reedville. Gasoline, diesel fuel, and some marine supplies are available.

The boatyards along Cockrell Creek can handle vessels up to 100 feet in length for hull and engine repairs.

Mill Creek, on the southwest side of the river 1.5 miles above the entrance, has depths of 12 feet or more through a crooked channel across the flats and for a mile above the entrance, thence 8 to 10 feet for another mile. A grain wharf is 1.5 miles above the mouth.

Cranes Creek is on the west side of Great Wicomico River 1.5 miles above the mouth. The entrance channel marked by daybeacons has a controlling depth of 5 feet; greater depths are inside. Several small privately owned wharves along the banks of the creek are used by boats drawing up to 3 feet.

Mila, on the west side of Great Wicomico River 3.5 miles above the mouth, has a landing with a depth of 5 feet at the outer end.

The highway bridge over Great Wicomico River 6 miles above the mouth has a swing span with a clearance of 9 feet in the north opening; see **117.240 and 117.245 (a) through (e), and (f) (16-a),**

Chapter 2, for drawbridge regulations and opening signals. The overhead power cable 50 yards above the bridge has a clearance of 40 feet. There are small-craft facilities on both sides of **Glebe Point** at the north end of the bridge. Gasoline, diesel fuel, and supplies are available. A marine railway can haul-out boats up to 50 feet in length for repairs. Gasoline is also obtainable at a yacht basin on Ferry Point, 0.7 mile east of the bridge.

12. CHESAPEAKE BAY, POTOMAC RIVER

This chapter describes the Potomac River and the numerous tributaries that empty into it; included are Coan, St. Marys, Yeocomico, Wicomico, and Anacostia Rivers. Also described are the ports of Washington, D.C., and Alexandria, and several smaller ports and landings on these waterways.

Charts 557-560, 101—SC.—Potomac River flows into the west side of Chesapeake Bay 68.4 miles above the Virginia Capes. The river is the boundary between Virginia on the west and Maryland on the east, and at the head of tidewater on the Maryland side is the city of Washington, D. C., the Nation's Capital.

Hains Point at the junction of Anacostia River and the Washington and Virginia Channels is 94.6 miles above the mouth of the Potomac. The head of tidewater navigation is at Chain Bridge, Washington, 101 miles above the mouth. The widest point of the river, 6.4 miles, is 11 miles above its mouth (see chart 557).

Mileages on Potomac River in this chapter, such as Mile 13E, Mile 41W, Mile 51N, etc., are the nautical miles above the midchannel entrance point which is 4.8 miles northwest of Smith Point on a line between Smith Point and Point Lookout; that point is 68.4 miles above the Capes. The letters N, S, E, or W following the mileage numbers denote by compass points the side of the river where each feature is located.

Traffic on the river consists chiefly of petroleum products; sand, gravel, and crushed rock; and some newsprint and fertilizers. Drafts of vessels navigating the river usually do not exceed 20 feet.

Channels.—The federal project depth is 24 feet for Potomac River from the mouth to Hains Point. Channel depths of 38 feet or more are available to Ragged Point, 20 miles above the mouth; thence the controlling depth through the dredged cuts is about 18 feet to Hains Point.

Anchorages.—Vessels bound up or down the river anchor anywhere near the channel where the bottom is soft; vessels sometimes anchor in Cornfield Harbor or St. Marys River (see chart 557). Above Alexandria, vessels usually go to the wharves; there is little or no anchorage for anything but small craft. Near the mouth of the river, small craft can find secure anchorage in most of the tributaries; Smith Creek (see chart 557) is said to have best protection from all winds.

Fishtrap areas extend upriver from the mouth to St. Clements Island. Limits of the areas are marked by buoys and are shown on charts 557 and 558.

Numerous markers, established and maintained by the Potomac River Fisheries Commission, mark the Maryland and Virginia jurisdictional fishing boundaries on both sides of the Potomac River from Chesapeake Bay to Mattawoman Creek at Mile 71.5E in Maryland, and Occoquan Bay at Mile 73.8W in Virginia, and at the entrances to many of the bays and rivers.

The markers are pile structures with white square daymarks with orange borders and identifying black letters "PRM", "PRV", and numbers.

Danger zones and restricted area.—The Potomac River and its tributaries are used extensively by the military establishments for testing operations and gunnery practice. Limits and regulations for these areas are given in **204.40, 204.41, and 207.126,** Chapter 2.

Tides.—The mean range of tide is about 1.3 feet at the mouth of the river, 1.9 feet in the vicinity of St. Clements Island, 1.1 feet at Maryland Point, 1.7 feet at Indian Head, and 2.9 feet at Washington. Above Washington, the river is tidal as far as Chain Bridge. The tides are influenced by the force and direction of the wind and by freshet conditions, and may at times vary considerably. Daily predictions for Washington and other places on the Potomac River are given in the Tide Tables.

Currents.—The currents in Potomac River follows the general direction of the channel. The velocities vary throughout the river and are influenced by wind and freshets. There may be little or no flood current during freshets.

The current velocity is weak in the lower part of the river between the entrance and Piney Point, averaging less than 1.0 knot. See Tidal Current Tables for daily predictions.

Ice.—During severe winters the tributaries of the Potomac are closed by ice and the river is frozen over to Cedar Point; the upper part is then closed to navigation. During ordinary winters the powered vessels plying the river keep the channel open.

When threatened by icing conditions, certain lighted buoys may be replaced by lighted ice buoys with reduced candlepower or by unlighted buoys, and certain unlighted buoys may be discontinued; see Light List.

Freshets occur at irregular intervals, but usually do not interfere with navigation below Alexandria unless accompanied by floating ice.

Pilotage is compulsory on the Potomac River for foreign vessels and United States vessels under register in the foreign trade. Pilotage is optional for United States vessels in the coastwise trade who have on board a pilot licensed by the Federal Government for these waters. Virginia pilots take vessels to Virginia ports and Maryland pilots take

vessels to Maryland ports. Vessels bound for Washington, D.C., from Hampton Roads use Virginia pilots, and those from Chesapeake and Delaware Canal use Maryland pilots. See Pilotage for Hampton Roads and Chesapeake and Delaware Canal for further details.

Charts 557, 101—SC.—Potomac River is entered between Smith Point and Point Lookout; the width of the entrance, normal to the channel, is about 5 miles.

The **fishtrap** areas in the lower river are marked by buoys and are shown on the charts. **Danger zones** for military testing operations extend from the mouth of the river to about 4 miles above the Potomac River Bridge, Mile 43.4; limits and regulations are given in **204.40,** Chapter 2.

Smith Point, the southerly entrance point, is low and inconspicuous. A shoal area that extends eastward from the point has depths as little as 8 feet 2 miles from shore; a buoy marks the northeast edge of the shoal.

Smith Point Light (37°52.8'N., 76°11.0'W.), 52 feet above the water, is shown from a white square brick tower and octagonal dwelling on a brown cylindrical pier about 2.5 miles east-by-south of the point; a radiobeacon and fog signal are at the light. A fairway buoy 1.5 miles from the light marks the separation lane of the Traffic Separation Scheme for the bay ship channel; see chart 1223. The Scheme is discussed in Chapter 9.

Little Wicomico River, used by local fishermen and pleasure craft, empties into the Potomac River at Smith Point. A marked dredged channel leads from the Potomac River through a jettied entrance to a marked natural channel in the river. In 1969, the controlling depth was 6 feet in the entrance channel. With local knowledge, a depth of about 6 feet can be carried for 4 miles upriver from the entrance. A light is on the end of the south jetty, and daybeacons mark the upper reaches of the river to a point about 3 miles above the entrance. The entrance is subject to shoaling due to the strong current between the jetties; mariners are advised to exercise caution.

Slough (Tabs) Creek, empties into the south side of Little Wicomico River, about 0.6 mile above the entrance. Small-craft facilities on both sides of the creek can provide gasoline, diesel fuel, water, ice, berths, and some marine supplies.

Sunnybank, on the south side of Little Wicomico River 1.5 miles above the entrance, has gasoline and some supplies. A vehicular ferry crosses the river at the village. Small-craft facilities, on the north side of the river about 2.9 and 3.6 miles above the entrance, can provide gasoline, diesel fuel, water, ice, berths, and marine supplies. Hull and engine repairs can be made; largest haul-out capacities: marine railway, 60 feet; lift, 5 tons.

Point Lookout, the northerly entrance point of Potomac River, is low, but well marked by a water tank, and several buildings. The shoal that extends about 1 mile southward from the point is marked by **Point Lookout Light (38°01.6'N., 76°19.3'W.),** 41 feet above the water, shown from a skeleton tower with a red and white checkered daymark on pile structure; a fog signal is at the light.

Cornfield Harbor, just inside Point Lookout, is sheltered from northerly and northeasterly winds; vessels bound up and down the bay frequently use it as an anchorage for the night. The shoaling is gradual, except off **Cornfield Point** and at the south end of the shoal that extends southward from Point Lookout; at these places the hard sand bottom drops off abruptly. An 18-foot spot, and rocks covered 16 and 17 feet, are about 0.7 mile westward from Point Lookout, and a 10-foot spot lies between them and the Point Lookout shore.

Coan River (38°00.0'N., 76°27.0'W.), Mile 7.8S, has depths of 13 to 7 feet for 4.5 miles to within 0.5 mile of the head. The river is used mostly by local oyster and fish boats. A 500-yard lane in the approach is kept clear of fishtraps; the initial course through the lane is **230°.** The entrance to Coan River is marked by buoys and a light, and is easy to navigate; the channel inside is marked at the critical points by daybeacons and bush stakes. The mean range of tide is 1.4 feet at the entrance.

Kingscote Creek, on the north side of Coan River 0.6 mile above the mouth, has depths of 8 feet for most of its 1-mile length. A shoal extends halfway across the entrance from the point on the west side. Gasoline, diesel fuel, water, ice, berths, and marine supplies are available at the small-craft facilities on the east side of the creek at **Lewisetta.** Hull and engine repairs can be made; marine railway, 40 feet.

The Glebe, on the west side of Coan River 0.7 mile above the mouth, has depths of 9 to 13 feet to the forks 1.5 miles above the entrance. The channel in The Glebe is clear except for a shoal that extends well off from the point on the south side 0.6 mile above the entrance.

Stevens Point is on the west side of Coan River a mile above the mouth. The boatyard on the south side makes hull and engine repairs; marine railway, 50 feet. Gasoline is available.

The wharf at **Bundick,** on the west side of Coan River 3.4 miles above the mouth, has depths of 9 feet at the outer end, but is in poor condition; gasoline and some supplies are obtainable at a nearby store. **Coan** wharf, directly across the river from Bundick, is in ruins. The overhead power cable from Coan to Bundick has a clearance of 60 feet.

Smith Creek, Mile 8.5N, is used by many small fishing and pleasure boats, and has the best protection along this part of the river from all winds. A depth of about 9 feet can be carried over the bar to the junction of the two main branches, 1.5 miles above the entrance light. The entrance is well marked. The lane through the fishtraps can be navigated on a course of **355°.**

Wynne, on the east side of the entrance to Smith Creek, has fish wharves with depths of 5 to 10 feet at their outer ends. Small-craft facilities on the east side of the creek, just above the entrance, and at the head of Fox Harbor, an easterly arm of the Smith Creek, can provide gasoline, diesel fuel, water, ice, berths, and marine supplies. Hull and engine repairs can be made. Largest haul-out capacities: marine railway, 100 feet; lift, 20 tons.

St. Marys River, Mile 9.7N, is 2 miles wide at the entrance and about 600 yards wide at St. Marys City, 5.5 miles up. The channel has depths of 20 feet or more to St. Marys City, then shoals gradually to 12 feet at **Martin Point** and to 8 feet at **Tippity Wichity Island,** 8 miles above the mouth. St. Mary's River is sometimes used as an anchorage by the deeper draft vessels seeking shelter from heavy gales, but small boats prefer Smith Creek. The river has very little traffic other than local fishing craft. The course through the fishtraps off the entrance is **345°**. The mean range of tide is about 1.5 feet.

St. George Island, on the west side of the entrance to St. Marys River, is long, low, and sparsely wooded. The island is thickly settled, mostly by oystermen and fishermen, and is used to some extent as a summer resort. **St. George Bar** extends 1.3 miles southeastward from the island; a lighted buoy is about a mile southeastward of the outer end of the bar.

Island Creek, on the southeast end of St. George Island, is entered by a marked dredged channel which leads to fishing piers and a turning basin inside. In 1969, the controlling depth was 2 feet to the turning basin, thence 5 feet in the basin.

St. George Creek, which joins St. Marys River along the northeast side of St. George Island, has a narrow, crooked channel with depths of about 9 feet for 3.5 miles; the channel is marked for about 2.8 miles. In 1970, shoaling was reported in the creek, about 0.2 mile northwest of Daybeacon 9; extent of shoaling not known. The creek is used extensively by oystering and fishing boats, and by pleasure craft.

A marked passage with a controlling depth of about 6 feet enters St. George Creek at the north end of St. George Island. The fixed bridge over the passage has a width of 35 feet and a clearance of 17 feet. Overhead power cables on both sides of the bridge have a clearance of 29 feet.

The town of **Piney Point,** on the west side of St. George Creek 2.5 miles above the mouth, has several wharves with depths of 5 to 8 feet; a marina and yacht club are in **St. George Harbor.** Supplies, fuel, and berths are available. Repairs can be made; marine railway, 60 feet.

At **Morgan Point,** on the west side of St. George Creek 3.5 miles above the mouth, is a boatyard where hull repairs can be made; marine railway, 40 feet. Gasoline, water, and berths are available.

St. Marys City, at **Church Point,** on the east side of St. Marys River 5.5 miles above the mouth, was the original capital of Maryland. Few traces of the original town remain, but the statehouse was reconstructed in 1934 from the ruins of several other buildings nearby. A landing on the south side of the point has a depth of about 9 feet at the outer end.

Yeocomico River, Mile 10.2S, has depths of 19 to 12 feet to the forks 1.4 miles above the entrance. Lights mark the channel to the forks and bush stakes mark the edges of the tributary channels. The initial course through the fish stakes off the entrance is **244°**. The mean range of tide is 1.3 feet at the entrance and 1.2 feet at Kinsale.

There are small-craft facilities on the east side of **Shannon Branch,** the north fork of Yeocomico River, and one is on the south side of **White Point Creek,** the westerly arm of Shannon Branch. Gasoline, diesel fuel, water, ice, berths, and marine supplies are available. Hull and engine repairs can be made. An 85-foot marine railway is available in White Point Creek, and the largest marine railway in Shannon Branch can handle craft up to 42 feet in length.

West Yeocomico River, the west fork, has depths of 13 to 7 feet to **Kinsale,** on the southwest side 1.7 miles above the entrance. Gasoline, diesel fuel, water, ice, berths, and some marine supplies are available at a small-craft facility in the cove on the north side of the river east of **Allen Point,** 0.4 mile above the mouth. Engine repairs can be made. The fixed highway bridge at Kinsale has a width of 29 feet and a clearance of 8 feet. The cannery landing has depths of 6 feet at the outer end. The bulkhead wharf just southward has depths of 10 feet alongside; the grain elevators on the wharf are prominent. Gasoline, diesel fuel, water, ice, berths, and marine supplies can be obtained at a small-craft facility at Kinsale. Hull and engine repairs can be made; lift, 6 tons.

South Yeocomico River, the south fork, has depths of 13 to 7 feet to **Lodge,** on the west side of **Lodge Creek** 2 miles above the entrance of the south branch. The cannery wharf at **Mundy Point,** on the west side of the entrance, has depths of 6 feet at the wharf. Several small landings on the south side of the point have depths of 9 feet at their outer ends.

Harryhogan Point is on the west side of South Yeocomico River a mile south of the entrance. The marine railways at the settlement can handle vessels up to 80 feet in length. The north landing at the cannery has depths of 9 feet alongside, and the south landing has depths of 5 feet. The lumber-mill landing 0.2 mile southwestward has depths of 7 feet alongside.

Small-craft facilities are on Mundy Point, on the south side of Harryhogan Point, and on the east side of Lodge Creek. Gasoline, diesel fuel, water, ice, berths, and marine supplies are available. Hull and engine repairs can be made. The largest marine

railway in the area can handle craft up to 80 feet in length.

Piney Point (38°08.1'N., 76°31.8'W.) is at Mile 15.9N. An abandoned lighthouse tower and a Coast Guard station are on the point. The Coast Guard wharf and the small private landings east of Piney Point have depths of about 5 feet at their outer ends. Gasoline and some supplies are available at a dock about a mile northeast of the point.

A prominent T-head pier of an oil company extends 1,000 feet southwestward from Piney Point. The pier, marked by private lights, has depths of about 35 feet along its 684-foot outer face. The pier is owned by the Maryland Ports Authority, and operated by L.P. Steuart Company.

Immigration, quarantine, and **customs** officials come from Baltimore upon notification by the maritime exchange that tankers are due at Piney Point; vessels are boarded at the pier.

Charts 558, 101—SC.—Limits of the **fishtrap** areas that extend upriver as far as St. Clements Island are marked by buoys and are shown on the charts. **Danger zones** for military testing operations extend upriver to about 4 miles above the Potomac River Bridge, Mile 43.4; limits and regulations are given in **204.40,** Chapter 2.

Bonum Creek (38°05.7'N., 76°34.1'w.), Mile 16.0S, is entered from the Potomac River by a dredged channel which leads through jetties to an anchorage basin 0.4 mile inside. In 1969, the controlling depth was 3½ feet to the basin, thence in 1967, 6 feet in the basin. Lights mark the outer ends of the jetties, and daybeacons mark the channel to the basin.

Herring Creek, Mile 18.7E, is entered by a marked dredged channel and is protected on both sides of the entrance by jetties. In 1966, the channel had a controlling depth of 6 feet; depths inside are 7 to 4 feet. Lights mark the outer ends of the jetties. A marina, on the south side of the entrance, has gasoline, diesel fuel, and some marine supplies; engine repairs can be made. A fish pier with 6 feet at the outer end is just east of the marina fuel pier. Another marina is on the south side of the creek 1.2 miles above the entrance; depths of 4 feet are reported alongside the piers. Gasoline, water, and marine supplies are available. Hull and engine repairs can be made; marine railway, 35 feet.

A shoal extends 0.5 mile offshore from **Ragged Point,** at Mile 19.1S. A light is near the outer edge of the shoal.

Lower Machodoc Creek, Mile 21.7S, has depths of 15 to 11 feet for 2 miles, thence the depths decrease to 4 feet at a point 4 miles above the entrance. The critical points are marked as far as the narrows 2.2 miles from the entrance; the shoals are usually bush-staked.

Branson Cove, on the east side of Lower Machodoc Creek a mile above the entrance, is entered by a marked dredged channel which leads to a boat basin inside. In 1966, the controlling depth to and in the basin was 5½ feet. **Coles Point,** the village along the north shore of the cove, has piers with depths of about 6 feet at the outer ends. A large oyster-packing plant is on the south side of the entrance to the cove. Small-craft facilities in the cove can provide gasoline, diesel fuel, water, ice, berths, and marine supplies. Hull and engine repairs can be made; largest marine railway, 50 feet.

Gasoline can be obtained at **Tidwells** on the west side of the narrows 2.2 miles above the entrance to Lower Machodoc Creek. A small-craft facility is on the west side of the creek about 3.4 miles above the entrance. Gasoline and water are available. Hull repairs can be made; marine railway, 45 feet.

Nomini Bay, Mile 25S, has depths of 20 to 15 feet and is the approach to Nomini Creek and Currioman Bay. The shoaling is abrupt on the east side of the bay and gradual on the west side.

Nomini Creek has a controlling depth of about 6 feet to the second bridge, 5 miles above the entrance, thence 3 feet for 0.5 mile. There is a long jetty on the east side of the entrance to the creek and the narrow entrance channel is marked. The mean range of tide is about 2 feet. Traffic on the creek consists chiefly of seafood and fertilizer.

The highway bridge at **Nomini,** 3.7 miles above the entrance, has a swing span 39 feet wide in the west opening, and a clearance of 5 feet; the east opening is not used; see **117.240,** Chapter 2, for drawbridge regulations and opening signals. The fixed highway bridge at **Prospect Hill,** 5 miles above the entrance, has a 30-foot span with a clearance of 10 feet.

Some supplies and fuel are available at Nomini. The landings have depths of about 7 feet at their faces.

Currioman Bay is separated from the west side of Nomini Bay by **Hollis Marsh,** a narrow 2-mile-long spit which is wooded in the middle. Currioman Bay has depths of 7 to 10 feet in the entrance from the head of Nomini Bay and in most of the area back of Hollis Marsh; the entrance from Potomac River at the northwest end of Hollis Marsh has depths of only 2 to 3 feet. The entrance from Nomini Bay is marked by daybeacons which should not be confused with the markings for Nomini Creek entrance, just eastward.

Breton Bay, Mile 25.2N, is a favorite anchoring ground for yachts. Commercial traffic consists chiefly of petroleum products. Drafts using the bay are mostly 6 feet or less, but occasionally vessels drawing up to 11 feet come inside.

The bay has depths of 15 to 11 feet for 4.5 miles, thence about 5 feet to Leonardtown, 5 miles above the entrance.

A 1,000-yard lane extends through the fishtraps off the entrance to Breton Bay; the initial course through the lane is 352°. The shoal that extends eastward from Heron Island Bar to the Breton Bay approach is marked by an obstruction buoy, and another shoal that extends southwestward from **Huggins Point,** on the east side of the entrance, is marked by a light near its outer end. Buoys and lights mark the bay channel to within 0.5 mile of Leonardtown. The mean range of tide is 1.7 feet at Leonardtown.

Combs Creek, on the north side of Breton Bay 1.5 miles above the mouth, has depths of about 6 feet to the landings. The narrow entrance is between shoal spits marked by stakes. Gasoline is available. The marine railways on the west side of the creek can haul-out boats up to 50 feet in length for hull and engine repairs. An overhead power cable 0.2 mile above the mouth has a clearance of 50 feet.

A channel with a controlling depth of 6 feet, marked by piles, leads into the bight just southwestward of the entrance to Combs Creek. The boatyard in the bight can haul-out vessels up to 70 feet in length for hull and engine repairs. Gasoline, diesel fuel, and some supplies can be obtained.

Lovers Point is on the east side of Breton Bay 3 miles above the mouth. A bar with depths of less than 1 foot extends 500 yards northwestward from the point and is marked at its outer end by a light. An unmarked obstruction, submerged at low water, is reported to exist about 200 yards north-northeastward of the light.

Buzzard Point is on the west side of Breton Bay 4.5 miles above the mouth. A light marks the outer end of a bar that extends off the point.

Leonardtown, on the north side of Breton Bay 5 miles above the mouth, has some supplies and gasoline at the wharf; slips are on the east side. An oil pier is west of the wharf.

St. Clements (Blakiston) Island is at Mile 27.0N. Near the south end of the thinly wooded island is a prominent cross which commemorates the first Catholic mass by English settlers in America on March 25, 1634. Shoals extend from the island in all directions. The long pier on the northeast side of the island has a depth of about 16 feet at the outer end; supply and fishing boats use the pier.

Heron Island Bar, about 1 mile eastward of St. Clements Island, is an extensive shoal area mostly covered at low water; the bar is marked at the eastern and western ends by buoys.

St. Clements Bay, north-northeastward of St. Clements Island has three entrances. The eastern entrance, between Heron Island Bar and the mainland, is by the way of the Breton Bay lane through the fishtraps; this entrance has depths of 20 to 16 feet and is easily followed in the daytime. The middle entrance, between Heron Island Bar and St. Clements Island, has depths of 15 feet or more and is approached through a 500-yard lane in the fishtraps on an initial course of 352°; this entrance is narrow and crooked, but is marked by a light and buoys and is easily followed in the daytime.

Dukeharts Channel, the western entrance, leads from the Potomac River to St. Clements Bay between St. Clements Island and the mainland 0.5 mile to the north-northwestward. The controlling depth is 5 feet in the marked channel.

St. Clements Bay has channel depths of 14 feet for 3 miles, then shoals gradually to 8 feet 5 miles above the entrance. The mean range of tide is 1.9 feet.

St. Patrick Creek, on the west side of St. Clements Bay 0.5 mile above the mouth, is entered through a marked dredged channel. In 1970, the controlling depth in the dredged channel was 7 feet; depths decrease to 2 feet toward the head. The creek is much frequented by fishermen, oystermen, and pleasure craft. There are several small-craft facilities along the creek above **Palmers,** on the south side 0.4 mile above the entrance. Gasoline, diesel fuel, berths, water, ice, and marine supplies are available. Hull and engine repairs can be made. Largest haul-out capacities: marine railway, 75 feet; lift, 100 tons.

Canoe Neck Creek, on the west side of St. Clements Bay 1.5 miles above the mouth, has depths of 11 feet in the entrance, then shoals gradually to 6 feet a mile upstream. The landings at **Morris Point,** on the south side just above the entrance, have depths of 4 to 12 feet at the outer ends. A small-craft facility on Morris Point can provide gasoline, diesel fuel, water, and some marine supplies. Hull and engine repairs can be made; marine railway, 65 feet.

St. Catherine Sound, Mile 29.0N, has depths of 5 to 9 feet behind **St. Catherine Island.** Two marked dredged channels lead into the sound; one at the northwesterly end and the other at the southeasterly end. In 1970, the controlling depths were 2 feet in the northwesterly channel and 6 feet in the southeasterly channel. The wharves along the shore of the sound are privately owned.

Whites Neck Creek, on the north side of St. Catherine Sound, has depths of 4 feet in the entrance and 6 to 2 feet inside; an overhead power cable crossing the entrance has a clearance of 40 feet. A marine service pier on the west side just inside the entrance has depths of 4 feet at the outer end; fuel and some supplies are available. The marine railway just upstream can handle boats up to 45 feet in length for hull and engine repairs.

Wicomico River (38°15.0′N., 79°49.6′W.) is at Mile 31.0N. Its commercial traffic consists chiefly of shellfish. Drafts of vessels using the river are mostly 6 feet or less.

The river is characterized by long spits, with little depth and abrupt outer ends, which extend to the edges of the channel in several places. The entrance is 1.3 miles wide between **St. Margaret**

Island on the east and **Cobb Island** on the west. **Cobb Point Bar,** which extends a mile southeastward from the island, is marked at the outer end by a light; the shoal extending 0.6 mile westward from St. Margaret Island is marked by a buoy.

The Wicomico River channel has depths of 40 to 12 feet for 5 miles, thence 6 feet with local knowledge for 3 miles, and then decreasing to 3 feet to the head, 11 miles above the mouth. The channel is marked at the most critical points for about 8 miles. The mean range of tide is 1.9 feet.

An overhead power cable with a clearance of 46 feet crosses the river about 10 miles above the mouth. The cable suspension towers are each marked by a private light.

Neale Sound, on the west side of the entrance to Wicomico River between Cobb Island and the mainland, has depths of 7 to 12 feet and affords secure anchorage for small boats. Both entrances are marked by lights and the critical part of the channel at the northwest end is marked by daybeacons; the aids are numbered from Wicomico River westward to Potomac River.

In 1968, the controlling depths into Neale Sound were 5 feet from the Potomac River entrance through the west cut, and 7 feet from Wicomico River through the east cut. A shoal, marked by a buoy, encroaches into the west cut channel between Lights 9 and 11. The highway bridge over Neale Sound has a 34-foot fixed span with a clearance of 18 feet.

Several small-craft facilities are on both sides of Neale Sound at the bridge. Gasoline, diesel fuel, water, ice, berths, and marine supplies are available. Hull and engine repairs can be made; marine railway, 60 feet.

Bushwood Wharf is on the east side of Wicomico River 1.5 miles above the mouth. Gasoline and some supplies are obtainable.

Charleston Creek, on the west side of Wicomico River 3 miles above the mouth, is used by oyster boats as an anchorage.

From Nomini Bay to within 2 miles of Popes Creek (38°11.6′N., 76°54.2′W.) the Virginia shore of Potomac River is backed by high ground. Along this stretch are **Nomini Cliffs, Stratford Cliffs, Horsehead Cliffs,** and the valleys between them.

Popes Creek, Mile 33.5S, leads to **Wakefield** and the **George Washington Birthplace National Monument.** The controlling depth is about 1½ feet in the entrance, and a stone jetty 2 feet high extends 200 feet offshore from the point on the north side. Current velocity up to 4.5 knots has been reported in the entrance.

Mattox Creek, Mile 36.1S, has depths of 7 to 5 feet in a marked narrow channel for 2 miles to **Fox Point,** then the depths decrease to 3 feet at the fixed concrete highway bridge, 4 miles above the entrance. A small-craft facility is on the east side of the creek south of Fox Point. Gasoline, water, ice, berths, and some marine supplies are available; hull and engine repairs can be made.

Colonial Beach, Mile 36.5, is a summer resort just north of Mattox Creek. The largest of the piers on the river side of the town is the municipal 450-foot T-head pier 1.2 miles above the south end. The pier, in poor condition, has depths of 8 feet at the outer end.

Monroe Creek, back of Colonial Beach, is entered between **Gum Bar Point,** at the south end of the town, and **Sebastian Point,** 150 yards westward. The creek is used extensively as an anchorage. The dredged channel, marked by lights and daybeacons, leads from the entrance of the creek to a basin at **Robins Grove Point** at Colonial Beach. In 1969, the controlling depth in the channel was 2 feet; depths of 7 feet were available in the basin in 1967.

There are numerous small-craft facilities along the east side of the creek below and above Robins Grove Point. Gasoline, diesel fuel, water, ice, berths, and marine supplies are available. Hull and engine repairs can be made. Largest haul-out capacities: marine railway, 65 feet; lift, 30 tons. The landings in the basin have depths of 7 feet at their outer ends. A yacht club is on the eastern side of the entrance to the creek.

Charts 556, 101—SC.—Potomac Beach is at Mile 38.8W. A fish dock and an oil wharf are the only usable landings. Depths of 7 to 12 feet can be taken to the landings. Gasoline and some supplies are obtainable.

Rosier Creek, entered just westward of Potomac Beach, has depths of 2 feet in the entrance and 5 to 3 feet for a mile upstream. The creek has no wharves and is little used.

Upper Machodoc Creek is at Mile 40.2W. The **United States Naval Weapons Laboratory** is at **Dahlgren,** on the north side of the entrance to the creek, but also occupies land for a considerable distance along the south shore; limits of the **danger zones** and regulations governing them are given in **204.40 (a) (1) (i) and (ii), and (a) (2),** Chapter 2. The tanks and radio masts at Dahlgren are prominent. A Coast Guard station is on the north side of the creek just inside the entrance.

Two well-marked, navy-maintained channels lead from Potomac River to the basin and wharves at Dahlgren. In 1961, the main channel, leading from westward, and the cutoff channel, leading from southeastward, had controlling depths of 10 feet and 8 feet, respectively. A **282°** lighted range marks the main channel. The mean range of tide is 1.6 feet.

Above Dahlgren, Upper Machodoc Creek has depths of 7 to 5 feet to **Little Ferry Landing,** 3.5 miles above the entrance, thence 7 to 2 feet for another 2 miles to **Milford Landing.** Only small piers are found along the banks. A fixed highway bridge with a 47-foot span and a clearance of 10

feet crosses the creek 3.7 miles above the entrance. Overhead power cables across the creek have a least clearance of 35 feet.

Williams Creek, on the north side of Upper Machodoc Creek a mile above the mouth, has depths of 4 to 2 feet to the highway bridge 1.1 miles above the entrance. An overhead power cable 0.6 mile above the entrance has a clearance of 28 feet.

A marina is on the north side of the entrance to Williams Creek. Gasoline, diesel fuel, water, ice, berths, and some marine supplies are available. Hull and engine repairs can be made; lift, 8 tons. Gasoline and a few supplies can also be obtained 0.6 mile above the entrance.

Lower Cedar Point is at Mile 42.1E. A light is shown from a white skeleton tower on piles in depths of 3 feet on the west edge of the main channel 0.7 mile westward of the point. Oyster-study platforms marked by lights are 500 yards southwestward of Lower Cedar Point and 500 yards off the east shore 0.4 mile south of Potomac River Bridge.

Morgantown is on the south side of Lower Cedar Point. There are strong cross currents south of the point. The landings that remain intact are suitable only for small boats. Depths of 6 feet can be taken to the landings by passing about 0.5 mile eastward of the light marking the south end of the 0.7-mile long shoal south of Lower Cedar Point. Gasoline and some supplies can be obtained at Morgantown.

Charts 559, 101—SC.—Potomac River Bridge, Mile 43.4, has a fixed channel span with clearances of 135 feet for a width of 480 feet and 105 feet for a width of 700 feet. The centerline of the main span has a fog signal and is marked by a flashing red aviation obstruction light and by a fixed green light surmounted by three fixed white lights vertically 15 feet apart. The bridge is also marked by fixed red lights on the main trusses and approaches.

There is a small-boat basin and marina just above the Potomac River Bridge on the Maryland side. The entrance channel and basin have depths of about 6 feet. Gasoline, diesel fuel, berths, and marine supplies are available. Hull and engine repairs can be made; lift, 20 tons.

A **danger zone** for military testing operations extends 4 miles upriver from the Potomac River Bridge; see **204.40 (a) (1) (iii), and (a) (2),** Chapter 2, for limits and regulations.

Persimmon Point is at Mile 44.5W. A 5-foot shoal on the west edge of the channel 0.6 mile southeastward of the point is marked by a light.

Popes Creek, Mile 45.4E, is not navigable. The village of **Popes Creek** is the terminus of a railroad from Baltimore and Washington. There is a reported depth of 10 feet to the railroad wharf. Gasoline and some supplies are available in small quantities. A buoy marks a 3-foot spot just south of the wharf.

Between Popes Creek and Upper Cedar Point, 4.5 miles upriver, the Maryland shore of Potomac River bends northward about 2 miles to form **Port Tobacco River Flats,** which have shoal spots of 3 to 5 feet but generally navigable depths of 7 to 10 feet. **Port Tobacco River,** at the head of the bight, has depths of 7 feet for 1.6 miles and thence 5 to 3 feet for another 1.3 miles. Private daybeacons mark the channel. An obstruction visible at low water has been reported 0.3 mile off Chapel Point near Daybeacon 3. The mean range of tide is 1.5 feet.

Chapel Point, on the east side of Port Tobacco River 1.2 miles above the mouth, is a summer resort. **Port Tobacco,** 4.4 miles above the entrance, is now the head of practical navigation. Marinas at the town have some supplies and gasoline. Hull and engine repairs can be made; lift, 10 tons.

Mathias Point is at Mile 47.7S. A light is shown from a skeleton tower on piles in depths of 3 feet on the south edge of the main channel 0.3 mile northward of the point.

Upper Cedar Point, at Mile 50.0N, is marked by a light shown from a skeleton tower on piles in depths of 3 feet on the north edge of the channel 0.5 mile southeastward of the point. Give the light a berth of at least 200 yards.

Nanjemoy Creek, Mile 51.0N, has a controlling depth of about 4 feet in a privately marked channel to a point about 4 miles above the entrance.

Metomkin Point is at Mile 53.1S. A light, shown from a pile structure in depths of 1 foot 0.5 mile off the point, marks the shallowest part of a shoal area along the southeast edge of the channel.

Maryland Point Light (38°21.0′N., 77°11.9′W.), Mile 55.8S, 42 feet above the water, is shown from a skeleton tower on piles in depths of 9 feet on the south edge of the Potomac River channel 0.7 mile southeastward of **Maryland Point.** A fog signal is at the light. Other shoals east and west of the light are marked by buoys.

Gasoline and some supplies can be obtained at **Fairview Beach,** Mile 57.4S. Depths to the fuel pier are about 4 feet. Minor repairs can be made; lift, 10 tons.

Potomac Creek, Mile 58.5S, is used only by small motorboats. **Bull Bluff,** on the south side of the entrance, is high and wooded. The creek has depths of 7 feet in the entrance, thence 3 feet for 2 miles. The best water favors the south side of the entrance. Gasoline and water are available at small-craft facilities on the south side of the creek 1 mile and 2 miles above the entrance. Hull and engine repairs can be made at the more easterly facility.

Aquia Creek, Mile 60.4W, has depths of 4 to 5 feet to the railroad bridge, and thence 2 feet to **Coals Landing,** 5 miles above the mouth. The creek is marked by lights and daybeacons. The mean range of tide is 1.2 feet. A fixed railroad bridge, 3 miles above the entrance, has a width of 46 feet and a clearance of 26 feet. An overhead power cable just south of the bridge has a clearance of 36

feet. Gasoline, diesel fuel, water, berths, and some marine supplies can be obtained at the small-craft facilities on the south side of the creek close below and above the bridge. Hull and engine repairs can be made: marine railway, 20 feet; lift, 8 tons.

Smith Point, Mile 61.5E, is marked by a light. **Clifton Beach** is on the point. The broken piling of a former landing 300 yards south of the light is nearly awash at high water.

There is danger of striking submerged hulks in the mile-wide former restricted anchorage area that extended 2.5 miles upriver along the Virginia shore from directly opposite Smith Point.

Liverpool Point is at Mile 64.4E. **Mallows Bay,** on the north side of Liverpool Point is a ship graveyard area; the western danger limit is a line from Liverpool Point to Sandy Point. A buoy marks the inner edge of the river channel off the bay. The southern part of the bay has unobstructed depths of 5 feet to the submerged wreck near the head. On the southern shore is a small bulkhead landing.

Sandy Point, Mile 65.5E, is marked by a light and a seasonal fog signal.

An aviation school wharf at Mile 66.2W, has depths of about 8 feet at the outer end. The short dredged channel to the wharf has a controlling depth of about 10 feet. About 0.2 mile north of the wharf, a diversion canal 10 feet deep connects **Chopawamsic Creek** with the Potomac River; three fixed bridges over the canal have a minimum width and clearance of 10 feet. An overhead power cable between the two uppermost bridges has a clearance of 17 feet.

Quantico, Mile 67.7W, is the site of the **U.S. Marine Corps Development and Education Command.** The T-head pier has depths of 25 to 30 feet at the face, and the launch harbor immediately south of the pier has depths of about 10 feet. The pier has a fog signal on the outer end. Except in emergencies, the pier and harbor are restricted to government vessels.

Quantico Creek, Mile 68.2W, has depths of 7 feet in a narrow, crooked entrance channel, and about 2 feet for 2 miles upstream. The fixed railroad bridge over the entrance has a 29-foot span with a clearance of 8 feet. An overhead power cable along the west side of the bridge, and another one 1.3 miles above the bridge, have clearances of 8 feet and 30 feet, respectively. A small landing on the south side of the entrance is used by local pleasure boats.

Possum Point is at Mile 68.5W. A privately maintained light marks the wharf 0.2 mile northward of the point.

Chicamuxen Creek, Mile 69.2E, has depths of 5 feet in the entrance but shoals rapidly farther up. The creek is little used.

A **danger zone** of a Navy explosion test area includes part of Chicamuxen Creek and extends northeastward in Potomac River up to 0.5 mile off the Maryland shore for about 5 miles to Indian Head; see **204.41,** Chapter 2, for limits and regulations.

The Government wharf at the north end of **Stump Neck,** Mile 70.6E, has depths of 15 feet at the outer end and is marked by a light. Lights also mark the ends of an ice breaker on the north side. Landing is permitted only in case of emergency.

Mattawoman Creek, Mile 71.5E, has easily navigated depths of 7 to 5 feet for a mile to the marsh that extends southeastward from **Deep Point** to the edge of the channel. Above this marsh, the creek channel has greater depths for 3 miles but meanders back and forth between the flats and is almost impossible to follow without a guide. The mean range of tide is 1.6 feet at the entrance. Some supplies and gasoline are available at a marina at **Sweden Point,** 2 miles inside the entrance. Depths to the fuel pier are about 3 feet.

Powells Creek, Mile 71.1W, has depths of 4 to 5 feet in the approach and 1 to 2 feet through the railroad bridge and for a short distance upstream. The fixed railroad bridge 0.3 mile above the entrance has a width of 40 feet and a clearance of 26 feet. An overhead power cable at the bridge has a clearance of 45 feet.

Charts 560, 101—SC.—Occoquan Bay, Mile 73.8W, has general depths of 5 to 7 feet. The entrance is 2.5 miles wide between **Freestone Point** on the southwest and **High Point** on the northeast; the channel is 0.3 mile off High Point. A manmade rocky islet, 3 feet high, is near the center of the bay, a mile westward of High Point. The bay has little commerce; it and its tributaries are used as an ice harbor when the river channel is closed above.

Neabsco Creek, at the southwest side of Occoquan Bay north of Freestone Point, has depths of 4 to 2 feet. The fixed railroad bridge over the mouth has a 30-foot span with clearance of 33 feet. The overhead cables just west of the bridge have a clearance of 36 feet. Gasoline, berths, water, and marine supplies can be obtained at the small-craft facilities on the south side of the creek above the bridge. Hull and engine repairs can be made; lifts up to 12 tons.

Belmont Bay, the northeastern arm of Occoquan Bay, has general depths of 3 to 4 feet. Belmont Bay is said to be rocky throughout; the rocks are covered at low water except during northwest winds.

Occoquan Creek empties into the head of Occoquan Bay along the west side of Belmont Bay. The creek has natural depths of 7 to 25 feet. A dredged channel leads through the bay and creek to Occoquan. In 1969, the channel had a controlling depth of 4 feet. The channel is marked through Occoquan Bay to within 0.4 mile of the first bridge over Occoquan Creek. The mean range of tide is 1.6 feet at the entrance.

Two fixed bridges over Occoquan Creek, 3.6 miles above the bay entrance, have a minimum clearance of 66 feet; the fixed bridge 0.4 mile above has a clearance of 44 feet. Piles extend out into the channel on both sides of the first two bridges. A power cable over the creek, 5 miles above the bay entrance, has a clearance of 44 feet.

Occoquan, on the southwest side of Occoquan Creek 5 miles above the bay entrance, is the head of navigation. Channel depths off the Occoquan bulkheads are about 10 feet. Small-craft facilities, on the southwest side of the creek above the third bridge, can provide gasoline, diesel fuel, water, berths, and marine supplies. Hull and engine repairs can be made; lift, 20 tons.

Indian Head, Mile 75.3S, is a high wooded bluff. The town of **Indian Head** is back of the bluff. The lower wharf has depths of 12 feet off its northern face, and the small-boat basin on the lower side has depths of 4 feet. A fog signal is on an intake house just above the wharf. The upper wharf has depths of 12 to 15 feet at the face. Landing is permitted at either wharf only in case of emergency.

Craney Island, Mile 77.3W, is a tiny islet marked by a clump of trees and surrounded by an extensive shoal. Between the islet and the Virginia shore is a narrow unmarked channel with depths of 7 feet.

Pomonkey Creek, Mile 78.0E, has depths of 7 to 3 feet in the entrance but little water inside.

Gunston Cove, Mile 80.0W, has depths of 3 to 5 feet in the entrance and 5 to 7 feet inside. The peninsula between Gunston Cove and Dogue Creek, 2 miles to the northeastward, is a part of the U. S. Army reservation of **Fort Belvoir.**

The small-boat basin and facilities at **Whitestone Point,** on the south side of the Gunston Cove entrance, are part of Fort Belvoir and are not for public use. A **restricted area** is established off Whitestone Point; see **207.126,** Chapter 2, for limits and regulations.

Pohick Bay and **Accotink Bay,** which joins at the head of Gunston Cove 2 miles from the entrance, have depths of 2 to 3 feet for about 0.5 mile from the junction. Pohick Bay is foul with submerged duckblind and fish stakes. Parts of both bays are within the **danger zone** of a Fort Belvoir target range; see **204.40 (b),** Chapter 2, for limits and regulations.

Dogue Creek, Mile 81.9W, has depths of 3 to 5 feet but is foul with grass and submerged duckblind stakes, and is little used.

Marshall Hall, Mile 82.3S, has an amusement part. Excursion boats operate between Marshall Hall and Washington. The excursion boat wharf has depths of about 10 feet at the face. Fuel is available at a small-boat landing south of the wharf. The fuel pier has depths of 4 feet alongside. The pipeline wharf, 200 yards southwestward of the excursion wharf, is in poor condition; landing is not permitted.

Mount Vernon, the **home of George Washington,** is at Mile 83.2N. The custom of tolling the ship's bell while passing Mount Vernon is said to have originated the night of Washington's death, December 14, 1799. The buildings are open to the public daily from 9 a.m. to 5 p.m. Excursion boats operate between Mount Vernon and the city of Washington. The buoyed dredged channel leading to Mount Vernon wharf, in 1964, had a controlling depth of 9 feet.

Little Hunting Creek, Mile 83.9N, has depths of about 4½ feet in a narrow channel, sometimes marked by bush stakes, for about 0.6 mile above the entrance. A stone-arch bridge over the entrance has a clearance of 22 feet for a center width of 25 feet.

Piscataway Creek, Mile 85.4S, has depths of 2 to 7 feet. Some marine supplies, gasoline, diesel fuel, and berths are available at a marina on the north side of the creek 0.5 mile inside the entrance. Hull and engine repairs can be made; lift, 25 tons.

Fort Washington, Mile 85.8E, was built early in the 19th century for the protection of the then new nation's capital; the fort is now a unit of National Capital Parks. There is a light and fog signal on shore at the fort.

Broad Creek, Mile 88.0E, has depths of 2 to 4 feet. **Indian Queen Bluff** is on the north side of the entrance. The creek is little used.

Rosier Bluff, Mile 89.4E, is wooded and prominent. Only piles remain of the wharf just below the bluff. A light is shown from a pile in depths of 6 feet, below the bluff.

Hunting Creek, Mile 90.0W, has depths of 1 to 4 feet. Fixed highway bridges cross the creek 0.6 and 0.9 mile above the entrance. The lower bridge is a three-arch structure with a width of 44 feet and a clearance of 9 feet for a width of 20 feet; the upper bridge has a clearance of 3 feet. Piles marking an abandoned channel are in the north end of the bay.

On the Maryland side opposite Hunting Creek is an extensive bight dredged for sand and gravel. Depths are 8 to 20 feet in the inner part of the bight but only 1 to 5 feet along the edge of the river channel.

Jones Point, Mile 90.5W, is on the north side of the entrance to Hunting Creek and at the lower end of the Alexandria waterfront. **Woodrow Wilson Memorial Bridge,** Mile 90.7, which connects Jones Point with the Maryland shore, has a bascule span with a clearance of 50 feet; a fog signal is at the channel span of the bridge. See **117.325 (a),** Chapter 2, for drawbridge regulations and opening signals.

Alexandria, Mile 91.4W, has considerable waterborne traffic in petroleum products, sand and gravel, and fertilizer materials. Foreign vessels drawing as much as 21 feet unload newsprint and some general cargo. **Storm warning signals are displayed;** see chart.

Pilotage to Alexandria was discussed at the beginning of the chapter.

Towage.—Tugs are not normally required for docking and undocking; a city-owned tug, 250 hp is available. Arrangements for its use are made in advance through ships' agents.

Quarantine.—Vessels subject to such inspections are boarded at their berths by officials of the U.S. Public Health Service. Officials maintain an office at Dulles Airport. An outpatient clinic is at nearby Washington, D.C.; see Appendix for address.

Agriculture quarantine.—Vessels subject to such inspections are inspected at their berths by officials from Dulles Airport.

Customs.—Alexandria is a customs port of entry. Vessels are inspected at their berths. Officials maintain an office at Union and Franklin Streets, Alexandria, Va.

Coast Guard.—A vessel documentation office is at Washington, D.C.; see Appendix for address.

Immigration.—Vessels are boarded at their berths. Officials maintain an office at Dulles Airport.

Harbor regulations.—Jurisdiction of the District of Columbia harbormaster extends upriver from Jones Point. Harbor regulations provide a **speed limit** of 10 m.p.h. when passing the wharf area of Alexandria, except in emergencies.

The Alexandria waterfront extends about 1.5 miles north of the Woodrow Wilson Memorial Bridge. Some of the wharves are owned by the Government; several of the privately owned wharves are open to the public by special arrangement. Depths of 20 to 25 feet are at the outer ends of the wharves; in places old piling is a hazard to approaching vessels. Robinson south and north terminals are 0.45 miles and 0.9 mile above the bridge, respectively; each has a 300-foot face with depths of 25 feet alongside. For information on the latest depths alongside the facilities at Alexandria, contact the individual operators. Water is available at most of the facilities; cargo is handled by ship's tackle. There are no major repair facilities for oceangoing vessels at Alexandria; the nearest such facilities are at Baltimore, Md., and in the Hampton Roads area.

Small-craft facilities along the Alexandria waterfront can provide gasoline, diesel fuel, water, berths, and marine supplies. Hull and engine repairs can be made; largest marine railway, 35 feet; lift, 16 tons.

Oxon Creek, Mile 91.6E, has bare flats in the approaches and general depths of 1 to 3 feet inside. Sand dredges have cut channels through the flats and made holes inside, but local knowledge is needed to find the deeper water. The fixed highway bridge over the creek has a clearance of 19 feet.

Marbury Point is at Mile 92.1E. A bush-staked channel with depths of about 7 feet leads to the point. Just northward is the Blue Plains sewage-disposal plant. The pier 0.4 mile above Marbury Point extends to deep water and is marked at its outer end by a light and fog signal. The **Bellevue** pier is 0.7 mile above Marbury Point.

Fourmile Run, Mile 93.0W, has depths of 10 to 20 feet in the outer basin, but there is a 3-foot spot off the south side and shoal water surrounds the other sides. Airport landing lights extend 0.5 mile into the basin from the north side. The marked entrance channel had a controlling depth of 15 feet in 1964. The Washington Sailing Marina is in the cove on the south side of the basin just above the entrance.

Washington National Airport occupies the extensive fill area on **Gravelly Point** at Mile 94.1W. Many domestic and international airlines use the airport day and night.

Giesboro Point is at Mile 94.0E. Submerged pile remains of former wharves extend out about 150 feet from shore in the vicinity of the point.

Washington, D.C., on the east side of Potomac River 96 miles above the mouth, is the **Capital of the United States.** The city, with its impressive memorials and public buildings, is one of the most beautiful in the world, and is host to a constant stream of visitors. Prominent from the river are the Capital dome, the Washington Monument, and the Lincoln and the Linccoln and Jefferson Memorials.

Commercial traffic in Washington Harbor consists chiefly of sand and gravel and pertoleum products.

The mean range of **tide** is 2.9 feet; daily predictions for Washington are given in the Tide Tables. Currents are variable but the set is usually in the directions of the channels, and there is little or no flood current during freshets; information for several places in Washington Harbor is given in the Tidal Current Tables. **Ice** closes the river at Washington during severe winters, but power vessels keep the channels open during ordinary winters. During the highest freshet in recent years, the river rose about 11.5 feet above mean low water in Washington Channel.

Weather.—Washington summers are warm and humid, and winters are mild; generally, pleasant weather prevails in the spring and autumn. The coldest weather occurs in late January and early February. The warmest weather occurs late in July. There are no well pronounced wet and dry seasons. Thunderstorms, during the summer months, often bring sudden and heavy rain showers and may be attended by damaging winds, hail, or lightning.

Tropical disturbances occasionally, during their northward passage, influence Washington's weather mainly with high winds and heavy rainfall, but extensive damage from this cause is rare. Snow accumulations of more than 10 inches are relatively rare. Usually the melt-off is rapid and conditions improve within a day or so.

Records of the past 20 years show the average date of the last freezing temperature in the spring to be March 29 and the latest, April 16. The average date of the first freezing temperature in the fall is November 10 and the earliest, October 21.

Occasional overflows from the Potomac River result from heavy rain over the basin, at times augmented by melting snow. In a few cases during cold winters, ice forms on the river and in spring, flooding is caused by ice gorges when the ice breaks up. The river is in tidewater and above normal tides associated with hurricane or severe storms along the coast cause flooding at times. Local flooding in the area is also caused by locally heavy rain. Some flooding occurs from one or the other of these causes every year on the average.

In using the Climatological Tables for the area note that recent observations have been taken at the National Airport which is located in a warmer part of the area. Minimum and maximum temperatures in nearby areas may be 8° and 5° lower respectively, and rain and snowfall amount may be slightly higher away from the airport. See Appendix for **Washington climatological table. Storm warning display locations** are listed on the NOS charts and shown on Marine Weather Services Charts published annually by the National Weather Service.

Pilotage to Washington, D.C. was discussed at the beginning of the chapter.

Towage.—The city-owned tug at Alexandria is available for the Washington waterfront. Arrangements for its use are made through ships' agents.

Quarantine.—Vessels subject to such inspections are boarded at their berths by officials of the U.S. Public Health Service. Officials maintain an office at Dulles Airport. An **outpatient clinic** of the Public Health Service is at Washington, D.C.; see Appendix for address.

Agriculture quarantine.—Vessels subject to such inspections are inspected at their berths by officials from Dulles Airport.

Customs.—Washington, D.C. is a customs port of entry. Vessels are inspected at their berths. Officials maintain an office at 2100 K St., N.W., Washington, D.C.

Coast Guard.—A vessel documentation office is in Washington, D.C.; see Appendix for address.

Immigration.—Vessels are boarded at their berths. Officials maintain an office in the city; see Appendix for address.

Harbor regulations.—The District of Columbia Harbormaster, who is the officer commanding the Harbor Precinct of the Metropolitan Police Department, regulates the operation, navigation, mooring, and anchoring of all vessels within the waters of the District of Columbia and enforces all laws and regulations relating thereto. The person in charge of any vessel, 26 feet or more in length, entering the harbor, shall, if he intends to remain over 24 hours, report the date and time of arrival without delay and shall also report immediately before finally departing, to the Harbormaster at the Harbor Precinct wharf, Maine Avenue and M Street, SW., or to any police officer under his command.

At Mile 94.2 is the junction of Potomac River with **Anacostia River** to the eastward, Washington Channel to the northward, and Virginia Channel of the Potomac River to the westward. The lighted junction buoy also marks the outer end of the shoal making southerly from **Hains Point,** 0.4 mile north of the junction. **Washington Harbor** comprises the navigable waters upstream from this junction.

A dredged channel leads from the Potomac River off Hains Point into the Anacostia River to a turning basin at the foot of 15th St., S.E., about 2.6 miles above the mouth. In 1966, the controlling depths were 21 feet to a point about 1.8 miles above the mouth; thence in 1954-1966, 16 feet to and in the turning basin. Above the turning basin, depths of about 8 feet can be carried to the East Capitol Street Bridge, 4 miles above the mouth, and thence 1½ feet to a marina at Bladensburg, 7 miles above the mouth. The channel is well marked by lights, buoys, and daybeacons.

Anchorage areas, maintained by the District of Columbia on the southeast side of Anacostia River between the third and sixth bridges, are marked by buoys. No vessel shall come to anchor in the usually travelled channel northwest of the established areas. Harbor regulations prescribe a **speed limit** of 6 m.p.h. between the entrance to Anacostia River and the Benning Road Bridge, a distance of 4.4 miles.

Anacostia River is crossed by nine bridges between the entrance and the head of navigation. The South Capitol Street Bridge, 1.4 miles above the entrance, has a swing span with a clearance of 40 feet; see **117.330 (c)**, Chapter 2, for drawbridge regulations and opening signals.

The Eleventh Street Bridge, 2.2 miles above the mouth, is a fixed bridge with a clearance of 28 feet. Twelfth Street Bridge has a fixed channel span with a clearance of 28 feet. The remaining fixed bridges have a minimum width of 40 feet and clearance of 12 feet. The Pennsylvania Railroad Bridge, 3.3 miles above the mouth, has a vertical-lift span with a width of 33 feet and clearance of 5 feet down and 29 feet up; see **117.240** and **117.330 (a)**, Chapter 2, for drawbridge regulations and opening signals.

The waterfront of Anacostia River extends along the north side for about 3 miles above the entrance. The Washington Navy Yard Annex occupies the area just above the first bridge to the second bridge; depths at the outer piers are 19 to 23 feet. Most of the other piers and bulkhead

wharves are privately owned. Oil terminals are just below the first bridge and just above the third bridge.

There are small-craft facilities on the north side of Anacostia River just above the mouth; between the third and fifth bridges; and at **Bladensburg,** 7 miles above the mouth. Supplies, gasoline, and berths are available. Repairs can be made; largest marine railway, 50 feet.

Washington Channel extends northward along the east side of Hains Point for 2 miles to the Fourteenth Street causeway. In 1966, the controlling depth was 17 feet. The channel is marked by buoys. A fixed highway bridge at the upper end of the channel has a clearance of 37 feet.

Anchorage areas, maintained by the District of Columbia along the west side of Washington Channel, are marked by buoys. No vessel shall anchor in the channel outside these areas. Harbor regulations prescribe a **speed limit** of 6 m.p.h. upstream from Hains Point.

The waterfront facilities are on the eastern side of Washington Channel. Pier 5, a mile above Hains Point, has depths of about 23 feet at the outer end; it is the headquarters of the harbormaster and is used by his patrol boats and the Coast Guard. Pier 6, just northward, has depths of about 23 feet at the outer end; it is used by excursion boats. The municipal fish and fresh oyster wharves are just below the highway bridge, 1.5 miles above Hains Point.

Slips and minor repair facilities for pleasure craft are at the north end of Washington Channel; largest haul-out capacity: lift, 20 tons. Gasoline, diesel fuel, and marine supplies are available.

Virginia Channel is the local name for that part of the Potomac River between Hains Point and Georgetown. In 1966, the controlling depth was 11 feet to the Francis Scott Key Bridge at Georgetown. The channel from Key Bridge to Chain Bridge, about 2.7 miles above, has strong currents, and numerous shoals and rocks. This part of the channel is used by small craft with local knowledge; mariners are advised to exercise caution.

A **157°-337° measured nautical mile** begins just above Hains Point. The front markers are yellow triangles on the Potomac Park seawall rail, and the rear markers are yellow diamond shapes on poles. The half-mile markers are yellow rectangles with black vertical center lines.

Virginia Channel is crossed by six bridges between Hains Point and Chain Bridge, Mile 10 1. All bridges have either fixed spans or drawspans fixed in the closed position; see **117.325 (b),** Chapter 2. The minimum width of the bridges is 104 feet and the clearance is 18 feet. In 1970, the third bridge above Hains Point was being replaced by a new fixed highway bridge with a design clearance of 23 feet.

The Tidal Basin is on the northeast side of Potomac River 1.6 miles above Hains Point; tide gates obstruct the entrance.

Directly across the river from the Tidal Basin is the **Pentagon Lagoon.** Depths are about 9 feet in the entrance and 7 to 10 feet in the lagoon. The fixed bridge over the entrance is a stone arch, 100 feet between piers, with a clearance of 18 feet over the middle 41 feet. On the north side of the lagoon just above the bridge is a marina with extensive berthing facilities; gasoline and some supplies are available. Hull and engine repairs can be made; marine railway, 30 feet. There is a 2-foot shoal just south of the marina. **Boundary Channel,** which extends northward from the lagoon between **Columbia Island** and the Virginia shore, is shallow and is crossed by several fixed bridges.

Arlington Memorial Bridge is 2.3 miles above Hains Point and 97 miles above the mouth of Potomac River. Harbor regulations prescribe a speed limit of 6 m.p.h. above the bridge.

Theodore Roosevelt Island, Mile 97.5W. is a park area. Boats should not attempt to pass between the island and the Virginia shore.

Francis Scott Key Bridge is at Mile 98.3W. The stone piers of the former Aqueduct Bridge, just above Key Bridge, have been removed to a depth of 10 feet except for the one nearest the Virginia shore, which is 9 feet above water.

The commercial wharves are on the north side of Virginia Channel at **Georgetown** between Key Bridge and **Rock Creek,** 0.6 mile downriver. The wharves, which are mostly of the bulkhead type, are privately owned. The only commercial traffic in Virginia Channel is sand and gravel by barge to a plant 0.4 mile below Key Bridge.

An **anchorage area** is maintained by the District of Columbia on the shoals between Key Bridge and the **Three Sisters Islands,** which are on the Georgetown side 0.5 mile above the bridge. No vessel shall anchor between the designated area and the shores.

Chain Bridge, Mile 101, is the head of tidewater navigation on the Potomac River.

13. CHESAPEAKE BAY, PATUXENT AND SEVERN RIVERS

This chapter describes the western shore of Chesapeake Bay from Point Lookout, on the north side of the entrance to Potomac River, to Mountain Point, the northern entrance point to Magothy River. Also described are Patuxent River, Herring Bay, West River, South River, Severn River, and Magothy River, the bay's principal tributaries; the ports of Solomons Island, Benedict, Chesapeake Beach, Shady Side, Galesville, and Annapolis; and several of the smaller ports and landings on these waterways.

Charts 1224 to 1226.—From Potomac River to Patuxent River, the western shore of Chesapeake Bay is mostly low, although the 100-foot elevation does come within a mile of the water midway between the two rivers. Above Patuxent River, the ground rises and 100-foot elevations are found close back of the shore along the unbroken stretch northward to Herring Bay. Above Herring Bay, the 100-foot contour is pushed back by the tributaries. Except for the developed areas, the shore is mostly wooded.

The bay channel has depths of 42 feet or more, and is well marked by lights and buoys.

The **fishtrap areas** that extend along this entire section of the western shore are marked at their outer limits and are shown on the charts.

Ice is encountered in the tributaries, particularly during severe winters. When threatened by icing conditions, certain lighted buoys may be replaced by lighted ice buoys having reduced candlepower or by unlighted buoys, and certain unlighted buoys may be discontinued; see Light List.

Tidal Current Charts, Upper Chesapeake Bay, present a comprehensive view of the hourly speed and direction of the current northward of Cedar Point, at the south entrance to Patuxent River. The series of 12 charts may be obtained for $1.00 from NOS sales agents and from the National Ocean Survey, Distribution Division (C44), Washington, D.C. 20235.

Weather.—Storm warning display locations are listed on the NOS charts and shown on the Marine Weather Services Charts, published annually by the National Weather Service.

Chart 1224.—The **danger zone** of an aerial gunnery range and target area begins off Point Lookout and extends northward to Cedar Point; see **204.42,** Chapter 2, for limits and regulations.

A middle ground with depths of 10 to 18 feet is about 8 miles eastward of Point Lookout; the area is about 7 miles long in a north-south direction and 2 miles wide. The stranded wreck near the middle of the shoal is marked by lighted buoys.

Chart 557.—St. Jerome Creek, 5 miles north of Point Lookout, is entered by a marked channel. In 1966, the controlling depth was 6½ feet. There are general depths of 8 to 4 feet above the marked channel. The creek is used principally as an anchorage for oyster and fishing boats.

There are several small wharves along St. Jerome Creek. The landing at **Airedele,** on the south side just above the entrance, has depths of about 5 feet at the channel face; gasoline is available.

Point No Point, on the west side of Chesapeake Bay 6 miles north of Point Lookout, has no prominent natural marks. **Point No Point Light (38°07.7′N., 76°17.4′W.),** 52 feet above the water, is shown from a white octagonal brick dwelling on a brown cylinder, in depths of 22 feet, 1.6 miles southeastward of the point; a fog signal is sounded at the light. The light is 1.7 miles due west of a point on the bay ship channel 76.4 miles above the Capes.

An **aerial target** is 5.5 miles north-by-west of Point No Point Light; see **204.42,** Chapter 2, for limits and regulations of the prohibited area. The 200-yard square target area has rock and concrete piers at the corners and in the center, all in depths of 37 feet. Each pier is 50 feet in diameter and 12 feet high; lighted buoys are moored east and west of the target. The steel piling of a former navy radar target (39°14′15″N., 76°20′25″W.) is about 1.6 miles northwestward of the center of the aerial target. The piling is covered 5 feet and marked by a buoy; mariners are advised to exercise caution when transiting the area.

Hooper Island Light (38°15.4′N., 76°15.0′W.), 63 feet above the water, is shown from a white conical tower on a brown cylindrical base, in depths of 18 feet near the outer edge of the shoals, 3 miles westward from Hooper Islands; a fog signal is sounded at the light. The light is 2.8 miles due east of a point on the bay ship channel 84.4 miles above the Capes.

Chart 553.—The inclosed navy seaplane basin 8.5 miles north-northwestward of Point No Point and 2 miles southwestward of Cedar Point has depths of about 10 feet. The entrance to the basin is between two breakwaters, each marked at their outer ends by a light.

Cedar Point (38°17.9′N., 76°22.5′W.) is 10 miles north-by-west of Point No Point. The ruins of an abandoned lighthouse are on the tiny islet 0.3 mile off the point. The shoal extending 0.5 mile east-

ward from the islet is marked at its outer end by a lighted buoy.

Charts 553, 561.—Patuxent River empties into the west side of Chesapeake Bay 89.3 miles above the Virginia Capes. Commericial traffic consists chiefly of shellfish and shells, and petroleum products. Drafts of vessels using the river are mostly 7 feet or less and seldom exceed 12 feet.

The river has natural depths of 25 to 30 feet in the approach, 30 to over 100 feet for 16 miles upstream, thence 23 feet to the Benedict highway bridge 19 miles above the mouth, thence 10 feet for 12 miles to within 2 miles of Nottingham, thence 6 feet for 5 miles, and thence 3 feet to Hills Bridge, 40 miles above the mouth. The channel is not difficult to follow as far as the Benedict bridge, and the principal shoals are marked by lights and buoys; the channel above the bridge is narrow in places and is marked for about another 2.5 miles.

Anchorage can be had off the mouth of Patuxent River; shelter from westerly winds is found in depths of 20 to 30 feet close to shore on the north side of the approach. Shelter from easterly winds is found in depths of 30 to 50 feet in the channel about 1.5 miles above the entrance.

Bottom in Patuxent River channel is mostly soft as far as the Benedict highway bridge, and vessels can anchor where convenient. Small vessels anchor in the creeks back of Solomons Island, but there is little swinging room. St. Leonard Creek is a good small-vessel anchorage in any weather.

The mean range of tide is 1.2 feet at the entrance to Patuxent River, 1.6 miles at Benedict, and 2.5 feet at Nottingham. The current velocity is 0.4 knot in the entrance to Patuxent River off Drum Point. Ice closes the river to near the mouth in severe winters.

The principal places along Patuxent River for supplies and small-vessel repairs are in the creeks back of Solomons Island. Supply and repair facilities are also available in Town Creek, Cuckold Creek, Island Creek, and at Benedict.

Patuxent River empties into the head of the bight between Cedar Point and **Cove Point,** 5 miles to the northward. **Cove Point Light (38°23.2′N., 76°22.9′W.), 45 feet above the water, is shown from a white tower on the point; a radiobeacon and fog signal are at the light. The light is 1 mile due west of a point on the bay ship channel 92.6 miles above the Capes. The daytime vessel-reporting station** at the light communicates with Baltimore by telephone. The high bluffs on **Little Cove Point,** 1.5 miles to the southward, are prominent.

The entrance to Patuxent River is between **Drum Point** and **Fishing Point,** 0.9 mile to the southward. The shoals that extend off Fishing Point and **Hog Point,** a mile to the east-northeastward, are marked at their outer ends by lighted buoys.

A light and fog signal are 50 yards south of the abandoned lighthouse on Drum Point.

Mileages on Patuxent River, shown as Mile 8W, 11E, etc., are the nautical miles above the midchannel point on a line drawn between Drum and Fishing Points. The letters N, S, E, and W following the numerals denote by compass points the side of the river where each feature is located.

The **Patuxent River Naval Air Station** is along the south side of the entrance. The inclosed seaplane basins, East Basin at Mile 0.8S, and West Basin at Mile 1.3S, have general depths of 9 to 4 feet, and 15 to 7 feet, respectively. Lights mark the entrance points to West Basin. A **restricted area** off the air station begins at the mouth of Patuxent River and extends upstream about 2.5 miles; see **207.125,** Chapter 2, for limits and regulations.

Solomons Island, Mile 1.8N, is joined to the mainland on the northwest by a causeway. The shoal that extends 500 yards southward from **Sandy Point,** at the south end of the island, is marked at its outer end by a lighted buoy. **Solomons,** the village on the island, is populated mostly by oystermen and fishermen. The pier of the **Chesapeake Biological Laboratory** on the east side of the island has depths of 8 feet at the outer end and is marked by a private light.

Back Creek and **Mill Creek** have a common entrance between Solomons Island and the mainland 200 yards to the north-northeastward. The marked main approach, between the island and the shallow middle ground to the eastward, has depths of 20 to 25 feet. The second marked approach, between the middle ground and the mainland to the northward, has depths of 12 feet.

The two creeks separate just above the entrance. Mill Creek goes eastward of a shallow spit with a small islet at the southern end, and Back Creek goes westward; the spit and the islet are marked by lights.

Storm warning signals are displayed; see chart.

The Back Creek cove between the islet and the inner side of Solomons has general depths of 15 feet and is used as an anchorage by many yachts and fishing boats. The largest marine service pier has depths of 10 feet at the outer end. Supplies, fuel, and slips are available at Solomons. Repairs can be made; largest lift, 12 tons.

Back Creek has depths of 12 feet for 0.7 mile above the cove, thence 10 to 6 feet for another 0.5 mile. Some supplies, fuel, and slips are available at marinas on both sides of the creek, 0.6 mile above the entrance. Repairs can be made; largest haul-out facilities: railway, 45 feet; lift, 25 tons.

Mill Creek has depths of 16 to 12 feet for 1.2 miles, thence 10 to 4 feet for another mile. Two submerged wrecks, reported covered 9 feet, are along the east side of the channel, about 0.5 mile above the mouth. Midchannel courses will safely pass the wrecks. Repairs can be made at the boatyard on the east side of the creek 0.3 mile above the entrance; largest lift, 20 tons. Gasoline is available.

Town Point is at Mile 2.9S. **Town Creek,** on the southwest side of the low point, is used by fishing and oyster boats, and recreational craft. The creek, marked at the entrance by a light, is entered about 0.5 mile south-southwestward of Town Point. The entrance light also marks the outer end of a shoal that extends southward from the northern entrance point. In May 1969, depths of 5 to 12 feet were reported in the creek. Submerged wrecks are reported in the southwestern arm of the creek. Marine supplies and fuel are available. The largest marine railway in Town Creek can handle craft up to 40 feet in length.

Point Patience is at Mile 3.9N; a lighted buoy marks the southern end of a shoal extending southward of the point. The long government piers on the east and west sides of the point have depths of 20 feet or more at their outer ends; see **207.125,** Chapter 2, for limits and regulations of the **restricted area** in the vicinity of these piers.

Cuckold Creek and **Mill Creek** (not to be confused with Mill Creek near Solomons Island) have a common entrance at Mile 4.7W. A buoy marks the outer end of the shoal that extends 0.4 mile southeastward from the point on the north side of the entrance, and daybeacons mark the entrance channel. The channel entrance is marked on the south side by a light. Gasoline and some supplies are available at **Clarks Wharf,** on the peninsula between the two creeks. Depths at the fuel pier are about 6 feet.

Cuckold Creek, which extends northwestward from the entrance, has depths of 15 to 11 feet for a mile, thence 10 to 4 feet into the several arms. A marina and marine service dock are on the south side of the creek 0.6 mile and 0.9 mile above the entrance, respectively. Gasoline and some supplies are available. Repairs can be made; marine railway, 60 feet; lift, 10 tons.

Hellen Creek, Mile 5.3E, has depths of 3 feet over the bar at the entrance, which is marked by bush stakes, thence 11 to 5 feet for a mile; the deeper water favors the east side of the entrance. The creek is used principally as a small-boat harbor.

St. Leonard Creek, Mile 7E, has depths of 15 to 10 feet for 2 miles, then shoals gradually to 1 foot at the head, 3.5 miles above the entrance. Safe anchorage in any weather is available in depths of 15 to 21 feet, 0.5 mile above the entrance. Fuel is available at a yacht club on the east side, 2 miles above the mouth; minor repairs can be made. Gasoline is also available at a pier on the west side about a mile above the mouth. The shoal that extends 0.4 mile southward from **Petersons Point,** on the northwest side of the entrance, is marked at its outer end.

Broomes Island, which is not an island but a mainland peninsula, is at Mile 9.5N. A light marks the limit of the shoal area extending 0.2 mile southward of the peninsula.

Island Creek, which empties into Patuxent River along the east side of Broomes Island, has depths of 8 to 10 feet for a mile, but there are unmarked shoals, particularly along the west side of the entrance; a light marks the east side of the entrance.

The village of **Broomes Island** is on the west side of Island Creek about a mile from the outer end of the peninsula. A marine railway can haul-out boats up to 50 feet in length for hull repairs. Gasoline and some supplies are available.

Nan Cove, on the west side of Broomes Island, is entered by a marked dredged channel which leads to a turning basin in the upper end of the east arm. In 1965, the controlling depth was 6 feet.

A private channel, marked at the entrance by a light, leads to a marina at the entrance to **Cat Creek** at Mile 12.6W. In 1970, the channel had a reported depth of 5½ feet. Some supplies, fuel, berths, and a 10-ton lift are available.

Battle Creek, Mile 13.2E, has depths of 10 to 7 feet for 1.5 miles, but local knowledge is needed to navigate between the 2-foot shoals on either side of the channel just above the entrance. The shoal that extends 0.3 mile southwestward from the point on the east side of the entrance is marked at its outer end by a light.

The highway bridge over Patuxent River at Mile 18.8, from **Town Point** on the west side to **Hallowing Point** on the east side, has a 49-foot swing span with a clearance of 16 feet; see **117.245 (a) through (e), and (f) (15),** Chapter 2, for drawbridge regulations and opening signals.

Benedict, a village just below the west end of the highway bridge, is the head of commercial navigation on Patuxent River. The marine service dock at Benedict has depths of 5 feet at the outer end; gasoline and some supplies are available. Other docks along the waterfront have depths of 4 to 9 feet at their outer ends. Marine railways can haul-out boats up to 40 feet in length for repairs.

Depths of 4 feet can be carried to a small-boat basin just below Hallowing Point. Gasoline and water are available.

Navigation on Patuxent River above Benedict is difficult because of the numerous fishtraps and stakes.

Overhead power cables with a clearance of 60 feet over the main channel cross Patuxent River at Mile 20.9. The supporting towers are marked by private lights.

An overhead power cable across Patuxent River at Mile 25.5, a mile above **Holland Cliff,** has a clearance of 46 feet.

Lower Marlboro is a village at Mile 28.3E. The State landing has depths of 12 feet at the face.

Nottingham, a village at Mile 32.8W, has a landing with depths of 13 feet at the face.

Flag Harbor, on the west side of Chesapeake Bay 6.3 miles northwest of Cove Point, has depths of about 3½ feet in the entrance channel leading to

a small-boat basin. The 600-foot stone jetties on either side of the entrance are almost covered at high water. Gasoline is available.

Chart 551.—The **danger zone** of the **Naval Research Laboratory** firing range fans out from a point near **Randle Cliff Beach** (38°38.5′N., 76°31.7′W.), 18 miles northward of Cove Point; see **204.32,** Chapter 2, for limits and regulations. The laboratory towers are prominent.

Chesapeake Beach (38°41.8′N., 76°32.0′W.) is a resort and fishing center on the western shore of Chesapeake Bay 19.6 miles northward of Cove Point. **Fishing Creek,** on the north side of the resort, is entered by a dredged channel which leads from the bay through jetties to an anchorage basin in the creek. The channel is marked by a lighted range and other aids. In 1970, depths of 7 feet were reported in the channel and basin. A fixed highway bridge 0.3 mile above the jetties has a width of 36 feet and a clearance of 10 feet.

Small-craft facilities, on the south side of the creek at Chesapeake Beach, have gasoline, diesel fuel, water, berths, and marine supplies. Hull and engine repairs can be made; marine railway, 50 feet; lift, 12 tons.

Chart 550.—Holland Point (38°43.6′N. 76°31.7′W.), on the western shore of Chesapeake Bay 21.6 miles above Cove Point, has shoal areas extending in all directions; depths of 11 feet are 1.3 miles to the eastward and northeastward. Buoys mark the outer edges of the shoals.

Herring Bay, between Holland Point and the marsh 3 miles to the northward, has general depths of 14 to 7 feet. **Long Bar,** with depths of 2 to 5 feet, extends from the north side of the bay to within a mile of Holland Point, and is marked at its south end by a light.

Rose Haven Harbor (see also chart 551), 0.6 mile westward of Holland Point, is entered by a private channel from the south side of Herring Bay. The channel is marked by a **199°** lighted range and other private aids. In May 1969, the channel had a reported controlling depth of 4½ feet. The channel is very narrow and must be followed closely to carry the best water. A small-craft facility is on the east side of the harbor just inside the entrance. Gasoline, diesel fuel, water, berths, and marine supplies are available. Hull and engine repairs can be made; marine railway, 50 feet; lift, 40 tons.

Rockhold Creek, at the northwest corner of Herring Bay, has good shelter for small boats. A marked dredged channel leads from the bay to near the county wharf and a turning basin just below the fixed highway bridge at **Deale.** In 1969, the controlling depth was 4½ feet to the county wharf and to and in the basin. Depths are 3 to 5 feet for about 0.4 mile above the bridge. A light marks the outer end of the breakwater on the north side of the entrance. The mean range of tide is 0.9 foot. The fixed highway bridge a mile above the entrance has a width of 19 feet and a clearance of 10 feet. The fixed highway bridge 1.8 miles above the entrance has an opening 41 feet wide with a clearance of 10 feet.

There are extensive small-craft facilities on both sides of Rockhold Creek below the first bridge, and on the east side of the creek between the first and second bridges. Most of these facilities have gasoline, diesel fuel, water, berths, and marine supplies, and most make hull and engine repairs. Largest haul-out capacities: marine railway, 50 feet; lift, 15 tons.

West River, 29 miles above Cove Point, empties into the west side of Chesapeake Bay north of **Curtis Point** (38°51.1′N., 76°29.9′W.). A marked fish trap area is off the entrance. The river has depths of 14 to 7 feet for about 4 miles, then shoals gradually to less than 3 feet in the tributaries. The river channel is marked by a light at the entrance, and by lights and daybeacons to **Galesville,** on the west side of the river 2.5 miles above the entrance light. A yacht club is on the east side of the river at **Avalon Shores,** opposite Galesville. **Storm warning signals are displayed;** see chart.

Several small-craft facilities are at Galesville. and closeby. Most of these facilities have gasoline, diesel fuel, water, berths, and marine supplies, and most can make hull and engine repairs. Largest haul-out capacities: marine railway, 100 feet; lift, 15 tons.

Parish Creek, on the south side of West River 0.5 mile westward of Curtis Point, is entered by a marked dredged channel which leads to an anchorage basin, and thence to **Shady Side** at the head of the south fork. In 1970, the controlling depth to and in the basin, and toShady Side was 5½ feet.

Small-craft facilities on the north side of Parish Creek and at Shady Side can provide gasoline, water, berths, and marine supplies. Hull and engine repairs can be made. Largest haul-out capacities: marine railway, 50 feet; lift, 4 tons.

Rhode River empties into the north side of West River 1.1 miles westward of West River Entrance Light 2. The river, marked at the entrance by a light, has depths of 11 to 9 feet for 2 miles. The critical shoals extending off the points are marked.

Cadle Creek, on the east side of Rhode River 1 mile above the entrance light, has depths of 4 to 7 feet. A daybeacon marks the entrance to the creek. **Mayo,** is a town on the east side of the creek.

Bear Neck Creek, on the north side of Rhode River 1.5 miles above the entrance light, has depths of 9 to 5 feet for a mile. The entrance is marked by daybeacons.

Small-craft facilities on Cadle Creek and Bear Neck Creek can provide gasoline, some diesel fuel, water, berths, and marine supplies. Hull and engine repairs can be made. Largest haul-out capacities: marine railway, 50 feet; lift, 15 tons.

An **000°-180° measured course,** 0.5 mile long, is about 1.4 miles eastward of Curtis Point. The course is marked at each end by an orange and white mine-type buoy. These private aids are maintained from May to November.

South River, just north of West River, has channel depths of 14 feet or more to the second bridge, 6 miles above the mouth, then shoals gradually to 2 feet at the bridge near the head, 8.5 miles above the mouth. The river channel is marked to a point about 0.3 mile below the second bridge. Several of the creeks that flow into the river have good depths and are used extensively by local yachts and motorboats. Although there are no commercial facilities in the creeks on the north side below the first bridge, most of these tributaries are reported to provide good anchorage.

The entrance to South River is between **Saunders Point** and **Thomas Point,** 1.8 miles to the northeastward. **Thomas Point Shoal Light (38°53.9′N., 76°26.2′ W.),** 43 feet above the water, is shown from a white hexagonal tower on brown piles, in depths of 7 feet near the outer end of the shoal 1.2 miles east-southeastward of the point; a fog signal is at the light; special radio direction-finder calibration service is provided; see Light List. The light is 1.5 miles due west of a point on the bay ship channel 124.2 miles above the Capes.

Selby Bay, on the southwest side of South River 1.7 miles above the mouth, has general depths of 8 to 11 feet. The south end of the bay is shallow and heavily covered with grass. The channel to **Selby Beach,** on the northwest side of the bay, is marked by lights and a daybeacon. **Ramsay Lake** has a narrow entrance from the south end of Selby Bay; depths are about 2 feet in the entrance and 7 to 8 feet in the lake. The fixed highway bridge over the Selby Bay entrance to the lake has a width of 20 feet and a clearance of 10 feet.

The small-craft facilities on the east side of Selby Bay and in Ramsey Lake can provide gasoline, water, berths, and marine supplies; hull and engine repairs can be made. Largest haul-out capacities: lift, 12 tons, in Selby Bay; marine railway, 42 feet, and lift, 15 tons, in Ramsey Lake.

Brewer Creek, on the southwest side of South River 3 miles above the mouth, has depths of 12 feet in the entrance but only depths of 2 feet reported through the narrows 0.2 mile above the entrance. The narrows connect Brewer Creek with **Pocahontas Creek** to the southward. Gasoline, some diesel fuel, water, berths, and marine supplies are available in Pocahontas Creek; hull and engine repairs can be made. Largest haul-out capacities: marine railway, 50 feet; lift, 12 tons.

Glebe Creek, on the southwest side of South River 3.5 miles above the mouth, has depths of 15 to 11 feet for a mile. Care should be taken to avoid the 2-foot shoal in the center of the creek 0.3 mile above the entrance. Gasoline, diesel fuel, water, berths, and marine supplies are available in the cove on the north side of the creek just inside the entrance. Hull and engine repairs can be made; marine railway, 55 feet.

The highway bridge at **Edgewater,** 5 miles above the mouth of South River, has a swing span with a clearance of 13 feet; see **117.245 (a) through (e), and (f) (10),** Chapter 2, for drawbridge regulations and opening signals. **Storm warning signals are displayed;** see chart.

Gingerville Creek, on the north side of South River, extends along the westerly side of Edgewater. The creek has depths of 6 feet for 0.7 mile, nearly to the head.

There are small-craft facilities at Edgewater, and in Warehouse Creek, on the south side of the river opposite Edgewater. Gasoline, diesel fuel, water, berths, and marine supplies are available at all the facilities, except for diesel fuel in Warehouse Creek. Hull and engine repairs can be made. Largest haul-out capacities: lift, 35 tons, at Edgewater; marine railway, 50 feet and lift, 2 tons, in Warehouse Creek.

Beards Creek, on the south side of South River 5.7 miles above the mouth, has depths of 15 to 8 feet for a mile; a shallow spit extends halfway across the entrance from the point on the northwest side. The highway bridge at **Riva,** 6 miles above the mouth of South River, has a fixed span with a clearance of 25 feet. Water, berths, and some marine supplies are available at Riva. Hull and engine repairs can be made; marine railway, 50 feet.

Fishing Creek, immediately northward of the entrance to South River, has depths of 7 to 4 feet. A privately dredged channel leads from Chesapeake Bay to the Annapolis Coast Guard Station wharf on the northeast side of the creek. In 1970, the marked channel had a reported controlling depth of 6 feet.

Chart 566.—Severn River, the approach to Annapolis, empties into Chesapeake Bay 127 miles above the Virginia Capes. Commercial traffic consists chiefly of petroleum products, and some fish and shellfish. Naval craft and many pleasure craft use the river.

The river has main channel depths of 17 feet or more from the entrance to Annapolis, thence 15 feet or more for 8 miles, thence 11 to 7 feet for 2 miles to within a mile of the head. The channel is well marked as far as Annapolis, above which it is marked at the critical points and is easy to follow.

The mean range of tide is 0.9 foot, and is greatly influenced by winds. The current velocity seldom exceeds 0.5 knot. Ice rarely interferes with navigation except in severe winters, and then only for a short time.

Chart 385.—The entrance to Severn River is between **Tolly Point** and Greenbury Point, 2 miles

to the northward. **Tolly Point Shoal,** with depths of 4 to 5 feet, extends a mile east-southeastward from the point; it is marked at its outer end by a lighted buoy.

A sunken wreck in 20 feet of water, is in the entrance channel, about 550 yards northwestward of Severn River Channel Lighted Bell Buoy 2.

The entrance to **Lake Ogleton** is on the southwest side of Severn River 0.8 mile above Tolly Point. The lake has depths of 5 to 9 feet, but the narrow entrance, marked by lights and daybeacons, has only about 3 feet. A charted foul area is close southward of Daybeacon 3. The small private wharves along the shore of the lake are used mostly for mooring pleasure craft.

Greenbury Point is on the north side of the entrance to Severn River. The tall towers of the naval radio station on the point are prominent from up and down the bay; each tower has a flashing red light on top and fixed red lights on the sides. Most prominent is the lighted 869-foot high radio tower, about 1.3 miles north-northwestward of Greenbury Point. A light and fog signal mark the shoal extending 0.4 mile south of the point. A 3-foot depth at the outer tip of the shoal is 250 yards westward of the light and only 100 yards northeastward of the buoyed entrance channel.

A naval deep-draft **anchorage area** is southeast of Greenbury Point, and several smaller naval anchorages and prohibited anchorage areas are west and northwest of the point; see **110.159,** Chapter 2, for limits and regulations.

The entrance to **Carr Creek** is northwest of Greenbury Point. The creek has depths of 9 feet over the unmarked entrance bar and deeper water through a narrow channel inside. A naval rifle range is on the west side of the entrance to the creek. Mariners are warned to keep out of the creek when the red flag is flying from **Carr Point** or the next point southward.

Back Creek, on the southwest side of Severn River 0.7 mile above the mouth, has depths of 7 to 9 feet for most of its 1-mile length. A light marks the outer end of the breakwater on the south side of the entrance, and a light and a daybeacon mark the south side of the narrow entrance channel. The creek is used by fishing boats and pleasure craft. Most of the berthing and repair facilities are at **Eastport** along the north side of the creek; largest haul-out capacities: railway, 50 feet; lift, 25 tons. Gasoline, diesel fuel, and supplies are available.

Spa Creek, on the southwest side of Severn River 1.4 miles above the mouth, has depths of 13 feet in the entrance channel, thence 10 feet to the highway bridge, and thence 10 to 6 feet for 0.7 mile to near the head. Drafts of vessels using the creek are mostly 10 feet or less. The highway bridge from Eastport to Annapolis, 0.4 mile above the entrance, has a 40-foot bascule span with a clearance of 15 feet; see **117.311,** Chapter 2, for drawbridge regulations and opening signals.

Annapolis, the capital of Maryland, is on the north side of Spa Creek. The **U.S. Naval Academy** occupies the entire northeastern part of the city between Spa Creek and College Creek, 0.7 mile to the northwestward. **Storm warning signals are displayed;** see chart.

Annapolis is a **customs** port of entry. Customs, **quarantine, agriculture quarantine,** and **immigration** inspectors come from Baltimore when needed.

A Coast Guard **documentation office** is in Annapolis; see Appendix for address.

The Naval Academy basin, on the Severn River side of Annapolis, has depths of 13 feet, and the Spa Creek waterfront almost to Market Slip, has depths of 4 to 10 feet alongside the bulkhead and wharves.

A **restricted area** is off the Naval Academy basin; see **207.117,** Chapter 2, for limits and regulations.

Market Slip, 250 yards below the north end of the Spa Creek highway bridge, is 250 yards long and 40 yards wide, with depths of 10 to 8 feet; the slip is open to the public and is used extensively by small craft.

Extensive marine facilities are on both sides of Spa Creek above and below the bridge. Gasoline, diesel fuel, water, berths, and marine supplies are available. Most of the boatyards are on the south, or Eastport, side of Spa Creek; hull and engine repairs can be made. Largest haul-out capacities: marine railway, 120 feet; lift, 75 tons.

The **U.S. Navy Marine Engineering Laboratory** is part of the Government reservation extending from Carr Creek along the eastern shore of Severn River for about a mile to **Ferry Point.** The small-boat basin, 0.4 mile westward of Carr Creek, can be entered only in an emergency. See **207.116,** Chapter 2, for limits and regulations of the **restricted area** extending off the piers north of the basin.

College (Dorseys) Creek, on the southwest side of Severn River 2.1 miles above the mouth, has depths of 11 to 8 feet for most of its 1-mile length; the best water in the entrance is along the south side. A fixed footbridge, three drawbridges, and two fixed bridges cross the creek from Annapolis on the southeast bank to **West Annapolis** on the northwest bank. The drawspans are secured in a fixed position; see **117.245 (a), and (f) (8),** Chapter 2, for drawbridge regulations. The bridges have a minimum width of 40 feet and a clearance of 5 feet. An overhead power cable with a clearance of 70 feet crosses the mouth of the creek.

The highway bridge, 2.4 miles above the mouth of Severn River, has a bascule span with a clearance of 12 feet. The railroad bridge 3 miles above the mouth has a swing span with a clearance of 6 feet. Drawbridge regulations and opening signals for these bridges are given in **117.310,** and in **117.240,** Chapter 2, respectively.

Chart 566.—Weems Creek (39°00.0'N., 76°30.1'W.), on the southwest side of Severn River 3.2 miles above the mouth, has depths of 13 feet for 0.8 mile, thence 11 to 7 feet for 0.3 mile to near the head. A shoal extends 300 yards eastward from the point on the north side of the entrance, and is marked by a buoy. The highway bridge 0.5 mile above the entrance has a swing span with a width of 28 feet and a clearance of 5 feet; see **117.245 (a) through (e) and (f) (9),** Chapter 2, for drawbridge regulations and opening signals. The fixed highway bridge about 500 feet above the drawbridge has a clearance of 28 feet.

The fixed highway bridge over Severn River, 3.5 miles above the mouth, has a clearance of 80 feet at the center span.

Round Bay, an expansion of Severn River beginning 6 miles above the mouth and continuing for 2 miles, has depths of 17 to 23 feet, and is traveled extensively by motorboats. **Little Round Bay,** west of Round Bay, has depths of 17 to 19 feet, and is marked by daybeacons. Depths of 4 feet can be carried to a boatyard in **Browns Cove,** behind **St. Helena Island.** Gasoline and some supplies can be obtained. Repairs are made; lift, 12 tons.

Forked Creek, on the north side of Severn River 9 miles above the mouth, has depths of 16 to 10 feet for most of its 0.4-mile length. The marine service pier in the creek has depths of 8 feet at the outer end; gasoline and some supplies are available. A yacht yard has berths and does repair work on small craft; marine railway, 50 feet.

There is a small-boat basin on the east side of Severn River, 11 miles above the mouth, where gasoline and some supplies are available. The controlling depth to the basin is about 3 feet.

Charts 385, 566.—Whitehall Bay, on the west side of Chesapeake Bay, is between Greenbury Point (38°58.5'N., 76°27.3'W.) and **Hackett Point,** 1.5 miles to the northeastward. The bay has general depths of 13 to 6 feet. The entrance channel is about 300 yards wide between **Whitehall Flats** on the west and **North Shoal** on the east, both with depths of 3 to 4 feet; a light marks the western limit of North Shoal. A fish haven, marked by a buoy, is about 1 mile eastward of Hackett Point.

Mill Creek, which empties into the northwest corner of Whitehall Bay, has depths of 2 feet over the bar across the privately buoyed entrance, thence 7 to 14 feet for 1.5 miles to near the head. With local knowledge, 6 feet can be carried in the narrow, crooked entrance channel. Gasoline is available at a pier 0.7 mile above the entrance. A marine railway, 1.3 miles above the entrance, can haul-out boats up to 50 feet in length. Gasoline and water are available just west of the railway.

Whitehall Creek, which empties into the northeast corner of Whitehall Bay, has depths of 9 to 13 feet for 1.5 miles, then shoals gradually to 1-foot at the head 0.5 mile farther up. The narrow, crooked entrance channel is marked by buoys and daybeacons. In 1967, shoaling to 5 feet was reported in the channel between buoys 4 and 5. Gasoline is available at the entrance to a cove on the west side, 0.9 mile above the mouth; a marine railway can haul out boats up to 40 feet in length for repairs. The marine service pier on the northeast side of Whitehall Creek, 1.4 miles above the entrance, has depths of 10 feet at the outer end; gasoline and some supplies are available. The marine railway at the pier can handle boats up to 50 feet in length for repairs.

Meredith Creek, in the northeast corner of Whitehall Bay just eastward of Whitehall Creek, has depths of about 2 feet in a very narrow entrance, thence 10 to 7 feet for 0.7 mile, then shoals gradually to 1 foot at the head, 0.6 mile farther up. Local knowledge is necessary to carry more than 2 feet through the entrance.

The **William P. Lane Jr. Memorial (Chesapeake Bay) Bridge** (see also charts 550 and 1225), 130 miles above the Virgina Capes, is 3.7 miles long from shore to shore; the western end is 0.5 mile southwestward of Sandy Point, and the eastern, or Kent Island end, is 4 miles south-southwestward of Love Point.

The suspension span over the main channel 1.4 miles from the western end of the bridge has a width of 1,533 feet and a clearance of 187 feet. Flashing red aero lights are mounted on top of the two suspension towers. Three fixed white lights are mounted vertically at the center of the main channel span over fixed green range lights. Fog signals are mounted on the south and north sides of the bridge at the center of the main channel span.

The fixed span over the secondary channel 1.2 miles from the eastern end of the bridge has a width of 708 feet and a clearance of 58 feet. The center of the span is marked by a range of two green lights. A fog signal is at the span center.

Red lights mark the ends of the bridge piers, except those adjacent to the main channel, between points 0.3 mile from the western end and 1 mile from the eastern end. Lighted buoys mark the main channel on either side of the bridge. The abandoned Sandy Point-Matapeake Ferry Terminal is just south of the west end of the bridge. Mariners are permitted to tie up at the old slips in case of emergency. The north half of the terminal is State owned; the south half is privately owned. Depths of about 10 feet can be carried into the slips.

In 1970, a fixed highway bridge was under construction parallel to and 450 yards northward of the William P. Lane Jr. Memorial Bridge. The new

bridge will have the same clearances as the William P. Lane Jr. Memorial Bridge.

Sandy Point Shoal Light (39°01.0′N., 76°23.1′W.), 51 feet above the water, is shown from a red brick house with white roof, on a brown cylinder pier in depths of 7 feet 0.4 mile northeastward of Sandy Point. A fog signal is sounded at the light. The light is 0.5 mile due west of a point on the bay ship channel 131.5 miles above the Capes.

Storm warning signals are displayed; see chart.

Baltimore Light (39°03.5′N., 76°24.0′W.), 52 feet above the water, is shown from a white, octagonal, brick house on a brown cylinder pier, in depths of 22 feet, 2.5 miles north of Sandy Point.

Magothy River (see also chart 549), on the west side of Chesapeake Bay 1.7 miles westward of Baltimore Light, has depths of 10 feet or more for 6 miles, thence 4 feet for 0.5 mile to within 0.2 mile of a fixed highway bridge. There are many excellent anchorages in the numerous tributaries, and the area is a favorite cruising ground for pleasure craft. The critical points along the lower half of the channel in Magothy River are marked.

The entrance to Magothy River is between **Persimmon Point** and Mountain Point, 0.4 mile to the north-northeastward. **Mountain Point,** the southernmost extremity of **Gibson Island,** is a sandy spit making out from a high wooded bluff. The current velocity is 0.6 knot on the flood and 0.3 knot on the ebb in the entrance to Magothy River.

A **dumping ground** is located in Chesapeake Bay about 4.4 miles east-southeastward of the entrance to Magothy River, see **205.20,** Chapter 2, for limits and regulations.

Deep Creek, marked through the entrance, is on the south side of Magothy River 0.5 mile above the mouth. The creek has depths of 7 to 5 feet for 0.6 mile to near the head. Gasoline, water, berths, and some marine supplies are available at marinas in the creek. Hull and engine repairs can be made; lift, 5 tons.

Sillery Bay, on the north side of Magothy River along the west side of Gibson Island, has general depths of 8 to 13 feet. The bay is the approach to Magothy Narrows and the harbor on the north side of Gibson Island; the eastern shore of the island is connected with the mainland on the north by a causeway.

The marked channel through **Magothy Narrows** has depths of about 10 feet, and there are depths of 9 to 10 feet in Inner Harbor. The Gibson Island Yacht Club has facilities in Inner Harbor. **Storm warning signals are displayed;** see chart.

A marine service pier on the east side of the entrance to **Redhouse Cove,** at the west end of Inner Harbor, has depths of 9 feet at the outer end; gasoline and some supplies are available. The boatyard can haul-out craft up to 50 feet in length for repairs.

Cornfield Creek, which flows into the eastern end of Magothy Narrows, has depths of 7 feet nearly to its head. Gasoline, diesel fuel, water, berths, and some marine supplies are available just above the mouth. Hull and engine repairs can be made.

Grays Creek, in the northwest side of Sillery Bay, has depths of about 3 feet over the entrance bar through a narrow channel which leads to deeper water inside the creek. A daybeacon is on the north side of the channel. A boatyard just inside the north prong has gasoline, water, berths, and some marine supplies. Hull and engine repairs can be made; marine railway, 40 feet; lift, 3 tons.

Broad Creek, marked by a daybeacon on the east side off the entrance, is on the north side of Magothy River 2.5 miles above the mouth. The creek has depths of 9 feet or more to a marina in the upper end of the creek. Water and berths are available.

Blackhole Creek, on the north side of Magothy River 3.5 miles above the mouth, has depths of 7 feet in a narrow marked entrance channel, and 5 or more feet almost to the head. A special small-vessel **anchorage area is in the cove on the west side of Blackhole Creek 0.2 mile above the** entrance; see **110.1** and **110.72,** Chapter 2, for limits and regulations.

Mill Creek and Dividing Creek have a common entrance on the south side of Magothy River, 3.8 miles above the mouth. Depths of 8 to 12 feet can be carried in both creeks for about 0.3 mile. A small-craft facility just inside Mill Creek has gasoline, water, berths, and marine supplies. Hull and engine repairs can be made; marine railway, 45 feet; lift, 25 tons.

Cypress Creek is on the southwest side of Magothy River 4 miles above the mouth. The creek is entered by a narrow, marked dredged channel. In 1966, the channel had a controlling depth of 7 feet. Depths of 9 feet are inside the creek, with gradual shoaling to the flats at the head. Gasoline, diesel fuel, water, berths, and some marine supplies are available on the north side of the entrance. Hull and engine repairs can be made at a boatyard on the east side of the creek just inside the entrance; marine railway, 45 feet; lift, 5 tons.

Gasoline, water, berths, and marine supplies are available on the southwest side of Magothy River, 5 miles above the mouth; minor repairs can be made; lift, 10 tons.

14. CHESAPEAKE BAY, EASTERN SHORE

This chapter describes the eastern shore of Chesapeake Bay from Cape Charles to Swan Point, about 6 miles northward of the entrance to Chester River, and several bodies of water and their tributaries that empty into this part of the bay. Included are Pocomoke Sound, Pocomoke River, Tangier Sound, Wicomico River, Nanticoke River, Little Choptank River, Choptank River, Eastern Bay, and Chester River, and the off-lying islands of Tangier, Smith, Hooper and Tilghman.

Also described are the ports of Cape Charles, Pocomoke City, Tangier, Crisfield, Salisbury, Easton, Cambridge, St. Michaels, and several smaller ports and landings.

Storm warning display locations are listed on the NOS charts and shown on the Marine Weather Services Charts published annually by the National Weather Service.

Charts 1222 to 1226.—The Eastern Shore of Chesapeake Bay, from Cape Charles to Chester River, is mostly low and has few prominent natural features. The mainland and the islands are subject to erosion, and many of the islands and points have completely washed away. **Fishtrap** limits are shown on the charts and usually are marked by black and white horizontal-banded buoys. In the tributaries of Pocomoke Sound, **ice** sufficient to interfere with the navigation of small vessels may be encountered at any time from January through March. The ice from Pocomoke Sound does not interfere with the larger vessels in the bay, but the smaller oyster and fishing boats frequently are held up and sometimes require assistance, especially in Kedges and Hooper Straits.

Chart 563.—Wise Point (38°07.0′N., 75°58.3′W.), the mainland tip of Cape Charles, is included in Chapter 9, which also describes Fishermans Island, Cape Charles Light on Smith Island, and the Atlantic entrance to Chesapeake Bay.

Kiptopeke Beach, 3.2 miles northward of Cape Charles, is the site of a former ferry terminal. The offshore breakwaters are obsolete ships filled with sand and sunk end-to-end. Just northward of the abandoned terminal is **Butlers Bluff,** which has steep bare faces conspicuous from the bay.

Old Plantation Creek, 7 miles northward of Cape Charles, has depths of about a foot. Many of the bars and middle grounds are marked by discolored water and the channel usually is marked by bush stakes, but it is narrow and difficult to navigate without local knowledge. The opening in the thick woods at the mouth is visible from outside. No supplies are available along the creek.

Old Plantation Flats Light (37°13.7′N., 76°02.8′W.), 35 feet above the water, is shown from a red and white checkered diamond daymark on a square white house on piles in 10 feet on the north end of the flats, 1.5 miles from shore; a fog signal is at the light. The current velocity is about 1.3 knots 0.5 mile west of the light.

Cape Charles Harbor, 9 miles northward of Cape Charles, is a dredged basin on the north side of the town of **Cape Charles.** A well-marked dredged channel just north of Old Plantation Flats Light leads to the harbor between a sand mole on the south and a stone jetty on the north. Two small dredged basins are eastward of the main harbor basin. The northerly basin is known as the Harbor of Refuge, and the southerly basin as Mud Creek Basin. In 1966–1967, the dredged channel to Cape Charles Harbor had a midchannel controlling depth of 17 feet, with depths of 17 to 18 feet in the harbor basin; In October-November 1969, depths of 7 feet were available in the Harbor of Refuge basin, and 7 feet in Mud Creek Basin in 1967.

The mean range of tide is 2.4 feet at Cape Charles. The tidal currents set across the entrance to the dredged channel, but farther north they follow the general direction of the axis. The channel is exposed to westerly winds but is partially protected by the flats to the westward, and seldom is too rough for motorboats. Navigation is not hindered by ice. Because of the limited space in the channel and harbor, the larger vessels and tows occasionally are somewhat of a hazard to small boats.

Cape Charles is a **customs** port of entry. The U.S. Coast Guard maintains a vessel **documentation office** in town; see Appendix for address.

Cape Charles Harbor, owned by and a terminus of the Penn Central Railroad, is open to the public. The railroad operates floats to Little Creek. Small craft seeking shelter in the harbor should moor so as not to interfere with the railroad vessels. The larger vessels load and discharge at a 500-foot wharf on the south side of the harbor; in 1970, depths of about 15 feet were reported alongside the wharf. Fishing vessels and small craft moor in the Harbor of Refuge and Mud Creek Basin. Gasoline, diesel fuel, and water are available in the Harbor of Refuge; some marine supplies can be obtained in town.

Cherrystone Channel is a passage inside Old Plantation Flats that leads from deep water 2 miles south-southeastward of Old Plantation Flats Light northward of Kings Creek and Cherrystone Inlet. The route follows part of the dredged channel to Cape Charles Harbor for about a mile. That part of Cherrystone Channel southward of the dredged

channel to Cape Charles Harbor is unmarked and little used. Cherrystone Channel above Cape Charles Harbor is marked by lights and daybeacons to the vicinity of **Cherrystone Island.** This part of the channel has depths of about 10 feet, but is narrow in places and local knowledge is required to carry the best water. The recommended southerly approach to Kings Creek and Cherrystone Inlet is via the marked dredged channel to Cape Charles Harbor, which was discussed earlier in this chapter.

Kings Creek, about 1 mile northward of Cape Charles Harbor and eastward of Cherrystone Island, has depths of 3½ feet for a mile upstream. The shoal that extends out from the north side of the entrance bares at low water; lights and daybeacons mark the entrance. The creek is used extensively by fishermen and pleasure craft. Gasoline, berths, and some marine supplies are available at marinas just inside the entrance; a marine railway can haul out boats up to 60 feet in length for minor repairs.

Cherrystone Inlet, which extends northeastward from Cherrystone Island, has depths of 5 feet for 2 miles, thence 4 to 2 feet to the upper end. The channel in the inlet sometimes is marked by bush stakes, but it is narrow and difficult to navigate without local knowlege.

Boats bound for Kings Creek or Cherrystone Inlet can leave the Cape Charles Harbor channel west of the jetty on the north side of the harbor entrance and proceed northward in marked Cherrystone Channel. Depths of 2 to 4 feet over the flats that extend southward for 2 miles along the west side of Cherrystone Channel from Cherrystone Island limit the draft that can be carried over that area from westward and northwestward. The area between Cherrystone Island and **Wescoat Point,** 0.3 mile to the northward, bares at low water.

Chart 564.—Hungars Creek and **Mattawoman Creek** have a common outlet (37°23.7′N., 75°59.4′W.) to the bay 8 miles northward of Cape Charles Harbor (see chart 563). Both creeks are marked by bush stakes, but are difficult to follow without local knowledge.

Hungars Creek extends about 4 miles in a northeasterly direction to **Bridgetown.** Depths of 3 feet are available in the narrow entrance channel, marked by lights, thence decreasing to 1 foot to Bridgetown where supplies can be obtained.

Mattawoman Creek extends about 2 miles in a southeasterly direction and has several branches at its head. The best approach is to follow the lights at the entrance of Hungars Creek to the light off **Wilsonia Neck,** then follow the bush stakes southeastward and southward along the shore. The controlling depth is about a foot to the head of navigation. The overhead power cables near the head of the creek have a minimum clearance of 33 feet.

A **danger zone** for naval firing begins about 12 miles north-northwestward of Cape Charles Harbor and extends northward to Tangier Sound Light; see **204.46,** Chapter 2, for limits and regulations.

Nassawadox Creek, 13 miles northward of Cape Charles Harbor and about 5 miles northward of the entrance to Hungars Creek and Mattawoman Creek, extends about 5 miles to the northeast. The controlling depth across the bar is about a foot, thence 4 feet for 4 miles upstream. The entrance channel is marked by a buoy and a light, and bush stakes mark the inside channel, but local knowledge is necessary to carry the best water. An overhead power cable with a clearance of 38 feet crosses the creek about 3 miles above the mouth. The flats on either side of the entrance are nearly bare at low water, are covered by marsh grass in the summer, and are usually well defined. The mean range of tide is 1.8 feet. **Bayford,** on the southeast side of the creek 1.5 miles above the mouth, has a wharf and a store. The several creeks that branch off from Nassawadox Creek have depths of 3 feet or less.

Occohannock Creek (37°33.0′N., 75°56.3′W.) flows into Chesapeake Bay from eastward 18 miles northward of Cape Charles Harbor; a fixed bridge 5.4 miles above the entrance is the head of navigation. The centerline controlling depth is 5 feet to **Morley Wharf,** on the south side 4 miles above the entrance, with lesser depths to the fixed bridge. The mean range of tide is 1.7 feet.

The channel over the bar of Occohannock Creek is marked by lights and daybeacons, but it is narrow and tortuous, and difficult to navigate without local knowledge. The channel within the creek also is narrow, but the ends of the shoals are marked by daybeacons all the way to Morley Wharf.

Nandua Creek, 23 miles northward of Cape Charles Harbor and about 5 miles northward of Occohannock Creek, is entered through a dredged channel which leads across the bar to the mouth of the creek. In 1965, the controlling depth was 5 feet in the bar channel. Depths of about 4 feet can be carried in the creek channel to the wharf in ruins at the settlement of **Nandua,** 3 miles above the mouth. The mean range of tide is 1.7 feet. The bar channel, marked by a light and daybeacons, is narrow and shifting; local knowledge is required to carry the best water. The shoals at the entrance usually can be distinguished by the difference in color of the water, except in rough weather when the water is clouded. Daybeacons mark the critical parts of the channel to Nandua.

Back Creek, on the north side of Nandua Creek, a mile above the mouth, has depths of 3 feet to the village of **Hacks Neck** where some supplies are available.

Pungoteague Creek, 3 miles northeastward of Nandua Creek, has depths of 8 feet to the pier at **Harborton,** 2 miles above the mouth, and thence 4 feet to the ruins of **Boggs Wharf,** 3 miles above the

mouth. Above this point the creek shoals rapidly. The entrance and inside channel are marked as far as Harborton. The mean range of tide is 1.7 feet. Barges load pulpwood at Harborton for delivery to West Point on York River.

Chart 568.—Onancock Creek (37°43.4′N., 75°51.1′W.), 38 miles north of Cape Charles, has considerable traffic in petroleum products and fertilizers. A marked dredged channel leads across the entrance bar and up the creek to **Onancock,** 4.3 miles above the mouth. In March-April 1970, the controlling depths were 11 feet for a midwidth of 100 feet across the bar, thence 11 feet for a width of 100 feet to Onancock. The mean range of tide is 1.8 feet.

A boatyard at **Poplar Cove Wharf,** 2.3 miles above the mouth of Onancock Creek, can haul out boats up to 40 feet in length for repairs. Gasoline can be obtained.

The anchorage basin in the entrance to **Titlow Creek,** just below Onancock, had depths of 5 feet in March 1970; **North Branch,** on the north side of Onancock, had depths of 11 feet to the end of a turning basin 0.2 mile above the junction with Onancock Creek in March 1970; **Joynes Branch,** on the south side of Onancock, had depths of 6 feet to the first bridge in May-August 1968.

Water and electricity are available at the public dock at Onancock. Gasoline and marine supplies can be delivered.

Chesconessex Creek, 2 miles northward of Onancock Creek, has depths of 8 feet in the approach channel and for a mile above the mouth to the middle of **Tobacco Island,** thence 4 feet to **Chesconessex,** 2 miles above the mouth, and 2 feet for 0.4 mile above the town. The creek is used by small local boats.

The approach to Chesconessex Creek from eastward of Watts Island Light is marked by buoys and a light; the channel above the entrance is marked by daybeacons and sometimes bush stakes. Gasoline is available at Chesconessex; a marine railway can haul out craft up to 30 feet in length for minor hull repairs.

The southern and main entrance to **Pocomoke Sound,** between the southern end of **Watts Island** and **Beach Island Shoal Light (37°47.8′N., 75°50.3′W.), is 40 miles northward of Cape Charles. Extensive flats occupy most of the sound. A channel, wide and deep at the entrance but comparatively shallow in its most northerly part, leads to Pocomoke River, the most important tributary.**

The shores of Pocomoke Sound are low and without prominent natural landmarks. The critical points along the main channel between the entrance and the mouth of Pocomoke River are marked by lights and buoys. The Virginia-Maryland boundary line is marked by white spar buoys and buoys with orange and white bands.

The sound is used by many local oyster and fishing boats and by some tugs and barges. Small boats can enter from northwestward in Tangier Sound by way of Broad Creek, which is discussed later. The mean range of tide is about 2 feet in Pocomoke Sound; for current predictions, see the Tidal Current Tables.

A string of marshy islands and large shoals separates the lower part of Pocomoke Sound from Tangier Sound on the westward. Watts Island, southernmost of the string, is marshy and wooded. Watts Island Rocks Light is 0.6 mile south-southwestward of the island.

Little Fox Islands, 5 miles northward of the entrance, are bare and marshy; the flats between these islands and Watts Island are very shallow and cannot be navigated without local knowledge. **Great Thorofare,** just northward of Little Fox Islands, has depths of 2 feet and is sometimes used by local boats.

Great Fox Island, 6 miles northward of the entrance to Pocomoke Sound, consists of a group of low islands, the northeasternmost of which is marked by a large building.

Just north of Beach Island Shoal Light (37°47.8′N., 75°50.3′W.), a crooked tributary marked channel with depths of 8 feet or more leads between shallow flats for 5 miles into a dredged channel of Deep Creek. In March-April 1969, the controlling depth in the dredged channel to the turning basin at the town of **Deep Creek,** a distance of about 2.3 miles, was 4 feet, thence 3½ feet in the basin. The channel is marked by lights and daybeacons.

Deep Creek is used only by small local boats, many of which enter from Hunting Creek on the eastward by way of **The Notch,** a passage behind the 1.5 mile chain of islands which separates the outer parts of the two creeks; the controlling depth in The Notch is about 2 feet; the channel is marked by bush stakes.

Gasoline and supplies are obtainable at Deep Creek; diesel fuel is delivered by truck. A boatyard can haul out vessels up to 50 feet in length for minor repairs.

Another tributary channel, 3.5 miles northeastward of Beach Island Shoal Light, leads to **Hunting Creek** along the south side of **Guilford Flats** and southward through **The Thorofare** to the wharf at **Hopkins** on the east side of Hunting Creek, 2.5 miles above the mouth. The marked channel has depths of 7 feet or more to within 0.7 mile of Hopkins, thence 2½ feet to the wharf.

Guilford Creek is 2.5 miles northeastward of Hunting Creek, with which it has a common approach from the main channel as far as the inner buoy on the south side of Guilford Flats. The channel to Guilford Creek continues eastward along the flats, then turns northeastward and rounds a light off the mouth of the creek; the total

distance from the main channel is about 8 miles and depths are 8 feet or more all the way. Within Guilford Creek the depths are 6 to 2 feet.

Messongo Creek empties into the east side of Pocomoke Sound 8 miles northeast of Beach Island Shoal Light. The marked approach to Messongo Creek is from west-southwestward. Depths of 7 feet at the mouth of the creek shoal gradually to about 1 foot at the village of **Marsh Market,** 2.5 miles above. The creek is used only by small local boats.

Starling Creek is on the southeast side of Pocomoke Sound 9 miles northeast of Beach Island Shoal Light. A dredged channel, marked by lights and daybeacons, leads from the sound to a harbor basin on the north side of the creek. In May-June 1970, the controlling depth was 3 feet to the basin, thence 6½ feet in the basin. **Saxis,** on the northeast side of the creek, is the center of a considerable shellfish industry. Gasoline can be obtained at the bulkhead and some groceries are available in the town.

Charts 568, 1224.—Pocomoke River flows into the northeast end of the Pocomoke Sound 15.5 miles above Beach Island Shoal Light. The river carries a large amount of petroleum products and fertilizer, and some fish products. The buoyed approach through Pocomoke Sound has depths of 7 feet or more for 12.5 miles above the southern entrance, then the route passes through a marked cut with a controlling depth in 1961-1966, of 5 feet for 3 miles to the mouth of Pocomoke River. The cut is subject to continual shoaling and lesser depths may be found, particularly on the southerly side of the channel.

Pocomoke River has depths of 7 feet or more from the mouth for 14 miles to Pocomoke City, thence 5 feet or more for 12 miles to Snow Hill. Navigation is easy for 20 miles, but the remainder of the channel to Snow Hill is narrow and requires local knowledge to carry the best water. The mean range of tide is 2.4 feet at Shelltown and 1.6 feet at Pocomoke, but is considerably affected by winds. Freshets cause a rise of 1 to 5 feet at Snow Hill, but are not dangerous. The water is fresh above **Rehobeth,** 7.5 miles above the mouth.

Shelltown is a village on the west bank of Pocomoke River a mile above the mouth. Gasoline and some supplies can be obtained in the village. The landing is in poor condition.

Pocomoke City, on the east bank 14 miles above the mouth, has bus and rail communication, and all kinds of supplies. The bulkhead landings are in poor condition. The railroad bridge over the river at Pocomoke City has a swing span with a clearance of 4 feet; the best water is in the western opening. The overhead power cable 0.3 mile below the bridge has a clearance of 137 feet. The highway bridge 0.5 mile above the railroad bridge has a bascule span with a clearance of 3 feet; see **117.240,** Chapter 2, for drawbridge regulations and opening signals. The fixed highway bridge a mile above the railroad bridge has a clearance of 35 feet.

A dredged channel about 22 miles above the mouth of Pocomoke River leads southerly from the river to **Shad Landing State Park;** a marina and turning basin are at the head of the channel. In January 1967, the controlling depth in the channel and turning basin was 6 feet. The channel is marked by privately maintained buoys. Gasoline and some supplies are available.

Snow Hill, the town on the east bank 26 miles above the mouth, has rail freight service. The highway bridge just above the wharves has a 40-foot bascule span with a clearance of 2 feet; see **117.245 (a) through (e) and (f) (17),** Chapter 2, for drawbridge regulations and opening signals. An overhead power cable just above the bridge has a clearance of 61 feet. The river is navigable for 2 miles above the bridge. Gasoline and some supplies are available in the town.

A line of marshy islands and flats, with Tangier Island at the south end, separates Tangier Sound from Chesapeake Bay to the westward; the principal thorofares between the islands are Kedges and Hooper Straits. The **danger zones** south and west of Tangier Island have been described in Chapter 11.

Tangier Island is low, sparsely wooded in the middle, and bare on the north and south ends. **Tangier** is the village midway along the eastern side of the island; a church spire is prominent. Oystering, crabbing, and fishing are the principal industries. The island has telephone and motorboat communication with Crisfield.

Tangier Sound Light (37°47.3′N., 75°58.5′W.), 41 feet above the water, is shown from a white square tower on brown piles, in depths of 5 feet; a fog signal is at the light. The light is 53.3 miles above the Virginia Capes.

Tangier Sound, its main entrance a mile northeastward of Tangier Sound Light, affords a broad and deep channel extending the 28-mile length of the sound. Extensive flats border the sound, but the critical points are marked by lights and buoys.

The town of Tangier can be reached from either Chesapeake Bay or Tangier Sound through well-marked dredged channels. In August-September 1969, the controlling depths to the anchorage basin at Tangier were 7 feet from Chesapeake Bay and 8 feet from Tangier Sound; depths of 7 feet were available in the anchorage basin. **Note well** that the system of marking the channels is continuous from Chesapeake Bay eastward to Tangier Sound; entering from Chesapeake Bay, odd numbers are on the left and even numbers on the right. Gasoline, diesel fuel, and some marine supplies are available at Tangier; a marine railway here can handle craft up to 40 feet in length.

The flats between Tangier Island and Smith Island, on the north, are shallow and can be navigated only by very small boats at high water; a line of telephone poles extends across the flats from island to island.

Chart 555.—Smith Island consists of a large group of marshy islands separated by narrow thorofares; travel from place to place is mostly by boat. **Tylerton, Ewell,** and **Rhodes Point** are small villages along the interior channels; oystering and fishing are the principal industries. Gasoline and some supplies can be obtained at the villages. The island has telephone and motorboat communication with Crisfield. A marine railway at Rhodes Point can haul out boats up to 40 feet in length for hull repairs.

A well-marked 5-mile dredged channel extends from Tangier Sound through **Big Thorofare** to Ewell, thence northwestward in **Levering Creek** and again through Big Thorofare to Chesapeake Bay. In 1968-1969, the controlling depths were 5½ feet from Tangier Sound to Ewell Canal, thence 1 foot through the canal, thence 4½ feet in Levering Creek, and thence 9 feet to Chesapeake Bay. The eastern end of the channel is 11 miles north of Tangier Sound Light. An overhead power cable across the northwest end of Big Thorofare has a clearance of 25 feet. A marked channel leads southward from Big Thorofare through **Tyler Ditch** to Tylerton, about 1.7 miles above the entrance. In August 1970, the controlling depth was 6 feet for a midwidth of 40 feet in the dredged section of the channel, thence natural depths of about 5 feet to Tylerton. An overhead power cable across Tyler Ditch just north of Tylerton has a clearance of 72 feet.

Another marked dredged channel from Tylerton to Rhodes Point, in 1964-1965, had a controlling depth of 4 feet. An overhead power cable across the west end of the channel has a clearance of 57 feet. Local fishermen in shallow draft boats sometimes approach Tylerton from southward at high water, leaving the main channel in Tangier Sound 7 miles north of Tangier Sound Light and following the deeper water northward into Tyler Creek. The depth in the southern approach is about 4 feet. The channel is marked by daybeacons from the Maryland-Virginia boundary line to Tylerton.

Several thorofares with depths less than 3 feet lead westward from the interior of Smith Island into Chesapeake Bay; the principal thorofare leads to Rhodes Point and is marked on the north side of the bay entrance. Navigation of all these channels requires local knowledge.

Kedges Straits, between Smith Island on the south and uninhabited **South Marsh Island** on the north, is used by vessels bound from northward in Chesapeake Bay to points southward of Manokin River in Tangier Sound. The inner approach to the straits is about 16 miles north of Tangier Sound Light. A depth of 10 feet can be carried through the marked straits.

Holland Island Bar Light (38°04.1′N., 76°05.7′W.), 37 feet above the water, is shown from a white square house on brown piles in depths of 9 feet on the north side of the bay approach to Kedges Straits; a fog signal is at the light, which is 6.3 miles due east of a point on the bay ship channel 72.6 miles above the Virginia Capes.

Solomons Lump Light (38°02.9′N., 76°00.9′W.), 47 feet above the water, is shown from a white octagonal dwelling, with a square tower, on a brown cylinder, in depths of 7 feet on the Smith Island side of Kedges Straits; a fog signal is at the light.

The mean range of tide in Kedges Straits is 1.7 feet but it is affected considerably by winds. Easterly winds raise the water and northwesterly winds lower it sometimes as much as 2 feet below the normal level. In severe winters, floating ice makes navigation of the straits dangerous.

Holland Straits, on the north side of Kedges Straits between South Marsh Island on the south and **Bloodsworth Island** and other smaller uninhabited low marshy islands on the north, is generally shallow and should not be used without local knowledge. Sand bars obstruct the Chesapeake Bay side and patches of eel grass uncover in the Tangier Sound entrance on the lower tides. Bloodsworth Island is within a **danger zone** for naval firing and bombing. A **prohibited area,** within the danger zone and with a radius of 0.5 mile, is close off the western side of the island. See **204.36,** Chapter 2, for limits and regulations of the danger zone and prohibited area.

Hooper Strait, between Bloodsworth Island on the south and Hooper Islands and Bishops Head on the north, is the most northerly direct passage from Chesapeake Bay into Tangier Sound and is used by vessels bound from northward in the bay to tributaries at the north end of the sound. The inner approach to the strait is 27 miles north of Tangier Sound Light.

The narrow, crooked channel through Hooper Strait, in 1964-1965, had a controlling depth of 14 feet. The shoals on each side are well marked; strangers should have little difficulty if they pay close attention to the chart. **Hooper Strait Light (38°13.6′N., 76°04.5′W.),** 41 feet above the water, is shown from a red and white checkered diamond daymark on skeleton tower in depths of 9 feet midway along the north side of the channel; a fog signal is at the light. **Sharkfin Shoal Light (38°12.1′N., 75°59.2′W.),** 44 feet above the water, is shown from a red and white checkered diamond daymark on skeleton tower in depths of 7 feet on the south side of the approach from the main channel in Tangier Sound; a fog signal is at the light.

The mean range of tide is 1.7 feet at Hooper Strait Light and 2.2 feet at Sharkfin Shoal Light, but in the fall and winter continual northerly winds may lower the water as much as 2 feet below normal level. The current velocity is about 1.5 knots; the current floods eastward through Hooper Strait.

In the winter vessels navigating Hooper Strait are in danger from running ice.

Charts 555, 568.—Little Annemessex River. (37°58.0′N., 75°53.8′W.), the approach to the town of Crisfield, empties into Tangier Sound 10 miles north of Tangier Sound Light. The entrance to the river is 0.8 mile wide between **Great Point** on the south and **Island Point** on the north.

A fish haven is about 1.3 miles west-southwestward of Great Point.

The main extrance to Crisfield is through the well-marked dredged channel of Little Annemessex River. In 1968, the controlling depths were 12 feet to Light 13, thence 8 feet to Daugherty Creek Canal. The spur channel to the wharves at **Hop Point** has depths of 3½ feet, and the L-shaped channel and mooring basin 0.5 mile to the northward have depths of 7 feet.

The southerly approach to Crisfield from Pocomoke Sound, used extensively by oyster boats, is through crooked **Broad Creek;** in 1970, the controlling depth in the marked channel was 6 feet. The northerly approach from Big Annemessex River is through marked Daugherty Creek and through **Daugherty Creek (Annemessex) Canal;** in 1968, the controlling depth through the creek and canal was 8 feet, thence 8 feet to the Crisfield waterfront at Light 13. The tidal current floods northward in the canal and ebbs southward; the velocity is reported to be about 1.3 knots.

The mean range of tide in Little Annemessex River is 2 feet. The current velocity is 0.9 knot.

Jenkins Creek, which enters Little Annemessex River close northeastward of Broad Creek, is used by fishermen and crabbers. Depths of 3 feet can be carried 0.5 mile above the mouth of the creek, thence 2 feet for 0.5 mile farther to the highway bridge with a 16-foot fixed span and a clearance of 6 feet; small boats pass through the bridge to piers on the north shore.

Crisfield, on the east side of Little Annemessex River 2 miles above the mouth, is a fishery and seafood processing center. Waterborne commerce consists chiefly of seafood and petroleum products. The harbor is used by many oyster, fish, and crab boats with drafts of 2 to 6 feet. Small freight and passenger boats operate daily to Tangier and Smith Islands. **Storm warning signals are displayed;** see chart.

Crisfield is a **customs port of entry.** A vessel **documentation office** of the U.S. Coast Guard, and a **contract physician's office** of the U.S. Public Health Service are in town; see Appendix for addresses.

The Crisfield waterfront is largely built up with bulkhead wharves and timber piers, most of which are privately owned but open to the public on equal terms. Some of the terminals have mechanical freight-handling equipment, but most of the freight is transferred by hand. Depths at the wharves and piers range from 5 to 12 feet, the deepest being at the outer end of the railroad pier.

Somers Cove, a well protected basin on the south side of Crisfield, has a controlling depth of about 10 feet in the entrance channel and basin. It is necessary to make a sharp turn into the basin at the entrance light. A marina is on the north side and a Coast Guard station is on the south side of the cove.

Supplies, gasoline, and diesel fuel are available at Crisfield. The largest marine railway can haul out vessels up to 135 feet in length for repairs.

Chart 555.—Big Annemessex River (38°02.9′N., 76°52.3′W.) joins Tangier Sound 15 miles north of Tangier Sound Light. The river has depths of 8 feet for 4 miles, thence 5 feet for 1 mile, and thence 3 feet for 1 mile. The channel is marked as far as Colbourn Creek. The mean range of tide is 2.1 feet.

Daugherty Creek (Annemessex) Canal, already described, enters the south side of Big Annemessex River 1.3 miles above the mouth. **Jones Creek,** close eastward of the canal, has depths of 2 feet for about 1.5 miles above the mouth, but the channel is narrow, crooked, and unmarked.

Colbourn Creek, on the south side of Big Annemessex River 3.5 miles above the mouth, has depths of 4 feet for about 0.7 mile, thence 2 feet for 0.5 mile. Excellent storm anchorage with good holding ground is available in depths of 5 feet in midstream 0.3 mile above the entrance.

Manokin River, on the east side of Tangier Sound 16 miles north of Tangier Sound Light, is directly across the sound from Kedges Straits, described earlier. The entrance to the river is 3.5 miles wide between **Hazard Point** on the southeast and low **Little Deal Island** on the northwest, but is obstructed by numerous shoals.

The main channel of Manokin River is narrow and crooked, and favors the southeast shore. The channel has depths of about 9 feet to abeam of **St. Pierre Island,** on the north side 4 miles above the mouth, thence 6 feet to within 0.5 mile of **Locust Point,** on the northwest side 7 miles above the mouth, and thence 1 foot to **Princess Anne,** 15 miles upstream. The channel is marked to a point about 10 miles above the mouth. Gasoline can be obtained at **Inverness,** on the south side 6 miles above the mouth. The lower of the two fixed highway bridges, 14 miles above the mouth, has a clearance of 3 feet. The mean range of tide in Manokin River is 2.1 feet. Most of the piers and wharves along the river are in poor condition.

St. Peters Creek, used mostly by fishing boats, is on the north side of Manokin River 5.5 miles above the mouth. A marked dredged channel leads to a basin and public wharf a mile above the entrance. In 1966, the controlling depth was 6 feet. A gasoline pier and small store are near the wharf.

A marked dredged channel, 21 miles north of Tangier Sound Light, leads through **Lower Thorofare** between **Little Deal Island** and **Deal Island** to a mooring basin with bulkhead and several small piers at the fishing village of **Wenona.** In 1969, the controlling depth was 3½ feet in the channel, with depths of 5½ feet in the basin. Gasoline and some supplies can be obtained at the village.

Another marked dredged channel, 25 miles north of Tangier Sound Light, leads through the west end of **Upper Thorofare** to an anchorage basin at the north end of Deal Island. In June 1968, the channel had a controlling depth of 8 feet, and depths of 7 to 6 feet were available in the basin. A wreck with 2 feet over it lies in the northwest corner of the basin. The highway bridge across the north end of the thorofare has a 20-foot fixed span with a clearance of 10 feet. On the northwest side of the bridge is an overhead power cable with a clearance of 34 feet, but there is sufficient water for some high-masted vessels to drift close enough to touch the wires; extreme caution should be observed. A marina just east of the bridge has a marine railway that can haul out boats up to 40 feet in length. Gasoline and some supplies are available. Beyond the bridge, least depths are about a foot southeastward for 2.5 miles to Manokin River.

Chart 554.—Wicomico River flows into the north end of Tangier Sound eastward of the inner approach to Hooper Strait, described earlier, and 26 miles north of Tangier Sound Light. The entrance to Wicomico River is 1.5 miles wide between **Long Point** on the south and Nanticoke Point on the north. Waterborne commerce is largely in fish and shellfish, and fish by-products.

In 1962-1965, the controlling depths in the marked channel in Wicomico River were 12 feet from the entrance to **Bitter Head Point,** 19 miles above the mouth, thence in 1970, 12 feet to South Prong at Salisbury, except for shoaling to 2 feet in the north half of the channel about 100 yards southeast of Light 47.

Great Shoals Light (38°12.8′N., 75°52.8′W.), 37 feet above the water, is shown from a white skeleton tower on piles in depths of 4 feet on the north side of the channel, 0.5 mile above the mouth; a fog signal is at the light.

The mean range of tide in Wicomico River is 2.3 feet at the entrance and 3 feet at Salisbury. Strong tidal currents set across the main channel off Monie Bay; the current velocity in the entrance to the river is 0.6 knot on the flood and 0.9 knot on the ebb. Ice usually forms on the river as far down as Whitehaven; in ordinary winters the channel usually is open to navigation, but in severe winters it is often closed for extended periods.

Monie Bay is a large cove on the southeast side close within the mouth of Wicomico River. The bay has depths of 4 feet to the head, but is used only by small local boats.

A marine railway on **Semi Point,** on the south side of Wicomico River 2 miles above the mouth, can haul out boats up to 40 feet in length for repairs.

Webster Cove, on the south side 3.5 miles upriver, is entered by a marked dredged channel which leads to a public wharf inside. In 1968, the channel had a controlling depth of 8 feet. Gasoline is available.

Whitehaven, on the north bank 6.5 miles above the entrance, has some supplies and gasoline. Most of the docks are in poor condition. A marine railway can haul out boats up to 150 feet in length. The cable ferry operates during daylight hours only; the cables rest on the bottom when the ferry is tied up.

Wicomico Creek, on the south side of Wicomico River 8.5 miles above the mouth, is navigable for small craft for several miles. The marked entrance channel has a controlling depth of about 4 feet with deeper water inside. A small marina on the north side of the entrance has gasoline and some supplies. The cable ferry about a mile above the mouth operates daily except Sundays in daylight hours only, and drops its cable when tied up.

At **Upper Ferry,** 15 miles above the mouth of Wicomico River, a cable ferry operates during daylight hours only; it drops its cables when tied up. Fishing boats use the large wharf on the south bank, 16.5 miles above the mouth; water is available. An overhead power cable, 17.7 miles above the mouth, has a clearance of 137 feet.

Shad Point, 18 miles above the mouth on the southeast side, has a boatyard that can haul out craft up to 75 feet in length for minor repairs. Gasoline and some supplies are available.

Salisbury, the head of navigation 20 miles above the mouth, is a major trading center of the eastern shore. Wicomico River forks at the city; the **North Prong,** in 1965, had a controlling depth of 6½ feet or 12 feet at midchannel to the fixed bridge 0.4 mile upstream, but **South Prong** is used only by small boats to the fixed bridge. The two highway bridges over the entrance to North Prong have 40-foot wide bascule spans with a minimum clearance of 1 foot; see **117.245 (a) through (e) and (f) (16-a),** Chapter 2, for drawbridge regulations and opening signals.

Most of the commercial fish and shellfish wharves are in North Prong. Gasoline, diesel fuel, and some marine supplies are available at Salisbury. The largest marine railway, at a boatyard 0.4 mile below the forks, can haul out vessels up to 150 feet in length for repairs.

Nanticoke River flows into the north end of Tangier Sound 29 miles north of Tangier Sound Light. Waterborne commerce is mostly in petroleum products, but there is also sizable traffic in fer-

tilizers, corn, soybeans, pulpwood, shellfish, and shells.

Mileages on Nanticoke River, such as Mile 11W, 19.6E, etc., are the nautical miles above the entrance which is between Nanticoke Point on the east side, and **Clay Island** on the west. The letters N, S, E, or W following the numerals indicate the side of the river by compass direction where each feature is located.

The controlling depth of the marked channel in Nanticoke River to the highway bridge at Seaford, Del., is about 8 feet. A depth of about 11 feet can be carried to Sharptown with local knowledge. From the mouth to Wetipquin Creek, the river is more than a mile wide, and is obstructed by extensive shoals, most of which are marked. The deepest water is usually near the points rather than in the bends.

The mean range of tide in Nanticoke River is 2.3 feet at the entrance and at Vienna. The current velocity is 1.2 knots in the entrance. The water is fresh above Vienna. Ice forms on the river in winter, but ordinarily there is enough traffic to keep the channel open. Spring freshets do not interfere with navigation.

Nanticoke, Mile 2.5E, has several packing plants. A marked dredged channel with a controlling depth of 1 foot in 1969, leads to a small-boat harbor, protected by jetties, at the village. Gasoline and some supplies are available; marine railways can haul out craft up to 40 feet in length for repairs.

Bivalve is at Mile 5.4E. A marked dredged channel leads to a jettied basin for skiffs and oyster boats 0.4 mile northeastward of the village. In 1966, the controlling depth was 4 feet in the channel and basin.

Wetipquin Creek, Mile 7.0E, has depths of 4 feet to the wharf at **Tyaskin** on the south side of the creek just inside the entrance; gasoline and some supplies are available.

Vienna, Mile 19.6W, has a grain dock and a bulkhead wharf. A Coast Guard station is 0.2 mile below the bridge. Gasoline and some supplies can be obtained nearby.

The highway bridge over Nanticoke River at Vienna has a bascule span with a clearance of 18 feet; see **117.240,** Chapter 2, for drawbridge regulations and opening signals. The overhead power cable crossing the river at the electric powerplant 100 yards above the bridge has a clearance of 135 feet.

Marshyhope Creek, Mile 24.1, has depths of 5 feet to the Harrison Ferry bridge, 9 miles above the entrance, above which point the creek is obstructed by snags and debris. The highway bridge at **Brookview,** 5 miles above the entrance, is kept in a fixed position with a clearance of 11 feet; see **117.245 (a) and (f) (13),** Chapter 2, for drawbridge regulations.

Sharptown, Mile 26.1E, has a mill and cannery. Pulpwood is loaded here for West Point on York River. Gasoline and some supplies are available. The highway bridge over the river at the town has a swing span with a clearance of 7 feet; see **117.240,** Chapter 2, for drawbridge regulations and opening signals.

Broad Creek, Del., Mile 29.0E, has a controlling depth of about 5 feet to Laurel. A light, daybeacons, and buoys mark the channel from the entrance to about 0.5 mile above Bethel. The fixed highway bridge at **Bethel,** 3.5 miles above the entrance, has a clearance of 30 feet. The overhead power cable close westward of the bridge has a clearance of 58 feet. **Laurel,** 6 miles above the entrance, has a fertilizer plant and several mills. Gasoline and some supplies are available. The railroad bridge at Laurel has a swing span with the north opening obstructed; the south opening has a width of 40 feet and a clearance of 14 feet. Between this bridge and the dam, 0.3 mile upstream, are two drawbridges and a fixed bridge which have a minimum width of 37 feet and clearance of 2 feet; see **117.245 (a) through (e) and (f) (14),** Chapter 2, for drawbridge regulations and opening signals of bridges over Broad Creek. There are several power cables and a telephone cable crossing the creek near the bridges at Laurel, which have a minimum clearance of 20 feet.

The vehicular cable ferry over Nanticoke River at **Woodland,** Mile 31.3W, operates daytime only, and drops cables when not crossing. Just above the ferry lane, on the west bank, gasoline and some supplies are available; a marine railway can haul out boats up to 40 feet in length for minor repairs.

A power cable crossing at Mile 33.7 has a clearance of 75 feet.

Seaford, Del., Mile 34.7N, has several mills and factories. The railroad bridge at Mile 34.4 has a swing span with a width of 47 feet in the southeast opening and no vertical clearance; see **117.245 (a) through (e) and (f) (13-a),** Chapter 2, for drawbridge regulations and opening signals.

The highway bridge at Mile 34.7 has a 40-foot bascule span with a clearance of 3 feet; see **117.240,** Chapter 2, for drawbridge regulations and opening signals. Depths of 7 feet are said to extend 1.5 miles above the highway bridge, and small boats can go to a milldam 5 miles from the bridge, but there is little traffic above Seaford. Gasoline, diesel fuel, and some supplies are available in the town.

Fishing Bay is at the north end of Tangier Sound 28 miles north of Tangier Sound Light. The entrance to the bay is 3 miles wide between Clay Island on the east and **Bishops Head Point** on the west. The partially marked channel in Fishing Bay has depths of 9 feet for 2 miles, thence 13 to 30 feet for 4 miles, and thence 4 to 3 feet to the head, 9 miles above the mouth.

Tedious Creek, on the west side of the bay 2 miles above Bishops Head Point, has depths of 4

feet for 0.5 mile from the mouth, then for 0.7 mile shoals gradually to 1 foot at the head. The entrance is marked by a light. The cove at **Crocheron,** a village on the south side of the creek just inside the entrance, has several small piers which are obstructed by stakes and crab pounds. The depth to the gasoline pier is about 2 feet.

Goose Creek, on the west side of Fishing Bay 3 miles above the entrance, has a marked dredged channel which, in 1968, had a controlling depth of 5½ feet to the wharves just inside; gasoline is available. **McCreadys Creek,** on the east side of Fishing Bay 4 miles above the entrance, has a marked dredged channel which in 1968, had a controlling depth of 3½ feet to the wharves just inside.

Farm Creek, on the west side of Fishing Bay 5 miles above the entrance, has a marked dredged channel which, in 1968, had a controlling depth of 5 feet to the wharves at **Toddville,** on the south side of the creek 0.6 mile upstream. Depths of about 3 feet have been reported at the entrance to the basin at the village. Gasoline is available.

Honga River extends northwestward from the western part of Hooper Strait for 14 miles between the mainland on the northeast and the Hooper Islands on the southwest; the river is more than a mile wide for most of its length. Honga River has a sizable traffic in shellfish and shellfish products.

The southern and main entrance to Honga River is between Hooper Strait Light on the east and Honga River Light on the west. The narrow crooked channel in the river has depths of 13 to 55 feet as far as **Wroten Island,** on the east side 8.5 miles above the southern entrance, and thence 8 feet for 1.5 miles to the improved channel, described later, leading northwestward and westward to Fishing Creek. Depths northward of the Fishing Creek channel are 4 to 5 feet, shoaling gradually to 2 feet at the head. The river is marked as far as Fishing Creek.

Fox Creek is on the northeast side of Honga River 2.5 miles above the entrance. A light marks the east side of the creek entrance and a daybeacon marks the point of a shoal that extends southeastward from **Paul Point.** The creek has depths of 8 feet to a line from Paul Point to **Wingate Point,** on the east side 2 miles above the entrance, then shoals gradually to 1 foot at the head, a mile farther up.

Duck Point Cove, on the east side just inside the entrance of Fox Creek, has general depths of 2 to 5 feet. In 1968, the marked dredged channel into **Hearns Cove,** on the north side of Duck Point Cove, had a controlling depth of 6 feet to the basin at **Wingate.** The oyster-packing plants here have small wharves for the oyster boats. Gasoline is available.

A 2-foot channel marked by private stakes leads to a marine railway in **Insley Cove** at the northeastern end of Fox Creek; boats up to 50 feet in length can be hauled out for hull repairs.

The three **Hooper Islands** divide Honga River from Chesapeake Bay and Tar Bay; Middle and Upper Hooper Islands are connected with each other and with the mainland by bridges. **Hoopersville** is a village with general stores and packing plants on Middle Hooper Island, 3.5 miles above the southern entrance of Honga River. A dredged channel in **Muddy Hook Cove,** which is marked by a light and daybeacons, leads to a fish company-owned wharf at the village. The controlling depth in the channel was 6 feet in 1968.

The highway bridge over the passage between **Middle Hooper Island** and **Upper Hooper Island,** at **Ferry Point,** has a swing span 25 feet wide with a clearance of 6 feet; the draw is opened from sunrise to sunset; see **117.240,** Chapter 2, for drawbridge regulations and opening signals. The marked passage through the bridge from Honga River to Chesapeake Bay has a controlling depth of about 2 feet, but greater depths can be carried with local knowledge.

Back Creek, midway along the inner side of Upper Hooper Island 8.8 miles above the river mouth, has a marked dredged channel which, in 1968, had a controlling depth of 6½ feet leading to a basin at the upper end. Oysterhouses and a marine railway are along the creek; boats up to 50 feet in length can be hauled out for repairs. Gasoline and some supplies can be obtained on Upper Hooper Island. **Storm warning signals are displayed;** see chart.

Charts 553, 554.—A 4-mile dredged channel marked by lights leads from the upper part of Honga River, 10.3 miles above the mouth, through Fishing Creek and Tar Bay to Chesapeake Bay. The controlling depth in the channel was 7 feet in 1969.

Fishing Creek lies between Upper Hooper Island and **Meekins Neck.** The highway bridge over the creek has a swing span with a width of 28 feet and a clearance of 6 feet; the draw is opened from sunrise to sunset; see **117.240,** Chapter 2, for drawbridge regulations and opening signals. The overhead power cable just west of the bridge has a clearance of 65 feet. The mean range of tide is 1.3 feet. The current velocity is estimated to be 3 knots. A public wharf and several private wharves are along the creek.

In **Tyler Creek Cove,** just west of the bridge and on the north side of Fishing Creek, there is an anchorage basin. The channel to the basin is marked by daybeacons; in 1968, the controlling depth was 5 feet in the channel and basin. The largest marine railway can haul out boats up to 55 feet in length for repairs; some supplies can be obtained at **Honga,** on the south side at the bridge. A marina 0.3 mile west of the bridge has gasoline, diesel fuel, and berths; the narrow entrance channel, marked by bush stakes, has depths of about 3 feet.

Tar Bay, west of Meekins Neck and Upper Hooper Island, is separated from Chesapeake Bay by Barren Island and a smaller island to the northward. The bay is shallow and unimportant except for the channel that leads through it from Honga River to Chesapeake Bay.

Chart 551.—Sharps Island Light (38°38.3′ N., 76°22.5′W.), 54 feet above the water, is shown from a brown tower on a cylindrical pier, in 10 feet at the north end of a shoal with depths as shallow as 2 feet; a fog signal is at the light. The light is 2.9 miles due east of a point on the bay ship channel 108.2 miles above the Virginia Capes. A rock, covered 2 feet, and a wreck close eastward cleared to a depth of 6 feet, are about 0.4 mile south-southeastward of the light. A daybeacon, 1.4 miles south-southeast of the light, marks a group of rocks, sometimes awash at low tide, which are all that remains of **Sharps Island.** Submerged piling are about 0.2 mile southwestward of the daybeacon.

Little Choptank River joins the eastern side of Chesapeake Bay 6 miles south-southeastward of Sharps Island Light. Although obstructed by shoals, the river has depths of 11 feet in a crooked channel for 7 miles and the tributaries have depths of 5 feet for considerable distances. The river is marked as far as Fishing Creek, above which it is difficult to carry more than 7 feet without local knowledge. The tributary channels are usually marked by bush stakes, but navigation is difficult without some local information.

The mean range of tide in the entrance to Little Choptank River is 1.4 feet. The current velocity is 0.4 knot. The river carries some commercial traffic in shellfish and shells.

The entrance to Little Choptank River is between **James Island** on the southwest and **Hills Point** on the northeast. James Island is subject to rapid erosion. Good anchorage is available in depths of 12 to 18 feet in the bight between James Island and **Hooper Point,** which is on the west side of the entrance to Slaughter Creek.

Slaughter Creek (chart 553), on the south side of Little Choptank River 4 miles above the mouth, has depths of 4 feet over the bar marked by lights, thence 6 feet to the bridge at the village of **Taylors Island,** 2 miles above the entrance. The creek is used by oyster tongers and crab fisherman. A marina on the east side of the creek just north of the bridge has gasoline, some supplies, and slips; a marine railway can haul out boats up to 40 feet in length for repairs. The entrance to the marina is marked by private daybeacons.

Brooks Creek, on the north side of Little Choptank River 5 miles above the mouth, has depths of 10 to 4 feet in a narrow channel for 2 miles then depths decrease to 2 feet at the head. The narrow entrance is marked, but local knowledge is required to carry the best water. Gasoline is available at small-craft facilities on the west side of the creek along Hills Point Neck. A marine railway can haul out boats up to 35 feet in length for repairs.

Hudson Creek, on the north side of Little Choptank River 6 miles above the mouth, has depths of 5 feet for 3.2 miles to just below **Hudson,** a village at the head. The entrance is marked and the upper reaches usually are bush-staked. The wharves at Hudson are in poor condition; grass growth is prevalent in the creek at the village.

Madison Bay, on the south side of the river opposite Hudson Creek, has depths of 6 to 8 feet for 1 mile, thence about 2 feet for 0.5 mile to **Madison,** a village at the head. A light and daybeacon mark the channel through the bay. There is a small wharf at Madison; gasoline and some supplies are available.

Fishing Creek, on the southeast side 7 miles above the river mouth, has a controlling depth of 5 feet for 4 miles to the forks at the head. The channel is narrow and crooked, and difficult to navigate without local knowledge. There are several small piers along the creek which is used extensively by boats bound for Church Creek, the principal tributary. The entrance is marked by buoys, and the upper reaches usually are marked by bush stakes. The **Northeast** and **Southeast Branches** have depths of 3 feet. A boatyard on the Southeast Branch can haul out boats 45 feet in length for repairs.

Church Creek, on the south side of Fishing Creek 2.5 miles above the latter's mouth, has depths of 6 feet for 0.8 mile, thence 4 feet for 0.8 mile, and thence 1 to 3 feet for 0.3 mile to **Church Creek,** a village near the head. Gasoline and some supplies are available.

Other tributaries of Little Choptank River have depths of 2 to 5 feet, and are used by small local boats.

Choptank River (see also chart 552), which flows into Chesapeake Bay 2 miles eastward of Sharps Island Light, is navigable for 53.4 miles to the town of Greensboro. Traffic on the river consists chiefly of petroleum products, fish and shellfish, shells, grain, soybeans, and fertilizer.

Mileages on Choptank River, such as Mile 8N, 13S, etc., are the nautical miles above the entrance between Blackwalnut Point on the north and Hills Point on the south. The letters N, S, E, or W, following the numerals indicate by compass direction the place where each feature is located.

The principal approach to Choptank River is from southward through a buoyed channel commencing 6 miles southward of Sharps Island Light; the controlling depth is about 25 feet. The approach from northward, between designated fish-trap areas, has a least depth of 10 feet.

The Choptank River main channel has depths of 19 to 25 feet to Cambridge, 15 miles above the mouth, thence a controlling depth of 6 feet to

within a mile of Greensboro, 53.4 miles above the entrance, and thence 2½ feet to the fixed bridge at Greensboro. The channel is marked as far as Denton.

The mean range of tide is 1.6 feet at Cambridge, 2.2 feet at Denton, and 2.5 feet at Greensboro. The river water is fresh above the town of Choptank. The current velocity is about 0.7 knot in the entrance off Cook Point. In Choptank and Tred Avon Rivers the current velocity is less than 1.0 knot.

Caution.—It has been reported that during the winter months many of the buoys marking the main river channel from the entrance to Cambridge may be moved off station due to ice conditions. It has been further reported that several vessels have grounded on the charted 12-foot shoal close westward of the main river channel in (38°37′37″N., 76°08′15″W.), about 0.2 mile southward of Lighted Buoy 18; mariners are advised to give this area a good berth. In 1970, a stake was reported southward of the main river channel in 38°35′47″N., 76°06′34″W., near Mile 11.9.

Two miles above Hills Point, on the south side of the entrance, is shallow **Trippe Bay** which is little used except by small oyster and fishing boats. The channel to **Brannock Bay** is marked by daybeacons.

Tilghman Island, north of the entrance to Choptank River, has a substantial crabbing, oystering, and fishing industry. The island, 3 miles long in a north-south direction, is subject to rapid erosion on its western side.

Blackwalnut Cove, at the south end of Tilghman Island, is well sheltered except from the south, and is used extensively by small boats. A marked dredged channel leads to a basin at the upper end of the cove. In 1968, the controlling depth in the channel and basin was 6 feet. The mean range of tide is 1.3 feet. A public pier at the south end of **Fairbank** has depths of 3 feet at the outer end.

Dogwood Harbor, on the eastern side of Tilghman Island, has depths of 7 feet to the packing-plant wharf at **Avalon.**

Knapps Narrows, between the mainland and the northern end of Tilghman Island, affords passage from Choptank River to Chesapeake Bay. The marked channel through the narrows had in 1961--1969, a controlling depth of 7 feet. **Note** that the system of marking is from each entrance and reverses at the bridge. The highway bridge over the narrows has a bascule span with a clearance of 7 feet; see **117.240,** Chapter 2, for drawbridge regulations and opening signals. The mean range of tide is 1.3 feet.

The village of **Tilghman** is on the south side of Knapps Narrows. The bulkheaded sides of the turning basin on the west side of the southerly abutment of the bridge are available for public use. The basin has depths of about 6½ feet. A marina and boatyards are on the south side of the narrows. Supplies, gasoline, and diesel fuel are available; repairs are made. Largest haul-out capacities are: railway, 55 feet; lift, 20 tons.

Harris Creek empties into Choptank River at Mile 2.3N, along the east side of Tilghman Island. The channel has depths of 10 feet, with local knowledge, and is marked as far as Cummings Creek, 5.5 miles above the mouth. Above this point the narrow and crooked channel has depths of 6 feet to the forks, thence 5 feet in a channel marked by private stakes for 1 mile up **Northeast Branch** (chart 550), and thence 2 feet for 1 mile to the head of the branch, 9 miles above the mouth of the creek. **Northwest Branch** (chart 550) also extends about 2 miles from the forks, and has a controlling depth of about 2 feet to its head.

Sherwood is a village on the west side of Harris Creek 4.5 miles above the mouth. The county wharf at the village, available for public use, has depths of 3 feet alongside.

Cummings Creek empties into the northwest side of Harris Creek 5.5 miles above the mouth. A depth of about 5 feet can be carried up Cummings Creek to the county wharf at **Wittman** (chart 550). The larger of two boatyards along the prongs just eastward of Cummings Creek can haul out boats up to 45 feet in length for hull repairs.

Broad Creek, Mile 4.4N, has depths of 16 feet as far as **Edge Creek,** on the east side 3 miles above the mouth. Above Edge Creek, the winding channel has depths of 9 feet for 3 miles, then shoals gradually to depths of 2 feet at the head, 7.5 miles above the entrance. The wide entrance channel is marked, but some local knowledge is needed in the narrow unmarked upper reaches.

Balls Creek, on the west side of Broad Creek 1 mile above the entrance, has depths of 6 to 7 feet almost to its head; the narrow entrance is marked by a light and the channel by daybeacons. **Neavitt** is a village on the southwest side near the head.

Grace Creek, on the west side of Broad Creek 2.3 miles above the entrance, is marked by daybeacons. A marine railway at the head of the creek can haul out vessels up to 42 feet for hull repairs. Gasoline is available in cans.

St. Michaels, a town with its main waterfront on Miles River, can be reached from Choptank River by way of Broad Creek, thence southeastward in Edge Creek for 0.7 mile, and thence northward in **San Domingo Creek** for 2.3 miles to its head, 6 miles from the mouth of Broad Creek. San Domingo Creek has depths of 7 feet or more for most of its length, and a controlling depth of 4 feet to St. Michaels. The channel is marked by daybeacons.

Irish Creek, Mile 4.7N, has depths of 7 feet for 1.4 miles, then shoals gradually to 2 feet at its head, 2 miles above the entrance. The narrow approach channel is marked by buoys. The creek is used only by small local boats.

Tred Avon River, Mile 7.9N, has natural depths of 16 feet or more for 5 miles, thence 11 feet for 1 mile to **Peachblossom Creek,** and thence about 8 feet to Easton Point, 8.5 miles above the mouth. The channel is marked as far as Easton Point. Shoals extend off **Watermelon Point,** on the east side 7 miles above the mouth; above this point midchannel courses can be steered. Caution should be exercised if going beyond Easton Point because of abrupt shoaling. The mean range of tide is 1.6 feet. Traffic in the river consists chiefly of petroleum products and shellfish.

Choptank River Light (38°39.4'N., 76°11.1'W.), 35 feet above the water, is shown from a skeleton tower with small white house on piles in depths of 10 feet 0.6 mile outside the entrance to Tred Avon River; a fog signal is at the light.

Small motorboats can find anchorage near midchannel of any of the larger tributaries of Tred Avon River. The river bottom is quite firm but the bottom in the tributaries is mostly soft mud. There is usually excellent protection from the wind; the brush and trees that line most of the banks provide some protection.

Oxford is on the east side of Tred Avon River, 2 miles above the mouth. The principal facilities are along Town Creek on the east side of the town. A marina on the river side, 2 miles above Choptank River Light, has gasoline and slips; the marked entrance channel has a controlling depth of about 4 feet. The ferry landing on the river side of Oxford has depths of 14 feet at the face. Year-round ferry service is maintained to Bellevue, on the opposite side of the river, from 6:30 a.m. to sunset daily and Sundays from April 1 through December 1. A public landing nearby has fuel.

Town Creek enters Tred Avon River east of Oxford and comprises the waterfront area of the town. A marked dredged channel leads from the entrance to a turning basin at the head of the creek. In 1966, the controlling depths were 6 feet in the channel and 5 feet in the turning basin. Two anchorage basins, off the west side of the channel, 0.3 mile and 0.5 mile above the entrance, had in 1966, depths of 10 feet and 7½ feet, respectively. The range of tide is 1.4 feet.

The several packing houses have wharves along the west bank of Town Creek, and small piers are scattered on both sides. Supplies, gasoline, diesel fuel, and slips are available. The largest shipyard can haul out vessels up to 100 feet in length for repairs; lifts up to 35 tons are available.

Bellevue, across the river from Oxford, is the site of several oyster-packing plants in ruins but prominent as landmarks. There are no facilities for mooring.

Easton Point, at the head of Tred Avon River 8.5 miles above the mouth at the junction of **North Fork** and **Papermill Pond,** is a mile west of **Easton.** Bulkhead wharves of the oil terminals are on the point. A marina here has gasoline, some supplies, and slips. A 12-ton lift can haul out boats for repairs.

Island Creek, Mile 8.3E, has a natural channel through the bar with a depth of about 5 feet. The entrance is marked.

Lecompte Bay, Mile 10.0S, has depths of 7 to 13 feet. A narrow channel, marked at the entrance by private daybeacons, has a controlling depth of about 4 feet and leads to a boatyard 0.5 mile inside **Lecompte Creek** on the west side of the bay. A marine railway can haul out boats up to 50 feet in length for repairs; gasoline is available.

La Trappe Creek, Mile 10.6N, has depths of 10 feet for 0.5 mile, thence 5 feet to the bulkhead at **Trappe Landing,** 3 miles above the mouth. The entrance is marked.

Cambridge, Mile 15.2S, is the center of a large agricultural area with related industries serving the Delmarva Peninsula. Waterborne commerce consists chiefly of tuna fish from both Atlantic and Pacific Ocean fishing grounds; local fish and shellfish, petroleum products, fertilizers, grains, and soybeans. The town has railroad freight and truck services.

A marked channel with a controlling depth of about 25 feet leads to deeper water in Choptank River to the **Cambridge Marine Terminal** and turning basin on the south side of the entrance to **Cambridge Harbor.** The dredged channel through Cambridge Harbor had, in 1970, a controlling depth of 14 feet to the head, 0.7 mile above the entrance; depths of 12 feet were available in the turning basin. Most of the waterfront facilities inside the harbor have depths of 8 to 12 feet alongside. The mean range of tide is 1.6 feet. The highway bridge 0.3 mile above the harbor entrance has a bascule span with a clearance of 8 feet; see **117.270,** Chapter 2, for drawbridge regulations and opening signals.

Cambridge is a **customs port of entry.** A vessel **documentation office** of the U.S. Coast Guard, and a **contract physicians's office** of the U.S. Public Health Service are in the city; see Appendix for addresses. Vessels subject to customs, **immigration, quarantine,** and **agricultural** inspections are inspected at their berths; officials come from Baltimore.

The Cambridge Marine Terminal, under a port director, is owned and operated by the Maryland Port Authority as a public facility. The 500-foot marginal wharf at the terminal provides an additional 150 feet of berthing space by a catwalk and two mooring dolphins; depths of 25 feet are reported alongside. The terminal has rail and highway connections, warehouse, and open storage. Water is piped to the wharf.

Vessels usually moor portside-to for easier undocking; tug assistance is usually required during strong northwesterly winds. A 360-hp. tug is available at the terminal; contact the port director at the terminal for this service.

Fuel and supplies can be obtained at Cambridge. The largest shipyard has a marine railway that can handle vessels up to 75 feet in length or 75 tons in weight for hull and engine repairs; and 8-ton lift is also available.

A channel with a controlling depth of about 5 feet leads to the municipal boat basin just westward of Cambridge Harbor; gasoline is available. The Cambridge Yacht Club is on the north side of the basin. **Storm warning signals are displayed;** see chart.

Chart 552.—The highway bridge over Choptank River at the southeast side of Cambridge, Mile 15.5, has a swing span with a clearance of 18 feet; see **117.240,** Chapter 2, for drawbridge regulations and opening signals.

Warwick River, Mile 20.4E, is entered through a marked dredged channel which leads to the bulkhead wharves at **Secretary,** a mile above the entrance. In 1965, the channel had a controlling depth of 8 feet. Gasoline is available at the wharves. A marine railway on the south side of the entrance to the river can haul out boats up to 60 feet in length for repairs; gasoline is available.

Cabin Creek, Mile 22.6E, has depths of 3 feet to the fixed highway bridge 1 mile above the entrance, thence 2 feet for 0.5 mile nearly to the head. Private daybeacons mark the creek to below the bridge. The bridge has a width of 17 feet and a clearance of 7 feet. Gasoline is available at a small marina just below the bridge.

Hunting Creek at Mile 25.2E has depths of 3 feet for 3 miles to a fixed highway bridge. The fixed highway bridge 0.4 mile above the entrance has a width of 17 feet and a clearance of 7 feet.

Choptank is a village at Mile 25.6N. The small yacht harbor at Choptank has depths of 2 to 3 feet behind its wooden bulkheads. The old wharf northwest of the yacht harbor is in ruins.

The overhead power cable at Mile 30.7 has a clearance of 139 feet.

Dover Bridge, Mile 33.0, has a swing span with a clearance of 10 feet; see **117.240,** Chapter 2, for drawbridge regulations and opening signals.

Tuckahoe Creek is at Mile 39.5N. The channel in the creek has depths of 8 feet for 2.7 miles, thence 5 feet for 6 miles, and thence less than a foot to the fixed highway bridge from **Hillsboro** to **Queen Anne,** at the head of navigation 11 miles above the entrance. **Tuckahoe Bridge,** 1.7 miles above the entrance, has a 40-foot fixed span with a clearance of 17 feet. The channel is unmarked, crooked, and difficult to navigate in places without local knowledge. The flats are covered with tuckahoes or marsh grass in the summer. The creek is used only by small fishing and pleasure boats. The overhead power cable just north of the bridge has a clearance of 25 feet. The overhead power cable across the creek about 6 miles above the mouth has a clearance of 32 feet.

Williston is a small settlement with a bulkhead landing at Mile 42.0E.

Choptank River is constricted by **Pealiquor Shoal** at Mile 44.3. A dredged channel through the shoal area, in 1962, had a controlling depth of 8½ feet.

Denton is a town at Mile 46.6E. The highway bridge over the river here has a bascule span with a clearance of 4 feet. The overhead power cable at the bridge has a clearance of 62 feet. The railroad bridge 0.4 mile above the highway bridge has a swing span with a clearance of 6 feet. See **117.245 (a) through (e) and (f) (11) and (12),** Chapter 2, for drawbridge regulations and opening signals for the bridges at Denton. The overhead power cable 300 yards north of the railroad bridge has a clearance of 131 feet.

Gasoline and some marine supplies can be obtained at Denton. A boat club is just below the highway bridge.

Greensboro is a town at the head of navigation at Mile 53.4W. In 1965, the controlling depth in the dredged channel above Denton was 3½ feet to the bridge at Greensboro. The fixed highway bridge at Greensboro has a width of 37 feet and a clearance of 10 feet. Gasoline and some marine supplies can be obtained in town.

Chart 550.—Eastern Bay, the approach to Claiborne, St. Michaels, Miles River and other tributaries, is entered between the southerly tip of Kent Island and the northerly end of Poplar Island, 2.2 miles southward.

The shores are low and have few prominent marks. Light-draft vessels also can enter from southward through Poplar Island Narrows and from Chester River on the north by way of Kent Island Narrows.

Bloody Point Bar Light (38°50.0′N., 76°23.5′W.), 56 feet above the water, is shown from a brown tower on cylindrical foundation in 7 feet a mile westward of the south end of Kent Island. A fog signal is at the light which is 1 mile due east of a point on the main ship channel 120.2 miles above the Virginia Capes.

The bay is used extensively by oystermen and fishing craft, as well as by increasing numbers of pleasure craft. The channel is wide and deep; within the bay are large shoal areas, but depths of 25 feet can be taken without difficulty to the mouths of most of the tributaries.

Currents.—East of Poplar Island the current velocity is 1.0 knot on the flood and 0.6 knot on the ebb. Throughout Eastern Bay the current velocity is less than 1.0 knot.

Poplar Island, on the south side of the main entrance, is 1.3 miles long in a north-south direction, and is low and wooded. Smaller **Jefferson Island,** southeast of the northern part of Poplar Island, and **Coaches Island,** east-southeast of the southern end, once were part of the large island. **Poplar Harbor,** formed by the three islands, has secure anchorage in depths of 4 to 6 feet.

Poplar Island Narrows has a least width of 1 mile between Coaches Island and the mainland to the eastward. The channel through the narrows is marked. In July 1970, shoaling to 5½ feet was reported in the southern entrance to the narrows in about 38°44′03″N., 76°21′17″W.

Ferry Cove, on the mainland side of Poplar Island Narrows, is entered through a marked dredged channel which leads to a turning basin on the south side of **Lowes Wharf** at the head. In 1969, the controlling depths were 6 feet in the channel and 3½ feet in the basin. Gasoline is available at the fish company pier.

Claiborne is a summer resort on the southeast side of Eastern Bay 5 miles by deep channel from the main entrance. A combination pier and jetty extends 0.2 mile west-southwestward from the Claiborne waterfront; the pier is in poor condition. The former ferry landing is just south of the old pier. The channel to Claiborne has a controlling depth of about 9 feet with depths of 5 feet in the basin. Gasoline and some supplies can be obtained in the village.

Kent Point, the northerly entrance point of Eastern Bay, is the southernmost extremity of **Kent Island,** which has a north-south length of 12.5 miles and a greatest width of 5.5 miles.

Cox Creek flows southward from the interior of Kent Island into Eastern Bay between **Long Point,** 2 miles northeast of Kent Point, and **Turkey Point,** 3 miles farther to the northeastward. The channel has depths of 22 feet for 1.5 miles, thence 11 feet for 2 miles, thence 7 feet for 2 more miles, and then shoals gradually to 2 feet at the head of navigation, a fixed highway bridge 6.5 miles above the mouth.

A landing at **Romancoke,** 1.5 miles northward of Long Point, has depths of about 4 feet off its end, but is in poor condition. Above Romancoke, Cox Creek has no villages on its shores and is used mostly by oyster boats. The channel is very narrow in places and shallow water is close to the edges. The shoals are unmarked and local knowledge is needed to avoid them.

Crab Alley Bay joins Eastern Bay between **Bodkin Island,** 0.8 mile east-southeastward of Turkey Point, and **Parson Island,** 2 miles eastward of Turkey Point. Bodkin Island is very small and thickly wooded. Larger Parson Island is sparsely wooded and has a ragged appearance.

Crab Alley Bay is 8 miles by deep channel from the Eastern Bay main entrance. The principal channel in Crab Alley Bay is marked and has depths of 8 feet for 2.5 miles to Crab Alley Creek, in the northwestern part of the bay.

The mouth of **Crab Alley Creek,** between **Cox Neck** on the west and **Johnson Island** on the east, is partly obstructed by very shallow areas that extend out from both sides. The channel within the creek has depths of 6 feet for a mile, then shoals gradually to 1 foot at the head. A small-craft facility is on the east side of the creek just north of Johnson Island. Gasoline and a 35-foot marine railway are available; hull and engine repairs can be made.

Little Creek, northeast of Johnson Island, is entered through a marked dredged channel which leads to a basin about halfway up the creek. In 1969, the controlling depth was 7 feet in the channel and basin. The largest marine railway on the creek can haul out boats up to 50 feet in length for hull and engine repairs; gasoline, diesel fuel, water, some marine supplies, berths, and a 2-ton lift are available.

Prospect Bay, in the northeastern part of Eastern Bay, is entered between Parson Island and **Piney Neck Point,** 2 miles to the east-southeastward. The entrance is 9 miles by deep channel from the main Eastern Bay entrance.

Prospect Bay extends northward for 5 miles to the bridge over Kent Island Narrows. The channel has natural depths of 21 feet for 2 miles, thence 11 feet for 1 mile, and thence 7 feet to the beginning of the marked approach to the narrows, which is described later in connection with Chester River.

Greenwood Creek, entered on the southeast side of Pine Neck Point east of Prospect Bay entrance, has depths of 5 feet for nearly 3 miles inside, but only about 3 feet can be taken over the bar.

Miles River flows into the eastern part of Eastern Bay from southeastward, between **Tilghman Point,** at the northeastern end of **Rich Neck,** and **Bennett Point,** 2.3 miles east-southeastward. The entrance is 8.5 miles by deep channel from the main entrance to the bay.

Miles River channel has depths of 20 feet or more for 6 miles, thence 10 feet to the highway bridge 11 miles above the mouth, and lesser depths to the head 14.5 miles above the mouth. A shallow **middle ground,** about 2 miles above the entrance, bares in one place at low water but is well marked on all sides by buoys and a daybeacon; the river channel is marked as far as the bridge. The small trade on the river is chiefly in shellfish and shells.

Tilghman Creek is on the west side of the entrance along the southeast side of Tilghman Point and Rich Neck. The outer end of Tilghman Point is heavily wooded. Th narrow entrance, marked by a light and daybeacons, has depths of about 8 feet; depths of 11 to 8 feet are inside the creek for the remainder of its 1-mile length. A vessel must stay in midchannel to carry the best water. Gasoline and slips are available at the upper end. A marine railway can haul out boats up to 40 feet in length for hull and engine repairs.

Wye River flows into the east side of Miles River entrance, just inside **Bennett Point.** The approach can be made either around the middle ground or to the north of it. The northerly approach is shorter by 2 miles, but is limited to depths of 9 feet; the southerly encircling approach has depths of 30 feet or more. Both approaches are marked.

Small local boats are the principal users of Wye River and its several branches. The twisting channels, some partially marked by uncharted private buoys, require local knowledge. The channel in the river proper has depths of 30 feet or more for 2 miles,thence 10 feet for 4 miles, thence 6 feet for 1.5 miles and shoaler depths thence to the head 9.5 miles above the mouth. Oyster bars are along the channel edges in the vicinity of **Wye Island.** There are several landings along the river and its branches.

Wye Narrows, which branches eastward 4 miles above the mouth of Wye River, follows the north side of Wye Island for 4 miles to its junction with **Wye East River.** The channel through the narrows has a controlling depth of 6 feet. Midway along the narrows is a fixed highway bridge with a width of 40 feet and a clearance of 10 feet. An overhead power cable with a clearance of 32 feet crosses the narrows close eastward of the bridge.

Long Haul Creek, on the west side of Miles River 5 miles above the entrance, has depths of 9 feet or more in most of its 0.6-mile length. The Miles River Yacht Club maintains the finger posts and the range that mark the channel into the small club harbor in the creek; the range, bearing about **285°**, is lighted from April 1 to December 1.

St. Michaels, a town at the head of a small harbor on the west side of Miles River 6 miles above the entrance, has a marked entrance with depths of more than 10 feet. Depths of 8 to 5 feet are in the harbor. The mean range of tide is 1.2 feet. **Storm warning signals are displayed;** see chart.

The U.S. Public Health Service maintains a **contract physician's office** at St. Michaels; see Appendix for address.

The **Chesapeake Bay Maritime Museum** is at St. Michaels. Among the exhibits is the retired Lightship No. 76, nicknamed "OLD BARNEY" because of her many years of service off Barnegat Bay.

Small-craft supplies, gasoline, diesel fuel, and slips are available at St. Michaels. Largest haul-out capacities for repairs are: railway, 40 feet; lift, 30 tons. The town has railroad freight service.

Leeds Creek, marked at the entrance by a buoy, is directly across Miles River from St. Michaels. **Fairview Point,** on the north side of the entrance, is thickly wooded. The creek has depths of 5 feet for 2 miles to the village of **Tunis Mills,** then shoals gradually to 3 feet at the head, 0.5 mile farther up. The fixed highway bridge from Tunis Mills to **Copperville,** on the northwest side of the creek, has a width of 19 feet and a clearance of 6 feet. An overhead power cable just below the bridge has a clearance of 18 feet.

Oak Creek, on the south side of Miles River 8 miles above the entrance, has depths of 2 feet in the mouth and 3 to 5 feet to the village of **Royal Oak** at the head, 0.6 mile above. There are two bridges at the entrance: the fixed highway bridge has a width and a clearance of 24 feet. The railroad bridge has a 24-foot bascule span with a clearance of 2 feet; see **117.285,** Chapter 2, for drawbridge regulations and opening signals. Overhead power cables just southward of the bridge have clearances of 48 feet. Above the wharves at **Newcomb,** on the west side just above the bridges, the creek is obstructed by grass.

Hunting Creek, directly across Miles River from Oak Creek, has depths of 5 feet for 2.5 miles. The peninsula on the west side of lower Hunting Creek has a breakthrough with a depth of 2 feet, 0.8 mile above the entrance.

The highway bridge over Miles River 11 miles above the entrance has a 34-foot bascule span with a clearance of 5 feet; see **117.280,** Chapter 2, for drawbridge regulations and opening signals.

The Chesapeake Bay shore of Kent Island is low and wooded. Channels with depths of about 5 feet lead to marinas, 3.8 and 4.8 miles north of Kent Point. Supplies, gasoline, diesel fuel, and slips are available. The northerly marina has a marine railway that can haul out vessels up to 55 feet in length for hull and engine repairs; lift, 20 tons. **Storm warning signals are displayed;** see chart. Shoaling to 1 foot has been reported just inside the entrance to the channel 3.8 miles north of Kent Point.

A 001°30′–181°30′ measured nautical mile is off **Brickhouse Bar,** 5 miles north of Kent Point and a mile west of Kent Island; buoys and shore ranges mark the course.

Matapeake, 7 miles north of Kent Point, is the site of a former ferry terminal. The jettied entrance channel has a controlling depth of about 7 feet leading to a pier just north of the abandoned slips. The waters inside the jetties are used as a state harbor of refuge. The William P. Lane, Jr. Memorial (Chesapeake Bay) Bridge, 9 miles north of Kent Point, is described in Chapter 13.

Chart 548.—Love Point Light (39°03.4′N., 76°17.0′W.), 38 feet above the water, is shown from a skeleton tower, 1.4 miles northeast of Love Point; a fog signal is at the light.

The main entrance to **Chester River** is between **Love Point,** the northern end of Kent Island, and Eastern Neck Island, 3 miles to the eastward. The approach is northward and eastward of Love Point Light.

A fish haven, marked by a buoy, is in the approach to Chester River about 0.8 mile 333° from Love Point Light.

Light-draft vessels can also enter from Eastern Bay and Miles River on the southward by way of Kent Island Narrows. Traffic on the river consists chiefly of petroleum products and shellfish.

Mileages on Chester River are designated Mile 7S, 11W, etc., which are the nautical miles above the entrance. The letters N, S, E, or W, following

the numerals indicate the side of the river by compass point direction where each feature is located.

Chester River has channel depths of 13 feet or more to Chestertown, thence 7 feet to Crumpton, and thence 5 feet to Kirby Landing, Mile 35.2S. The channel is marked to Crumpton. Above Chestertown, deepest water is difficult to follow except with local knowledge and extreme caution.

The mean range of tide in Chester River is 1.1 feet at the entrance, 1.3 feet at Queenstown, 1.8 feet at Chestertown, and 2.4 feet at Crumpton. The current velocity is less than 1.0 knot. The river is usually closed to navigation by ice for extended periods during ordinary winters; in mild winters the channel is kept clear most of the time by powerboats. The river water is fresh above Chestertown.

Love Point is a summer resort on the point on the west side of the entrance to Chester River. The old railroad pier on the river side of the village is in ruins.

Eastern Neck Island, on the east side of the entrance, is about 3 miles long in a northwest-southeast direction. The island is sparsely wooded with extensive grassy flats along the south shore. It is connected with the mainland on the north by a fixed highway bridge over **Eastern Neck Narrows,** which is very shallow and little used.

At Mile 2.7S, a privately marked channel leads to a basin with a marina on its south side. In 1970, the reported controlling depths were 4 feet in the channel and 5 feet alongside the marina. Gasoline, diesel fuel, some marine supplies, and berths are available. Haul-out capacities for hull and engine repairs: railway, 55 feet; lift, 12 tons.

Storm warning signals are displayed; see chart.

Kent Island Narrows entrance is a Mile 4.0S. The controlling depth in the marked channel from Chester River to Eastern Bay is about 6 feet; the chart is the guide. Very heavy traffic can be expected through the channel during the summer months, especially on weekends. **Note well** that the system of marking is continuous from Eastern Bay to Chester River; if entering the narrows from Chester River, odd numbers are on the right and even numbers on the left. In 1970, a breakwater was under construction close westward of the channel, about 0.4 mile southward of the highway bridge crossing the narrows.

The highway bridge over the narrows has a 48-foot bascule span with a clearance of 18 feet; see **117.290,** Chapter 2, for drawbridge regulations and opening signals. The nearby overhead power cable has a clearance of 85 feet. The current velocity is 1.0 knot on the flood and 0.9 knot on the ebb at the bridge.

Wells Cove, on the east side of the narrows 0.4 mile southeast of the bridge, has general depths of 1 to 5 feet. A marked dredged channel leads to a basin in the cove; in 1966, the controlling depths were 6 feet in the channel and basin.

Many crab and oysterhouse piers are along Kent Island Narrows and on the north side of Wells Cove, but small-craft facilities are also available in this area where supplies, gasoline, diesel fuel, and berths can be obtained. Largest haul-out capacities for repairs are: railway, 45 feet; lift, 25 tons.

Jackson Creek, Mile 5S, has depths of 2 to 7 feet at the entrance and is used as an anchorage by oyster boats; the channel is marked. The bottom is covered with grass.

Queenstown Creek, Mile 6.1E, is entered through a marked channel which leads to a turning basin at **Queenstown,** on the southeast side of **Little Queenstown Creek.** In 1970, the controlling depth to and in the turning basin was 6 feet. The entrance channel is bordered by very shallow grassy flats.

Grays Inn Creek, Mile 10.7W, has depths of 8 feet for 2.3 miles to a small settlement on the west side, then shoals gradually to 1 foot at the head, 3.4 miles above the mouth. About 1.8 miles above the mouth, a marina on **Skinners Neck** has a marine railway that can haul out craft up to 45 feet in length for repairs; gasoline is available.

Langford Creek, Mile 11.3N., has depths of 12 feet over the bar and deeper water inside to the forks 1.7 miles above the mouth; the channel is buoyed to **Drum Point.** An unmarked shoal extends southwestward from small **Cacaway Island** toward the junction of the two fork channels; above the shoal the unmarked forks are clear in midchannel. **East Fork** has depths of 10 feet for 3 miles thence 7 feet for 1 mile to within a mile of the head. **West Fork** has depths of 8 feet for about 3 miles, thence 6 feet for 0.7 mile.

Long Cove, on the west side of Langford Creek 0.7 mile above the mouth, has depths of 4 feet to the head; the entrance is marked. The largest marine railway in the cove can haul out boats up to 50 feet in length for repairs; some supplies and gasoline are available.

Davis Creek, on the west side of Langford Creek 1.5 miles above the mouth, has depths of 9 feet to a marina on the south side near the entrance. A private buoy marks the entrance to the creek. Gasoline, diesel fuel, and some supplies are available; a marine railway can haul out boats up to 65 feet in length for repairs.

The common entrance to **Reed Creek** and **Grove Creek** at Mile 10.7E is marked by two buoys. The channel to the fork 0.3 mile above the common mouth has a depth of 6 feet. Reed Creek extends southeastward and has depths of 7 feet for about 0.6 mile above the fork, then shoals gradually to 1 foot a mile farther up. The channel in Grove Creek is only about 60 feet wide 0.3 mile above the fork but has depths of 3 feet through the narrows and 5 feet for a mile above that.

Corsica River is at Mile 11.9E. The controlling depth to the wharf at **Centreville Landing,** 5 miles

above the mouth, is about 7 feet. The lower part of the river is marked, but it is difficult to stay in the upper channel without local knowledge. Some supplies and gasoline can be obtained at Centreville, 0.5 mile inland of the landing. The main wharf at the landing is in poor condition, but a smaller wharf is available.

Southeast Creek, Mile 19.8S has depths of 4 feet for 1.8 miles, then shoals to 1 foot at the head of navigation 0.4 mile farther up. **Island Creek,** which empties into the south side of Southeast Creek, 0.5 mile above the mouth, has depths of 3½ feet in the entrance and 4 feet or more for 2 miles to a fixed highway bridge. Both creeks are marked by bush stakes in the difficult reaches.

A marina is at **Rolphs,** Mile 20.7E. Some supplies, gasoline diesel fuel, and slips are available. Repairs can be made; lift, 8 tons.

Chestertown, Mile 23.8W, is a county seat and has bus and rail transportation. Water commerce consists chiefly of barged petroleum products and grains.

The highway bridge over the river at Chestertown has a bascule span with a clearance of 12 feet; see **117.245 (a) through (e) and (f) (4),** Chapter 2, for drawbridge regulations and opening signals. The county wharf 0.1 mile below the bridge has depths of 14 feet alongside. The wharf at the marina 0.2 mile below the bridge has depths of 14 feet at the outer end and 6 feet at the inner face. Supplies, gasoline, and slips are available. A marine railway can haul out boats up to 40 feet in length for repairs.

Between Chestertown and Crumpton the channel is very narrow in places, with broad flats on either side which are almost awash at low water. Though marked in the more critical places, it is diffcult to navigate without local knowledge and is more easily followed at low water.

Morgan Creek, Mile 25.7N, has depths of 4 feet over the bar at the entrance and 5 feet for 2 miles in a narrow crooked channel. The entrance is a narrow slough between flats almost awash at low water and is usually marked by bush stakes. A fixed highway bridge 0.6 mile above the entrance has a clearance of 8 feet. The overhead power cable close northward of the bridge has a clearance of 32 feet.

A public wharf is at **Deep Landing,** Mile 30S. **Crumpton** is at Mile 32S. The highway bridge at the town has a 40-foot fixed span with a clearance of 14 feet. The overhead power cable on the east side of the bridge has a clearance of 28 feet.

Above Crumpton, the channel in Chester River is difficult to follow without local knowledge.

Rock Hall Harbor, north of the entrance to Chester River and 5 miles north-northeastward of Love Point Light, is a base for a large fishing fleet. Traffic in the harbor consists chiefly of fish, shellfish, and shells. In August 1970, the controlling depth in the entrance channel was 4 feet.

The approach to Rock Hall Harbor is from southward, between **Swan Point Bar** and the mainland on a **349°** lighted range. The entrance channel and the channels inside the jetties are marked.

Depths at the packing house and fish wharves in Rock Hall Harbor range up to 9 feet. Some supplies, gasoline, and diesel fuel can be obtained on the waterfront. The largest haul-out capacities for repairs are: railway, 65 feet; lift, 20 tons.

Swan Creek is a mile northwestward of Rock Hall Harbor and 0.7 mile southeastward of **Swan Point,** which is 139 miles above the Virginia Capes. The creek channel has depths of 7 feet for 1 mile above **Little Neck Island,** on the west side of the entrance, then shoals to 1 foot at the head of navigation 2.3 miles above the entrance.

The shallow flats that extend 0.4 mile south-southeastward from Little Neck Island are marked by a buoy. The approach to Swan Creek is made on the **349°** lighted range used for Rock Hall Harbor.

Supplies, fuel, and slips are available at **Gratitude,** 0.5 mile above the entrance to Swan Creek. Repairs can be made; largest lift, 12 tons. The area in Swan Creek just north of **Deep Landing** and **The Haven,** a cove 0.5 mile east of Deep Landing, provides a good small-boat refuge in heavy weather.

Storm warning signals are displayed; see chart.

15. BALTIMORE TO HEAD OF CHESAPEAKE BAY

This chapter describes the northern part of Chesapeake Bay and the many tributaries that empty into it, including the more important Patapsco, Elk, and Susquehanna Rivers. Also described is the major port of Baltimore, and several smaller ports and landings in this part of the bay.

Chart 1226.—Patapsco River forms Baltimore Harbor, and Elk River is the approach to the Chesapeake and Delaware Canal. The other tributaries that empty into this part of the bay are seldom used by vessels drawing more than 12 feet. The shores are mostly wooded in the undeveloped areas and rise to considerable heights in the vicinity of Northeast and Susquehanna Rivers.

There are extensive shoal areas in the upper part of the bay, and **fishtraps** are numerous in season; fishtrap limits are shown on the chart. All of the tributaries are usually closed by ice for extended periods during the winter.

Chart 549.—Sandy Point Shoal Light and Baltimore Light, respectively 131.5 and 134.2 miles above the Virginia Capes, were described in chapter 13. The channel to Baltimore and the channel to the head of Chesapeake Bay divide at 0.5 mile eastward of Sandy Point Light.

Sevenfoot Knoll Light (39°09.3′N., 76°24.5′W.), 42 feet above the water, is shown from a red cylindrical pile structure on the northeast side of the channel to Baltimore, 140.1 miles from the Capes; a fog signal is sounded at the light.

Baltimore Harbor consists of the entire Patapsco River and its tributaries; a part of the waterfront thus included lies outside the municipal limits of Baltimore but by State law is within the jurisdiction of the Maryland Port Authority.

Patapsco River joins the west side of Chesapeake Bay between Bodkin Point and **North Point** 4 miles to the northward; the midchannel point in the entrance, 2 miles northwest of Sevenfoot Knoll Light, is 142.1 miles above the Virginia Capes, and 54 miles from Delaware River by way of the Chesapeake and Delaware Canal.

Channels.—Federal project depths are: 42 feet in the main channel between the Virginia Capes and Fort McHenry, Baltimore; 35 feet in the main channel between the Delaware Capes and Baltimore via the Chesapeake and Delaware Canal; 42 feet in Curtis Bay Channel; 42 feet in Ferry Bar Channel (east section) to the channel leading to the Port Covington yard; and 35 feet in East Channel and West Channel of Northwest Harbor.

The channels are maintained at or near project depths, except the Delaware Capes-Baltimore route which was being dredged to 35 feet in 1970. See Notice to Mariners and latest editions of the charts for controlling depths.

Bodkin Point is the low northeastern extremity of **Bodkin Neck,** on the south side of the entrance to Patapsco River. Shoals extend northward and eastward from the point to the edge of the main channel.

Bodkin Creek, which flows into Patapsco River along the inner side of Bodkin Neck, has depths of 9 feet in the approaches and 7 to 9 feet for considerable distances into its branches. The channel is very narrow at the mouth and leads between extensive shoals. Shoaling is reported in the entrance to the creek between Buoy 6 and Light 7; mariners are advised to use caution in this area.

Back Creek is on the northeast side of Bodkin Creek just inside the mouth. A boatyard is in the upper part of the creek. Gasoline, some marine supplies, and slips are available. Hull and engine repairs can be made; marine railway, 50 tons; lift, 5 tons.

Main Creek is separated from Back Creek by **Spit Neck.** Both branches have depths of 7 to 9 feet almost to their heads and are much used by pleasure craft.

Several marinas are on **Graveyard Point,** on the south side of Main Creek 0.2 mile above the mouth. Gasoline, diesel fuel, slips, and some marine supplies can be obtained. Hull and engine repairs can be made. Largest haul-out capacities are: railway, 55 feet; lift, 6 tons.

A wreck is reported about 300 yards southeastward of Graveyard Point.

A marina at the entrance to **Perry Cove,** 1.3 miles above the mouth of Main Creek, has gasoline, slips, and some marine supplies. Hull and engine repairs can be made; marine railway, 65 feet; lift, 12 tons.

Rock Point is on the southwest side of Patapsco River 3 miles above Bodkin Point. Back of Rock Point is an elevated water tank, and a pier extends out from the Rock Creek side to depths of 5 feet or more. **White Rocks,** 0.6 mile northwest of Rock Point, are about 15 feet high and marked by a light; the deepest water is north and west of the rocks.

Rock Creek, on the northwest side of Rock Point, has depths of 11 feet almost to the head. It is marked; a light on the east side marks the narrow part of the channel off **Fairview,** 0.5 mile above the mouth.

Wall Cove empties into the southeast side of Rock Creek along the south side of Fairview. The Maryland Yacht Club piers on the Fairview side of the entrance have depths of about 13 feet at their outer ends.

There are several marinas and boatyards in Wall Cove and along Rock Creek where marine supplies, gasoline, diesel fuel, water, and slips can be obtained. Largest haul-out capacities for hull and engine repairs are: marine railway, 120 feet; lift, 150 tons.

Stony Creek, on the southwest side of Patapsco River 5 miles above Bodkin Point, has depths of 12 feet or more almost to the head. The channel along the west side of the entrance is about 70 yards wide and marked by a light and buoys; the east side is obstructed by rocks, some of which bare at all stages of the tide. The highway bridge 0.8 mile above the mouth of Stony Creek has a 40-foot bascule span with a clearance of 18 feet; see **117.240,** Chapter 2, for drawbridge regulations and opening signals. A marina on the north side just above the bridge has gasoline, diesel fuel, slips, and some marine supplies.

Nabbs Creek, a tributary on the northwest side of Stony Creek, a mile above the mouth, has depths of 12 feet almost to the head. The largest marine railway near the head of the creek can handle craft up to 45 feet in length for hull and engine repairs.

Back Cove, on the north side of Nabbs Creek near the mouth, has depths of 12 feet to a boatyard 0.3 mile above the entrance. The marine railway can handle craft up to 75 feet in length for hull and engine repairs; gasoline is available.

Old Road Bay, which empties into Patapsco River along the west side of North Point, has general depths of 7 to 12 feet. A rock covered 1 foot, 1.1 miles northwest of North Point, is marked by a buoy; a daybeacon marks the edge of a shoal that extends westward from North Point; a light 0.25 mile off the north shore of the bay, marks a shoal that extends 0.5 mile from the west shore. In 1970, an underwater obstruction was reported about 150 yards south of the light; mariners are advised to exercise caution in this area.

North Point Creek and **Jones Creek,** which empty into the northeast and northwest corners of Old Road Bay, respectively, have depths of 4 to 6 feet. Approach both creeks by passing eastward of the light off the north shore of the bay, being careful to avoid the reported underwater obstruction, about 150 yards south of the light. Small-craft facilities are in both creeks. Marine supplies, gasoline, diesel fuel, and berths are available. Maximum haul-out capacities are: marine railway, 60 feet; lift, 16 tons.

Chart 545.—Baltimore, Md., one of the major ports of the United States, is at the head of tidewater navigation on Patapsco River. The midharbor point, at the intersection of Fort McHenry and Ferry Bar Channels 0.6 mile southeast of Fort McHenry, is 8 miles from the mouth of the river, 150 miles above the Virginia Capes, and 62 miles from Delaware River.

Principal imports are general cargo, crude petroleum and petroleum products; iron ore, chrome and manganese, gypsum, lumber, motor vehicles, fertilizers, sugar, and bananas; exports are chiefly general cargo, grains, metal products, coal, and chemicals. Coastwise receipts are crude petroleum and petroleum products, fertilizers, sulfur, sugar, and lumber; shipments are mostly petroleum and metal products.

Channels.—Federal project channels were discussed at the beginning of the chapter. The branch channels will be covered in the descriptions of the tributaries.

Anchorages.—See **110.158,** Chapter 2, for limits and regulations of anchorage areas established in Baltimore Harbor.

Tides and currents.—The mean range of tide is 1.1 feet at Baltimore; daily predictions are given in the Tide Tables. Prolonged winds of constant direction may cause substantial variation in the tide. Currents in the harbor are too weak and variable to be predicted.

Weather.—Baltimore is in a region about midway between the rigorous climates of the North and the mild climates of the South and adjacent to the modifying influences of the Chesapeake Bay and Atlantic Ocean to the east and the Appalachian Mountains to the west. The net effect is to produce a more equable climate compared to inland locations of the same latitude.

Rainfall distribution throughout the year is rather uniform; however, the greatest intensities are confined to the summer and early fall months, the season for hurricanes and severe thunderstorms. Rainfall during this period occurs principally in the form of thundershowers, and rainfall totals during these months vary appreciably, depending on the number of thundershowers which occur largely by chance in a given locality. Hurricane force winds, however, may occur on rare occasions due to a severe cold front or a severe thunderstorm. The greatest damage by hurricanes is that produced along waterfronts and shores by the high tides and waves.

In summer, the area is under the influence of the large semi-permanent high pressure system commonly known as the Bermuda High and centered over the Atlantic Ocean near 30° North Latitude. This high pressure system brings a circulation of warm, humid airmasses over the area from the deep South. The proximity of large water areas and the inflow of southerly winds contribute to high relative humidities during much of the year.

January is the coldest month, and July, the warmest. Winter and spring months have the highest average windspeeds. Snowfall occurs on about 25 days per year on the average; however, an average of only 9 days annually produce snowfalls greater than 1.0 inch. Although heaviest amounts of snow generally fall in February, occasional heavy falls occur as late as March. Records for the period,

August 1950 through December 1967, indicate that the average date of the last temperature as low as 32° in the spring is April 15, while the average date of the first temperature as low as 32° in the autumn is October 26.

Glaze or freezing rain occurs on an average of 2 to 3 times per year, generally in January or February. However, some occurrences have been noted in November and December. Some years pass without the occurrence of freezing rain, while in others it occurs on as many as 8 to 10 days. Sleet is observed on about 5 days annually. The sleet season begins as early as November in some years, and ends as late as March in some cases, with the greatest frequency of occurrence in January.

The National Weather Service office is at Friendship International Airport, about 7 miles southward of Baltimore. **Barometers** may be compared there or by telephone. See Appendix for **Baltimore climatological table.**

Storm warning display locations are listed on the NOS charts and shown on the Marine Weather Services Charts published annually by the National Weather Service.

Fogs occur chiefly from October to March, inclusive. From April to September there are only a few days with dense fogs. Very light winds clear the fog away.

Ice.—Baltimore Harbor is frozen over during severe winters, but the ice-breakers and the larger power-driven vessels keep the dredged channels open so that self-propelled vessels seldom have difficulty in entering the harbor. Ice conditions in the main channel are most severe in the vicinity of Sevenfoot Knoll Light, where ice moving from the northern end of Chesapeake Bay tends to collect in packs. Navigation from Baltimore to the upper end of the bay and the Chesapeake and Delaware Canal is likely to be interrupted by ice for short periods during an average winter.

Pilotage is compulsory for all foreign vessels and for United States vessels under register in the foreign trade bound to or from the port of Baltimore. Pilotage is optional for United States vessels under enrollment in the coastwise trade who have on board a pilot licensed by the Federal Government for these waters.

The Association of Maryland Pilots provides pilotage between Baltimore and the Virginia Capes, and between Baltimore and the Maryland entrance to the Chesapeake and Delaware Canal at Chesapeake City, Md. Pilots of the association also serve Maryland ports in the tributaries of Chesapeake Bay and the District of Columbia.

Pilotage information for incoming vessels is given in Chapters 6,7, and 9.

Towage.—Tugs up to 2,400 hp. are available at all times to assist vessels arriving or departing, in docking or undocking, and in shifting within the harbor. Long distance towage is also available. Tug services are usually arranged for in advance through ships' agents.

Quarantine.—Vessels subject to quarantine usually proceed to their berths for inspection. Special arrangements can be made for inspection at anchorage; 24-hour advance notice is required. Quarantine officials maintain an office in Baltimore; see Appendix for address.

A U.S. Public Health Service **hospital** is in Baltimore; see Appendix for address.

Agriculture quarantine.—Vessels subject to such inspections are usually inspected at their berths by officials from Baltimore; see Appendix for address.

Customs.—Baltimore is a **customs port of entry.** Vessels are usually inspected at their berths by officials from Baltimore; see Appendix for address.

Coast Guard.—The Captain of the Port maintains an office at the Coast Guard base in Curtis Bay. A **Marine Inspection Office,** and a vessel **documentation office** are in Baltimore; see Appendix for addresses.

Immigration.—Vessels are inspected on arrival at their berths. Officials maintain an office in Baltimore; see Appendix for address.

Harbor regulations.—The Maryland Port Authority has general jurisdiction over the physical operation of Baltimore Harbor and issues rules and regulations pertaining to the use of the public wharves and piers. The Port Authority office is at Pier 2, Pratt St., Baltimore.

Wharves.—Baltimore has more than 200 piers and wharves located at Locust Point, Port Covington, Fairfield, Curtis Bay, Hawkins Point, Sparrows Point, Dundalk, Lower Canton, Canton, Lazaretto Point, and in the Inner Harbor. Only the deep-draft facilities are described; for a complete description of the port facilities, refer to the Port Series, a Corps of Engineers publication. The alongside depths for the facilities described are reported; for information of the latest depths contact the Maryland Port Authority or the private operator. All of the facilities have direct highway connections and most have railroad connections. Water and electrical shore-power connections are available at most piers and wharves.

General cargo at the port is usually handled by ship's tackle; special handling equipment, if available, is mentioned in the description of the particular facility. A 150-ton floating crane can be rented. Numerous warehouses and cold storage facilities adjacent to the waterfront are available. Several municipal piers, administered by the city **harbormaster** whose office is on Municipal Pier 4, are used mainly by coastwise vessels.

Facilities at Locust Point:

American Sugar Co. Wharf (39°16′32″N., 76°35′42″W.): 970-foot face; 27 to 32 feet alongside; deck height, 7 feet; 12-ton buckets and 42-inch conveyor belt; receipt of raw sugar; owned and operated by American Sugar Co.

Proctor and Gamble Wharf (39°16′34″N., 76°35′30″W.): 415-foot face; 30 feet alongside; deck height, 7 feet; receipt of coconut oil, silicate, and caustic sodas; owned and operated by Proctor and Gamble Manufacturing Co.

Locust Point Terminal, Piers 10 through 3; owned by Maryland Port Authority:

Pier 10 (39°16′30″N., 76°35′20″W.): east side 610 feet long; 30 to 25 feet alongside; deck height, 7 feet; 24,000 square feet of covered storage; receipt and shipment of general cargo; operated by Maryland Port Authority.

Pier 9: 100 yards southeastward of Pier 10; west side 850 feet long, 35 to 25 feet alongside; east side 610 feet long, 31 feet alongside; face 182 feet long, 35 to 25 feet alongside; deck height, 10 feet; 69,000 square feet of covered storage; receipt and shipment of general cargo and bulk latex; operated by Hinkins Steamship Agency.

Pier 8: 125 yards southeastward Pier 9; west side 514 feet long, 35 to 27 feet alongside; east side 928 feet long, 35 to 25 feet alongside; deck height, 11 feet;160,000 square feet of covered storage; receipt and shipment of general cargo; operated by Stockard Shipping and Terminal Co.

Pier 7: 125 yards southeastward Pier 8; east side 1,000 feet long, west side 810 feet long; 35 to 30 feet alongside; deck height, 10½ feet; 3.8-million bushel capacity grain elevator, can load 100,000 bushels per hour through 4 conveyor belts, 26 loading spouts, 36 chutes; receipt and shipment bulk grains; operated by Baltimore and Ohio Railroad.

Pier 6: 125 yards southeastward Pier 7; 166-foot face, east side 955 feet long, west side 950 feet long; 35 to 30 feet alongside; deck height, 9 feet; 177,000 square feet of covered storage; receipt and operated by Baltimore Stevedoring Co., and Ramsay Scarlett and Co.

Pier 5: 125 yards southeastward of Pier 6; west side 800 feet long, deck height, 5 feet; east side 780 feet long, deck height, 10 feet; 35 to 28 feet alongside; 18,000 square feet of covered storage; receipt and shipment of general cargo; operated by Maryland Port Authority.

Pier 4 (West): 125 yards southeastward of Pier 5; west side 652 feet long, 35 to 30 feet alongside; east side 474 feet long, 35 to 20 feet alongside; deck height, 7 feet; two 7½-ton cranes equipped with magnets and buckets; receipt and shipment of bulk ores and general cargo; operated by Maryland Port Authority.

Pier 4 (East): 100 yards southeastward of Pier 4 (West); west side 222 feet long; east side 563 feet long; 34 feet alongside; deck height, 6 feet; receipt of bulk latex through pipeline, receipt and shipment of general cargo; operated by Maryland Port Authority.

Pier 3: 125 yards eastward of Pier 4 (East); 257-foot face, 34 feet alongside, deck heights, 5½ and 9½ feet; west side 1,205 feet long, 34 feet alongside, deck height 9½ feet; east side 1,317 feet long, 35 to 20 feet alongside, deck heights 5½ and 9½ feet; 190,000 square feet covered storage, pipelines, and mobile 6-ton cranes; receipt and shipment of general and bulk cargoes; operated by Chesapeake Operating Co.

Baltimore and Ohio Railroad Fruit Pier (39°15′40″N., 76°35′23″W.): east side 712 feet long; 30 feet alongside; deck height, 8 feet; four cranes and banana conveyors; receipt of bananas; owned by Baltimore and Ohio Railroad and operated by United Fruit Co.

Facilities at Port Covington:

Port Covington Terminal:

Piers 9-9A: 0.8 mile westward of Fort McHenry; south side 1,198 feet long; 35 feet alongside; deck height, 9 feet; cranes up to 10-ton capacity; 270,000 square feet of covered storage; receipt and shipment of general cargo; owned by Maryland Port Authority; operated by Western Maryland Railway Co.

Piers 7-8: adjacent westward of Piers 9-9A; 226-foot face, 35 feet alongside; northeast side 900 feet long, 35 feet alongside; southwest side 1,700 feet long, 36 feet alongside; deck height, 9 feet; cranes up to 10-ton capacity; 235,000 square feet of covered storage; receipt and shipment of general cargo; owned by Maryland Port Authority and operated by Western Maryland Railway Co.

Pier 6: 150 yards westward of Piers 7-8; southwest side 1,524 feet long, 38 feet alongside; northeast side 1,434 feet long, 30 to 25 feet alongside; deck height, 6 feet; cranes up to 15-ton capacity, conveyor belt; unloading capacity 2,000 tons per hour; receipt of bulk cargoes; owned and operated by Western Maryland Railway Co.

Pier 5: 100 yards southwest of Pier 6; 146-foot face; northwest side 970 feet long, 30 feet alongside; southwest side 964 feet long, 35 feet alongside; deck height, 10 feet; 80,000 square feet covered storage; receipt and shipment of general cargo; owned and operated by Western Maryland Railway Co.

Port Covington Coal Pier (39°15′41″N., 76°36′15″W.): northeast and southwest sides 887 feet long, 30 to 25 feet alongside northeast side, 40 feet alongside southwest side; deck height, 6 feet; two coal-unloading machines, 5-foot conveyor, 3,500 tons per hour loading capacity; shipment of coal and petroleum coke; owned and operated by Western Maryland Railway Co.

Port Covington Grain Pier (39°15′35″N., 76°36′20″W.): northeast side 1,340 feet long; 35 feet alongside; deck height, 8 feet; conveyor belts, 17 loading spouts; 150,000 bushels per hour loading capacity, 5-million-bushel grain elevators; owned by Western Maryland Railway Co. and operated by Louis Dreyfus Co.

Facilities at Fairfield:

Weyerhaeuser Pier (39°14′58″N., 76°34′37″W.): east and west sides 560 feet long; 32 feet alongside; deck height, 6 feet; receipt and shipment of

lumber products; owned by Weyerhaeuser Co. and operated by Atlantic Terminals, Inc.

F.S. Royster Guano Pier (39°14′31″N., 76°34′00″W.): 325-foot face, 25 feet alongside; deck height, 6 feet; unloading capacity 160 tons per hour, loading capacity 60 tons per hour; receipt and shipment of sulfur, phosphate rock, potash, and fertilizers; owned and operated by F.S. Royster Guano Co.

Continental Oil Co. Wharf (39°14′26″N., 76°33′55″W.): 582 feet with dolphins; 32 feet alongside; deck height, 6 feet; receipt and shipment petroleum products, bunkering vessels; owned and operated by Continental Oil Co.

Continental Oil Co. Pier: immediately eastward of Continental Oil Co. Wharf; northwest side 600 feet long; 34 feet alongside; deck height, 9 feet; receipt and shipment of petroleum products, bunkering vessels; owned and operated by Continental Oil Co.

Shell Oil Co. Pier (39°14′19″N., 76°33′40″W.): southeast side 675 feet long; 35 feet alongside; deck height, 8 feet; receipt and shipment petroleum products, bunkering vessels; owned and operated by Shell Oil Co.

Facilities in Curtis Bay:

American Oil Co. T-head Pier (39°13′27″N., 76°33′51″W.): 250-foot face with dolphins; 30 feet alongside; deck height, 6 feet; receipt and shipment of petroleum products, bunkering vessels; owned and operated by American Oil Co.

Sinclair (BP) Texas Co. Pier (39°13′30″N., 76°34′04″W.): 200-foot face, west side 520 feet long; 33 feet alongside; deck height, 8 feet; receipt and shipment petroleum products, bunkering vessels; owned and operated by Sinclair (BP) Refining Co. and Texaco, Inc.

Curtis Bay Ore Pier (39°13′31″N., 76°34′49″W.): northeast side 650 feet long; 39 feet alongside; deck height, 8 feet; cranes up to 15-ton capacity, conveyor belt; unloading capacity 2,000 tons per hour; receipt of bulk ores; owned and operated by Baltimore and Ohio Railroad.

Curtis Bay Coal Pier (39°13′23″N., 76°34′38″W.): north side 900 feet long, 30 feet alongside; south side 900 feet long, 40 feet alongside; deck height, 8 feet; conveyor loading system, loading capacities 6,000 tons per hour north side, 4,000 tons per hour south side; shipment of coal; owned and operated by Baltimore and Ohio Railroad.

Boston Metals Main Pier (39°13′18″N., 76°34′38″W.): north and south sides 810 feet long; 30 feet alongside; deck height, 8 feet; cranes to 45-ton capacity; shipping of steel scrap; owned by Baltimore and Ohio Railroad, operated by Boston Metals Co.

Olin Mathieson Pier (39°12′56″N., 76°35′00″W.): south side 750 feet with dolphins; 35 to 29 feet alongside; deck height, 7 feet; unloading capacity 250 tons per hour; receipt of liquid sulfur and bulk fertilizers; owned and operated by Olin Mathieson Chemical Corp.

Hess Pier (39°12′45″N., 76°34′50″W.): north side 285 feet long; south side 450 feet long; 37 feet alongside; deck height, 6 feet; receipt and shipment petroleum products, bunkering vessels; owned and operated by Hess Oil and Chemical Corp.

American Oil Pier 1 (39°12′42″N., 76°34′50″W.): 275-foot face with dolphins; 32 feet alongside; deck height, 6 feet; receipt and shipment of petroleum products; owned and operated by American Oil Co.

American Oil Pier 2 (39°12′38″N., 76°34′56″W.): face 250 with dolphins; 32 feet alongside; deck height, 6 feet; receipt and shipment petroleum products; owned and operated by American Oil Co.

Davison Chemical Rock Pier (39°12′48″N., 76°34′28″W.): north side 395 feet long; 30 feet alongside; deck height, 7 feet; cranes up to 5 tons; receipt of super phosphates and fertilizers; owned and operated by W.R. Grace and Co.

U.S. Gypsum Co. Pier (39°13′08″N., 76°33′20″W.): 621-foot face with dolphins; 27 feet alongside; deck height, 11 feet; 42-inch conveyor belt; receipt of gypsum rock; owned and operated by U.S. Gypsum Co.

Facilities at Hawkins Point:

Hawkins Point Terminal (39°12′49″N., 76°32′23″W.): northwest and southwest sides 720 feet long; 36 feet alongside; deck height, 9 feet; receipt and shipment of general cargo and bulk ores; owned by Maryland Port Authority and operated by Baltimore and Ohio Railroad.

Facilities at Sparrows Point:

Pennwood Shipping Wharf (39°12′38″N., 76°27′40″W.): 870-foot face; 38 feet alongside; deck height, 12 feet; cranes up to 25-ton capacity; shipment of steel products; owned and operated by Bethlehem Steel Corp.

Bethlehem Steel High Pier (39°12′42″N., 76°29′04″W.): east and west sides 700 feet long; 38 feet alongside; deck height, 11 feet; cranes up to 15 tons; shipment of steel products, receipt of fuel oil; owned and operated by Bethlehem Steel Corp.

Bethlehem Steel Ore Wharf (39°12′43″N., 76°28′50″W.): face 2,200 feet long; 40 feet alongside; deck height, 11 feet; cranes up to 20 tons; receipt of bulk ores; owned and operated by Bethlehem Steel Corp.

Facilities at Dundalk:

Dundalk Marine Terminal (39°14′42″N., 76°32′20″W.): 34 feet alongside; deck height, 9 feet; cranes up to 75-ton capacity; 350,000 square feet of covered storage, 265 acres open storage; receipt and shipment of general cargo, container cargo, and roll-on/roll-off cargo; owned and operated by Maryland Port Authority.

Berths 1-4; northwest face 3,880 feet long.

Berths 5-8; southwest face 1,458 feet long.

Western Electric Co. Wharf (39°15′17″N., 76°32′17″W.): 700-foot face; 35 feet alongside; deck height, 7 feet; 20-ton crane; shipment of

cable owned and operated by Western Electric Co., Inc.

Facilities at Lower Canton:

Sea Girt Terminal (39°15′30″N., 76°33′12″W.): west side 700 feet long; 32 feet alongside; deck height, 9 feet; 27½ ton traveling container crane; receipt and shipment of containerized cargo; owned by Canton Co. of Baltimore; operated by Sea Land Services.

National Gypsum Wharf (39°15′32″N., 76°33′17″W.): east side 594 feet with dolphins; 32 feet alongside; deck height, 8 feet; cranes to 9 tons; conveyors unload 500 tons per hour; receipt of gypsum rock; owned by the city of Baltimore and operated by National Gypsum Co.

Lower Canton Pier (39°15′27″N., 76°33′22″W.): east side 690 feet long; west side 1,418 feet long; 32 feet alongside; deck height, 8 and 12 feet; 4-million-bushel grain elevator, 16 loading spouts, loading capacity 225,000 bushels per hour; receipt and shipment bulk grains; owned by Penn-Central and operated by Western Stevedoring Co.

Pennsylvania Railroad Bulk Commodity Pier (39°15′27″N., 76°33′25″W.): east and west sides 1,200 feet long; 30 to 14 feet alongside; deck height, 10 feet; conveyor unloads 800 tons per hour; receipt of dry bulk cargo; owned and operated by Penn-Central.

Canton Railroad Pier 11 (39°15′25″N., 76°33′33″W.): east side 1,623 feet long; 32 feet alongside; deck height, 8 feet; 144,000 square feet of covered storage; receipt and shipment of general cargo; owned by Canton Co. of Baltimore and operated by U.S. Lines Co.

Canton Railroad Pier 10 (39°15′25″N., 76°33′38″W.): west side 1,485 feet long; 32 to 30 feet alongside; deck height, 8 feet; cranes up to 75 tons; 49,000 square feet covered storage; owned and operated by Canton Co. of Baltimore.

Canton Railroad Piers 6, 7, 8 (39°15′30″N., 76°33′43″W.): east side 869 feet long; 32 feet alongside; west side 987 feet long; 30 to 20 feet alongside; deck height, 8 feet; cranes up to 75 tons; 170,000 square feet covered storage; receipt and shipment of general cargo; owned by Canton Co. of Baltimore and operated by Canton Railroad and Oyster Shell Co.

Canton Railroad Piers 4-5 (39°15′30″N., 76°33′47″W.): east side 957 feet long; 30 to 20 feet alongside; deck height, 6 feet; cranes up to 55 tons; 180,000 square feet covered storage; receipt and shipment of general cargo; owned by Canton Co. of Baltimore and operated by Canton Railroad Co.

Canton Railroad Pier 3: about 250 yards southeastward of Piers 4-5; east side 818 feet long; west side 859 feet long; 30 to 20 feet alongside; deck height, 5 feet; cranes up to 75 tons; 87,000 square feet of covered storage; receipt and shipment of general cargo; owned by Canton Co. of Baltimore and operated by Patapsco Ship Ceiling and Stevedoring Co.

Canton Railroad Ore Pier: 125 yards eastward of Pier 3; east side 818 feet long, 25 feet alongside; west side 1,253 feet long, 42 feet alongside, deck height, 6 feet; cranes to 35 tons, conveyor stystem unloads 3,000 tons per hour; receipt of bulk ores; owned by Canton Co. of Baltimore and operated by Canton Railroad and Gottman Co.

Facilities at Lazaretto Point:

Ashland Oil and Refining Co. Pier (39°15′34″N., 76°33′57″W.): east side 426 feet long; 33 feet alongside, deck height, 6 feet; receipt and shipment petroleum products; owned by Canton Co. of Baltimore and operated by Deepwater Terminals, Inc.

Kerr-McGee Chemical Co. Pier (39°15′34″N., 76°34′08″W.): west side 357 feet long, 28 feet alongside, deck height, 7 feet; two overhead unloading towers with 1¼ cubic yard buckets, pipelines; receipt of liquid sulfur, phosphate rock, and fertilizers; owned and operated by Kerr-McGee Chemical Co.

Rukert Terminal Corp. Wharf (39°15′38″N., 76°34′18″W.): south side 590 feet long; west side 525 feet long, 30 feet alongside, deck height, 9 feet; receipt and shipment of general cargo, receipt of bulk cargoes; owned and operated by Rukert Terminal Corp.

Agrico Chemical Co. Pier (39°15′52″N., 76°34′19″W.): north side 533 feet long, 36 feet alongside; deck height, 8 feet; receipt of super phosphates and fertilizers; owned and operated by Agrico Chemical Co.

Facilities at Canton:

Pennsylvania Railroad Coal Pier (39°15′54″N., 76°34′20″W.): north and south sides 942 feet long, 35 feet alongside, deck height, 4 feet; two coal-loading towers, loading 800 tons per hour; shipment of coal; owned by Penn Central and operated by Baltimore Contracting Co.

Rukert Terminal Corp Pier 5 (39°16′00″N., 76°34′16″W.): north side 380 feet long; south side 110 feet long, 32 to 11 feet alongside, deck height, 8 feet; 3,700-cubic-foot fumigation chamber; 59,000 square feet covered storage; receipt and shipment of general cargo; owned and operated by Rukert Terminal Corp.

Pennsylvania Railroad Pier 1 (39°16′06″N., 76°34′22″W.): 223-foot face; north and south sides 1,100 feet long, 35 to 30 feet alongside, deck height, 10 feet; cranes to 15 tons; 250,000 square feet covered storage; receipt and shipment of general cargo and scrap metals; owned and operated by Penn Central.

Pennsylvania Railroad Pier 6: 200 yards north of Pier 1; 122-foot face, north and south sides 930 feet long; 32 feet alongside, deck height, 11 feet; cranes to 15 tons, 90,000 square feet covered storage; receipt and shipment of general cargo; owned and operated by Penn Central.

Copper Works Pier (39°16′17″N., 76°34′19″W.): north side 480 feet long, 34 feet alongside, deck height, 6 feet; cranes to 15 tons; receipt and shipment of crude and refined copper; owned and operated by American Smelting and Refining Co.

Gulf Oil Corp. Pier (39°16′19″N., 76°34′21″W.): north side 660 feet long with dolphins; south side 200 feet long, 35 feet alongside, deck height, 8 feet; receipt and shipment petroleum products; owned and operated by Gulf Oil Corp.

Crown Central Petroleum Wharf (39°16′23″N., 76°34′22″W.): 225-foot face with dolphins, 30 to 32 feet alongside, deck height, 5 feet; receipt and shipment of petroleum products; owned and operated by Crown Central Petroleum Corp.

Esso Pier 1 (39°16′30″N., 76°34′23″W.): north and south sides 510 feet long; 35 feet along north side, 37 feet along south side; deck height, 9 feet; receipt and shipment petroleum products, bunkering vessels; owned and operated by Humble Oil and Refining Co.

Main Pier (39°16′35″N., 76°34′48″W.): west side 430 feet long; 25 feet alongside; deck height, 7 feet; receipt of licorice and dyewood, shipment of finished products; owned and operated by J.S. Young Co.

Facilities in the Inner Basin:

Terminal Corp. Pier (39°16′46″N., 76°35′37″W.): east side 419 feet long; 26 feet alongside; deck height, 7 feet; 190,000 square feet of covered storage; receipt and shipment of general cargo, plywood, and newsprint; owned and operated by Terminal Corp.

Rukert Terminal Corp. Jackson Wharf (39°16′45″N., 76°35′41″W.): east side 330 feet long, 25 to 20 feet alongside; west side 260 feet long, 24 feet alongside, deck heights, 10 and 8 feet; 40,000 square feet covered storage; receipt and shipment of general cargo; owned and operated by Rukert Terminals Corp.

Municipal Pier 6 (39°16′58″N., 76°36′16″W.): east side 1,456 feet long; west side 780 feet long, 24 to 20 feet alongside, deck height, 5 feet; cranes up to 50 tons; 218,000 square feet of covered storage; receipt and shipment of general cargo; owned and operated by the city of Baltimore.

Municipal Pier 5: 100 yards westward of Pier 6; west side 1,068 feet long, 22 to 16 feet alongside; east side 1,245 feet long, 22 to 10 feet alongside, deck height, 5 feet; receipt and shipment of general cargo; owned and operated by the city of Baltimore.

Supplies.—Marine supplies of all kinds are available in the Port of Baltimore. All grades of heavy marine bunker fuel, lubricants, and diesel oil can be obtained. Vessels may bunker directly at marine oil terminals or may be serviced by barge at anchor or at loading berths. Most of the piers and wharves described have water and shore power connections. Water can also be delivered by waterboat anywhere in the harbor.

Repairs.—Baltimore is well equipped to make major repairs to large vessels. The largest floating drydock, in Middle Branch, is at the Maryland Shipbuilding and Drydock Company; it has a lifting capacity of 32,000 tons, is 684 feet long, 108 feet wide, and has 28 feet of water over the blocks. The largest floating drydock, in Northwest Harbor, is at the Bethlehem Steel Corporation; it has a lifting capacity of 22,000 tons, is 690 feet long, 110 feet wide, and has 25 feet of water over the blocks. A graving dock at the same plant is 589 feet long, 78 feet wide, and has a water depth of 23 feet.

Marine railways can haul out vessels up to 240 feet in length and up to 1,600 tons in weight.

The largest shaft that can be produced in the port is 120 inches by 45 feet. Several smaller repair facilities along the tributaries cater to yachtsmen and small-boat operators.

Baltimore has extensive facilities for wrecking and salvage. In addition to equipment especially designed for salvage operations, there are heavy hoisting facilities which, though primarily designed for private industrial purposes, are available in case of need.

Communications.—Nearly all the piers and wharves in Baltimore Harbor are near the center of the city and all are connected to it by wide paved streets. Most of the piers and wharves have direct connections with mainline railroads whose tracks are connected with all parts of the port area.

The Port of Baltimore is served by the Penn Central Railroad, the Baltimore and Ohio Railroad, and the Western Maryland Railway. The Canton Railroad is a terminal line that operates about 35 miles of track in the port area and connects with the major railroads.

More than 100 steamship companies connect Baltimore with principal United States and foreign ports by regular sailings in the overseas, coastwise, and intercoastal trades. About 150 motor truck carriers service the port.

Several major airlines provide frequent scheduled services between **Friendship International Airport** inland about 7 miles southwestward of Fort McHenry, and domestic and overseas points.

The Maryland Port Authority radiotelegraph station **WMH** provides ship-to-shore communications on a 24-hour basis on 428, 500, 6519.5, 8686, and 12952.5 kHz. This station reports local harbor information to shipping.

The Baltimore Maritime Exchange, on the Baltimore Recreation Pier, provides, to its members, information concerning ship movements, local harbor conditions, and various other services; the exchange operates on VHF channel 18 (156.80 MHz).

Sparrows Point, on the northeast side of Patapsco River 3 miles above the mouth, is the site of the Bethlehem Steel Corporation steel and shipbuilding plants. The two marked channels on the south side of Sparrows Point lead from the main channel in Baltimore Harbor to the ore-handling wharves; the easterly channel (chart 549) in 1961, had a reported controlling depth of 33 feet. The westerly channel in 1962, had a controlling depth of 40 feet.

The marked channel on the west side of Sparrows Point has a controlling depth of about 22 feet and leads to the shipyard facilities; a marked branch coal pier channel in August 1970, had a reported controlling depth of 25 feet.

Bear Creek, on the northeast side of Patapsco River 4 miles above the mouth, has channel depths of 8 feet or more almost to the head, 3.5 miles above the mouth. An overhead power cable a mile above the mouth has a clearance of 95 feet between the lighted structures, and 62 feet elsewhere.

Peachorchard Cove, on the west side of Bear Creek just below the first bridge, has depths of 9 feet for 0.4 mile to within 0.1 mile of its head.

The highway bridge over Bear Creek 1.3 miles above the mouth has a bascule span with a clearance of 15 feet. The highway bridge 0.5 mile upstream has a bascule span with a clearance of 25 feet. Drawbridge regulations and opening signals for these bridges are given in **117.245 (a) through (e) and (f) (5)**, Chapter 2. The railroad bridge 0.7 mile above the first bridge has a swing span with a clearance of 8 feet; see **117.240**, Chapter 2, for drawbridge regulations and opening signals.

Lynch Cove, on the northwest side of Bear Creek 0.8 mile above the first bridge, has general midchannel depth of 8 feet or more to its head 0.8 mile above the entrance.

There are several small-craft facilities in Lynch Cove where marine supplies, gasoline, diesel fuel, and slips can be obtained. The largest haul-out capacities for hull and engine repairs are: railway, 100 feet; lift, 15 tons.

Schoolhouse Cove, 1.5 miles above the first bridge, has depths of 8 to 12 feet to near the head. A small boatyard in the cove can haul out boats up to 45 feet in length for hull and engine repairs. A yacht club is on the east side of Bear Creek just below Schoolhouse Cove.

The highway bridge over Bear Creek just above Schoolhouse Cove, has a bascule span with a clearance of 12 feet; see **117.245 (a) through (e) and (f) (5-a)**, Chapter 2, for drawbridge regulations and opening signals.

Fort Carroll is a stone-and-concrete structure on the northeast side of Patapsco River main channel 4.4 miles above the mouth. The white tower of the abandoned lighthouse is on the west front of the fort.

Hawkins Point, on the southwest side of Patapsco River 4.5 miles above the mouth, is at the southeastern limits of Baltimore. There are many obstructions surrounding the point. A privately dredged and marked 36-foot channel leads to a 720-foot long cargo pier with rail and truck connections 0.4 mile northwestward of the point.

Curtis Bay, on the southwest side of Patapsco River 6 miles above the mouth, is the approach to large coal and oil wharves and to several plants. The entrance is between Leading Point and Fishing Point, 0.8 mile to the northwestward. Depths in well-marked Curtis Bay Channel were given at the beginning of this chapter.

A 27-foot privately dredged channel leads to a 400-foot gypsum pier with mooring dolphins and conveyor belt 0.2 mile west of Leading Point; the berth has a reported depth of 27 feet alongside.

The petroleum terminals on **Fishing Point**, the ore pier on the southwest side of **Stonehouse Cove**, the coal pier at the head of Curtis Bay, and the other deep-draft facilities in Curtis Bay were described earlier in this chapter under Wharves, Baltimore Harbor.

Curtis Creek empties into the head of Curtis Bay from southward between **Sledds Point** and **Ferry Point**, 0.3 mile to the southwestward. The dredged channel is buoyed at critical points. See Notice to Mariners and latest edition of the chart for controlling depths.

Cabin Branch, on the west side of Curtis Creek just south of Ferry Point, has depths of 18 feet or more to within 0.1 mile of a fixed bridge 0.4 mile above the entrance. The industrial wharves on the north side of the branch have reported depths of about 32 feet at their faces.

Several of the wharves on either side of Curtis Creek between the entrance and Pennington Avenue bridge have depths of 25 to 30 feet at their faces.

The Pennington Avenue bridge, 0.9 mile above the entrance to Curtis Creek, has a bascule span with a clearance of 12 feet; see **117.240**, Chapter 2, for drawbridge regulations and opening signals. A shipyard on the west side of Curtis Creek just north of the bridge has a marine railway that can haul-out vessels up to 125 feet in length for hull and engine repairs.

The railroad bridge 1.3 miles above the entrance has a swing span with a clearance of 13 feet; see **117.240**, Chapter 2, for drawbridge regulations and opening signals.

Arundel Cove is on the east side of Curtis Creek 1.6 miles above the entrance. The Coast Guard yard is on the north side of the cove. A highway bridge 0.4 mile above the enrance to the cove has a 28-foot fixed span with a clearance of 6 feet.

A depth of 16 feet can be carried up Curtis Creek beyond the improved sections to the forks 2.3 miles above the entrance. **Marley Creek** (chart 549), the middle fork, has depths of 12 feet or more for 1.2 miles, then shoals gradually to 3 feet at a fixed bridge a mile farther up; the bridge has a clearance of 4 feet. Overhead power cables crossing Marley Creek have a least clearance fo 33 feet.

A marine service pier on the west side of Marley Creek 1.3 miles above the forks has depths of 12 feet at the face and is marked by a light; gasoline and water are available. A marine railway directly opposite the service station can handle boats up to 75 feet in length for hull and engine repairs.

The **Fairfield** section of Baltimore begins 6.5 miles above the mouth of Patapsco River and extends upriver along the southwest side for more than a mile. Most of the piers and wharves handle paper, petroleum products, sulfur, chemicals, fertilizers, scrap metal, and lumber; depths range from 18 to 30 feet at most of the facilities, but depths of 25 to 34 feet are at the petroleum terminals at the southerly end of the section. Vessels can be bunkered at the rate of 1,800 barrels per hour. The deep-draft facilities at Fairfield were described earlier in this chapter under Wharves, Baltimore Harbor.

The Maryland Shipbuilding and Drydock Company, at the upper end of the Fairfield section, has a floating drydock with a lifting capacity of 32,000 tons, a length of 684 feet, a width of 108 feet, and has 28 feet of water over the blocks. Pier cranes with capacities up to 50 tons and floating cranes with capacities up to 35 tons are available.

Dundalk Marine Terminal, on the east side of Patapsco River 6.5 miles above the mouth, has a marked entrance channel with a privately maintained **030°** lighted range; in 1970, the reported dredged depth was 34 feet. The facilities at the terminal were described earlier in this chapter under Wharves, Baltimore Harbor.

Colgate Creek, just north of the Dundalk facility, has channel depths of 10 feet or more to the second bridge, 0.8 mile above the entrance. A depth of about 34 feet can be carried to the bulkhead wharf of the electric company on the west side of the entrance by using the Dundalk Channel. Depths of 35 feet are reported alongside the 700-foot wharf.

The fixed highway bridge 0.3 mile above the entrance has a clearance of 8 feet. The railroad bridge 0.8 mile above the entrance has a swing span with a width of 30 feet and a clearance of 5 feet; the swing span is inoperative and remains in a closed position. Overhead power cables crossing the creek have a least clearance of 28 feet.

The **Lower Canton** section of Baltimore begins on the north side of Patapsco River 7.5 miles above the mouth and extends westward to **Lazaretto Point.** Dredged and buoyed channels lead to the principal piers which handle general cargo, grain, ore, and chemicals; depths of 20 to 39 feet are at the berths. The deep-draft facilities in this section were described earlier in this chapter under Wharves, Baltimore Harbor.

Patapsco River turns sharply westward at the intersection of Ferry Bar Channel and main Fort McHenry Channel 7.8 miles above the mouth. About 0.7 mile wide between **Fort McHenry** on the north and Fairfield on the south, the river narrows to a width of 150 yards 10 miles above the mouth and meanders off to the southwestward while the deeper channel continues westward into **Middle Branch.**

Ferry Bar is a point on the north side of Ferry Bar Channel 1.5 miles westward of Fort McHenry.

See Notice to Mariners and latest editions of the charts for the controlling depths in the well-marked Ferry Bar Channel and Spring Garden Channel to the Hanover Street highway bascule bridge over Middle Branch. The controlling depths in the marked channel continuing westward into Middle Branch from the Hanover Bridge are about 18 feet to the railroad bridge in Middle Branch, thence about 15 feet to within 0.2 mile of the head, 1.4 miles above Ferry Bar.

The Western Maryland Railway **Port Covington** section of Baltimore begins 0.8 mile west of Fort McHenry and extends west and southwestward to Ferry Bar. The buoyed approach is 1.2 miles westward along Ferry Bar Channel. Depths of 30 to 40 feet are in the approach channels and 33 to 40 feet alongside the principal piers.

The deep-draft facilities in this section were described earlier in this chapter under Wharves, Baltimore Harbor.

Depths of about 10 feet are at the outer ends of piers at the boatyards 0.4 mile northwestward of Ferry Bar. The largest marine railway can haul out boats up to 50 feet in length for hull and engine repairs. Gasoline, slips, and some marine supplies are available.

The Hanover Street bridge over Middle Branch 0.3 mile above Ferry Bar has a bascule span with a clearance of 25 feet; see **117.305,** Chapter 2, for drawbridge regulations and opening signals. The Western Maryland Railway bridge, a mile above Ferry Bar, has a swing span with a clearance of 9 feet; see **117.245 (a) through (e) and (f) (5-b),** Chapter 2, for drawbridge regulations and opening signals.

Most of the marine facilities in Middle Branch are used by small vessels and barges for delivery of petroleum and coal for local consumption.

Northwest Harbor, the northerly branch of Patapsco River, is entered between Fort McHenry and Lazaretto Point, 8.2 miles above the mouth of Patapsco River. The harbor has depths of about 35 feet to the principal piers on either side of the lower reaches and to the line from **Locust Point** on the southwest to **Fells Point** on the northeast, 1.2 miles above the entrance; thence about 25 feet for 0.6 mile; and thence about 21 feet to the head, 2.5 miles from the entrance.

The Baltimore and Ohio Railroad **Locust Point** section is on the southwest side between Fort McHenry and Locust Point. Most of the piers handle general cargo, but some also handle bulk; depths alongside are 30 to 35 feet. The grain elevator at pier 7 has a capacity of nearly 4,000,000 bushels and can load 150,000 bushels per hour.

The piers and wharves on the east and north sides of Northwest Harbor handle general cargo, coal, petroleum products, chemicals, and fertilizers; depths alongside the principal facilities are 30 to 35 feet, and at the others, 15 to 25 feet. The deep-draft facilities in this section were described earlier in this chapter under Wharves, Baltimore Harbor.

The ship repair facilities in Northwest Harbor can handle large ocean-going vessels. The graving dock on the southwest side of the harbor 0.4 mile above Fort McHenry is 460 feet long, 58 feet wide at the bottom, with a water depth of 18 feet. The largest marine railway, 0.4 mile west of Locust Point, is 250 feet long and can lift, 1,600 tons. The largest of the floating drydocks, 0.7 mile westward of Locust Point, is 690 feet long, 110 feet wide, has a water depth of 25 feet, and can lift 22,000 tons. The graving dock at this plant is 589 feet long, 78 feet wide at bottom, and has a water depth of 23 feet.

A marina with depths of 12 feet or more at the slips is on the south side of the inner harbor at the head of the basin. Gasoline is available only on weekends.

Chart 549.—Swan Point (39°08′41″N., 76°16′44″W.), on the east side of Chesapeake Bay opposite Patapsco River entrance, has been mentioned in Chapter 14.

Fairlee Creek, on the east side of Chesapeake Bay 8.5 miles north-northeastward of Swan Point, has a narrow entrance between a jetty on the east and a long, low hook on the west. The privately buoyed entrance has depths of about 6 feet. A yacht club with berthing facilities is on the east side of the creek just inside the entrance; gasoline, diesel fuel, and some marine supplies are available.

Storm warning signals are displayed; see chart.

Worton Point (39°19′10″N., 76°11′14″W.) is on the east side of Chesapeake Bay 152.5 miles above the Virginia Capes. A flashing white light is shown from a watch tower on the point during the ice season; a flashing red light is shown from this structure at night when firing is in progress; see **204.30,** Chapter 2, for limits and regulations of the **restricted area.**

About 1.5 miles southward of Worton Point is **Worton Creek,** which has depths of 10 to 12 feet in the broad bight at the entrance and 7 feet inside for 1.4 miles. Good anchorage, protected from easterly winds, is available in depths of 11 to 12 feet just inside the entrance. The critical part of the channel, 0.5 mile above the entrance, is marked by buoys.

A marina at **Green Point Wharf,** on the east side of Worton Creek about 1.1 miles above the mouth, has gasoline, berths, and some marine supplies and the marina at **Buck Neck Landing,** on the east side of the creek 1.4 miles above the entrance, has gasoline, diesel fuel, and berthing facilities; some supplies are available. Haul-out capacities for repairs are: railway, 60 feet; lift, 12 tons. The public bulkhead adjoining the fuel pier has depths of about 6 feet alongside.

Pooles Island, 10 miles northeastward of Baltimore Harbor entrance, has an abandoned lighthouse on the west side near the north end. On the island are the white skeleton towers of two lighted ranges, the rear tower common to both. The north range marks a reach of the main channel leading to the Chesapeake and Delaware Canal. The south range marks a passage across the middle ground east of the island. Pooles Island is entirely within the Aberdeen Proving Ground; see **204.30,** Chapter 2, for limits and regulations of the **restricted area.**

In 1969, shoaling was reported 1.2 miles east of the southern end of Pooles Island in about 39°16′26″N., 76°14′48″W.

Local magnetic disturbance.—Differences of as much as 5° from the normal variation have been observed in the channel from Pooles Island to Howell Point (chart 572).

Pooles Island Bar Light (39°15.7′N., 76°16.7′W.), 27 feet above the water, is shown from a black skeleton tower on a cylinder base, in depths of 15 feet 0.8 mile south-southwestward of the island; a fog signal is sounded at the light, which is 147.1 miles above the Virginia Capes.

A buoyed lane extends southwestward between fishtrap areas from eastward of Pooles Island to the Baltimore channel a mile southward of North Point. The lane, with a minimum depth of 10 feet, is entered on the Pooles Island south range, bearing **264°**; Pooles Island Bar Light is on the northwest side of the lane.

The approach to the rivers between North Point (39°11′42″N., 76°26′38″W.) and Pooles Island is through a buoyed side lane southwestward of Pooles Island Bar Light.

Hawk Cove, 5 miles north-northeastward of North Point, has depths of 8 to 11 feet and is a good anchorage.

Back River, which flows into the southwest end of Hawk Cove, has depths of 7 to 4 feet for 6 miles to a fixed highway bridge with a width of 46 feet and a clearance of 14 feet; overhead power cables above and below the bridge have a clearance of 34 feet. Even the smallest boats seldom go above the bridge. The channel is unmarked, but is clear except for a 4-foot middle ground about halfway between Hawk Cove and the bridge.

There are small-craft facilities on both sides of Back River where gasoline, diesel fuel, supplies, and slips can be obtained. The largest haul-out capacities for repairs are: railway, 45 feet; lift, 20 tons.

Charts 549, 1226.—Middle River, 6.5 miles north-northeastward of North Point, is entered through a marked dredged channel which leads to an anchorage basin at the Martin Marietta Company plant at the head of **Dark Head Creek,** the east fork of the river 3.2 miles above the mouth. In October 1969, the reported controlling depth to the anchorage basin was 4 feet on the centerline. The west fork of Middle River has depths of 7 feet to within 0.5 mile of a fixed bridge near the head.

Sue Creek, on the south side of the entrance to Middle River, has depths of about 7 feet to the yacht club just inside the entrance, thence depths of 5 to 3 feet for a mile inside. The entrance is marked by a light.

Galloway Creek, a broad cove on the north side of Middle River just inside the entrance, has depths of 8 to 5 feet except along the shoreline.

Frog Mortar Creek, on the northeast side of Middle River 1.5 miles above the mouth, has depths of 6 to 8 feet. A 12-foot marked channel leads from Middle River to the Martin Marietta seaplane basin on the west side of the creek 0.5 mile above the entrance.

Hopkins Creek, on the southwest side of Middle River 2.6 miles above the mouth, has depths of 8 to 5 feet.

Numerous small-craft facilities are at the upper end of Middle River and in most of the tributaries. Most places have supplies, gasoline, and slips. The largest haul-out capacities for repairs are: railway, 60 feet; lift, 35 tons.

Storm warning signals are displayed; see chart.

Seneca Creek, 8 miles north-northeastward of North Point, has depths of 8 feet in the entrance and 5 to 6 feet into the several arms. A light marks the outer end of the shoal on the east side of the entrance. Gasoline, diesel fuel, slips, and some marine supplies can be obtained at several marinas along the creek. Largest haul-out capacities for hull and engine repairs are: railway, 50 feet; lift, 24 tons.

Gunpowder River, 9 miles northeastward of North Point, is entered through a buoyed channel westward of marshy **Spry Island,** in midentrance; the island covers at high water and must be avoided. The river has channel depths of 11 feet for 2 miles, thence 6 to 8 feet for 3.5 miles, and thence about 5 feet in a privately dredged section which leads to the mouth of an unnamed creek below **Joppatowne.**

The fixed railroad bridge 6.3 miles above the mouth has a 19-foot channel span with a clearance of 11 feet. An overhead power cable at the bridge has a clearance of 37 feet.

Marinas above the bridge have slips, gasoline, and some marine supplies. A 15-ton mobile hoist is available for hauling out boats for hull and engine repairs.

Storm warning signals are displayed; see chart.

Spry Island and most of Gunpowder River are within the **Aberdeen Proving Ground;** see **204.30,** Chapter 2, for limits and regulations of the **restricted area.** Flashing red lights are shown on **Robins Point,** at the south end of Gunpowder Neck, and **Maxwell Point,** on the east side of Gunpowder River 3.5 miles above the mouth, at night when firing is in progress.

Chart 572.—Bush River is on the northwest side of Chesapeake Bay 152 miles above the Virginia Capes. The lower 5 miles of the river are within the Aberdeen Proving Ground. A flashing red light is shown on **Pond Point,** on the east side 3.5 miles above the mouth, at night when firing is in progress; see **204.30,** Chapter 2, for limits and regulations of the **restricted area.**

The river has minimum depths of 7 feet to the railroad bridge 6.3 miles above the mouth, thence 5 to 6 feet for another 1.5 miles. The approach to the river and the channel inside are marked by buoys and a light as far as **Tapler Point,** on the west side 3.5 miles above the mouth, and by a light, on the east side 0.3 mile southward of the railroad bascule bridge, which shows a high intensity beam down river; the lower light, off the western shore about 2.7 miles above the mouth, shows high intensity beams up and down river. The mean range of tide is 1.4 feet.

The railroad bridge 6.3 miles above the mouth of Bush River has a 35-foot bascule span with a clearance of 12 feet; see **117.245 (a) through (e) and (f) (3),** Chapter 2, for drawbridge regulations and opening signals. The power cable at the bridge has a clearance of 35 feet. A high-voltage power cable about 200 yards below the bridge has a clearance of 43 feet and is supported by towers on either bank and a tower near midriver; a privately maintained light is shown from the southeast leg of the middle tower.

Otter Point Creek, on the west side of Bush River 0.5 mile above the railroad bridge, has depths of 3 feet for a mile above the entrance.

Marinas in Otter Point Creek and on the eastern shore of the Bush River just above the bridge have slips, gasoline, and some marine supplies. Hull and engine repairs can be made; the largest haul-out capacities are: railway, 45 feet; lift, 12 tons.

Still Pond (39°20′25″N., 76°08′30″W.) a bight on the southeast side of Chesapeake Bay 154.7 miles above the Virginia Capes, has general depths of 9 to 11 feet and is a good anchorage for small craft during easterly winds. **Churn Creek,** which empties into the southwest corner of the bight, has depths of 2 feet in the very narrow entrance and deeper water inside.

Stillpond Creek, at the southeast corner of the bight, is entered through a narrow privately dredged channel. A buoy marks the channel entrance, and a daybeacon is just inside the entrance. In August 1969, the channel had a reported controlling depth of 8 feet; inside, depths of 4 to 8 feet are available for 2 miles, nearly to the head.

A flashing red light is shown on **Meeks Point,** on the north side of Still Pond, at night when firing is in progress; see **204.30,** Chapter 2, for limits and regulations of the **restricted area.**

Sassafras River joins Chesapeake Bay from eastward 159 miles above the Virginia Capes. The entrance is between **Howell Point,** marked by a light, and **Grove Point,** 3.5 miles east-northeastward; the entrance width normal to the channel is about 1

mile. The river is used by vessels drawing up to 12 feet, but the usual draft is 6 feet or less.

The river channel has depths of 13 feet, or more to a point a mile above the Fredericktown-Georgetown bridge, thence 7 to 3 feet for another 2 miles. The channel is broad and straight for the first 4 miles, then is narrow and crooked in places but is marked as far as the highway bridge 10 miles above the mouth. The mean range of tide is 1.7 feet at Betterton and 2 feet at Georgetown. In 1967, the following depths were reported in the river channel: a shoal covered 1 foot or less in 39°22′13″N., 75°58′58″W.; 6 feet in 39°21′50″N., 75°54′40″W.; and 10 feet in 39°21′46″N., 75°53′26″W.

Betterton is a summer resort on the south side of Sassafras River 2 miles eastward of Howell Point. The principal wharf has depths of 9 feet at the outer end. Excursion boats from Baltimore call at the wharf during the summer. Gasoline and some supplies are available in the summer.

Turner Creek, on the south side of Sassafras River 4.5 miles above the mouth, has depths of at least 7 feet in a very narrow, unmarked entrance and 5 feet for 0.6 mile upstream. The creek has several small landings along its shores and is much traveled by local pleasure boats.

Kentmore Park is a small community on the south side of Sassafras River 5 miles above the mouth. The community wharf has depths of 7 feet at the upper end.

Fredericktown, on the north side, and **Georgetown,** on the south side of Sassafras River 10 miles above the mouth, are connected by a highway bridge that has a 40-foot bascule span with a clearance of 4 feet; see **117.240,** Chapter 2, for drawbridge regulations and opening signals. Many yachts and pleasure craft harbor here.

There are numerous small-craft facilities on both sides of the river just below the bridge. Gasoline, diesel fuel, slips, and some marine supplies are available. The largest haul-out capacities for hull and engine repairs are: railway, 65 feet; lift, 60 tons.

Storm warning signals are displayed; see chart.

The unmarked channel in Sassafras River above the bridge is narrow in places and difficult to follow without local knowledge. A marina on the south side of the river a mile above the bridge has gasoline and some supplies; an 18-ton lift can haul out boats for hull and engine repairs.

Spesutie Narrows (39°25.2′N., 76°05.7′W.), on the northwest side of Chesapeake Bay 159 miles above the Virginia Capes, is between the mainland and **Spesutie Island,** close to the eastward. A privately dredged channel with a midchannel controlling depth of 10 feet in 1958, leads from the flats off the southern entrance into and along the narrows to the Army landings; the entrance channel is marked by buoys and privately maintained lighted ranges, and the inner channel is marked by buoys.

The upper end of the narrows is closed by a solid-fill causeway.

Spesutie Island and Spesutie Narrows are within the Aberdeen Proving Ground. A flashing red light is shown at night on **Mulberry Point,** on the west side of Spesutie Narrows, 1 mile above the south entrance, when firing is in progress; see **204.30,** Chapter 2, for limits and regulations of the restricted area.

Storm warning signals are displayed; see chart.

Elk River, on the east side of Chesapeake Bay 162 miles above the Virginia Capes, is the approach to the Chesapeake and Delaware Canal, which is described in Chapter 7. The entrance to the river is between **Grove Point** and **Turkey Point,** 3 miles north-northeastward; the latter point is a thinly wooded bluff with abrupt slopes at the south end. A light is shown from a white tower on the bluff. The entrance width normal to the channel is about a mile.

The mean range of tide is 2.1 feet at the entrance to Elk River and 2.3 feet at the head. The current velocity is 0.6 knot.

Local magnetic disturbance.—Differences of 3° to 8° from normal variation have been observed in Elk River channel from Grove Point to Courthouse Point.

Bohemia River, on the east side of Elk River 5 miles above the mouth, has depths of 7 feet or more for 4 miles to the junction of **Great Bohemia Creek** and **Little Bohemia Creek,** thence 6 to 4 feet for 1.5 miles in Great Bohemia Creek and 7 feet for a mile in Little Bohemia Creek. The channel is broad and easy to follow for 2 miles above the entrance, then becomes very narrow and crooked.

The cove on the southwest side of Bohemia River 3 miles above the entrance has depths of 3 to 5 feet and is much used as a small-boat anchorage.

A highway bridge 3.6 miles above the mouth of Bohemia River has a 40-foot bascule span with a clearance of 12 feet; see **117.245 (a) through (e) and (f) (2),** Chapter 2, for drawbridge regulations and opening signals.

There are small-craft facilities along Bohemia River. Depths of about 6 feet lead to boat basins on the north side about 1.5 miles from the entrance. Gasoline, diesel fuel, berths, and some supplies are available. Largest haul-out capacities for hull and engine repairs are: railway, 42 feet; lift, 30 tons. The facilities on the south side below the bridge have gasoline, berths, and some marine supplies; largest haul-out capacities for hull and engine repairs are: railway, 50 feet; lift, 20 tons.

Old Town Point Wharf, on the southeast side of Elk River 7 miles above the mouth, has depths of 10 feet at the outer end. This is a government wharf and a reporting station for the west end of the Chesapeake and Delaware Canal.

Back Creek, on the east side of Elk River 9 miles above the mouth and 171.4 miles above the Virginia Capes, is the route of the Chesapeake and Delaware Canal and has been described in Chapter 7.

Above Back Creek, the natural channel in Elk River has depths of 9 to 5 feet for 6 miles to the junction of **Big Elk Creek** and **Little Elk Creek,** 15 miles above the mouth. The channel is narrow and crooked in places but is marked by buoys to within 2 miles of the junction.

Small-craft facilities are on both sides of Elk River 5 miles above Old Town Point Wharf. Gasoline, some marine supplies, and slips are available; largest haul-out lift for hull and engine repairs is 15 tons.

Big Elk Creek, on the east, and Little Elk Creek, on the west, have depths of 3 feet to the fixed highway bridges 0.6 and 0.4 mile above their respective mouths. The channels in each are narrow and crooked with numerous snags and shoals that are unmarked. Extreme caution is advised beyond the junction. **Elkton,** between the creeks and 16 miles above the mouth of Elk River, is on the main line of the Penn Central Railroad and has several industrial plants.

The natural channel of Chesapeake Bay turns northward off the mouth of Elk River and splits into two branches between Turkey Point and Spesutie Island, 2.3 miles to the westward. One branch rounds Spesutie Island and continues northward to Susquehanna River; the other hugs the west side of Turkey Point and high thickly wooded **Elk Neck,** and continues to Northeast River. The flats between the two branches are very shallow, and large areas bare at low water.

Fishing Battery Light (39°29.7′N., 76°05.0′W.), 38 feet above the water, is shown from a black skeleton tower on the battery on the east side of the channel leading to Susquehanna River; the light is 167.1 miles above the Virginia Capes. Near the light are a house and a few trees. A shallow channel leads from the main channel to a basin on the west side of the light.

Swan Creek, on the western shore of Chesapeake Bay opposite Fishing Battery Light, has depths of 4 feet in the entrance and 3 to 10 feet inside for about 2 miles. The creek is little used except by boats of the U.S. Army. An overhead power cable with a clearance of 32 feet crosses the northern part of the creek.

Susquehanna River empties into the head of Chesapeake Bay from northwestward 170.1 miles above the Virginia Capes. The entrance is between **Concord Point,** marked by a light, and **Perry Point,** a mile east-northeastward. Controlling depth in the marked dredged entrance channel, through the flats from deep water in Chesapeake Bay to Havre de Grace, was 13 feet at midchannel in 1965. The mean range of tide is 1.7 feet at Havre de Grace and 2.1 feet at Port Deposit. The river usually is entirely closed by ice for about 3 months during the winter, but ice gorges and freshets are infrequent because of the dams upstream.

Havre de Grace, on the west side of the entrance to the Susquehanna River, is on the main lines of the Penn-Central Railroad and the Baltimore and Ohio Railroad. The town has little waterborne commerce, but many pleasure craft base here; most of the wharves are in poor condition. The oil wharf just above the first bridge has depths of about 10 feet alongside.

A rock covered 6 feet and marked by buoys on the east, west, and south sides, is about 200 yards off the Havre de Grace wharves and 500 yards below the drawspan of the first bridge. There are said to be several other rocks between this rock and the wharves that require local knowledge to avoid. In 1967, a sunken rock was reported just north of the first bridge in 39°33′20″N., 76°04′58″W., about 200 yards east-northeastward of the charted rock.

The railroad bridge 0.8 mile above the mouth has a swing span with a clearance of 52 feet; see **117.245 (a) through (e) and (f) (1),** Chapter 2, for drawbridge regulations and opening signals. The overhead power cable on the lower side of the bridge has a clearance of 127 feet. Stone piers of a former highway bridge, just below the railroad bridge, stands 15 feet above high water. The remaining three fixed bridges between Havre de Grace and Port Deposit have minimum clearance of 86 feet.

There are berthing and repair facilities for small craft at Havre de Grace. Gasoline, diesel fuel, and some marine supplies are available. The largest haul out capacities for hull and engine repairs are: railway, 50 feet; lift, 20 tons. One of the basins is protected by old railroad barges sunk in place.

Perryville, on the opposite side of the river from Havre de Grace, has berthing facilities for small craft above the first bridge. Gasoline and some marine supplies are available; largest lift for hauling out boats is 7 tons.

Above Havre de Grace, depths of 13 feet to 50 feet are in the channel of Susquehanna River to Port Deposit, on the northeast side 4 miles above the mouth; the river is obstructed by rocks above this point.

Garrett Island, 0.8 mile long and 0.4 mile broad, high and wooded, is in midriver a mile above the mouth. The favored channel is west of the island.

Port Deposit has a large manufacturing company that builds barges, derricks, boats, and hoisting equipment. The marinas at the south end of the town have berthing and engine repair facilities; largest lift, 12 tons. Gasoline is available.

Conowingo Dam is about 10 miles above the mouth of the Susquehanna River.

Northeast River empties into the head of Chesapeake Bay 4.5 miles eastward of Susquehanna River and 169.1 miles above the Virginia Capes. The entrance is between **Red Point,** which is 5 miles north-northeastward of Turkey Point, and **Carpenter Point,** on the west. The only commercial traffic on the river is in seafood products, but yachtsmen use it extensively.

The controlling depth from the entrance to within a mile of a dam at the head of navigation is about 7 feet, except in 1969, shoaling to 5 feet was reported in an area of undetermined size about 2.5 miles above the mouth. The channel is well marked for most of its length. The mean range of tide is 1.9 feet.

Extensive small-craft facilities with depths of 5 to 9 feet are at **Hance Point,** on the east side of Northeast River 2 miles above the mouth; at **Charlestown,** on the west side 2.5 miles above the mouth; and at **Northeast Heights,** on the east side 3 miles above the mouth. Gasoline, diesel fuel, slips, and some marine supplies are available. The largest haul-out capacities for hull and engine repairs are: railway, 60 feet; lift, 40 tons.

Storm warning signals are displayed; see chart.

North East, at the head of navigation 4.5 miles above the mouth of Northeast River, has good rail and highway connections. In 1968, the controlling depth in the dredged channel leading to the town was 7 feet. Gasoline and some supplies are available at a few of the fish piers.

APPENDIX

NATIONAL OCEAN SURVEY.—Coast Pilots, Nautical Charts, Tide Tables, Tidal Current Tables, and Tidal Current Charts are sold by the National Ocean Survey and by authorized sales agents located in many United States ports and in some foreign ports. Orders mailed to Washington, D.C., should be addressed to National Ocean Survey, Distribution Division (C44), Washington, D.C. 20235, and accompanied by a check or money order payable to NOS, Department of Commerce. Remittance from outside of the United States should be made either by an International Money Order or by a check payable on a United States bank. Chart catalogs and a list of sales agents are free upon request. Counter sales are available at Room 200, Building 14, 4200 Connecticut Avenue, Washington, D.C.

Field offices:

New York: New York Field Representative, NOS, National Oceanic and Atmospheric Administration, 30 Rockefeller Plaza, Room 11, Mezzanine, New York, N.Y. 10020.

Norfolk: Director, Atlantic Marine Center, NOS, National Oceanic and Atmospheric Administration, 439 West York Street, Norfolk, Va. 23510.

Detroit: Director, Lake Survey Center, NOS, National Oceanic and Atmospheric Administration, 630 Federal Building and U.S. Courthouse, Detroit, Mich. 48226.

Kansas City: Mid-Continent Field Director, NOS, National Oceanic and Atmospheric Administration, Federal Building, 601 East 12th Street, Kansas City, Mo. 64106.

San Francisco: San Francisco Field Representative, NOS, National Oceanic and Atmospheric Administration, Federal Building, 450 Golden Gate Ave., Box 36114, San Francisco, Calif. 94102.

Seattle: Director, Pacific Marine Center, NOS, National Oceanic and Atmospheric Administration, 1801 Fairview Avenue, East, Seattle, Wash. 98102.

Anchorage: Chief, Anchorage Field Office, NOS, National Oceanic and Atmospheric Administration, 632 Sixth Avenue, Anchorage, Alaska 99501.

Honolulu: Chief, Honolulu Field Office, NOS, National Oceanic and Atmospheric Administration, P.O. Box 3887, Honolulu, Hawaii 96812.

Coast Pilot Books:

U.S. Coast Pilot 1, Atlantic Coast, Eastport to Cape Cod, 1965.

U.S. Coast Pilot 2, Atlantic Coast, Cape Cod to Sandy Hook, 1966.

U.S. Coast Pilot 3, Atlantic Coast, Sandy Hook to Cape Henry, 1971.

U.S. Coast Pilot 4, Atlantic Coast, Cape Henry to Key West, 1970.

U.S. Coast Pilot 5, Atlantic Coast—Gulf of Mexico, Puerto Rico, and Virgin Islands, 1967.

U.S. Coast Pilot 7, Pacific Coast and Hawaii, 1968.

U.S. Coast Pilot 8, Alaska—Dixon Entrance to Cape Spencer, 1969.

U.S. Coast Pilot 9, Pacific and Arctic Coasts,Alaska—Cape Spencer to Beaufort Sea, 1964.

Distances Between United States Ports, Fourth (1967) Edition.

New editions of Coast Pilots 3 and 4 will be published annually. When other Coast Pilots are computerized, they will be issued on an annual basis. In the meantime, all the books, except Coast Pilots 3 and 4, should be used only by reference to the latest supplement which can be obtained free from National Ocean Survey, Distribution Division (C44), Washington, D.C. 20235, and from NOS sales agents.

Tide Tables:

Europe and West Coast of Africa.
East Coast, North and South America.
West Coast, North and South America.
Central and Western Pacific Ocean and Indian Ocean.

Tidal Current Tables:

Atlantic Coast, North America.
Pacific Coast, North America and Asia.

Tidal Current Charts:

Boston Harbor.
Narragansett Bay to Nantucket Sound.
Narragansett Bay.
Block Island and Eastern Long Island Sound.
Long Island Sound and Block Island Sound.
New York Harbor.
Delaware Bay and River.
Upper Chesapeake Bay.
Charleston Harbor, S.C., including the Wando, Cooper, and Ashley Rivers.
San Francisco Bay.
Puget Sound, Northern Part.
Puget Sound, Southern Part.

PUBLICATIONS.—A resume of the U.S. Government publications of navigational value is included for the ready reference of the mariner. In addition to the agents located in the principal seaports handling sales publications, certain libraries have been designated by the Congress of the United States to receive the publications as issued for public review.

Nautical Charts.—Coasts of the United States and Possessions: Published by National Ocean

Survey; for sale by NOS and its sales agents.

Mississippi River (Cairo Ill., to Gulf of Mexico): Published and for sale by Mississippi River Commission, Vicksburg, Miss.

Mississippi River (Cairo, Ill., to Minneapolis, Minn.) and Illinois Waterway (Mississippi River to Lake Michigan): Published and for sale by the U.S. Army Engineer District, Chicago, Ill.

Great Lakes, Lake Champlain, New York State Canals, and the St. Lawrence River—St. Regis to Cornwall, Canada: Published and for sale by National Ocean Survey, Lake Survey Center, 630 Federal Building and U.S. Courthouse, Detroit, Mich. 48226.

Foreign countries: Published by U.S. Naval Oceanographic Office; for sale by that office and its sales agents.

Coast Pilots.—Coasts of the United States and Possessions: Published by National Ocean Survey; for sale by NOS and its sales agents.

Great Lakes Pilot: Published and for sale by National Ocean Survey, Lake Survey Center, 630 Federal Building and U.S. Courthouse, Detroit, Mich. 48226.

Foreign countries (Sailing Directions): Published by U.S. Naval Oceanographic Office; for sale by that office and its sales agents.

Tide and Tidal Current Tables, and Tidal Current Charts: Published by National Ocean Survey; for sale by NOS and its sales agents.

Notice to Mariners may be obtained free from the following: Local Notices to Mariners—District Commander of the local Coast Guard district; Weekly Notice to Mariners, coasts of the United States, Possessions, and foreign —U.S. Naval Oceanographic Office; Weekly Notice to Mariners, Great Lakes—Commander, Ninth Coast Guard District, Cleveland, Ohio.

Special Notice to Mariners are published annually in Notice to Mariners 1. These notices contain important information of considerable interest to all mariners. Interested parties are advised to peruse these notices.

Light Lists.—United States and Possessions: Published by U.S. Coast Guard; for sale by the Superintendent of Documents and his sales agents.

Foreign countries: Published by U.S. Naval Oceanographic Office; for sale by that office and its sales agents.

Radio.—Radio Navigational Aids, Atlantic and Mediterranean Area (H.O. Pub No. 117A); Radio Navigational Aids, Pacific and Indian Oceans Area (H.O. Pub. No. 117B); Radio Weather Aids (H.O. Pub. No. 118;) Weather Station Index (H.O. Pub. No. 119). Published by U.S. Naval Oceanographic Office; for sale by that office and its sales agents.

Miscellaneous.—The Nautical Almanac, The Air Almanac, and American Ephemeris and Nautical Almanac: Published by United States Naval Observatory; for sale by Superintendent of Documents and his sales agents.

American Practical Navigator (Bowditch) (H.O. Publication No. 9), and International Code of Signals (H.O. Pub. No. 102): Published by the U.S. Naval Oceanographic Office; for sale by its sales agents or from the Superintendent of Documents.

Rules of the Road, International—Inland (CG—169). Rules of the Road, Western Rivers (CG—184). Rules of the Road, Great Lakes (CG—172): Published by and free on application to the U.S. Coast Guard.

Port Series of the United States: Part 1 (port administration and services) published by Maritime Administration, U.S. Department of Commerce; Part II (port conditions and facilities) published by Corps of Engineers, U.S. Army. Both parts are for sale by the Superintendent of Documents.

Official U.S. Coast Guard Recreational Boating Guide (CG—340): Published by U.S. Coast Guard; for sale by the Superintendent of Documents. Price 45 cents.

Marine Radio Telephony—How to correctly operate your radiotelephone set in the 2 MHz band; and Maritime Mobile VHF—FM Radio Telephony—Usage in the United States: Published by Radio Technical Commission for Marine Services; for sale by RTCM Services, c/o Federal Communications Commission, Washington, D.C. 20554.

CORPS OF ENGINEERS, U.S. ARMY.—District offices and areas covered by this Coast Pilot:

New York District: 26 Federal Plaza, New York, N.Y. 10007. Coastal and tributary waters from Sandy Hook, N.J. to a point just north of Manasquan Inlet.

Philadelphia District: U.S. Customhouse, Second and Chestnut Streets, Philadelphia, Pa. 19106. Coastal and tributary waters from a point just north of Manasquan Inlet to the Maryland boundary including Delaware Bay and River, and the Chesapeake and Delaware Canal.

Baltimore District: 31 Hopkins Plaza, Baltimore, Md. 21203. Coastal and tributary waters of Chesapeake Bay generally northward of the Maryland-Virginia boundary line except the Chesapeake and Delaware Canal, and including Potomac River upstream from Smith Point.

Norfolk District: Fort Norfolk, 803 Front Street, Norfolk, Va. 23510. Coastal and tributary waters of Virginia, including Chesapeake Bay and tributaries southward of Smith Point on the western shore and Onancock Creek southward on the eastern shore.

COAST GUARD.—District offices and areas covered by this Coast Pilot.

Commander, Third Coast Guard District, Governors Island, New York, N.Y. 10004. Coastal waters and tributaries of Rhode Island from Watch Hill, Connecticut, New York, New Jersey, Pennsylvania, and Delaware, including Fenwick Island Light, but not including that portion of

Delaware containing the reaches of the Nanticoke River and the Chesapeake and Delaware Canal.

Commander, Fifth Coast Guard District, Federal Building, 301 Crawford Street, Portsmouth, Va. 23705. Coastal waters and tributaries of Maryland, Virginia, North Carolina, District of Columbia, and that portion of Delaware containing the reaches of the Nanticoke River and the Chesapeake and Delaware Canal.

Captains of the Port:

Philadelphia Captain of the Port, U.S. Coast Guard Base, Gloucester City, N.J. 08030.

Baltimore Captain of the Port, Baltimore Group, U.S. Coast Guard Yard, Curtis Bay, Md. 21226.

Hampton Roads Area Captain of the Port, Coast Guard Group Office, Berkley Station, Norfolk, Va. 23523.

Marine Inspection Offices:

U.S. Customhouse, Second and Chestnut Streets, Philadelphia, Pa. 19106.

U.S. Customhouse, 40 South Gay Street, Baltimore, Md. 21202.

Federal Building, 301 Crawford Street, Portsmouth, Va. 23705.

Documentation Offices:

U.S. Customhouse, Room 801, Philadelphia, Pa. 19106.

U.S. Customhouse, Wilmington, Del. 19801.

U.S. Customhouse, Room 304, Baltimore, Md. 21202.

U.S. Post Office Bldg., Room 208, Annapolis, Md. 21404.

U.S. Post Office Bldg., Cambridge, Md. 21613.

U.S. Post Office Bldg., Crisfield, Md. 21817.

U.S. Post Office Bldg., Cape Charles, Va. 23310.

Washington, D.C.-Alexandria, Va., 1221 31st Street, N.W., Washington, D.C. 20007.

Post Office Box 198, Reedville, Va. 22539.

U.S. Post Office Bldg., Newport News, Va. 23607.

U.S. Customhouse, Room G-9, Norfolk, Va. 23510.

Coast Guard Stations.—The stations listed are in the area covered by this Coast Pilot. They have search and rescue capabilities and may provide lookout, communication, and/or patrol functions to assist vessels in distress. They guard the International radiotelephone distress and calling frequency 2182 kHz and the International calling and safety frequency 156.8 MHz (channel 16) of the maritime mobile VHF-FM band.

New Jersey:

Sandy Hook (40°28.2'N., 74°00.8'W.). On the bay side, 0.5 mile south of the point of the hook.

Shark River (40°11.3'N., 74°00.8'W.). About 500 yards west of the entrance, on the north side of Shark River Inlet.

Manasquan Inlet (40°06.2'N., 74°02.2'W.). Quarter mile west of inlet entrance, south side.

Barnegat (39°45.5'N., 74°06.4'W.). On Long Beach at Barnegat City, 0.5 mile south-southeast of abandoned light tower.

Beach Haven (39°33.1'N., 74°15.1'W.). At Beach Haven, 3 miles north of Beach Haven Inlet.

Atlantic City (39°22.7'N., 74°25.4'W.). Near Absecon Inlet entrance, on north side of Clam Creek opposite Gardiner Basin.

Great Egg (39°17.7'N., 74°33.8'W.). Inside Great Egg Harbor Inlet at Ocean City, 0.4 mile southward of bridge.

Townsend Inlet (39°07.7'N., 74°42.6'W.). North side of the inlet, 2.3 miles southwest of Ludlum Beach Light.

Cape May (38°56.9'N., 74°53.4'W.). On the south side of Cape May Harbor.

Gloucester City (39°53.9'N., 75°07.7'W.). On the east side of Delaware River, 700 yards south of Walt Whitman Bridge.

Delaware:

Roosevelt Inlet (38°47.4'N., 75°09.9'W.). At the junction of Broadkill River and Lewes Rehoboth Canal (manned during summer months only).

Indian River Inlet (38°36.6'N., 75°04.1'W.). On the north shore inside the inlet.

Maryland:

Ocean City (38°19.7'N., 75°05.4'W.). On Philadelphia Avenue between South Division and Worcester Streets.

Still Pond (39°20.1'N., 76°07.9'W.). On the north side of the entrance to Stillpond Creek.

Baltimore (39°11.9'N., 76°34.2'W.). At Curtis Bay Coast Guard Yard in Arundel Cove.

Annapolis (38°55.3'N., 76°28.4'W.). On the west side of Fishing Creek, about 1 mile northwestward of Thomas Point.

Crisfield Light Attendant Station (37°58.6'N., 75°51.6'W.). In Somers Cove at Crisfield.

Taylors Island (38°28.5'N., 76°17.2'W.). A houseboat moored about 1.6 mile south of Hooper Point in Slaughter Creek.

Piney Point (38°08.1'N., 76°31.7'W.). Just east of the point.

Virginia:

Dahlgren, Potomac River (38°19.2'N., 77°02.2'W.). On the north side of Upper Machodock Creek, just inside the entrance.

Chincoteague (37°55.9'N., 75°23.0'W.). On the east side of Chincoteague Channel, 0.3 mile south of the bridge.

Parramore Beach (37°34.4'N., 75°37.0'W.). On the west side of Parramore Island, about 0.5 mile south of Wachapreague Inlet.

Milford Haven (37°29.3'N., 76°18.4'W.). About 0.4 mile eastward of Narrows Point.

Little Creek (36°54.7'N., 76°10.7'W.). About a mile south of the entrance to Little Creek, 4.5 miles west of Lynnhaven Inlet.

Norfolk (36°49.5'N., 76°17.3'W.). At Berkley, on the east side of Southern Branch, 1.2 miles south of the junction with Eastern Branch.

Chesapeake Light Station (36°54.3'N.,

75°42.8′W.). In Atlantic Ocean, 14 miles east of Chesapeake Bay Entrance.

Broadcasts by Coast Guard radio stations.—Urgent, safety, and scheduled marine information broadcasts are made by Coast Guard radio stations. In general, these broadcasts provide information vital to vessels operating in the approaches and coastal waters of the United States including Puerto Rico and the U.S. Virgin Islands. Transmissions are as follows:

Urgent and safety broadcasts:

(1) **By radiotelegraph:** (a) Upon receipt, except within 10 minutes of the next silent period, for urgent messages only; (b) during the last 15 seconds of the first silent period after receipt; (c) repeated at the end of the first silent period which occurs during the working hours of one-operator ships unless the original warning has been cancelled or superseded by a later warning message.

(2) **By radiotelephone:** (a) upon receipt; (b) repeated 15 minutes later, for urgent messages only; (c) additional broadcasts at the discretion of the originator.

(3) Urgent broadcasts are preceded by the urgent signal; XXX for radiotelegraph; PAN for radiotelephone. Both the urgent signal and message are transmitted on 500 kHz and 2182 kHz, respectively. Safety broadcasts are preceded by the safety signal: TTT for radiotelegraph; SECURITE for radiotelephone. After the preliminary signal 500 kHz and 2182 kHz, the station shifts to its assigned working medium frequency for the radiotelegraph broadcast and 2670 kHz for the radiotelephone transmission.

Scheduled broadcasts.—The following Coast Guard radio stations make scheduled broadcasts, preceded by a preliminary call on 500 kHz and 2182 kHz, at the times and frequencies indicated:

Radiotelegraph:

NMY, New York, N.Y., 486 kHz, 1200 and 2000 EST.

NMN, Portsmouth, Va., 448 kHz, 1120 and 2020 EST.

Radiotelephone:

NMY, New York, N.Y., 2670 kHz, 0720 and 1920 EST.

NMK, Cape May, N.J., 2670 kHz, 0445, 0600, 0745, 1045, 1345, 1645, 1800, and 1945 EST.

NMX, Baltimore, Md., 2670 kHz, 1250 EST.

NMN, Portsmouth, Va., 2670 kHz, 0020 and 1220 EST.

CUSTOMS.—Ports of entry where customs officers are assigned authority to accept entries of merchandise, to collect duties, and to enforce the various provisions of the customs and navigation laws in the port areas covered by this volume are listed below. The first-named port in each district (capital letters) is the headquarters for the area.

Baltimore Region:

Philadelphia District: PHILADELPHIA, PA. (including Camden and Gloucester City, N.J.), Chester, Pa., Wilmington, Del.

Baltimore District: BALTIMORE, MD., Cambridge, Crisfield, and Annapolis, Md.

Washington District: WASHINGTON, D.C. and Alexandria, Va.

Norfolk District: NORFOLK, VA., Newport News, Cape Charles City, Reedville, and Richmond-Petersburg, Va.

In addition to the ports of entry, the following customs stations handle customs business. Entry of clearance of these ports must be authorized by the District Director of Customs in advance.

Philadelphia District: Atlantic City, Port Norris, and Tuckerton, N.J., Lewes. Del.

Baltimore District: Salisbury, Md.

NATIONAL WEATHER SERVICE.—The following offices will provide forecasts and climatological data or arrange to obtain these services from other offices. They will also check barometers in their offices or by telephone:

New York, N.Y.: National Weather Service office, 30 Rockefeller Plaza, (telephone: 212-971-5569).

Atlantic City, N.J.: National Weather Service office, National Aviation Facilities Experimental Center (telephone: 609-641-4325).

Trenton, N.J.: National Weather Service office, Federal Building (telephone: 609-396-8951).

Philadelphia, Pa.: National Weather Service office, Terminal Building, International Airport (telephone: 215-726-4275).

Wilmington, Del.: National Weather Service office, Greater Wilmington Airport (telephone: 302-328-7596).

Baltimore, Md.: National Weather Service Airport Station, Friendship International Airport (telephone: 301-761-6036).

Norfolk, Va.: National Weather Service office, Room 236, U.S. Post Office Building (telephone: 703-627-7517). Norfolk Regional Airport (telephone: 703-853-3013).

Richmond, Va.: National Weather Service office, Byrd Field (telephone: 703-737-1213).

Washington, D.C.: National Weather Service Forecast Center FOB 4, Suitland, Md. (telephone: 301-736-3070); National Weather Service Airport Station, Washington National Airport (telephone: 202-628-9149).

Weather broadcasts by commercial radio stations.—Taped or direct broadcasts of forecasts and storm warnings are made by commercial radio stations in the areas covered by this Coast Pilot. These are usually made several times daily; broadcast times are published in local newspaper radio program schedules, and in the Marine Weather Services Charts published annually by the National Weather Service.

Weather broadcasts by Coast Guard radio stations were described previously in this chapter.

VHF-FM Weather Broadcasts. National Weather

Service VHF-FM radio stations provide mariners with continuous FM broadcasts of weather warnings, forecasts, radar reports, and surface weather operations. These stations transmit on 162.55 or 162.40 MHz. Reception range is usually up to 40 miles from the antenna site, depending on terrain, type of receiver, and antenna used. The following VHF-FM radio stations are located in or near the area covered by this Coast Pilot:

KWO-35, New York, N.Y., 162.55 MHz.
KHB-38, Atlantic City, N.J., 162.40 MHz.
KHB-36, Washington, D.C., 162.55 MHz.
KHB-37, Norfolk, Va., 162.55 MHz.

PUBLIC HEALTH SERVICE.—Quarantine stations where supervision of quarantine and medical examination of aliens are performed:

Baltimore, Md.: Room 426, U.S. Customhouse, Gay and Lombard Sts.

Philadelphia, Pa.: Marcus Hook, Delaware Ave. and Market St.

Fort Monroe, Va.: waterfront.

Additional places where quarantine and/or medical examination of aliens are performed: Annapolis, Cambridge, Salisbury, and Piney Point, Md.; Washington, D.C. (Dulles International Airport); Atlantic City, Burlington, Camden, Cape May, Eagle Point, Paulsboro, Pennsauken, Trenton, and Wildwood, N.J.; Bombay Hook anchorage, Delaware City, Lewes, New Castle, and Wilmington, Del.; Chester and Morrisville, Pa.; Alexandria, Cheatham Annex, Chesapeake, Craney Island, Hampton Roads, Hopewell, Newport News, Norfolk, Portsmouth, Richmond, West Point, and Yorktown, Va.

Hospitals:

Baltimore, Md.: Wyman Park Dr. and 31st Street. 21211.
Norfolk, Va.: 6500 Hampton Blvd., Larchmont. 23508.

Outpatient Clinics:

Philadelphia, Pa.: 225 Chestnut St. 19106.
Washington, D.C.: Health, Education, and Welfare Building, 4th and D Sts., S.W. 20201.

Contract physicians's offices:

Atlantic City, N.J.: 2703 Pacific Ave.
Atlantic Highlands, N.J.
Beach Haven, N.J.: Medical Arts Building.
Brigantine, N.J.: 1801 W. Brigantine Ave.
Cambridge, Md.: 604 Church St.
Cape May, N.J.: Columbia Ave. and Ocean St.
Chincoteague, Va.: 204 Willow St.
Crisfield, Md.: 322 Main St.
Kilmarnock, Va.: Gravett Medical Center, Irvington Road.
Lewes, Del.: 821 Savannah Road.
Mathews, Va.
Nassawadox, Va.
Newport News, Va.: 12361 Warwick Blvd.
Ocean City, Md.: 10th and North Philadelphia Ave.
Point Pleasant, N.J.: 1104 Arnold Ave.
Reedville, Va.
Richmond, Va.: 714 North Blvd.
St. Michaels, Md.
Sea Isle City, N.J.: 5200 Landis Ave.
Seaside Heights, N.J.: 10 Blvd.

Radio shore stations providing medical advice.—Messages to shore stations may be transmitted in code groups or plain language; messages should be signed by the master and be prefixed: "DH MEDICO".

The following stations maintain a continuous guard on 500 kHz and are most accessible in point of radio connection with medical relief facilities of the U.S. Public Health Service in the area covered by this Coast Pilot.

NMY, New York, N.Y.
WSC, Tuckerton, N.J.
WMH, Baltimore, Md.
NMN, Portsmouth, Va.

DEPARTMENT OF AGRICULTURE.—Maritime Ports covered by this Coast Pilot where Animal and Plant Quarantine inspectors are located and inspections conducted:

Maryland:

Baltimore: Room 506 Appraisers Stores Bldg., 103 South Gay St. 21202.

Pennsylvania:

Philadelphia: 605A Customhouse, Second and Chestnut Sts. 19106.

Virginia:

Chantilly (Arlington): Dulles International Airport. 20041.
Newport News: Room 6 Post Office Bldg. 23607.
Norfolk: Room 209 Customhouse. 23510.

IMMIGRATION AND NATURALIZATION:

Regional Office: Room 6226 Federal Building, Richmond, Va. 23240.

District Offices:

Philadelphia, Pa.: 128 North Broad St. 19102.

Baltimore, Md.: Room 124, Federal Building, 31 Hopkins Plaza 21201.

Washington, D.C.: 1025 Vermont Ave., N.W. 20005.

Norfolk, Va.: Room 426, Post Office Building 23510.

Fort Monroe: Building P-207, P.O. Box 95 23351.

FEDERAL COMMUNICATIONS COMMISSION:

District field offices:

Philadelphia, Pa.: Room 1005, U.S. Customhouse 19106.

Baltimore, Md.: Room 819, Federal Building, 31 Hopkins Plaza 21201.

Washington, D.C.: Room 216, 1919 M St., N.W. 20554.

Norfolk, Va.: Room 400, Federal Building 23510.

CLIMATOLOGICAL TABLES

These tables were compiled from National Weather Service data. Sky cover is expressed in a range of 0 for no clouds to 10 for complete sky cover. The number of days is based on average cloudiness of 0 to 3, partly cloudy days on 4 to 7, and cloudy days on 8 to 10.

Heavy fog includes data referred to at various times in the past as "Dense" or "Thick". The upper visibility limit for heavy fog is ¼ mile.

(a) means length of record in years.
(b) means climatological standard normals, 1931-1960.
* means less than one-half.
T means trace, an amount too small to measure.

NEW YORK, NEW YORK (Central Park Observatory) 40°47'N. 73°58'W. Elevation (ground) 132 feet. WB-1969

Month	Air temperature (°F.) Normal: Daily maximum	Normal: Daily minimum	Normal: Monthly	Extreme: Record highest	Extreme: Record lowest	Precipitation (inches): Normal total	Maximum 24 hrs.	Snow, sleet mean total	Humidity (percent): 7 a.m. EST	1 p.m. EST	Wind (knots): Mean speed	Prevailing direction	Maximum speed and direction	Percent of possible sunshine	Mean sky cover sunrise to sunset	Mean number of days: Sunrise to sunset: Clear	Partly cloudy	Cloudy	Precipitation .01 inch or more	Snow, sleet 1.0 inch or more	Thunderstorms	Heavy fog
(a)	(b)	(b)	(b)	101	101	(b)	(58)	101	50	50	50	45	23	93	42	42	42	42	101	99	9	
Jan.	39.5	26.9	33.2	72	-6	3.31	3.33	7.6	68	60	9.5	NW	41NW	50	6.0	8	9	14	11	2	*	
Feb.	40.3	26.4	33.4	75	-15	2.84	2.96	8.7	68	58	9.6	NW	41NE	55	5.8	8	9	11	10	2	*	
Mar.	47.8	33.2	40.5	86	3	4.01	4.25	5.4	67	55	9.7	NW	52NW	57	5.7	9	10	12	12	2	1	
Apr.	59.6	43.1	51.4	92	12	3.43	2.67	1.0	68	52	9.2	NW	39NE	59	6.0	8	10	12	11	*	1	
May	71.4	53.4	62.4	99	32	3.67	4.88	T	71	53	7.8	SW	33NE	62	5.7	8	12	11	11	0	2	
June	80.2	62.5	71.4	101	44	3.31	4.74	0.0	73	55	7.1	SW	43SW	65	5.6	8	12	10	10	0	4	
July	85.3	68.2	76.8	106	52	3.70	3.56	0.0	75	56	6.7	SW	37NW	65	5.5	8	13	10	11	0	4	
Aug.	83.3	66.8	75.1	104	50	4.44	4.80	0.0	78	58	6.8	SW	31NE	64	5.5	9	12	10	10	0	4	
Sept.	76.8	60.1	68.5	102	39	3.87	8.30	0.0	79	57	7.1	SW	38NE	63	5.2	11	10	9	8	0	1	
Oct.	66.3	50.3	58.3	94	28	3.14	11.17	T	76	55	7.9	SW	35NE	62	4.9	12	10	9	8	0	1	
Nov.	53.7	40.3	47.0	84	5	3.39	3.81	1.0	73	59	8.8	NW	61NE	53	5.8	9	9	12	9	*	*	
Dec.	42.1	29.7	35.9	70	-13	3.26	3.21	6.2	69	60	9.1	NW	37NW	50	5.9	9	9	13	10	2	*	
Year	62.2	46.7	54.5	106	-15	42.37	11.17	29.9	72	56	8.3	NW	61NE	59	5.6	107	125	133	121	8	18	

Means and extremes above are from existing and comparable exposures. Annual extremes have been exceeded at other sites in the locality as follows: Maximum monthly snowfall 37.9 inches in February 1894; maximum speed and direction of wind 98SE in October 1954.

NEWARK, NEW JERSEY (Newark Airport) 40°42'N., 74°10'W. Elevation (ground) 7 feet. WB-1969

Month	Air temperature (°F.) Normal: Daily maximum	Normal: Daily minimum	Normal: Monthly	Extreme: Record highest	Extreme: Record lowest	Precipitation (inches): Normal total	Maximum 24 hrs.	Snow, sleet mean total	Humidity (percent): 7 a.m. EST	1 p.m. EST	Wind (knots): Mean speed	Prevailing direction	Maximum speed and direction	Percent of possible sunshine	Mean sky cover sunrise to sunset	Mean number of days: Sunrise to sunset: Clear	Partly cloudy	Cloudy	Precipitation .01 inch or more	Snow, sleet 1.0 inch or more	Thunderstorms	Heavy fog
(a)	(b)	(b)	(b)	4	4	(b)	16	28	4	4	26	22	21		24	28	28	28	28	28	28	28
Jan.	39.5	25.0	32.3	68	1	3.33	1.78	7.0	71	57	9.9	NE	39WSW		6.4	8	8	15	11	2	*	3
Feb.	40.7	24.7	32.7	59	4	2.80	2.45	8.2	68	54	10.2	NW	40SW		6.3	7	8	13	10	2	*	2
Mar.	48.8	32.1	40.5	79	8	4.09	2.58	5.6	71	52	10.5	NW	37W		6.1	8	9	14	11	2	1	2
Apr.	60.9	41.7	51.3	88	28	3.51	2.01	0.6	67	47	9.8	WNW	43W		6.4	7	9	14	12	*	1	1
May	72.1	51.9	62.0	96	35	3.65	4.11	T	66	49	8.9	SW	43NW		6.4	7	11	13	12	0	4	2
June	81.3	61.2	71.3	101	49	3.44	1.75	0.0	71	52	8.2	SW	48ENE		6.0	7	12	11	10	0	5	2
July	86.1	66.5	76.3	105	59	3.67	3.15	0.0	72	53	7.6	SW	39S		6.2	7	12	12	10	0	6	1
Aug.	83.8	64.9	74.4	95	50	4.43	4.17	0.0	75	53	7.6	SW	40E		5.9	8	12	11	10	0	4	1
Sept.	77.0	57.6	67.3	94	42	3.76	4.71	0.0	76	52	7.9	SW	44NE		5.4	11	8	11	8	0	2	1
Oct.	66.2	47.0	56.6	87	28	3.11	2.65	T	77	52	8.3	SW	42ESE		5.2	12	8	11	8	0	1	2
Nov.	53.5	37.3	45.4	76	20	3.37	2.09	0.5	76	59	8.9	SW	71E		6.2	8	9	13	10	*	*	2
Dec.	42.0	27.4	34.7	68	8	3.22	1.90	8.0	75	61	9.4	SW	48NW		6.2	9	8	14	11	2	*	2
Year	62.7	44.8	53.7	105	1	42.38	4.71	29.9	72	53	9.0	SW	71E		6.1	99	114	152	122	8	25	21

Means and extremes above are from existing and comparable exposures. Annual extremes have been exceeded at other sites in the locality as follows: Lowest temperature -14 in February 1934; maximum monthly precipitation 22.48 in August 1943; minimum monthly precipitation 0.07 in June 1949.

ATLANTIC CITY, NEW JERSEY (Aviation Facilities Experiment Center) 39°27'N., 74°34'W. Elevation (ground) 64 feet. WB-1969

Month	Air temperature (°F.) Normal: Daily maximum	Daily minimum	Monthly	Extreme: Record highest	Record lowest	Precipitation (inches): Normal total	Maximum 24 hrs.	Snow, sleet mean total	Humidity (percent): 7 a.m. EST	1 p.m. EST	Wind (knots): Mean speed	Prevailing direction	Maximum speed and direction	Percent of possible sunshine	Mean sky cover sunrise to sunset	Mean number of days: Sunrise to sunset: Clear	Partly cloudy	Cloudy	Precipitation .01 inch or more	Snow, sleet 1.0 inch or more	Thunderstorms	Heavy fog
(a)	(b)	(b)	(b)	5	5	(b)	26	25	5	5	11	5	10	9	11	11	11	11	26	25	11	11
Jan.	42.9	26.6	34.8	78	-8	3.56	2.86	5.0	77	58	10.8	WNW	32WNW	54	5.9	10	7	14	11	1	*	3
Feb.	43.3	26.1	34.7	69	-7	3.13	2.59	5.3	76	55	10.8	W	37W	50	6.8	7	6	15	10	2	*	4
Mar.	49.7	32.4	41.1	81	7	3.91	2.27	3.8	79	54	10.9	WNW	38WNW	54	5.9	9	8	14	11	1	1	4
Apr.	60.3	41.7	51.0	94	12	3.41	3.37	0.3	75	50	10.5	S	40ENE	51	6.4	7	9	14	11	*	2	3
May	71.0	51.5	61.3	99	25	3.51	4.15	0.0	74	51	9.5	S	28SW	56	6.2	7	12	12	10	0	3	3
June	79.2	60.7	70.0	106	37	2.83	2.91	0.0	82	54	8.5	S	32WNW	61	5.9	8	11	11	9	0	4	4
July	83.8	66.3	75.1	104	46	3.72	6.46	0.0	85	57	8.1	S	32ENE	59	6.4	7	10	14	9	0	6	4
Aug.	82.2	65.1	73.7	97	40	4.90	6.40	0.0	86	56	7.8	S	28NW	61	6.1	8	9	14	9	0	5	3
Sept.	76.0	58.4	67.2	93	32	3.31	3.98	0.0	86	54	8.4	ENE	52NW	61	5.4	11	8	11	7	0	1	3
Oct.	66.5	47.8	57.2	87	23	3.20	2.95	T	87	52	8.9	W	36WNW	62	4.9	13	8	10	7	0	1	5
Nov.	55.5	37.9	46.7	76	11	3.66	3.93	0.5	84	56	10.2	W	35W	52	6.0	9	8	13	9	*	*	3
Dec.	45.1	28.1	36.6	72	0	3.22	2.75	2.9	80	59	10.0	WNW	48N	46	6.2	9	8	14	9	1	*	4
Year	63.0	45.2	54.1	106	-8	42.36	6.46	17.8	81	55	9.5	S	52NW	56	6.0	105	104	156	112	5	25	45

Means and extremes above are from existing and comparable exposures. Annual extremes have been exceeded at other sites in the locality as follows: Lowest temperature -9 in February 1934; maximum monthly precipitation 14.87 in August 1882; minimum monthly precipitation .01 in September 1941; maximum precipitation in 24 hours 9.21 in October 1903; maximum snowfall in 24 hours 18.0 in February 1902.

WILMINGTON, DELAWARE (Greater Wilmington Airport) 39°40'N., 75°36'W. Elevation (ground) 74 feet. WB-1969

Month	Air temperature (°F.) Normal: Daily maximum	Daily minimum	Monthly	Extreme: Record highest	Record lowest	Precipitation (inches): Normal total	Maximum 24 hrs.	Snow, sleet mean total	Humidity (percent): 7 a.m. EST	1 p.m. EST	Wind (knots): Mean speed	Prevailing direction	Maximum speed and direction	Percent of possible sunshine	Mean sky cover sunrise to sunset	Mean number of days: Sunrise to sunset: Clear	Partly cloudy	Cloudy	Precipitation .01 inch or more	Snow, sleet 1.0 inch or more	Thunderstorms	Heavy fog
(a)	(b)	(b)	(b)	22	22	(b)	22	22	22	22	21	16	21		22	22	22	22	22	22	22	22
Jan.	41.3	25.5	33.4	75	-4	3.40	1.61	5.8	75	61	8.5	WNW	40WNW		6.6	7	8	16	11	2	*	4
Feb.	42.4	25.2	33.8	74	-4	2.95	2.29	6.2	75	59	9.1	NW	40WNW		6.4	7	7	14	10	2	*	4
Mar.	50.5	32.0	41.3	86	9	4.02	2.75	4.5	75	54	9.7	WNW	37SSE		6.2	8	9	14	12	1	1	3
Apr.	62.5	41.6	52.1	89	22	3.33	2.56	0.1	74	51	9.0	WNW	39WNW		6.5	7	8	15	11	*	2	3
May	73.4	52.0	62.7	95	32	3.53	2.35	T	76	53	7.7	S	39W		6.5	6	11	14	11	0	4	3
June	81.8	61.0	71.4	99	44	4.07	2.67	0.0	79	53	7.2	S	35SW		5.9	8	11	11	9	0	6	2
July	86.2	65.8	76.0	102	50	4.25	6.24	0.0	81	53	6.6	NW	42W		6.0	7	12	12	9	0	6	2
Aug.	84.2	64.3	74.3	101	46	5.59	4.00	0.0	84	56	6.4	S	35NNE		5.8	9	10	12	9	0	6	3
Sept.	77.9	57.3	67.6	100	37	3.95	5.62	0.0	85	55	6.9	S	35ENE		5.5	10	9	11	8	0	2	3
Oct.	67.3	45.9	56.6	91	24	2.91	3.88	T	85	53	7.0	NW	50SSW		5.2	12	8	11	7	0	1	5
Nov.	55.1	35.7	45.4	85	14	3.53	3.83	1.3	81	56	7.8	NW	40SSE		6.2	8	9	13	9	*	1	4
Dec.	43.5	26.7	35.1	72	3	3.03	2.22	4.7	77	60	8.0	WNW	38WNW		6.3	8	8	15	10	1	*	4
Year	63.8	44.4	54.1	102	-4	44.56	6.24	22.6	79	55	7.8	NW	50SSW		6.1	97	110	158	116	6	30	40

Means and extremes above are from existing and comparable exposures. Annual extremes have been exceeded at other sites in the locality as follows: Highest temperature 107 in August 1918; lowest temperature -15 in February 1934; maximum monthly precipitation 14.91 in August 1911; minimum monthly precipitation 0.06 in October 1924; maximum precipitation in 24 hours 6.53 in August 1945; maximum monthly snowfall 27.0 in January 1935; maximum snowfall in 24 hours 22.0 in December 1909.

PHILADELPHIA, PENNSYLVANIA (International Airport) 39°53'N. 75°15'W. Elevation (ground) 5 feet. WB-1969

Month	Air temperature (°F.) Normal: Daily maximum	Normal: Daily minimum	Normal: Monthly	Extreme: Record highest	Extreme: Record lowest	Precipitation (inches): Normal total	Maximum 24 hrs.	Snow, sleet mean total	Humidity (percent): 7 a.m. EST	1 p.m. EST	Wind (knots): Mean speed	Prevailing direction	Maximum speed and direction	Percent of possible sunshine	Mean sky cover sunrise to sunset	Mean number of days: Sunrise to sunset: Clear	Partly cloudy	Cloudy	Precipitation .01 inch or more	Snow, sleet 1.0 inch or more	Thunderstorms	Heavy fog
(a)	(b)	(b)	(b)	10	10	(b)	23	23	10	10	29	23	29	27	29	29	29	29	29	29	29	29
Jan.	40.3	24.3	32.3	69	-5	3.32	2.27	5.5	73	59	9.0	WNW	53NE	50	6.6	7	8	16	11	2	*	3
Feb.	41.8	24.6	33.2	67	-4	2.80	1.96	6.4	71	57	9.6	NW	51NW	54	6.4	7	7	14	9	2	*	3
Mar.	50.3	31.6	41.0	80	9	3.80	2.39	4.2	72	54	9.9	N	49NW	57	6.2	8	8	15	11	1	1	2
Apr.	62.6	41.4	52.0	92	24	3.40	2.03	0.1	70	49	9.6	SW	51SW	56	6.6	6	9	15	11	*	2	2
May	73.4	51.8	62.6	96	28	3.74	2.09	T	74	51	8.4	WSW	49SW	58	6.5	6	11	14	11	0	4	2
June	81.6	60.4	71.0	100	44	4.05	3.62	0.0	76	53	7.6	WSW	63NW	64	6.2	7	11	12	10	0	5	1
July	85.9	65.2	75.6	104	51	4.16	4.26	0.0	79	54	7.0	WSW	41W	62	6.2	7	12	12	9	0	5	1
Aug.	83.7	63.5	73.6	97	45	4.63	4.81	0.0	80	55	6.8	SW	58E	62	5.9	8	11	12	10	0	5	1
Sept.	77.2	56.2	66.7	94	35	3.46	5.45	0.0	83	55	7.2	SW	43NE	61	5.6	10	9	11	8	0	2	2
Oct.	66.5	44.9	55.7	88	25	2.78	3.78	T	81	51	7.6	WSW	57SW	60	5.4	11	8	12	7	*	1	4
Nov.	54.0	34.5	44.3	80	17	3.40	3.46	0.9	76	55	8.3	WSW	52SW	53	6.3	7	10	13	9	*	*	3
Dec.	42.3	25.5	33.9	71	3	2.94	1.77	4.8	73	59	8.7	WNW	41NW	51	6.3	8	9	14	10	1	*	3
Year	63.3	43.7	53.5	104	-5	42.48	5.45	21.9	76	54	8.3	WSW	63NW	58	6.2	92	113	160	116	6	26	27

Means and extremes above are from existing and comparable exposures. Annual extremes have been exceeded at other sites in the locality as follows: Highest temperature 106 in August 1918; lowest temperature -11 in February 1934; maximum monthly precipitation 12.10 in August 1911; maximum precipitation in 24 hours 5.89 in August 1898; maximum monthly snowfall 31.5 in February 1899; maximum snowfall in 24 hours 21.0 in December 1909; maximum speed and direction of wind 76N in July 1931.

TRENTON, NEW JERSEY (Federal Building) 40°13'N., 74°46'W. Elevation (ground) 56 feet. WB-1969

Month	Air temperature (°F.) Normal: Daily maximum	Normal: Daily minimum	Normal: Monthly	Extreme: Record highest	Extreme: Record lowest	Precipitation (inches): Normal total	Maximum 24 hrs.	Snow, sleet mean total	Humidity (percent)		Wind (knots): Mean speed	Prevailing direction	Maximum speed and direction	Percent of possible sunshine	Mean sky cover sunrise to sunset	Mean number of days: Sunrise to sunset: Clear	Partly cloudy	Cloudy	Precipitation .01 inch or more	Snow, sleet 1.0 inch or more	Thunderstorms	Heavy fog
(a)	(b)	(b)	(b)	37	37	(b)	37	37			32	32	37	37	26	37	37	37	37	37	32	
Jan.	40.0	26.2	33.1	72	-3	3.10	2.03	5.5			8.5	NW	42N	51	6.2	8	9	14	11	2	*	
Feb.	40.9	25.9	33.4	73	-14	2.59	2.45	7.3			8.9	NW	43W	55	6.2	8	8	12	10	2	*	
Mar.	48.8	32.5	40.7	86	8	3.84	2.55	4.7			9.3	NW	43NW	56	5.9	9	8	14	12	2	1	
Apr.	61.3	42.0	51.7	91	24	3.21	2.46	0.4			9.0	S	37N	58	6.3	7	10	13	11	*	2	
May	72.3	52.3	62.3	96	34	3.62	3.11	T			7.8	S	32NW	62	6.2	7	11	13	11	0	5	
June	80.7	61.3	71.0	100	43	3.60	4.79	0.0			7.3	S	31SE	65	5.9	7	12	11	10	0	6	
July	85.2	66.7	76.0	106	53	4.18	4.85	0.0			6.8	S	40SW	66	6.0	8	11	12	10	0	8	
Aug.	82.8	65.0	73.9	100	48	4.77	4.76	0.0			6.6	S	36N	64	5.8	8	11	12	10	0	6	
Sept.	76.2	57.9	67.1	100	38	3.50	4.01	0.0			6.9	S	49NW	63	5.5	10	9	11	8	0	3	
Oct.	65.9	47.7	56.8	94	27	2.84	3.46	0.1			7.2	N	52NW	61	5.0	12	9	10	7	*	1	
Nov.	53.6	38.0	45.8	83	14	3.16	2.37	1.1			8.0	NW	56E	53	6.1	8	9	13	10	*	*	
Dec.	42.2	28.2	35.2	72	-2	2.87	2.67	5.1			8.1	NW	42NW	50	6.1	8	9	14	11	1	*	
Year	62.5	45.3	53.9	106	-14	41.28	4.85	24.2			7.8	S	56E	59	5.9	100	116	149	121	7	33	

Means and extremes above are from existing and comparable exposures. Annual extremes have been exceeded at other sites in the locality as follows: Maximum monthly precipitation 15.22 in July 1880; maximum precipitation in 24 hours 5.42 in October 1903; maximum monthly snowfall 34.0 in February 1899; maximum speed of wind 63 in July 1914.

NORFOLK, VIRGINIA (Norfolk Regional Airport) 36°54'N., 76°12'W. Elevation (ground) 22 feet. WB-1969

Month	Air temperature (°F.) Normal: Daily maximum	Air temperature (°F.) Normal: Daily minimum	Air temperature (°F.) Normal: Monthly	Air temperature (°F.) Extreme: Record highest	Air temperature (°F.) Extreme: Record lowest	Precipitation (inches): Normal total	Precipitation (inches): Maximum 24 hrs.	Precipitation (inches): Snow, sleet mean total	Humidity (percent): 7 a.m. EST	Humidity (percent): 1 p.m. EST	Wind (knots): Mean speed	Wind (knots): Prevailing direction	Wind (knots): Maximum speed and direction	Percent of possible sunshine	Mean sky cover sunrise to sunset	Mean number of days: Sunrise to sunset: Clear	Mean number of days: Sunrise to sunset: Partly cloudy	Mean number of days: Sunrise to sunset: Cloudy	Mean number of days: Precipitation .01 inch or more	Mean number of days: Snow, sleet 1.0 inch or more	Mean number of days: Thunderstorms	Mean number of days: Heavy fog
(a)	(b)	(b)	(b)	21	21	(b)	21	21	21	21	21	15	16	16	21	21	21	21	21	21	21	21
Jan.	50.2	32.2	41.2	77	10	3.33	3.80	3.4	76	60	10.2	SW	49SW	58	6.2	9	7	15	10	1	*	2
Feb.	51.0	32.2	41.6	78	8	3.21	1.70	1.8	75	57	10.4	NNE	57SW	57	6.3	8	6	14	10	1	*	3
Mar.	57.2	38.7	48.0	85	20	3.45	3.18	0.7	74	53	10.9	SW	50W	64	6.0	9	8	14	11	*	2	2
Apr.	68.0	47.9	58.0	97	28	3.16	2.40	0.1	74	51	10.3	SW	54N	65	6.0	8	10	12	11	*	3	2
May	77.3	57.7	67.5	97	36	3.36	2.94	0.0	77	56	8.9	SW	46SW	66	6.1	8	10	13	10	0	5	2
June	84.9	66.3	75.6	101	45	3.61	6.85	0.0	79	57	8.2	SW	42NW	67	5.7	8	12	10	9	0	6	2
July	87.9	69.6	78.8	103	57	5.92	5.64	0.0	82	60	7.6	SW	55SW	65	6.0	8	12	11	11	0	8	1
Aug.	86.2	68.8	77.5	99	52	5.97	11.40	0.0	85	63	7.6	SW	50NE	64	5.9	8	11	12	11	0	8	2
Sept.	80.9	64.3	72.6	98	45	4.22	6.79	0.0	84	61	8.3	NE	63W	64	5.7	9	9	12	8	0	3	2
Oct.	70.9	53.1	62.0	95	29	2.92	4.19	0.0	83	60	9.0	NE	68S	62	5.2	13	6	12	8	0	2	3
Nov.	61.0	41.8	51.4	85	20	3.05	3.35	T	79	55	9.3	SW	45SE	61	5.3	11	8	11	8	0	*	2
Dec.	51.8	33.1	42.5	77	14	2.74	2.12	1.5	76	58	9.5	SW	42NW	58	5.9	10	7	14	8	*	*	2
Year	68.9	50.5	59.7	103	8	44.94	11.40	7.5	79	58	9.2	SW	68S	63	5.8	109	106	150	115	2	37	24

Means and extremes above are from existing and comparable exposures. Annual extremes have been exceeded at other sites in the locality as follows: Highest temperature 105 in August 1918; lowest temperature 2 in February 1895; maximum monthly precipitation 15.61 in August 1942; minimum monthly precipitation 0.04 in October 1874; maximum monthly snowfall 18.6 in December 1892; maximum snowfall in 24 hours 17.7 in December 1892; maximum speed and direction of wind 80W in June 1925.

RICHMOND, VIRGINIA (Byrd Field) 37°30'N., 77°20'W. Elevation (ground) 164 feet. WB-1969

Month	Air temperature (°F.) Normal: Daily maximum	Air temperature (°F.) Normal: Daily minimum	Air temperature (°F.) Normal: Monthly	Air temperature (°F.) Extreme: Record highest	Air temperature (°F.) Extreme: Record lowest	Precipitation (inches): Normal total	Precipitation (inches): Maximum 24 hrs.	Precipitation (inches): Snow, sleet mean total	Humidity (percent): 7 a.m. EST	Humidity (percent): 1 p.m. EST	Wind (knots): Mean speed	Wind (knots): Prevailing direction	Wind (knots): Maximum speed and direction	Percent of possible sunshine	Mean sky cover sunrise to sunset	Mean number of days: Sunrise to sunset: Clear	Mean number of days: Sunrise to sunset: Partly cloudy	Mean number of days: Sunrise to sunset: Cloudy	Mean number of days: Precipitation .01 inch or more	Mean number of days: Snow, sleet 1.0 inch or more	Mean number of days: Thunderstorms	Mean number of days: Heavy fog
(a)	(b)	(b)	(b)	40	40	(b)	32	32	35	35	21	15	19	19	24	24	24	24	32	32	32	40
Jan.	48.3	29.0	38.7	80	-12	3.46	3.31	5.6	81	57	7.0	S	35S	52	6.4	9	6	16	10	2	*	3
Feb.	50.6	29.2	39.9	83	-10	2.90	1.87	3.4	79	52	7.5	NNE	39SW	54	6.2	9	6	13	9	1	*	2
Mar.	59.1	36.3	47.7	93	11	3.42	2.04	3.1	78	48	7.8	W	36SE	60	6.1	8	9	14	11	1	1	2
Apr.	70.4	45.8	58.1	96	26	3.15	2.07	0.1	75	46	7.7	S	35NW	61	6.2	7	10	13	10	*	2	2
May	79.3	54.6	67.0	100	31	3.72	2.30	0.0	78	49	6.9	SSW	39N	65	6.2	7	11	13	11	0	6	2
June	86.8	63.4	75.1	104	40	3.75	4.61	0.0	81	53	6.3	S	45NW	67	5.9	7	12	11	10	0	7	2
July	89.4	66.7	78.1	104	51	5.61	5.73	0.0	85	56	6.0	SSW	49NW	66	6.1	7	12	12	11	0	9	3
Aug.	86.5	65.4	76.0	102	46	5.54	8.79	0.0	88	57	5.6	S	47W	64	6.0	8	11	12	10	0	7	3
Sept.	81.8	58.6	70.2	103	37	3.65	3.82	0.0	89	56	5.9	S	39SE	64	5.6	10	8	12	8	0	3	3
Oct.	70.6	46.7	58.7	99	21	3.00	6.50	T	89	52	6.1	NNE	59SE	61	5.1	12	8	11	7	0	1	4
Nov.	59.9	37.1	48.5	86	10	3.04	4.07	0.5	84	50	6.5	S	30S	55	5.6	10	7	13	8	*	*	2
Dec.	49.8	29.5	39.7	78	-1	2.97	3.16	2.3	81	54	6.5	SW	35SW	52	6.0	10	6	15	9	1	*	3
Year	69.4	46.9	58.1	104	-12	44.21	8.79	15.0	82	53	6.7	S	59SE	61	6.0	104	106	155	113	3	37	29

Means and extremes above are from existing and comparable exposures. Annual extremes have been exceeded at other sites in the locality as follows: Highest temperature 107 in August 1918; minimum monthly precipitation 0.11 in November 1890 and earlier.

WASHINGTON, D.C. (National Airport) 38°51'N., 77°02'W. Elevation (ground) 10 feet. WB-1969

Month	Air temperature (°F.) Normal: Daily maximum	Normal: Daily minimum	Normal: Monthly	Extreme: Record highest	Extreme: Record lowest	Precipitation (inches): Normal total	Maximum 24 hrs.	Snow, sleet mean total	Humidity (percent): 7 a.m. EST	1 p.m. EST	Wind (knots): Mean speed	Prevailing direction	Maximum speed and direction	Percent of possible sunshine	Mean sky cover sunrise to sunset	Mean number of days: Sunrise to sunset: Clear	Partly cloudy	Cloudy	Precipitation .01 inch or more	Snow, sleet 1.0 inch or more	Thunderstorms	Heavy fog
(a)	(b)	(b)	(b)	9	9	(b)	26	26	9	9	21	13	21	21	21	21	21	21	28	26	21	21
Jan.	44.3	29.5	36.9	71	3	3.03	1.73	5.1	68	54	8.9	NW	49NW	50	6.4	8	7	16	10	2	*	2
Feb.	46.1	29.4	37.8	71	4	2.47	1.63	5.2	68	53	9.2	S	50SW	51	6.4	7	7	14	9	1	*	2
Mar.	53.8	35.8	44.8	86	16	3.21	3.43	2.9	68	48	9.6	NW	52E	57	6.2	8	9	14	11	1	1	1
Apr.	65.8	45.6	55.7	90	27	3.15	1.77	T	69	47	9.2	S	49N	55	6.5	6	10	14	10	0	3	1
May	75.5	56.0	65.8	97	36	4.14	4.32	T	71	48	8.1	S	42S	58	6.3	7	11	13	11	0	5	1
June	83.4	64.9	74.2	100	47	3.21	3.67	0.0	75	51	7.6	S	50NW	65	5.7	8	11	11	9	0	5	*
July	87.0	69.3	78.2	101	56	4.15	4.40	0.0	76	52	7.2	S	47E	62	6.0	8	12	11	10	0	6	*
Aug.	85.0	67.9	76.5	99	51	4.90	6.39	0.0	78	53	7.1	S	43NE	62	5.7	10	9	12	9	0	5	*
Sept.	78.6	60.7	69.7	95	39	3.83	4.15	0.0	79	53	7.2	S	49SE	63	5.3	11	8	11	8	0	2	*
Oct.	68.3	49.6	59.0	91	29	3.07	4.98	T	78	49	7.5	SSW	68SE	62	5.0	13	7	11	7	0	1	2
Nov.	56.5	38.9	47.7	81	21	2.84	2.60	0.8	73	51	8.0	S	52E	51	5.9	9	8	13	8	*	*	1
Dec.	45.6	30.5	38.1	72	10	2.78	1.85	4.2	70	56	8.2	NW	54SW	48	6.4	9	6	16	9	1	*	2
Year	65.8	48.2	57.0	101	3	40.78	6.39	18.2	73	51	8.2	S	68SE	58	6.0	104	105	156	111	5	29	13

Means and extremes above are from existing and comparable exposures. Annual extremes have been exceeded at other sites in the locality as follows: Highest temperature 106 in July 1930; lowest temperature -15 in February 1899; maximum monthly precipitation 17.45 in September 1934; maximum precipitation in 24 hours 7.31 in August 1928; maximum monthly snowfall 35.2 in February 1899; maximum snowfall in 24 hours 25.0 in January 1922.

BALTIMORE, MARYLAND (Friendship International Airport) 39°11'N., 76°40'W. Elevation (ground) 148 feet. WB-1969

Month	Air temperature (°F.) Normal: Daily maximum	Normal: Daily minimum	Normal: Monthly	Extreme: Record highest	Extreme: Record lowest	Precipitation (inches): Normal total	Maximum 24 hrs.	Snow, sleet mean total	Humidity (percent): 7 a.m. EST	1 p.m. EST	Wind (knots): Mean speed	Prevailing direction	Maximum speed and direction	Percent of possible sunshine	Mean sky cover sunrise to sunset	Mean number of days: Sunrise to sunset: Clear	Partly cloudy	Cloudy	Precipitation .01 inch or more	Snow, sleet 1.0 inch or more	Thunderstorms	Heavy fog
(a)	(b)	(b)	(b)	19	19	(b)	19	19	16	16	19	13	19	19	19	19	19	19	19	19	19	19
Jan.	44.2	25.3	34.8	75	-7	3.43	2.54	5.7	72	57	9.0	WNW	55NE	52	6.1	9	8	14	10	2	*	4
Feb.	45.5	25.8	35.7	76	-1	2.89	1.75	6.7	73	56	9.6	NW	59W	55	6.2	8	7	13	9	2	*	4
Mar.	53.6	32.5	43.1	85	6	3.82	3.18	5.9	72	51	10.0	WNW	70SE	56	6.1	8	10	13	12	2	1	3
Apr.	65.8	42.6	54.2	94	20	3.60	2.80	0.1	74	50	9.8	WNW	61W	54	6.3	7	10	13	12	*	2	2
May	75.9	52.8	64.4	98	32	3.98	3.64	T	76	51	8.6	W	56SW	58	6.1	8	11	12	10	0	4	2
June	83.5	61.4	72.5	100	42	3.29	3.35	0.0	79	52	7.8	WNW	70SW	64	5.6	9	12	9	9	0	6	1
July	87.2	66.4	76.8	102	52	4.22	5.86	0.0	81	52	7.3	W	50NW	65	5.6	9	13	9	8	0	6	1
Aug.	85.0	65.0	75.0	102	48	5.19	7.82	0.0	84	55	7.5	W	47NE	62	5.6	10	10	11	10	0	5	1
Sept.	78.6	57.6	68.1	99	35	3.33	4.33	0.0	85	54	7.6	S	49W	62	5.1	12	8	10	7	0	2	2
Oct	68.4	45.6	57.0	92	25	3.18	3.49	T	82	51	8.2	NW	63SE	61	4.8	13	8	10	6	0	1	3
Nov.	56.5	34.4	45.5	83	13	3.13	3.43	1.4	77	53	8.5	WNW	50E	52	5.9	9	8	13	9	1	*	3
Dec.	45.7	25.9	35.8	74	0	2.99	1.80	5.3	75	57	8.4	WNW	50W	49	6.2	9	7	15	9	2	*	4
Year	65.8	44.6	55.2	102	-7	43.05	7.82	25.1	77	53	8.5	W	70SW	58	5.8	111	112	142	111	9	27	30

Means and extremes above are from existing and comparable exposures. Annual extremes have been exceeded at other sites in the locality as follows: Highest temperature 107 in July 1936; maximum monthly snowfall 33.9 in February 1899; maximum snowfall in 24 hours 24.5 in January 1922.

METEOROLOGICAL TABLE FOR COASTAL AREA OFF DELAWARE AND NEW JERSEY

Boundaries: Between 38°N. and 40°N., and from 72°W. westward to coast

	Weather Elements	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Percentage frequency	Wind ≧ 34 knots	9.3	4.5	2.5	2.0	0.6	0.3	0.3	0.2	2.1	1.6	3.5	3.5
	Wave height ≧ 10 feet	17.2	12.1	7.1	4.8	3.1	1.6	0.4	0.4	8.3	5.8	9.6	6.1
	Visibility < 2 naut. mi.	2.8	3.1	3.7	6.1	6.8	7.3	2.6	1.7	1.7	2.1	1.5	2.1
	Precipitation	9.2	8.8	7.7	5.7	5.2	3.7	3.5	4.6	5.1	5.2	6.8	7.8
	Sky overcast or obscured	39.0	37.9	31.9	32.8	30.4	27.0	23.0	23.2	24.3	23.7	28.9	33.5
	Thunder and lightning	0.3	0.2	0.2	0.4	1.4	1.2	1.9	1.8	0.9	0.2	0.4	0.2
	Temperature ≧ 85°F	0.0	0.0	0.0	0.0	0.0	0.1	2.4	1.9	0.4	0.0	0.0	0.0
	Temperature ≦ 32°F	13.4	9.2	3.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	7.1
	Mean temperature (°F)	42.3	41.0	44.1	49.9	57.4	67.1	74.6	74.9	70.1	62.1	54.1	45.7
	Mean relative humudity (%)	77	77	78	80	83	85	83	82	80	77	75	76
	Mean cloud cover (eighths)	4.4	4.8	4.3	4.3	4.3	4.1	4.2	4.2	3.9	3.8	4.5	4.9
Millibars	Mean sea-level pressure	1018	1017	1016	1016	1016	1016	1016	1016	1018	1018	1018	1018
	Extreme maximum sea-level pressure	1045	1044	1042	1040	1037	1038	1031	1041	1043	1040	1039	1043
	Extreme minimum sea-level pressure	977	972	971	981	991	992	977	976	985	993	979	979

These data are based upon observations made by ships in passage. Such ships tend to avoid bad weather when possible, thus biasing the data toward good weather samples.

METEOROLOGICAL TABLE FOR COASTAL AREA OFF VIRGINIA AND MARYLAND

Boundaries: Between 36°N. and 38°N., and from 73°W. westward to coast

	Weather Elements	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Percentage frequency	Wind ≧ 34 knots	6.0	3.3	3.3	0.9	0.5	0.9	0.2	0.2	1.5	1.8	2.8	2.7
	Wave height ≧ 10 feet	11.9	8.9	6.1	3.2	3.0	1.5	0.5	0.7	6.7	5.2	4.8	5.7
	Visibility < 2 naut. mi.	2.7	4.5	4.1	4.8	4.7	3.4	0.9	1.1	1.6	1.5	2.0	1.9
	Precipitation	9.3	9.2	7.1	6.5	5.3	4.4	5.0	4.8	5.7	6.1	6.5	7.5
	Sky overcast or obscured	36.7	36.4	33.1	29.2	26.1	22.6	20.5	21.3	22.2	23.6	25.8	32.2
	Thunder and lightning	0.4	0.4	0.5	0.7	1.5	1.7	2.4	3.0	1.2	0.8	0.4	0.4
	Temperature ≧ 85°F	0.0	0.0	0.0	*	0.1	1.5	5.1	4.4	1.5	0.1	0.0	0.0
	Temperature ≦ 32°F	6.9	6.4	1.4	*	0.0	0.0	0.0	0.0	0.0	0.0	0.2	3.1
	Mean temperature (°F)	46.6	46.3	49.2	55.3	62.7	71.8	77.5	77.7	73.4	65.5	57.5	49.9
	Mean relative humidity (%)	75	74	76	78	79	81	82	80	78	76	73	74
	Mean cloud cover (eighths)	4.9	4.8	4.5	4.2	4.3	4.2	4.3	4.4	4.1	3.9	4.3	4.8
Millibars	Mean sea-level pressure	1019	1017	1016	1016	1017	1016	1017	1017	1018	1018	1018	1019
	Extreme maximum sea-level pressure	1046	1044	1044	1039	1037	1033	1034	1034	1040	1040	1041	1041
	Extreme minimum sea-level pressure	983	975	983	974	994	991	981	990	991	992	981	983

*0.0-0.05%

These data are based upon observations made by ships in passage. Such ships tend to avoid bad weather when possible, thus biasing the data toward good weather samples.

MEAN SURFACE WATER TEMPERATURES (T) AND DENSITIES (D)

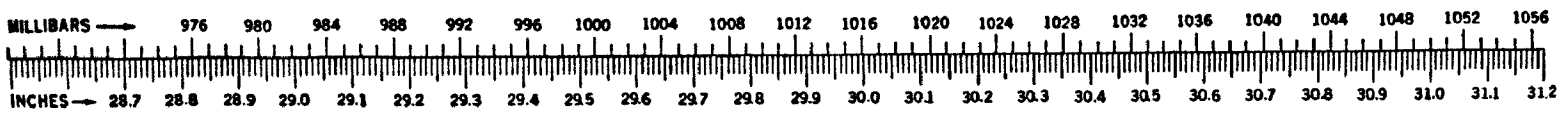
Stations	Years	Jan		Feb		Mar		Apr		May		June		July		Aug		Sept		Oct		Nov		Dec		Mean	
		(T) °C	(D) σ_{15}	(T) °C	(D) σ_{15}	(T) °C	(D) σ_{15}	(T) °C	(D) σ_{15}	(T) °C	(D) σ_{15}	(T) °C	(D) σ_{15}	(T) °C	(D) σ_{15}	(T) °C	(D) σ_{15}	(T) °C	(D) σ_{15}	(T) °C	(D) σ_{15}	(T) °C	(D) σ_{15}	(T) °C	(D) σ_{15}	(T) °C	(D) σ_{15}
Sandy Hook, N. J. 40°28'N., 74°01'W.	32	1.6	17.6	1.4	16.9	4.1	15.9	9.1	15.0	14.6	16.2	20.1	17.7	23.5	19.0	23.5	19.1	20.8	19.2	15.0	19.1	9.3	18.4	3.8	17.5	12.2	17.6
Atlantic City, N. J. 39°21'N., 74°25'W.	56	2.9	23.1	2.3	23.2	4.4	23.1	8.5	23.0	13.2	23.2	17.9	23.5	20.7	23.6	21.9	23.5	20.9	23.4	16.3	23.4	10.9	23.4	5.3	23.2	12.1	23.3
Breakwater Hbr., Del. 38°47'N., 75°06'W.	25	2.8	20.9	2.6	21.0	5.3	20.6	9.9	20.4	15.1	20.9	20.1	21.3	22.9	22.1	23.1	22.1	21.7	22.0	16.8	22.1	11.1	21.9	5.3	21.4	13.1	21.4
Philadelphia, Pa. 39°57'N., 75°08'W.	39	2.3	-0.6	2.5	-0.6	5.4	-0.5	10.8	-0.4	17.5	-0.2	23.3	-0.2	26.3	-0.2	26.1	-0.2	23.3	-0.2	17.5	-0.4	10.8	-0.4	4.8	-0.6	14.2	-0.4
Kiptopeke Beach, Va. 37°10'N., 75°59'W.	19	3.9	19.7	3.9	19.4	6.8	18.6	11.8	18.0	17.4	18.2	22.4	19.0	25.2	19.4	25.2	20.3	23.1	20.5	17.9	20.4	11.9	20.0	6.6	19.7	14.7	19.4
Cape Charles (town), Va. 37°16'N., 76°01'W.	5	5.5	16.0	5.4	15.6	7.5	15.2	12.8	14.8	18.1	14.6	23.8	15.7	26.6	16.9	26.2	17.4	24.0	17.8	18.8	17.7	12.5	17.6	6.7	16.8	15.7	16.3
Virginia Beach, Va. 36°50'N., 75°58'W.	9	5.3	20.4	4.4	19.8	6.3	19.6	10.7	19.2	15.7	19.0	20.6	18.8	23.0	19.8	23.7	20.3	22.4	20.1	18.6	20.2	13.7	20.6	8.3	20.6	14.4	19.9
Old Pt. Comfort, Va. 37°00'N., 76°18'W.	9	5.8	14.0	5.8	13.2	9.1	12.0	14.0	12.3	19.5	12.8	23.9	13.7	26.7	15.1	26.2	15.7	23.9	15.8	18.8	15.8	12.7	15.9	7.3	14.9	16.1	14.3
Little Creek, Va. 36°55'N., 76°11'W.	6	4.2	15.8	5.1	15.2	8.3	14.3	12.9	14.3	18.7	15.0	23.4	16.2	26.1	17.7	26.6	17.6	24.1	17.6	18.8	17.6	12.9	17.0	7.3	16.4	15.7	16.2
Richmond, Va. 37°32'N., 77°25'W.	21	4.7	-0.7	5.6	-0.7	8.9	-0.7	14.8	-0.6	20.7	-0.5	25.2	-0.4	28.1	-0.4	27.4	-0.5	24.3	-0.5	18.0	-0.6	11.3	-0.7	5.5	-0.6	16.2	-0.6
Gloucester Pt. Va. 37°15'N., 76°30'W.	18	4.3	14.7	4.6	13.9	7.7	13.0	13.1	12.6	19.2	12.6	23.8	13.3	26.5	14.7	26.6	15.4	24.2	15.6	18.8	15.6	12.7	15.6	7.7	15.2	15.7	14.4
Washington, D.C. 38°52'N., 77°01'W.	26	2.8	-0.9	3.5	-0.9	7.7	-0.8	14.1	-0.8	20.2	-0.7	25.3	-0.6	28.3	-0.5	27.6	-0.6	24.6	-0.6	18.3	-0.7	11.4	-0.8	4.8	-0.8	15.7	-0.7
Crisfield, Md. 37°58'N., 75°52'W.	2	2.6	11.9	4.4	17.3	7.5	11.1	15.0	10.9	21.9	11.6	26.0	11.6	27.9	11.7	28.4	11.6	24.7	12.2	18.4	12.8	10.7	12.4	4.0	12.0	16.0	12.3
Solomons, Md. 38°19'N., 76°27'W.	32	3.3	10.7	3.1	10.3	6.0	9.3	11.5	7.8	18.2	7.5	23.6	7.8	26.7	8.8	26.7	9.5	24.2	10.5	18.6	11.4	12.4	12.0	6.3	11.4	15.0	9.8
Cambridge, Md. 38°34'N., 76°04'W.	8	4.1	6.6	4.1	6.1	7.1	6.1	13.0	5.6	19.1	5.2	24.1	5.3	27.1	5.6	26.4	5.7	23.3	7.0	17.4	8.0	11.4	8.4	4.9	7.6	15.2	5.9
Annapolis, Md. 38°59'N., 76°29'W.	23	2.9	7.9	2.8	7.5	6.1	6.5	12.0	4.8	18.3	4.6	23.6	5.2	26.9	6.2	26.6	7.0	23.8	8.1	18.3	9.3	11.6	9.8	5.4	8.6	14.9	7.1
Baltimore, Md. 39°16'N., 76°35'W.	56	3.0	6.8	2.8	6.7	5.9	5.5	11.7	3.8	17.9	3.6	23.4	3.8	26.4	4.5	26.4	5.3	23.9	6.5	18.6	7.5	12.2	7.7	6.1	7.3	14.9	5.8

F (Fahrenheit) = 1.8C (Celsius) + 32

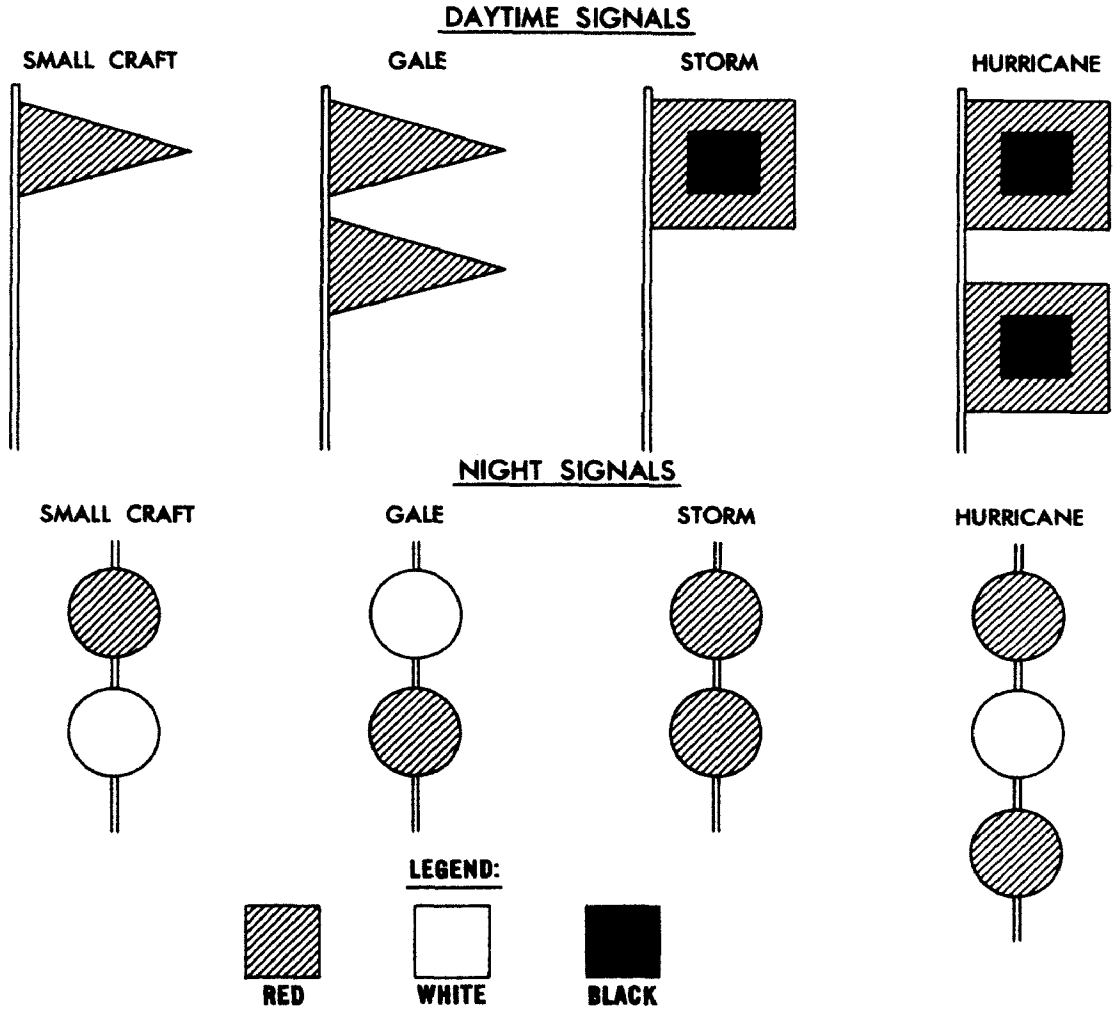
Density as used in this table is the specific gravity of the sea water or the ratio between the weight of a sea-water sample and the weight of an equal volume of distilled water at 15°C (59°F). These figures representing density at 15°C (ρ_{15}) are expressed in terms of sigma-t (σ_T) where t = 15°C and $\sigma_{15} = (\rho_{15} - 1)\ 1000$. Thus, for $\rho_{15} = 1.0238$, $\sigma_{15} = 23.8$. Obtain the pamphlet, " Surface Water Temperature and Density, Atlantic Coast, North and South America, C&GS Publication 31-1", for greater detail; for sale by Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, price $1.00.

BEAUFORT SCALE OF WIND FORCE

Beaufort Number	Miles per Hour	Knots	Wind Effects Observed at Sea	Terms used in NWS Forecasts and Warnings
0	Less than 1	Less than 1	Sea like a mirror	
1	1- 3	1- 3	Ripples with the appearance of scales formed, but without foam crests	Light
2	4- 7	4- 6	Small wavelets, short but pronounced; crests appear glassy, do not break	
3	8-12	7-10	Large wavelets with crests beginning to break; foam appears glassy. Perhaps scattered white horses (white foam crests).	Gentle
4	13-18	11-16	Small waves, becoming longer; fairly frequent white horses	Moderate
5	19-24	17-21	Moderate waves of a pronounced long form; many white horses, possibly some spray.	Fresh
6	25-31	22-27	Large waves begin to form; white foam crests more extensive everywhere; probably some spray.	Strong
7	32-38	28-33	Sea heaps up; some white foam from breaking waves blows in streaks along the direction of the wind.	
8	39-46	34-40	Moderately high waves. Edges of crests begin to break into spindrift. Well-marked streaks of foam blow along direction of wind.	Gale
9	47-54	41-47	High waves. Dense streaks of foam along direction of wind. Spray may affect visibility.	
10	55-63	48-55	Very high waves with long overhanging crests; great patches of foam blown in dense white streaks along direction of wind. Sea surface takes on a white appearance. Visibility affected.	Storm. Exception: If winds of 64 knots and above are associated with a tropical cyclone, "Hurricane" forecasts & warnings will be issued.
11	64-72	56-63	Exceptionally high waves; sea completely covered with long white patches of foam lying along direction of wind; edges of wave crests everywhere blown into froth. Visibility affected.	
12 or more	73 or more	64 or more	Air filled with foam and spray; sea completely white with driving spray. Visibility very seriously affected.	



SMALL CRAFT, GALE, STORM AND HURRICANE WARNINGS



EXPLANATION OF DISPLAY SIGNALS

Small-craft warning: One RED pennant displayed by day and a RED light ABOVE a WHITE light at night to indicate that wind and sea conditions, or sea conditions alone, considered hazardous to small-craft operations are forecast. Winds may range as high as 33 knots.

Important: The **Small-craft warning** covers a wide range of wind speeds and/or sea conditions. Also, "small craft" include boats of many designs and sizes. Therefore, boaters should regard the **Small-craft warning** display signal as an alert that wind and/or sea conditions potentially dangerous to their boats exist or are forecast. For more specific information they should obtain a detailed forecast by telephone or by listening to coastal weather forecasts and warnings over the local radio stations, Coast Guard radio, or the Weather Bureau continuous VHF-FM broadcasts on 162.55 mc.

Gale warning: Two RED pennants displayed by day and a WHITE light ABOVE a RED light at night to indicate that winds within the range 34 to 47 knots are forecast for the area.

Storm warning: A single square RED flag with a BLACK center displayed during daytime and two RED lights at night to indicate that winds 48 knots and above, no matter how high the speed, are forecast for the area. However, if the winds are associated with a tropical cyclone (hurricane) the **Storm warning** display indicates that winds within the range of 48 to 63 knots are forecast.

Hurricane warning: Displayed only in connection with a tropical cyclone (hurricane). Two square RED flags with BLACK centers displayed by day and a WHITE light between two RED lights at night to indicate that winds 64 knots and above are forecast for the area.

HOURS OF OPERATION OF FOG SIGNALS
(U.S. COAST GUARD)

Light station	20 Calendar years - 1950 thru 1969														Pre - 1950		
	Average													Max.			
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year	1 yr.	Ave	For yrs.	Max. 1 yr.
Ambrose, N.Y. (1) 40°27.5'N., 73°49.9'W.	75	72	75	74	91	81	73	59	51	42	44	57	794	1169	1137	56	2051
Barnegat Lightship, N.J. (2) 39°45.8'N., 73°46.0'W	46	61	53	66	72	70	53	23	24	27	26	41	562	940	850	16	---
Delaware Lightship, Del. (3) 38°27.3'N., 74°35.1'W.	37	63	64	69	42	46	34	16	43	35	19	40	508	1059	---	--	---
Harbor of Refuge, Del. 38°48.9'N., 75°05.6'W.	45	59	54	40	40	43	30	28	15	21	23	41	439	769	436	44	562
Brandywine Shoal, Del. 38°59.2'N., 75°06.8'W.	62	74	66	47	46	43	31	28	26	24	32	54	533	840	516	47	1006
Miah Maull Shoal, N.J. 39°07.6'N., 75°12.6'W.	58	74	52	34	33	23	16	19	12	23	29	52	425	793	439	37	838
Ship John Shoal, N.J. 39°18.3'N., 75°22.6'W.	52	60	42	24	17	9	5	8	11	20	32	53	333	510	354	44	612
Cherry Id. Range Front, N.J. (4) 39°45.0'N., 75°29.7'W.	48	53	32	19	16	9	9	8	14	23	34	52	317	478	315	44	686
Little Tinicum Id. Range Front, N.J. (4) 39°50.9'N., 75°15.2'W.	52	44	26	14	12	11	5	10	14	22	31	48	289	416	246	40	471
Fort Mifflin, Pa. (4) 39°52.5'N., 75°12.6'W.	31	30	12	11	9	8	2	5	7	17	20	33	185	267	260	44	390
Five Fathom Bank Lightship, N.J. 38°47.3'N., 74°34.6'W.	42	65	68	67	66	61	35	25	18	24	22	39	532	1034	548	61	690
Chesapeake, Va. (5) 36°54.3'N., 75°42.8'W.	54	72	54	51	45	33	21	16	20	23	20	32	441	863	652	14	1122
Cape Henry, Va. 36°55.6'N., 76°00.4'W.	59	70	45	39	40	36	17	23	24	25	29	47	454	1262	359	65	667
Old Point Comfort, Va. 37°00.1'N., 76°18.4'W.	74	76	43	35	33	27	26	28	34	33	42	63	514	1139	263	46	545
Wolf Trap, Va. 37°23.4'N., 76°11.4'W.	83	86	63	39	29	17	5	14	15	26	36	57	470	852	309	54	664
Smith Point, Va. 37°52.8'N., 76°11.0'W.	111	123	92	66	44	27	10	18	26	33	54	88	692	1128	442	50	1038
Point Lookout, Md. (6) 38°02.3'N., 76°19.3'W.	77	84	60	42	26	10	4	8	12	22	37	57	439	642	345	44	558
Cove Point, Md. 38°23.2'N., 76°22.9'W.	66	82	65	39	23	12	7	22	11	19	34	56	436	865	344	47	1045
Thomas Point Shoal, Md. 38°53.9'N., 76°26.2'W.	73	80	68	43	25	14	10	10	21	25	41	70	480	804	349	44	764

(1) Ambrose Channel Lightship (40°27.5'N., 73°50.2'W.) replaced by Ambrose Light Station on August 23, 1967.
(2) Barnegat Lightship replaced by Barnegat Lighted Horn Buoy B on February 12, 1970.
(3) Record for 9 calendar years - 1961 thru 1969. Delaware Lightship was established March, 1961, and replaced by Delaware Lighted Horn Buoy D on December 19, 1970.
(4) Record for 15 calendar years - 1950 thru 1964.
(5) Chesapeake Lightship (36°58.7'N., 75°42.2'W.) was replaced by Chesapeake Light Station, September, 1965.
(6) Record for 16 calendar years - 1950 thru 1965. Light Station replaced by minor light and unattended fog signal.

ATLANTIC OCEAN DISTANCES FOR DEEP-DRAFT VESSELS MONTREAL, CANADA, TO PANAMA CANAL ZONE

Figure at intersection of columns opposite ports in question is the nautical mileage between the two. Example: New York, N. Y., is 1399 nautical miles from San Juan, P. R.

	MONTREAL, CANADA* 45°30.2'N., 73°33.0'W.	Cabot Strait 47°07.0'N., 60°17.0'W.	Gut of Canso (Lock) 45°39.0'N., 61°25.0'W.	Portland, Maine 43°39.4'N., 70°14.7'W.	Boston, Mass. 42°22.0'N., 71°03.0'W.	NANTUCKET SHOALS 40°30.0'N., 69°25.0'W.	NEW YORK, N. Y. 40°42.0'N., 74°01.0'W.	Philadelphia, Pa. 39°56.8'N., 75°08.3'W.	Baltimore, Md. 39°16.0'N., 76°34.5'W.	CHESAPEAKE BAY ENT. 36°56.3'N., 75°58.6'W.	Norfolk, Va. 36°50.9'N., 76°17.9'W.	DIAMOND SHOALS 35°08.0'N., 75°15.0'W.	Wilmington, N. C. 34°14.0'N., 77°57.0'W.	Charleston, S. C. 32°47.2'N., 79°55.2'W.	Savannah, Ga. 32°05.0'N., 81°05.7'W.	Jacksonville, Fla. 30°19.2'N., 81°39.0'W.	Key West, Fla. 24°33.7'N., 81°48.5'W.	STRAITS OF FLORIDA 24°25.0'N., 83°00.0'W.	Tampa, Fla. 27°56.5'N., 82°26.7'W.	Pensacola, Fla. 30°24.0'N., 87°13.0'W.	Mobile, Ala. 30°42.5'N., 88°02.5'W.	NEW ORLEANS, La. (via SW Pass) 29°57.0'N., 90°03.7'W.	Port Arthur, Tex. 29°49.5'N., 93°57.6'W.	Galveston, Tex. 29°19.0'N., 94°47.0'W.	Corpus Christi, Tex. 27°48.8'N., 97°24.0'W.	San Juan, P. R. 18°27.8'N., 66°06.7'W.	YUCATAN CHANNEL 21°50.0'N., 85°03.0'W.	Panama Canal (Atlantic Ent.) 9°23.5'N., 79°55.3'W.	PANAMA CANAL (Pacific Ent.) 8°53.0'N., 79°31.0'W.
MONTREAL, CANADA*																													
Cabot Strait	681																												
Gut of Canso (Lock)	717	120																											
Portland, Maine	1276	595	484																										
Boston, Mass.	1318	637	526	100																									
NANTUCKET SHOALS	1311	630	519	203	163																								
NEW YORK, N. Y.	1534	853	742	426	386	223																							
Philadelphia, Pa.	1682	1001	890	575	535	372	240																						
Baltimore, Md.	1838	1157	1046	734	694	531	417	392																					
CHESAPEAKE BAY ENT.	1689	1008	896	584	544	381	267	242	150																				
Norfolk, Va.	1716	1035	923	611	571	408	294	269	173	27																			
DIAMOND SHOALS	1729	1048	936	628	588	425	345	322	267	117	144																		
Wilmington, N. C.	1948	1267	1155	847	807	644	564	541	486	336	363	219																	
Charleston, S. C.	2014	1333	1221	913	873	710	630	607	552	402	429	285	151																
Savannah, Ga.	2088	1407	1295	987	947	784	704	681	626	476	503	359	227	102															
Jacksonville, Fla.	2172	1491	1379	1071	1031	868	788	765	710	560	587	443	315	197	145														
Key West, Fla.	2479	1798	1690	1387	1347	1184	1109	1086	1031	881	908	764	667	572	543	462													
STRAITS OF FLORIDA	2540	1859	1751	1448	1408	1245	1170	1147	1092	942	969	825	728	633	604	523	73												
Tampa, Fla.	2772	2091	1983	1680	1640	1477	1402	1379	1324	1174	1201	1057	960	865	836	755	305	232											
Pensacola, Fla.	2977	2296	2188	1885	1845	1682	1607	1584	1529	1379	1406	1262	1165	1070	1041	960	510	437	347										
Mobile, Ala.	3011	2330	2222	1919	1879	1716	1641	1618	1563	1413	1440	1296	1199	1104	1075	994	544	471	389	89									
NEW ORLEANS, La. (via SW Pass)	3080	2399	2291	1988	1948	1785	1710	1687	1632	1482	1509	1365	1268	1173	1144	1063	613	540	502	288	269								
Port Arthur, Tex.	3240	2559	2451	2148	2108	1945	1870	1847	1792	1642	1669	1525	1428	1333	1304	1223	773	700	697	504	491	441							
Galveston, Tex.	3242	2561	2453	2150	2110	1947	1872	1849	1794	1644	1671	1527	1430	1335	1306	1225	775	702	703	509	496	446	89						
Corpus Christi, Tex.	3347	2666	2558	2255	2215	2052	1977	1954	1899	1749	1776	1632	1535	1440	1411	1330	880	807	810	618	605	555	249	207					
San Juan, P. R.	2445	1764	1669	1531	1486	1334	1399	1395	1375	1225	1252	1114	1153	1138	1156	1121	966	1017	1249	1448	1448	1557	1717	1719	1824				
YUCATAN CHANNEL	2730	2049	1937	1629	1589	1426	1346	1323	1268	1118	1145	1001	904	809	780	699	251	192	404	533	562	587	691	696	769	1111			
Panama Canal (Atlantic Ent.)	3203	2522	2419	2189	2149	1986	1972	1955	1904	1754	1781	1637	1609	1563	1564	1513	1060	1001	1213	1342	1371	1396	1487	1493	1549	990	809		
PANAMA CANAL (Pacific Ent.)	3249	2568	2465	2235	2195	2032	2018	2001	1950	1800	1827	1683	1655	1609	1610	1559	1106	1047	1259	1388	1417	1442	1533	1539	1595	1036	855	46	

*Quebec, Canada - SUBTRACT 139 miles.

All tabular distances are by outside routes which can be used by the deepest-draft vessel that the listed ports can accommodate. Lighter-draft vessels can save considerable mileage by transiting Canso Lock (Canada), the Cape Cod Canal (Massachusetts), and the Chesapeake and Delaware Canal (Delaware-Maryland); see the detailed tables. Gulf of Mexico distances are through the Shipping Safety Fairways, recomputed in 1970 to conform with latest fairway revisions.

COASTWISE DISTANCES

NEW YORK, N. Y., TO CHESAPEAKE BAY ENTRANCE, VA.

Figure at intersection of columns opposite ports in question is the nautical mileage between the two. Example: New York, N. Y., is 240 nautical miles from Philadelphia, Pa.

	NANTUCKET SHOALS 40°30.0'N., 69°25.0'W.	MONTAUK POINT, N. Y. 41°01.7'N., 71°47.3'W.	NEW YORK, N. Y. 40°42.0'N., 74°01.0'W.	Manasquan Inlet, N. J. 40°06.1'N., 74°01.9'W.	Barnegat Inlet, N. J. 39°46.0'N., 74°06.3'W.	Atlantic City, N. J. 39°22.6'N., 74°24.9'W.	Cape May Harbor, N. J. 38°57.1'N., 74°52.6'W.	DELAWARE BAY ENTRANCE 38°50.5'N., 75°03.3'W.	Harbor of Refuge, Del. 38°49.0'N., 75°05.2'W.	C. & D. CANAL E. ENT. 39°33.8'N., 75°32.8'W.	Wilmington, Del. 39°43.2'N., 75°31.5'W.	Marcus Hook, Pa. 39°48.2'N., 75°25.2'W.	Chester, Pa. 39°50.0'N., 75°22.0'W.	Philadelphia, Pa. 39°56.8'N., 75°08.3'W.	U.S. Steel Basin, Pa. 40°08.2'N., 74°45.3'W.	Trenton, N. J. 40°11.4'N., 74°45.4'W.	Indian River Inlet, Del. 38°36.5'N., 75°03.6'W.	Ocean City, Md. 38°19.6'N., 75°05.6'W.	Chincoteague, Va. 37°56.1'N., 75°22.8'W.	CHESAPEAKE BAY ENT. 36°56.3'N., 75°58.6'W.
113																				
223	122																			
212	117	40																		
221	131	63	22																	
242	159	94	52	32																
271	192	128	85	65	37															
285	212	153	97	78	49	16														
285	212	153	98	79	50	17	2													
336	263	204	148	129	100	67	51	52												
347	274	215	159	140	111	78	62	63	11											
353	280	221	165	146	117	84	68	69	17	8										
356	283	224	169	150	121	88	72	73	21	11	3									
372	299	240	184	165	136	103	87	88	36	26	18	15								
395	322	263	207	188	159	126	110	111	59	49	41	38	23							
400	327	268	212	193	164	131	115	116	64	54	46	43	28	5						
285	209	145	105	86	57	24	15	14	66	77	83	86	101	124	129					
295	227	161	121	101	73	40	32	31	83	95	101	104	119	142	147	20				
328	262	201	161	141	113	80	72	71	123	134	140	144	159	182	187	60	41			
381	322	267	219	199	171	141	155	155	206	218	224	227	242	265	270	118	100	69		

Ambrose Light (40°27.5'N., 73°49.9'W.) to New York, 20.7 miles.
Five Fathom Bank Lightship (38°47.3'N., 74°34.6'W.) to Philadelphia, 111 miles.
Delaware Lighted Horn Buoy D (38°27.3'N., 74°35.1'W.) to Philadelphia, 119 miles.
Chesapeake Light (36°54.3'N., 75°42.8'W.) to Norfolk, 42 miles; Baltimore, 165 miles.

DISTANCES BY NEW JERSEY INTRACOASTAL WATERWAY

MANASQUAN INLET, N. J., TO CAPE MAY CANAL, N. J.

Figure at intersection of columns opposite ports in question is the nautical mileage between the two. Example: Atlantic City, N. J., is 13 nautical miles from Ocean City, N. J.

	NEW YORK, N. Y. (Battery)* 40°42. 0'N., 74°01. 0'W.	Shark River Inlet * 40°11. 2'N., 74°00. 5'W.	Manasquan Inlet * 40°06. 1'N., 74°01. 9'W.	Bay Head 40°03. 8'N., 74°03. 1'W.	Mantoloking 40°02. 2'N., 74°03. 4'W.	Toms River (town) 39°56. 9'N., 74°11. 8'W.	Seaside Park 39°55. 3'N., 74°05. 0'W.	Forked River (town) 39°50. 1'N., 74°11. 7'W.	Barnegat Inlet 39°46. 0'N., 74°06. 3'W.	Beach Haven 39°34. 0'N., 74°14. 8'W.	Atlantic City 39°22. 6'N., 74°24. 9'W.	Mays Landing 39°26. 9'N., 74°43. 4'W.	Ocean City 39°17. 3'N., 74°34. 4'W.	Sea Isle City 39°09. 4'N., 74°42. 0'W.	Avalon 39°06. 6'N., 74°44. 0'W.	Stone Harbor 39°03. 4'N., 74°46. 0'W.	Wildwood 39°00. 5'N., 74°49. 8'W.	Cape May Harbor 38°57. 1'N., 74°52. 6'W.	Cape May Canal W. Ent. 38°58. 0'N., 74°58. 0'W.	C. & D. CANAL E. ENT., Del. 39°33. 8'N., 75°32. 8'W.
34																				
40	6																			
44	9	4																		
46	11	6	2																	
58	23	18	14	12																
54	20	14	10	9	7															
63	29	23	19	17	15	10														
66	32	26	22	20	18	13	8													
79	45	39	35	33	31	26	21	20												
97	62	57	53	51	49	44	39	38	18											
124	90	84	80	79	77	71	66	65	45	30										
108	74	68	64	63	60	55	50	49	29	13	18									
119	85	79	76	74	72	66	61	60	40	25	29	11								
123	89	83	79	77	75	70	65	64	44	28	33	15	4							
128	94	88	85	83	81	75	70	69	49	34	38	20	9	5						
133	99	93	89	88	86	80	75	74	54	39	43	25	14	10	5					
138	103	98	94	92	90	85	80	79	59	43	47	30	18	15	9	5				
142	108	102	98	96	94	89	84	83	63	47	52	34	23	19	14	9	4			
190	156	150	146	144	142	137	132	131	111	95	100	82	71	67	62	57	52	48		

*Outside distances between New York and Manasquan Inlet.

DISTANCES ON DELAWARE BAY AND RIVER

Figure at intersection of columns opposite ports in question is the nautical mileage between the two. Example: Salem, N. J., is 41 nautical miles from Philadelphia, Pa.

	DELAWARE BAY ENT. 38°50.5'N., 75°03.3'W.	Roosevelt Inlet, Del. 38°47.7'N., 75°09.4'W.	Cape May Canal W. Ent., N. J. 38°58.0'N., 74°58.0'W.	St. Jones River Mouth, Del. 39°04.0'N., 75°22.5'W.	Mauricetown, N. J. 39°17.1'N., 74°59.5'W.	Bridgeton, N. J. 39°25.5'N., 75°14.2'W.	Smyrna River Mouth, Del. 39°22.2'N., 75°30.2'W.	Salem, N. J. 39°34.6'N., 75°28.7'W.	C. & D. CANAL E. ENT. 39°33.8'N., 75°32.8'W.	New Castle, Del. 39°39.4'N., 75°33.6'W.	Wilmington, Del. 39°43.2'N., 75°31.5'W.	Marcus Hook, Pa. 39°48.2'N., 75°25.2'W.	Bridgeport, N. J. 39°48.0'N., 75°21.3'W.	Chester, Pa. 39°50.0'N., 75°22.0'W.	Schuylkill River Mouth, Pa. 39°52.8'N., 75°11.9'W.	Philadelphia, Pa. 39°56.8'N., 75°08.3'W.	Burlington, N. J. 40°04.9'N., 74°51.8'W.	U.S. Steel Basin, Pa. 40°08.2'N., 74°45.3'W.	Bordentown, N. J. 40°09.1'N., 74°43.0'W.	Trenton, N. J. 40°11.4'N., 74°45.4'W.
Roosevelt Inlet, Del.	6																			
Cape May Canal W. Ent., N. J.	9	14																		
St. Jones River Mouth, Del.	20	20	21																	
Mauricetown, N. J.	33	37	26	30																
Bridgeton, N. J.	51	52	47	35	51															
Smyrna River Mouth, Del.	39	40	36	21	39	25														
Salem, N. J.	54	55	51	36	54	39	16													
C. & D. CANAL E. ENT.	51	52	48	34	51	36	13	5												
New Castle, Del.	58	59	55	40	58	43	20	12	7											
Wilmington, Del.	62	63	59	45	62	47	24	16	11	5										
Marcus Hook, Pa.	68	69	65	51	68	53	30	22	17	12	8									
Bridgeport, N. J.	72	73	69	55	72	57	34	26	21	15	11	4								
Chester, Pa.	72	73	69	55	72	57	34	26	21	15	11	3	6							
Schuylkill River Mouth, Pa.	80	81	77	63	80	65	42	34	29	23	19	12	14	9						
Philadelphia, Pa.	87	88	84	69	87	72	49	41	36	30	26	18	22	15	7					
Burlington, N. J.	103	104	100	85	103	88	65	57	52	46	42	34	37	31	23	16				
U.S. Steel Basin, Pa.	110	111	107	92	110	95	72	64	59	53	49	41	44	38	29	23	7			
Bordentown, N. J.	112	113	109	94	112	97	74	66	61	55	51	43	46	40	31	25	9	2		
Trenton, N. J.	115	116	112	97	115	100	77	69	64	58	54	46	49	43	34	28	12	5	4	

CHESAPEAKE BAY DISTANCES

Figure at intersection of columns opposite ports in question is the nautical mileage between the two. Example: Washington, D.C., is 155 nautical miles from Annapolis, Md.

	C. & D. CANAL E. ENT. 39°33.8'N., 75°32.8'W.	Chesapeake City, Md. 39°31.8'N., 75°48.9'W.	Havre de Grace, Md. 39°32.7'N., 76°05.0'W.	Baltimore, Md. 39°16.0'N., 76°34.5'W.	Chestertown, Md. 39°12.4'N., 76°03.8'W.	Annapolis, Md. 38°59.0'N., 76°28.6'W.	St. Michaels, Md. 38°47.2'N., 76°13.2'W.	Cambridge, Md. 38°34.4'N., 76°04.3'W.	Solomons, Md. 38°19.2'N., 76°27.4'W.	Salisbury, Md. 38°21.9'N., 75°36.3'W.	Potomac River Mouth 37°57.7'N., 76°16.7'W.	Washington, D.C. 38°52.4'N., 77°01.4'W.	Crisfield, Md. 37°58.6'N., 75°51.9'W.	Fredericksburg, Va. 38°17.8'N., 77°27.2'W.	Cape Charles, Va. 37°15.9'N., 76°01.4'W.	Yorktown, Va. 37°14.4'N., 76°30.5'W.	West Point, Va. 37°31.6'N., 76°48.1'W.	Newport News, Va. 36°58.0'N., 76°26.0'W.	Suffolk, Va. 36°44.3'N., 76°35.0'W.	Hopewell, Va. 37°19.0'N., 77°16.4'W.	Petersburg, Va. 37°14.1'N., 77°24.0'W.	Richmond, Va. 37°31.4'N., 77°25.2'W.	Norfolk, Va. 36°50.9'N., 76°17.9'W.	CHESAPEAKE BAY ENT. 36°56.3'N., 75°58.6'W.
13																								
33	20																							
62	49	41																						
78	65	61	45																					
65	52	45	28	40																				
83	70	62	45	59	25																			
98	85	78	60	72	39	36																		
103	90	84	66	78	45	48	39																	
143	130	124	107	119	86	89	81	51																
122	109	101	84	96	64	65	58	27	49															
213	200	192	175	187	155	156	149	118	141	96														
134	121	115	98	110	77	80	72	42	43	27	121													
243	230	224	206	219	186	190	182	150	165	125	221	129												
169	156	149	132	146	112	116	107	76	87	50	146	51	122											
192	179	163	155	156	130	126	117	87	100	68	164	64	132	28										
214	201	185	174	178	152	149	140	109	122	90	186	86	154	50	22									
207	194	172	170	167	136	138	129	97	110	86	182	74	143	29	55	63								
209	196	190	172	185	152	156	147	115	128	89	185	92	161	48	55	78	21							
265	252	230	228	225	194	196	187	155	168	144	240	132	201	88	114	122	58	79						
259	246	240	222	235	204	206	197	165	178	137	233	142	211	97	101	123	68	89	10					
284	271	249	247	244	213	215	206	174	187	163	259	151	220	106	132	140	77	98	19	28				
209	196	175	173	170	140	141	132	100	113	89	185	77	146	32	58	66	12	29	70	80	90			
187	174	166	150	162	129	132	123	92	103	67	163	67	136	21	34	56	24	42	82	92	101	27		

Radio Bearing Conversion Table

Table of corrections, in minutes

[DIFFERENCE OF LONGITUDE IN DEGREES]

Mid. L.	½°	1°	1½°	2°	2½°	3°	3½°	4°	4½°	5°	5½°	6°	6½°	7°	7½°	8°	8½°	9°	9½°	10°
15°	4	8	12	16	19	23	27	31	35	40	43	47	50	54	58	62	66	70	74	78
16°	4	8	12	17	21	25	29	33	37	41	45	50	54	58	62	66	70	74	79	83
17°	4	9	13	18	22	26	31	35	39	44	48	53	57	61	66	70	75	79	83	88
18°	5	9	13	19	23	28	32	37	42	46	51	56	60	65	70	74	79	83	88	93
19°	5	10	15	20	24	29	34	39	44	49	54	59	63	68	73	78	83	88	93	98
20°	5	10	15	21	26	31	36	41	46	51	56	62	67	72	77	82	87	92	98	103
21°	5	11	16	21	27	32	38	43	48	54	59	64	70	75	81	86	91	97	102	108
22°	6	11	17	22	28	34	39	45	51	56	62	67	73	79	84	90	96	101	107	112
23°	6	12	18	23	29	35	41	47	53	59	64	70	76	82	88	94	100	105	111	117
24°	6	12	18	24	31	37	43	49	55	61	67	73	79	85	92	98	104	110	116	122
25°	6	13	19	25	32	38	44	51	57	63	70	76	82	89	95	101	108	114	120	127
26°	7	13	20	26	33	39	46	53	59	66	72	79	85	92	99	105	112	118	125	131
27°	7	14	20	27	34	41	48	54	61	68	75	82	89	95	102	109	116	123	129	136
28°	7	14	21	28	35	42	49	56	63	70	77	84	92	99	106	113	120	127	134	141
29°	7	15	21	29	36	44	51	58	65	73	80	87	95	102	109	116	124	131	138	145
30°	7	15	22	30	38	45	53	60	68	75	83	90	98	105	113	120	127	135	143	150
31°	8	15	23	31	39	46	54	62	70	77	85	93	100	108	116	124	131	139	146	155
32°	8	16	24	32	40	48	56	64	72	79	87	95	103	111	119	127	135	143	151	159
33°	8	16	25	33	41	49	57	65	74	82	90	98	106	114	123	131	139	147	155	163
34°	8	17	25	34	42	50	59	67	75	84	92	101	109	117	126	134	143	151	159	168
35°	9	17	26	34	43	52	60	69	77	86	95	103	112	120	129	138	146	155	163	172
36°	9	18	26	35	44	53	62	71	79	88	97	106	115	123	132	141	150	159	168	176
37°	9	18	27	36	45	54	63	72	81	90	99	108	117	126	135	144	153	163	172	181
38°	9	18	28	37	46	55	65	74	83	92	102	111	120	129	139	148	157	166	175	185
39°	9	19	28	38	47	57	66	75	85	94	104	113	123	132	142	151	160	170	179	189
40°	10	19	29	39	48	58	68	77	87	96	106	116	125	135	145	154	164	174	183	193
41°	10	20	30	39	49	59	69	79	89	98	108	118	128	138	148	157	167	177	187	197
42°	10	20	30	40	50	60	70	80	90	100	110	120	130	140	151	161	171	181	191	201
43°	10	20	31	41	51	61	72	82	92	102	113	123	133	143	153	164	174	184	194	205
44°	10	21	31	42	52	63	73	83	94	104	115	125	135	146	156	167	177	188	198	208
45°	11	21	32	42	53	64	74	85	95	106	117	127	138	149	159	170	180	191	201	212
46°	11	22	32	43	54	65	76	86	97	108	119	129	140	151	162	173	183	194	205	216
47°	11	22	33	44	55	66	77	88	99	110	121	132	143	154	165	176	186	197	208	219
48°	11	22	33	45	56	67	78	89	100	111	123	134	145	156	167	178	190	201	212	223
49°	11	23	34	45	57	68	79	91	102	113	125	136	147	158	170	181	192	204	215	226
50°	11	23	34	46	57	69	80	92	103	115	126	138	149	161	172	184	195	207	218	230
51°	12	23	35	47	58	70	82	93	105	117	128	140	152	163	175	186	198	210	221	233
52°	12	24	35	47	59	71	83	95	106	118	130	142	154	165	177	189	201	213	225	236
53°	12	24	36	48	60	72	84	96	108	120	132	144	156	168	180	192	204	216	228	240
54°	12	24	36	49	61	73	85	97	109	121	133	146	158	170	182	194	206	218	231	243
55°	12	25	37	49	61	74	86	98	111	123	135	147	160	172	184	197	209	221	233	246
56°	12	25	37	50	62	75	87	100	112	124	137	149	162	174	187	199	211	224	236	249
57°	13	25	38	50	63	75	88	101	113	126	138	151	164	176	189	201	214	226	239	252
58°	13	25	38	51	64	76	89	102	115	127	140	153	165	178	191	204	216	229	242	254
59°	13	26	39	51	64	77	90	103	116	129	141	154	167	180	193	206	219	231	244	257
60°	13	26	39	52	65	78	91	104	117	130	143	156	169	182	195	208	221	234	247	260

Example. A ship in latitude 39°51′. N., longitude 67°35′ W., by dead reckoning, obtains a radio bearing of 299° true on the radiobeacon located in latitude 40°37′. N., longitude 69°37′ W.

Radiobeacon station	Latitude	40°37′ N.
Dead-reckoning position of ship	Latitude	39°51′
Middle latitude		40°14′
Radiobeacon station	Longitude	69°37′ W.
Dead reckoning position of ship	Longitude	67°35′
Longitude difference		2°02′

Entering the table with difference of longitude equals 2°, which is the nearest tabulated value and opposite 40° middle latitude, the correction of 39′ is read.

As the ship is east of the radiobeacon, a minus correction is applied. The Mercator bearing then will be 299°−000°39′=298°21′. To facilitate plotting, subtract 180° and plot from the position of the radiobeacon the bearing 298°21′−180°, or 118°21′ (Mercator bearing reckoned clockwise from true north).

Distance of Visibility of Objects at Sea

The following table gives the approximate geographic range of visibility for an object which may be seen by an observer whose eye is at sea level; in practice, therefore, it is necessary to add to these a distance of visibility corresponding to the height of the observer's eye above sea level.

Height, feet	Nautical miles	Height, feet	Nautical miles	Height, feet	Nautical miles	Height, feet	Nautical miles	Height, feet	Nautical miles
6	2. 8	48	7. 9	220	17. 0	660	29. 4	2, 000	51. 2
8	3. 1	50	8. 1	240	17. 7	680	29. 9	2, 200	53. 8
10	3. 6	55	8. 5	260	18. 5	700	30. 3	2, 400	56. 2
12	4. 0	60	8. 9	280	19. 2	720	30. 7	2, 600	58. 5
14	4. 3	65	9. 2	300	19. 9	740	31. 1	2, 800	60. 6
15	4. 4	70	9. 6	320	20. 5	760	31. 6	3, 000	62. 8
16	4. 6	75	9. 9	340	21. 1	780	32. 0	3, 200	64. 9
18	4. 9	80	10. 3	360	21. 7	800	32. 4	3, 400	66. 9
20	5. 1	85	10. 6	380	22. 3	820	32. 8	3, 600	68. 6
22	5. 4	90	10. 9	400	22. 9	840	33. 2	3, 800	70. 7
24	5. 6	95	11. 2	420	23. 5	860	33. 6	4, 000	72. 5
26	5. 8	100	11. 5	440	24. 1	880	34. 0	4, 200	74. 3
28	6. 1	110	12. 0	460	24. 6	900	34. 4	4, 400	76. 1
30	6. 3	120	12. 6	480	25. 1	920	34. 7	4, 600	77. 7
32	6. 5	130	13. 1	500	25. 6	940	35. 2	4, 800	79. 4
34	6. 7	140	13. 6	520	26. 1	960	35. 5	5, 000	81. 0
36	6. 9	150	14. 1	540	26. 7	980	35. 9	6, 000	88. 8
38	7. 0	160	14. 5	560	27. 1	1, 000	36. 2	7, 000	96. 0
40	7. 2	170	14. 9	580	27. 6	1, 200	39. 6	8, 000	102. 6
42	7. 4	180	15. 4	600	28. 0	1, 400	42. 9	9, 000	108. 7
44	7. 6	190	15. 8	620	28. 6	1, 600	45. 8	10, 000	114. 6
46	7. 8	200	16. 2	640	29. 0	1, 800	48. 6		

Conversion Table, Degrees to Points and Vice Versa

° ′	Points	° ′	Points	° ′	Points	° ′	Points
0 00	N	90 00	E	180 00	S	270 00	W
2 49		92 49		182 49		272 49	
5 38	N ½ E	95 38	E ½ S	185 38	S ½ W	275 38	W ½ N
8 26		98 26		188 26		278 26	
11 15	N x E	101 15	E x S	191 15	S x W	281 15	W x N
14 04		104 04		194 04		284 04	
16 53	N x E ½ E	106 53	ESE ½ E	196 53	S x W ½ W	286 53	WNW ½ W
19 41		109 41		199 41		289 41	
22 30	NNE	112 30	ESE	202 30	SSW	292 30	WNW
25 19		115 19		205 19		295 19	
28 08	NNE ½ E	118 08	SE x E ½ E	208 08	SSW ½ W	298 08	NW x W ½ W
30 56		120 56		210 56		300 56	
33 45	NE x N	123 45	SE x E	213 45	SW x S	303 45	NW x W
36 34		126 34		216 34		306 34	
39 23	NE ½ N	129 23	SE ½ E	219 23	SW ½ S	309 23	NW ½ W
42 11		132 11		222 11		312 11	
45 00	NE	135 00	SE	225 00	SW	315 00	NW
47 49		137 49		227 49		317 49	
50 38	NE ½ E	140 38	SE ½ S	230 38	SW ½ W	320 38	NW ½ N
53 26		143 26		233 26		323 26	
56 15	NE x E	146 15	SE x S	236 15	SW x W	326 15	NW x N
59 04		149 04		239 04		329 04	
61 53	NE x E ½ E	151 53	SSE ½ E	241 53	SW x W ½ W	331 53	NNW ½ W
64 41		154 41		244 41		334 41	
67 30	ENE	157 30	SSE	247 30	WSW	337 30	NNW
70 19		160 19		250 19		340 19	
73 08	ENE ½ E	163 08	S x E ½ E	253 08	WSW ½ W	343 08	N x W ½ W
75 56		165 56		255 56		345 56	
78 45	E x N	168 45	S x E	258 45	W x S	348 45	N x W
81 34		171 34		261 34		351 34	
84 23	E ½ N	174 23	S ½ E	264 23	W ½ S	354 23	N ½ W
87 11		177 11		267 11		357 11	

Conversion Tables

INTERNATIONAL NAUTICAL MILES TO STATUTE MILES

1 nautical mile 6,076.10 feet or 1,852 meters 1 statute mile = 5,280 feet or 1,609.35 meters

Nautical miles	0	1	2	3	4	5	6	7	8	9
0	0.000	1.151	2.302	3.452	4.603	5.754	6.905	8.055	9.206	10.357
10	11.508	12.659	13.809	14.960	16.111	17.262	18.412	19.563	20.714	21.865
20	23.016	24.166	25.317	26.468	27.619	28.769	29.920	31.071	32.222	33.373
30	34.523	35.674	36.825	37.976	39.126	40.277	41.428	42.579	43.730	44.880
40	46.031	47.182	48.333	49.483	50.634	51.785	52.936	54.087	55.237	56.388
50	57.539	58.690	59.840	60.991	62.142	63.293	64.444	65.594	66.745	67.896
60	69.047	70.197	71.348	72.499	73.650	74.801	75.951	77.102	78.253	79.404
70	80.554	81.705	82.856	84.007	85.158	86.308	87.459	88.610	89.761	90.911
80	92.062	93.213	94.364	95.515	96.665	97.816	98.967	100.118	101.268	102.419
90	103.570	104.721	105.871	107.022	108.173	109.324	110.475	111.625	112.776	113.927

STATUTE MILES TO INTERNATIONAL NAUTICAL MILES

Statute miles	0	1	2	3	4	5	6	7	8	9
0	0.000	0.869	1.738	2.607	3.476	4.345	5.214	6.083	6.952	7.821
10	8.690	9.559	10.428	11.297	12.166	13.035	13.904	14.773	15.642	16.511
20	17.380	18.249	19.118	19.986	20.855	21.724	22.593	23.462	24.331	25.200
30	26.069	26.938	27.807	28.676	29.545	30.414	31.283	32.152	33.021	33.890
40	34.759	35.628	36.497	37.366	38.235	39.104	39.973	40.842	41.711	42.580
50	43.449	44.318	45.187	46.056	46.925	47.794	48.663	49.532	50.401	51.270
60	52.139	53.008	53.877	54.746	55.615	56.484	57.353	58.222	59.091	59.959
70	60.828	61.697	62.566	63.435	64.304	65.173	66.042	66.911	67.780	68.649
80	69.518	70.387	71.256	72.125	72.994	73.863	74.732	75.601	76.470	77.339
90	78.208	79.077	79.946	80.815	81.684	82.553	83.422	84.291	85.160	86.029

FEET TO METERS

Feet	0	1	2	3	4	5	6	7	8	9
0	0.00	0.30	0.61	0.91	1.22	1.52	1.83	2.13	2.44	2.74
10	3.05	3.35	3.66	3.96	4.27	4.57	4.88	5.18	5.49	5.79
20	6.10	6.40	6.71	7.01	7.32	7.62	7.92	8.23	8.53	8.84
30	9.14	9.45	9.75	10.06	10.36	10.67	10.97	11.28	11.58	11.89
40	12.19	12.50	12.80	13.11	13.41	13.72	14.02	14.33	14.63	14.93
50	15.24	15.54	15.85	16.15	16.46	16.76	17.07	17.37	17.68	17.98
60	18.29	18.59	18.90	19.20	19.51	19.81	20.12	20.42	20.73	21.03
70	21.34	21.64	21.95	22.25	22.55	22.86	23.16	23.47	23.77	24.08
80	24.38	24.69	24.99	25.30	25.60	25.91	26.21	26.52	26.82	27.13
90	27.43	27.74	28.04	28.35	28.65	28.96	29.26	29.57	29.87	30.17

METERS TO FEET

Meters	0	1	2	3	4	5	6	7	8	9
0	0.00	3.28	6.56	9.84	13.12	16.40	19.68	22.97	26.25	29.53
10	32.81	36.09	39.37	42.65	45.93	49.21	52.49	55.77	59.06	62.34
20	65.62	68.90	72.18	75.46	78.74	82.02	85.30	88.58	91.86	95.14
30	98.42	101.71	104.99	108.27	111.55	114.83	118.11	121.39	124.67	127.95
40	131.23	134.51	137.80	141.08	144.36	147.64	150.92	154.20	157.48	160.76
50	164.04	167.32	170.60	173.88	177.16	180.45	183.73	187.01	190.29	193.57
60	196.85	200.13	203.41	206.69	209.97	213.25	216.54	219.82	223.10	226.38
70	229.66	232.94	236.22	239.50	242.78	246.06	249.34	252.62	255.90	259.19
80	262.47	265.75	269.03	272.31	275.59	278.87	282.15	285.43	288.71	291.99
90	295.28	298.56	301.84	305.12	308.40	311.68	314.96	318.24	321.52	324.80

Form Approved. OMB No. 41-R2455

NOAA FORM 77-6
(4-71)

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

COAST PILOT REPORT

PLEASE MAIL TO:

Director
National Ocean Survey
National Oceanic and Atmospheric Administration
ATTENTION: C325
Rockville, Maryland 20852

This record of your experience and observations when coasting, entering port, and/or following inside channels will be used to correct, amplify, or confirm the description now given in the Coast Pilot.

Please use additional sheets if more space is needed.

Additional report forms will be provided upon receipt of each report.

GEOGRAPHIC LOCATION			
LATITUDE	LONGITUDE	CHART NUMBER	COAST PILOT NUMBER
VESSEL		MASTER/COMMANDING OFFICER	
DATE OF OBSERVATION		OBSERVER	

I. LANDMARKS: Mention those visible from seaward and useful for navigation (day and/or night); include natural ranges and indicate the pair of marks forming a range. Photographs of landmarks difficult to describe are solicited; each view should be labeled with the distance off and the direction towards which the camera was pointed.

TYPE	CHARTED		LATITUDE	LONGITUDE	DESCRIPTIVE INFORMATION HELPFUL IN IDENTIFICATION
	YES	NO	(Approximate)		

II. RADAR: List best radar targets and, if known, give maximum useful radar range at which the object can be positively identified and used. Mention under remarks places you have observed radar returns to be misleading.

NAME OR TYPE OF FEATURE (*Include approximate latitude and longitude if necessary to identify on chart*)	MAXIMUM USEFUL RANGE

III. ROUTES: Where entrance and inside routes are not marked by aids to navigation, show recommended directions for Coast Pilot (latitude and longitude of entrance point, and distances and true courses made good); include natural steering ranges if available.

USCOMM-DC 34235-P71

IV. DANGERS: Mention those of concern to the navigator where special caution should be indicated in the Coast Pilot.

V. CURRENTS: Indicate places you have experienced conditions of current where special caution should be mentioned in the Coast Pilot.

VI. ANCHORAGES: Mention best anchorage in the area and other secure anchorages having good holding ground.

LOCATION *(Include anchorage bearings and natural ranges if available)*

TYPE OF BOTTOM OBSERVED:

	EXCEL.	GOOD	FAIR	POOR	COMMENT
HOLDING QUALITY					
PROTECTION OFFERED					
ACCESSABILITY					

RECOMMENDED FOR VESSELS:

LENGTH	DRAFT
____ TO ____ FT.	____ TO ____ FT.

VII. REMARKS:

VIII. OTHER COAST PILOT CHANGES

U.S. COAST PILOT

NUMBER	EDITION	PAGE	LINE(S)

NOTE: Any chart(s) submitted with your report to show conditions will be replaced free of charge.

READ: STRIKE OUT: INSERT AFTER: *(Circle one)*

INDEX

The numbers of the largest scale charts on which the names appear are in parentheses. Some geographic names are indexed more than once when the features appear in regular text and are repeated in Chapter 5, New Jersey Intracoastal Waterway, and where more than one place has the same geographic name.

	Page
Aberdeen Creek (495)	149
Aberdeen Proving Ground (1226)	205
Absecon (826—SC)	89
Absecon Bay (826—SC)	89
Absecon Channel (826—SC)	89
Absecon Creek (826—SC)	89
Absecon Inlet (826—SC)	81
Absecon Lighthouse (826—SC)	81
Accotink Bay (560)	166
Agricultural Research Service	2
Aids to navigation	14, 69
Aircraft procedures for distress incident	8
Airedele (557)	170
Alexandria (560)	166
Allen Point (557)	160
Alloway Creek (294)	100
Anacostia River (560)	168
Anchorage regulations	23
Anchorages	69
Andalusia (296)	113
Annapolis (385)	175
Antipoison Creek (534)	155
Appomattox River (531)	143
Appoquinimink River (294)	101
Aquia Creek (559)	164
Arlington Memorial Bridge (101—SC)	169
Artificial Island (294)	100
Arundel Cove (545)	202
Assateague Island (1220)	123
Assateague Light (1220)	123
Assawoman Bay (1220)	122
Assawoman Canal (1219)	122
Assawoman Inlet (1221)	124
Assawoman Island (1221)	124
Assiscunk Creek (296)	113
Atlantic City (826—SC)	81, 89
Atlantic Marine Center (452)	137
Automated Merchant Vessel Report System (AMVER)	4
Avalon (551)	188
Avalon (826—SC)	91
Avalon Shoal (1217)	82
Avalon Shores (550)	173
Avon (795)	79
Aylett (496)	149
Back Cove (549)	196
Back Creek (218)	99
Back Creek (385)	175
Back Creek (494)	147
Back Creek (549)	195
Back Creek (554)	186
Back Creek (561)	171
Back Creek (564)	179
Back Creek (570)	115
Back Creek (572)	207
Back River (549)	204
Back River (562)	146
Baker Shoal (294)	100
Ballast Narrows (1221)	125
Balls Creek (551)	188
Baltimore (545)	196
Baltimore Harbor (549)	195
Baltimore Light (566)	177
Baremore Quarters (826—SC)	89
Barkers Landing (1218)	97
Barnegat Bay (824—SC)	86
Barnegat Inlet (824—SC)	80
Barnegat Light (824—SC)	80
Barrel Point (529)	139
Barrets Ferry (530)	143
Barrets Point (530)	143
Bass Harbor (826—SC)	90
Bass River (826—SC)	88
Batten Bay (529)	140
Battery Park (529)	141
Battle Creek (553)	172
Bay Head (824—SC)	80
Bay Head Harbor (824—SC)	86
Bay Side (294)	100
Bayford (564)	179
Bayside Wharf (494)	150
Beach Creek (826—SC)	92
Beach Haven (824—SC)	87
Beach Haven Inlet (826—SC)	80, 88
Beach Island Shoal Light (568)	180
Beach Thorofare (826—SC)	89, 91
Bearings	1, 15
Bear Creek (545)	202
Bear Neck Creek (550)	173
Beards Creek (550)	174
Beaverdam Creek (824—SC)	86
Bellevue (560)	167
Bellevue (551)	189
Belmar (795)	79
Belmont Bay (560)	165
Ben Davis Point (1218)	99
Ben Davis Point Shoal (1218)	99
Ben Hands Thorofare (826—SC)	91
Bends and curves	70
Benedict (553)	172
Benjamin Franklin Bridge (280)	106
Bennett Creek (494)	147
Bennett Creek (529)	140
Bennett Point (550)	191
Berkley (452)	137
Bertrand (534)	153
Bethel (554)	185
Betterton (572)	206
Bidwell Creek (1218)	98
Big Annemessex River (555)	183
Big Creek (826—SC)	88
Big Elk Creek (572)	207
Big Thorofare (555)	182
Big Timber Creek (280)	111
Bishops Head Point (554)	185
Bitter Head Point (554)	184
Bivalve (554)	185
Bivalve (1218)	99
Blackfish Bank (1220)	123
Blackhole Creek (566)	177
Blackwalnut Cove (551)	188
Blackwater Creek (494)	150
Bladensburg (101—SC)	169
Bloodsworth Island (555)	182
Bloody Point Bar Light (550)	190
Bodkin Creek (549)	195
Bodkin Island (550)	191
Bodkin Neck (549)	195
Bodkin Point (549)	195

	Page
Boer (605—SC)	154
Boggs Wharf (564)	179
Bogues Bay (1221)	125
Bohemia River (572)	206
Bonita Tideway (826sc)	89
Bonum Creek (558)	161
Bordentown (296)	114
Boundary Channel (101—SC)	169
Boundary lines of Inland Waters	23, 69
Bowers (1218)	97
Bowlers Rock (605—SC)	154
Bowlers Rock Light (605—SC)	154
Bradford Bay (1221)	126
Bramell Point (295)	105
Brandon (530)	143
Brandywine Creek (294)	102
Brannock Bay (551)	188
Branson Cove (558)	161
Breakwater Harbor (411)	96
Breton Bay (558)	161
Brewer Creek (550)	174
Brickhouse Bar (550)	192
Brickhouse Landing (496)	149
Bridge and cable clearances	13
Bridge-to-bridge radio communication	22
Bridge Creek (605—SC)	155
Bridgeboro (296)	112
Bridgeport (295)	104
Bridges	1
Bridgeton (1218)	100
Bridgetown (564)	179
Brielle (824—SC)	85
Brigantine (826—SC)	89
Brigantine Channel (826—SC)	89
Brigantine Inlet (826—SC)	81, 89
Brigantine Light (826—SC)	81
Brigantine Shoal (826—SC)	81
Bristol (296)	113
Broad Creek (534)	153
Broad Creek (551)	188
Broad Creek (554)	185
Broad Creek (560)	166
Broad Creek (566)	177
Broad Creek (568)	183
Broad Creek (826—SC)	89
Broad Thorofare (826—SC)	90
Broadcasts by Coast Guard radio stations	212
Broadkill River (411)	120
Brooks Creek (551)	187
Brookview (554)	185
Broomes Island (553)	172
Browns Bay (494)	150
Browns Cove (566)	176
Bruce (452)	136
Buck Neck Landing (549)	204
Bulkhead Shoal (294)	101
Bulkhead Shoal Channel (294)	101
Bull Bluff (559)	164
Bull Neck (534)	156
Bundick (557)	159
Buoys	16
Burlington (296)	113
Burtons Bay (1221)	126
Burwell Bay (529)	141
Bush River (572)	205
Bushwood Wharf (558)	163
Butlers Bluff (563)	178
Buzzard Point (558)	162
Cabin Branch (545)	202
Cabin Creek (552)	190
Cables	1
Cacaway Island (548)	193
Cadle Creek (550)	173
Callis Wharf (534)	151
Cambridge (551)	189
Cambridge Harbor (551)	189
Cambridge Marine Terminal (551)	189
Camden (280)	111
Camden Marine Terminals (280)	111
Campostella Bridge (452)	137
Canal Station (570)	118
Canoe Neck Creek (558)	162
Cape Charles (563)	178
Cape Charles (563)	125
Cape Charles (1222)	127
Cape Charles Harbor (563)	178
Cape Charles Light (1222)	127
Cape Henlopen (411)	120
Cape Henlopen (1219, 411)	93
Cape Henry (562)	127
Cape Henry Light (562)	127
Cape May (234)	82
Cape May (1219)	93
Cape May Canal (826—SC)	92
Cape May Canal (1218)	98
Cape May Channel (1219)	93
Cape May Harbor (234)	82
Cape May Inlet (234)	82
Cape May Inlet (826—SC)	92
Cape May Light (1219)	93
Cape May-lewes Ferry (411)	96
Captains of the Port	211
Carneys Point (295)	103
Carpenter Point (572)	208
Carr Creek (385)	175
Carr Point (385)	175
Carter Cove (534)	153
Carter Creek (534)	153
Cat Creek (553)	172
Cat Creek (1221)	125
Cat Point Creek (605—SC)	155
Cedar Creek (824—SC)	86
Cedar Island (1221)	124
Cedar Island Bay (1221)	126
Cedar Point (553)	170
Cedar Swamp Creek (826—SC)	91
Centerton (296)	112
Centreville Landing (548)	193
Chain Bridge (101—SC)	169
Channel markers, caution	16
Chapel Point (559)	164
Charleston Creek (558)	163
Charlestown (572)	208
Chart symbols and abbreviations	12
Cheatham Annex Depot (492)	148
Cherry Point (534)	151
Cherry Point (534)	153
Cherrystone Channel (563)	178
Cherrystone Inlet (563)	179
Cherrystone Island (563)	179
Chesapeake (452)	138
Chesapeake and Delaware Canal (294)	101
Chesapeake and Delaware Canal (570)	115
Chesapeake Bay Bridge-tunnel (562)	127
Chesapeake Bay (1222)	127
Chesapeake Bay Maritime Museum (550)	192
Chesapeake Beach (551)	173
Chesapeake Biological Laboratory (561)	171
Chesapeake City (570)	119
Chesapeake Light (1222)	127
Chesconessex (568)	180
Chesconessex Creek (568)	180
Chester (295)	104
Chester Creek (295)	104
Chester River (548)	192
Chestertown (548)	194
Chicamuxen Creek (559)	165
Chickahominy River (530)	142
Chincoteague (1220)	124
Chincoteague Bay (1220)	123
Chincoteague Channel (1220)	124
Chincoteague Inlet (1220,1221)	124
Chincoteague Island (1220)	124
Chincoteague Point (1220)	124
Chincoteague Shoals (1220)	123
Chisman Creek (494)	147
Chopawamsic Creek (559)	165

Page
Choptank (552) 190
Choptank River (551, 552) 187
Choptank River Light (551) 189
Christina River (294) 101
Chuckatuck Creek (529) 140
Church Creek (551) 187
Church Point (529) 142
Church Point (557) 160
Churchland (452) 136
Churn Creek (572) 205
City Point (531) 143
City Wharf (452) 136
Claiborne (550) 191
Clam Creek (826—SC) 81
Claremont (530) 143
Clark Point (534) 155
Clarks Wharf (553) 172
Clay Bank (495) 149
Clay Island (554) 185
Clifton Beach (559) 165
Coaches Island (550) 190
Coals Landing (559) 164
Coan (557) 159
Coan River (557) 159
Coast Guard 4, 210
Coast Guard Base (452) 137
Coast Guard radio stations 10
Coast Guard Stations 211
Coast Guard vessels, warning signals 19
Coast Pilots 1, 209, 210
Cobb Island (558) 163
Cobb Island (1221) 124
Cobb Point Bar (558) 163
Cobbs Creek (534) 152
Cobham Bay (529) 142
Cockrell Creek (534) 156
Cohansey Light (1218) 99
Cohansey River (1218) 99
Colbourn Creek (555) 183
Coles Point (558) 161
Colgate Creek (545) 203
College Creek (529) 142
College (Dorseys) Creek (385) 175
Colonial Beach (558) 163
Columbia Island (101—SC) 169
Combs Creek (558) 162
Commercial Fish Harbor (1220) 123
Compass roses on charts 14
Concord Point (572) 207
Conowingo Dam (572) 207
Control over movement of vessels 53, 69
Cooks Creek (824—SC) 85
Cooper Point (280) 111
Cooper River (280) 112
Copperville (550) 192
Cornell Harbor (826—SC) 91
Cornfield Creek (566) 177
Cornfield Harbor (557) 159
Cornfield Point (557) 159
Cornwells Heights (296) 113
Corps of Engineers 4
Corps of Engineers, U.S. Army 210
Corrotoman River (534) 153
Corsica River (548) 193
Corson Inlet (826—SC) 82
Courses 1
Courthouse Landing (496) 149
Courthouse Point (570) 119
Cove Point Light (553) 171
Cove Point (553) 171
Cox Creek (550) 191
Cox Neck (550) 191
Crab Alley Bay (550) 191
Crab Alley Creek (550) 191
Crab Point (295) 105
Crabtown Creek (824—SC) 85
Cranes Creek (534) 156
Craney Island (452) 136
Craney Island (560) 166

Page
Cricket Hill (534) 151
Crisfield (555) 183
Crittenden (529) 140
Crocheron (554) 186
Crook Horn Creek (826—SC) 91
Cross Currents 70
Crosswicks Creek (296) 114
Cruising schedules 8
Crumpton (548) 194
Cuckold Creek (553) 172
Cumberland Landing (496) 149
Cummings Creek (551) 188
Cunjer Channel (1221) 126
Curles of the River (531) 144
Currents 1, 71
Currioman Bay (558) 161
Curtis Bay (545) 202
Curtis Creek (545) 202
Curtis Point (550) 173
Customs 2, 212
Cypress Creek (529) 141
Cypress Creek (566) 177

Dahlgren (556) 163
Dameron Marsh (534) 156
Danger Signal 21
Danger zone regulations 55
Dangers 70
Darby Creek (295) 104
Dark Head Creek (549, 1226) 204
Daugherty Creek (Annemessex) Canal (555) 183
Davis Creek (494) 150
Davis Creek (548) 193
Daylight saving time 78
Deadman Shoal (1218) 98
Deal Island (555) 184
Deale (550) 173
Deck Officers 21
Deep Creek (494) 150
Deep Creek (529) 141
Deep Creek (566) 177
Deep Creek (568) 180
Deep Creek (605—SC) 154
Deep Landing (548) 194
Deep Point (559) 165
Deep Water Shoals Light (529) 141
Deepwater Point (294) 101
Delaware and Lehigh Canal (296) 113
Delaware and Raritan Canal (296) 114
Delaware Bay (1219) 93
Delaware Breakwater (411) 96
Delaware Breakwater Light (411) 96
Delaware Capes 93
Delaware City (294) 101
Delaware City Branch Channel (294) 101
Delaware City Branch Channel (570) 118
Delaware Memorial Bridge (294) 101
Delaware River (294) 100
Delta Basin (826—SC) 81
Deltaville (534) 151
Dennis Creek (1218) 98
Denton (552) 190
Department of Agriculture 213
Depths 1
Destructive waves 18
Dewey Beach (411) 121
Diggs Wharf (494) 150
Distances 1
Distress signals and procedures 6
Dividing Creek (534) 156
Dixie (534) 152
Dock Thorofare (826—SC) 90
Documentation 4
Documentation Offices 211
Dogue Creek (560) 166
Dogwood Harbor (551) 188
Dorchester (1218) 99
Double Creek (824—SC) 87
Drawbridge operation regulations 34

	Page
Drawbridges	70
Dredge Harbor (296)	112
Drewrys Bluff (531)	144
Drum Point (561)	171
Drum Point (452)	136
Drum Point (548)	193
Duck Island (296)	114
Duck Point Cove (554)	186
Dukeharts Channel (558)	162
Dumping grounds	13
Dumping grounds regulations	63
Dundalk Marine Terminal (545)	203
Dutch Gap (531)	144
Dutch Gap Cutoff (531)	144
Dyer Creek (494)	150
Dymer Creek (534)	155
Eagle Point (280)	111
East Burlington (296)	113
East Fork (548)	193
East Point (1218)	98
East River (494)	150
Eastern Bay (550)	190
Eastern Branch (452)	137
Eastern Branch (534)	153
Eastern Neck Island (548)	193
Eastern Neck Narrows (548)	193
Easton	189
Easton Cove (494)	147
Easton Point (551)	189
Eastport (385)	175
Echo soundings	14
Eckichy Channel (1222)	126
Eddystone (295)	104
Edge Creek (551)	188
Edgemoor (295)	103
Edgewater (550)	174
Edwards Creek (534)	151
Egg Island Flats (1218)	99
Egg Island Point (1218)	99
Elizabeth River (452)	132
Elk Neck (572)	207
Elk River (572)	206
Elkton (572)	207
Essington (295)	104
Ewell (555)	182
Fairbank (551)	188
Fairfield (545)	203
Fairlee Creek (549)	204
Fairmount Dam (280)	110
Fairton (1218)	100
Fairview (549)	195
Fairview Beach (559)	164
Fairview Point (550)	192
Falling Creek (531)	144
Farm Creek (554)	186
Farrar Island (531)	144
Federal Communications Commission	5, 213
Fells Point (545)	203
Fenwick Island (1219)	122
Fenwick Island Light (1220)	122
Fenwick Shoal (1220)	122
Ferry Bar (545)	203
Ferry Cove (550)	191
Ferry Point (385)	175
Ferry Point (545)	202
Ferry Point (554)	186
Fieldsboro (296)	114
Fish havens	5, 13
Fish trap areas	13
Fisher Point Dike (280)	112
Fishermans Cove (481)	129
Fishermans Island (1222)	127
Fishing Battery Light (572)	207
Fishing Bay (534)	152
Fishing Bay (554)	185
Fishing Creek (550)	174
Fishing Creek (551)	173, 187
Fishing Creek (554)	186
Fishing Point (545)	202
Fishing Point (561)	171
Fishing Point (1220)	124
Fishtraps	5
Fishweirs	70
Five Fathom Bank (1219)	93
Five Fathom Bank Lightship (1219)	93
Flag Harbor (553)	172
Fleeton (534)	156
Fleets Bay (534)	155
Flemings Landing (1218)	98
Florence (296)	113
Fog signals	1, 15
Folly Creek (1221)	126
Forked Creek (566)	176
Forked River (824—SC)	87
Fort Belvoir (560)	166
Fort Carroll (545)	202
Fort Delaware (294)	101
Fort Eustis (529)	141
Fort McHenry (545)	203
Fort Mifflin (295)	105
Fort Monroe (400)	131
Fort Powhatan (530)	143
Fort Washington (560)	166
Fort Wool (400)	132
Fortescue (1218)	99
Fortescue Creek (1218)	99
Fourmile Run (560)	167
Fox Creek (554)	186
Fox Point (558)	163
Francis Scott Key Bridge (101—SC)	169
Frederica (1218)	97
Fredericktown (572)	206
Fredericksburg (605—SC)	155
Freeport (534)	152
Freestone Point (560)	165
Frequency units	10
Friars Landing (295)	105
Friendship International Airport	201
Frog Mortar Creek (549, 1226)	205
Galesville (550)	173
Galloway Creek (549)	205
Gardner Basin (826—SC)	81
Gargathy Inlet (1221)	124
Garrett Island (572)	207
Geographic range	14
George Island Landing (1220)	123
George P. Coleman Memorial Bridge (492)	148
George Washington Birthplace National Monument (558)	163
Georgetown (101—SC)	169
Georgetown (572)	206
Gibson Island (566)	177
Giesboro Point (560)	167
Gingerville Creek (550)	174
Glass (494)	150
Glass House Point (530)	142
Glebe Creek (550)	174
Glebe Point (534)	157
Gloucester City (280)	111
Gloucester Point (492)	148
Golden Hammock Thorofare (826—SC)	89
Goodluck Point (824—SC)	86
Goose Creek (554)	186
Goose Creek (824—SC)	86
Government agencies	2
Grace Creek (551)	188
Granby Street Bridge (400)	135
Grassy Bay (826—SC)	89
Grassy Sound (826—SC)	92
Grassy Sound Channel (826—SC)	82, 92
Gratitude (548)	194
Gravelly Point (560)	167
Graveyard Point (549)	195
Grays Creek (530)	142
Grays Creek (566)	177

Page
Grays Inn Creek (548) 193
Great Bay (826—SC) 88
Great Bohemia Creek (572) 206
Great Channel (826—SC) 82, 92
Great Egg Harbor Bay (826—SC) 90
Great Egg Harbor Inlet (826—SC) 81, 90
Great Egg Harbor River (826—SC) 91
Great Fox Island (568) 180
Great Gull Bank (1220) 122
Great Lakes Pilot 210
Great Machipongo Channel (1221) 125
Great Machipongo Inlet (1221) 124
Great Point (555) 183
Great Shoal (529) 140
Great Shoals Light (554) 184
Great Sound (826—SC) 92
Great Thorofare (568) 180
Great Wicomico River (534) 156
Great Wicomoco River Light (534) 156
Green Bank (826—SC) 88
Green Point Wharf (549) 204
Greenbackville (1220) 123
Greensboro (552) 190
Greenbury Point (385) 175
Greenmansion Cove (494) 150
Greenvale Creek (605—SC) 154
Greenwich Pier (1218) 100
Greenwood Creek (550) 191
Grimstead (534) 151
Grove Creek (548) 193
Grove Point (572) 205, 206
Guilford Creek (568) 180
Guilford Flats (568) 180
Guinea Marshes (492) 148
Gull Island Thorofare (826—SC) 89, 92
Gull Marsh Channel (1221) 126
Gum Bar Point (558) 163
Gunpowder River (1226) 205
Gunston Cove (560) 166
Gwynn Island (534) 151

Hackett Point (385) 176
Hacks Neck (564) 179
Hains Point (560) 168
Hallowing Point (553) 172
Hammock Cove (826—SC) 89
Hampton (400) 131
Hampton Bar (400) 131
Hampton Boulevard Bridge (400) 135
Hampton Institute (400) 131
Hampton River (400) 131
Hampton Roads (400) 129
Hance Point (572) 208
Hancocks Bridge (294) 100
Harbor and inlet entrances 69
Harbor of Refuge (411) 96
Harbor of Refuge Light (411) 96
Harbormasters 78
Harborton (564) 179
Harris Creek (551) 188
Harris River (562) 146
Harryhogan Point (557) 160
Hazard Point (555) 183
Hatcher Island (531) 144
Havre De Grace (572) 207
Hawk Cove (549) 204
Hawkins Point (545) 202
Hawtree Landing (495) 148
Hearns Cove (554) 186
Heights 1
Helicopter evacuation of personnel 8
Hellen Creek (553) 172
Hen and Chickens Shoal (1219) 93
Hereford Inlet (826—SC) 82, 92
Heron Island Bar (558) 162
Herring Bay (550) 173
Herring Creek (411) 121
Herring Creek (558) 161
Herring Island (824—SC) 86

Page
High Point (560) 165
Highlands of Navesink (1215) 79
Hills Bay (534) 151
Hills Point (551) 187
Hillsboro (552) 190
Hodges Ferry (452) 136
Hog Island Bay (1221) 126
Hog Point (553) 171
Hole in the Wall (534) 151
Holiday Harbor (452) 137
Holland Cliff (553) 172
Holland Island Bar Light (555) 182
Holland Point (550) 173
Holland Straits (555) 182
Hollidays Point (529) 140
Hollis Marsh (558) 161
Honga (554) 186
Honga River (554) 186
Hooper Islands (554) 186
Hooper Island Light (557) 170
Hooper Strait (555) 182
Hooper Strait Light (555) 182
Hooper Point (551) 187
Hoopersville (554) 186
Hop Point (555) 183
Hope Creek (294) 100
Hopewell (531) 143
Hopkins (568) 180
Hopkins Creek (549) 205
Horn Harbor (494) 150
Horsehead Cliffs (558) 163
Horseshoe (400) 130
Horseshoe (562) 146
Horseshoe Lead (1221) 124
Hoskins Creek (605—SC) 154
Hospital Point (452) 136
Howell Point (572) 205
Hudson (551) 187
Hudson Creek (551) 187
Huggins Point (558) 162
Hummock Channel (1221) 124
Hungars Creek (564) 179
Hunting Creek (550) 192
Hunting Creek (552) 190
Hunting Creek (560) 166
Hunting Creek (568) 180
Hurricane mornings 71
hurricanes 73

Ice 71
Immigration and Naturalization 213
Immigration and Naturalization Service 5
Indian Creek (534) 155
Indian Head (560) 166
Indian Queen Bluff (560) 166
Indian River (411) 122
Indian River Bay (411) 122
Indian River Inlet (411) 121
Ingram Thorofare (826—SC) 91
Inner Middle Ground (1222) 127
Inside navigation 70
Inside Thorofare (826—SC) 89
Insley Cove (554) 186
Inverness (555) 183
Irish Creek (551) 188
Irvington (534) 153
Island Creek (548) 194
Island Creek (551) 189
Island Creek (553) 172
Island Creek (557) 160
Island Heights (824—SC) 86
Island Hole Narrows (1221) 125
Island Point (555) 183
Isle of Wight Bay (1220) 122
Isle of Wight Shoal (1220) 122

Jackson Creek (534) 151
Jackson Creek (548) 193
Jakes Landing (1218) 98

	Page
James Island (551)	187
James River (529—531)	139
James River Bridge (529)	140
Jamestown (529)	142
Jamestown Island (529)	142
Jarvis Sound (826—SC)	83, 92
Jefferson Island (550)	190
Jenkins Creek (555)	183
Johnson Island (550)	191
Jones Creek (400)	131
Jones Creek (529)	141
Jones Creek (549)	196
Jones Creek (555)	183
Jones Neck (531)	144
Jones Neck Cutoff (531)	144
Jones Point (560)	166
Joppatowne (1226)	205
Jordan Point (530)	143
Joynes Branch (568)	180
Kanawha Ship Canal (531)	145
Kedges Straits (555)	182
Kegotank Bay (1221)	125
Kent Island (550)	191
Kent Island Narrows (548)	193
Kent Point (550)	191
Kentmore Park (572)	206
Kettle Creek (824—SC)	86
Kilmarnock (534)	156
Kilmarnock Wharf (534)	155
Kings Creek (563)	179
Kingscote Creek (557)	159
Kinsale (557)	160
Kiptopeke Beach (563)	178
Knapps Narrows (551)	188
Knitting Mill Creek (400)	135
La Trappe Creek (551)	189
Lafayette River (400)	135
Lagrange Creek (605—SC)	154
Lake Louise (824—SC)	85
Lake Maury (529)	140
Lake Ogleton (385)	175
Lakes Bay (826—SC)	90
Lambert Point (452)	136
Lancaster Creek (605—SC)	154
Lanexa (530)	143
Langford Creek (548)	193
Langley Field (562)	146
Laurel (554)	185
Laurelton (824—SC)	86
Lavallette (824—SC)	86
Lawless Point (400)	135
Layton (605—SC)	155
Lazaretto Point (545)	203
League Island (280)	111
Lebanon (1218)	97
Lecompte Bay (551)	189
Lecompte Creek (551)	189
Leeds Creek (550)	192
Leedstown (605—SC)	155
Leesburg (1218)	99
Legal public holidays	78
Leipsic (1218)	98
Leipsic River (1218)	98
Leonardtown (558)	162
Levering Creek (555)	182
Lewes (411)	121
Lewes and Rehoboth Canal (411)	121
Lewisetta (557)	159
Light Lists	4, 210
Lights	1, 15
Linkhorn Bay (562)	129
Liston Point (294)	100
Little Annemessex River (555)	183
Little Assawoman Bay (1219)	122
Little Bay (534)	155
Little Bay (826—SC)	89
Little Bohemia Creek (572)	206
Little Choptank River (551)	187
Little Cobb Island (563)	125
Little Cove Point (553)	171
Little Creek (481)	129
Little Creek (550)	191
Little Creek (1218)	98
Little Deal Island (555)	183
Little Egg Harbor (826—SC)	87
Little Egg Inlet (826—SC)	81, 88
Little Elk Creek (572)	207
Little Ferry Landing (556)	163
Little Fox Islands (568)	180
Little Gull Bank (1220)	122
Little Hunting Creek (560)	166
Little Inlet (563)	125
Little Neck Island (548)	194
Little Queenstown Creek (548)	193
Little River (1218)	98
Little Round Bay (566)	176
Little Sheepshead Creek (826—SC)	88
Little Sloop Channel (1221)	126
Little Tinicum Island (295)	104
Little Wicomico River (557)	159
Liverpool Point (559)	165
Lobdell Canal (294)	102
Local magnetic disturbances	13
Local Notice to Mariners	2
Locklies Creek (534)	153
Locust Grove (496)	149
Locust Point (545)	203
Locust Point (555)	183
Lodge (557)	160
Lodge Creek (557)	160
Long Bar (550)	173
Long Beach (824—SC)	87
Long Cove (548)	193
Long Haul Creek (550)	192
Long Point (550)	191
Long Point (554)	184
Longboat Creek (1221)	126
Longport (826—SC)	90
Loran	17, 69
Love Creek (411)	121
Love Point (548)	192, 193
Love Point Light (548)	192
Lovers Point (558)	162
Lower Canton (545)	203
Lower Cedar Point (556)	164
Lower Machodoc Creek (558)	161
Lower Marlboro (553)	172
Lower Thorofare (555)	184
Lower Thorofare (826—SC)	92
Lowes Wharf (550)	191
Ludlam Bay (826—SC)	91
Ludlam Beach Light (826—SC)	82
Ludlam Thorofare (826—SC)	91
Lynch Cove (545)	202
Lynnhaven Bay (481)	129
Lynnhaven Inlet (481)	129
Lynnhaven Roads (481)	129
Machipongo River (1221)	125
Madison (551)	187
Madison Bay (551)	187
Magotha (1222)	126
Magothy Bay (1222)	126
Magothy Narrows (566)	177
Magothy River (566)	177
Mahon River (1218)	98
Main Channel (826—SC)	91
Main Creek (549)	195
Main Marsh Thorofare (826—SC)	89
Mallows Bay (559)	165
Manahawkin Bay (824—SC)	87
Manasquan (824—SC)	85
Manasquan Inlet (795)	80
Manasquan Inlet (824—SC)	85
Manasquan River (824—SC)	85
Manokin River (555)	183

Page
Mantoloking (824—SC) ... 86
Mantua (295) ... 105
Mantua Creek (295) ... 105
Manumuskin River (1218) ... 99
Marbury Point (560) ... 167
Marcus Hook (295) ... 103
Margate City (826—SC) ... 90
Marine Broadcast Notices to Mariners ... 2
Marine Inspection Offices ... 210
Mariners' Museum (529) ... 140
Market Slip (385) ... 175
Marley Creek (549) ... 202
Marsh Market (568) ... 181
Marshall Hall (560) ... 166
Marshelder Channel (826—SC) ... 88
Marshyhope Creek (554) ... 185
Martin Point (557) ... 160
Maryland Point (559) ... 164
Maryland Point Light (559) ... 164
Matapeake (550) ... 192
Mathias Point (559) ... 164
Mattaponi River (496) ... 149
Mattox Creek (558) ... 163
Mattawoman Creek (559) ... 165
Mattawoman Creek (564) ... 179
Maurice River (1218) ... 98, 99
Maurice River Cove (1218) ... 98
Mauricetown (1218) ... 99
Maxwell Point (1226) ... 205
Mayo (550) ... 173
Mayos Island (531) ... 144
Mays Landing (826—SC) ... 91
Mccreadys Creek (554) ... 186
Mccrie Shoal (1219) ... 93
Meadow Cut (826—SC) ... 89
Meekins Neck (554) ... 186
Meeks Point (572) ... 205
Menchville (529) ... 141
Mercator Projection ... 14
Meredith Creek (385) ... 176
Merry Point (534) ... 153
Messick Point (562) ... 146
Messongo Creek (568) ... 181
Metedeconk Neck (824—SC) ... 86
Metedeconk River (824—SC) ... 86
Metomkin Bay (1221) ... 125
Metomkin Inlet (1221) ... 124
Metomkin Island (1221) ... 124
Metomkin Point (559) ... 164
Middle Branch (545) ... 203
Middle Hooper Island (554) ... 186
Middle River (826—SC) ... 91
Middle River (549, 1226) ... 204
Middle Thorofare (826—SC) ... 89, 91, 92
Mila (534) ... 156
Miles River (550) ... 191
Milford (1218) ... 97
Milford Haven (534) ... 151
Milford Landing (556) ... 163
Mill Creek (385) ... 176
Mill Creek (529) ... 142
Mill Creek (534) ... 153, 156
Mill Creek (553) ... 172
Mill Creek (561) ... 171
Mill Creek (566) ... 177
Miller Landing (495) ... 149
Millsboro (411) ... 122
Millstone Creek (1221) ... 126
Millville (1218) ... 99
Milton (411) ... 120
Minesweeper signals ... 19
Mispillion River (1218) ... 97
Mobjack (494) ... 150
Mobjack Bay (494) ... 149
Mockhorn Channel (1222) ... 126
Money Island (1218) ... 99
Monie Bay (554) ... 184
Monroe Creek (558) ... 163
Morattico (605—SC) ... 154

Page
Morattico Creek (605—SC) ... 154
Morgan Creek (548) ... 194
Morgan Point (557) ... 160
Morgantown (556) ... 164
Morley Wharf (564) ... 179
Morris Bay (495) ... 149
Morris Point (558) ... 162
Mott Creek (826—SC) ... 89
Mount Landing Creek (605—SC) ... 155
Mount Vernon (560) ... 166
Mountain Point (566) ... 177
Mt. Airy (530) ... 143
Mud Island (296) ... 113
Muddy Hook Cove (554) ... 186
Mulberry Creek (605—SC) ... 154
Mulberry Point (572) ... 206
Mullica River (826—SC) ... 88
Mundy Point (557) ... 160
Murderkill River (1218) ... 97
Myrtle Island (563) ... 125

Nabbs Creek (549) ... 196
Nacote Creek (826—SC) ... 88
Nan Cove (553) ... 172
Nandua (564) ... 179
Nandua Creek (564) ... 179
Nanjemoy Creek (559) ... 164
Nansemond River (529) ... 139
Nantuxent Cove (1218) ... 99
Nantuxent Creek (1218) ... 99
Nantuxent Point (1218) ... 99
Nanticoke (554) ... 185
Nanticoke River (554) ... 184
Narrow channels ... 21
Narrows Point (534) ... 151
Nassawadox Creek (564) ... 179
National Ocean Survey ... 3, 209
National Weather Service ... 6, 212
Nautical charts ... 3, 12, 210
Nautilus Shoal (1222) ... 127
Naval Academy (385) ... 175
Naval Research Laboratory (551) ... 173
Naval Oceanographic Office ... 5
Naval Weapons Laboratory (556) ... 163
Navesink Lighthouse (1215) ... 79
Navesink River (1215) ... 79
Navigation regulations ... 63
Navy Marine Engineering Laboratory (385) ... 175
Neabsco Creek (560) ... 165
Neale Sound (558) ... 163
Neavitt (551) ... 188
Neshaminy Creek (296) ... 113
Neshaminy State Park (296) ... 113
New Bridge (294) ... 100
New Bridge (295) ... 103
New Castle (294) ... 101
New Gretna (826—SC) ... 88
New Jersey Intracoastal Waterway (824—SC, 826—SC) ... 84
New Point (494) ... 151
New Point Comfort (494) ... 150
Newbold Island (296) ... 113
Newcastle Bridges (496) ... 149
Newcomb (550) ... 192
Newport (1218) ... 99
Newport (294) ... 102
Newport News (400) ... 131
Newport News Creek (400) ... 131
Newport News Middle Ground Light (400) ... 131
Newport News Point (400) ... 131
Newport News Point (529) ... 139
Newton Creek (280) ... 111
Newton Rock (605—SC) ... 155
Nominal Range ... 14
Nomini (558) ... 161
Nomini Bay (558) ... 161
Nomini Cliffs (558) ... 163
Nomini Creek (558) ... 161
Norfolk (452) ... 136

	Page
Norfolk Harbor (400, 452)	132
Norfolk Naval Base (400)	133
Norfolk Naval Shipyard (452)	137
North Branch (568)	180
North Branch (824—SC)	87
North Channel (1221)	126
North East (572)	208
North Fork (551)	189
North Point (549)	195
North Point Creek (549)	196
North Prong (554)	184
North River (494)	150
North Shoal (385)	176
Northam Narrows (1221)	125
Northbury (496)	149
Northeast Branch (550)	188
Northeast Channel (563)	125
Northeast Heights (572)	208
Northeast River (572)	208
Northend Point (562)	146
Northfield (826—SC)	90
Northwest Branch (494)	150
Northwest Branch (550)	188
Northwest Branch (562)	146
Northwest Harbor (545)	203
Notice to Mariners	210
Notices to Mariners	2
Nottingham (553)	172
Nummy Island (826—SC)	82, 92
Oak Creek (550)	192
Obes Thorofare (826—SC)	89
Occohannock Creek (564)	179
Occoquan (560)	166
Occoquan Bay (560)	165
Occoquan Creek (560)	165
Occupacia Creek (605—SC)	155
Ocean City (826—SC)	82, 91
Ocean City (1220)	122
Ocean City Inlet (1220)	122
Ocean View (411)	122
Odessa (294)	101
Oil Pollution	20
Old Plantation Creek (563)	178
Old Plantation Flats Light (563)	178
Old Point Comfort (400)	131
Old Point Comfort Light (400)	131
Old Road Bay (549)	196
Old Town Point Wharf (572)	206
Oldmans Creek (295)	103
Oldmans Point (295)	103
Onancock (568)	180
Onancock Creek (568)	180
Ottens Harbor (826—SC)	92
Otter Point Creek (572)	205
Ottoman Wharf (534)	153
Outlet Bay (1221)	126
Overfalls Shoal (1219)	93
Oxford (551)	189
Oxon Creek (560)	167
Oyster (563)	125
Oyster Creek (824—SC)	87
Oyster Creek (826—SC)	89
Oyster Creek Channel (824—SC)	80
Paddy Thorofare (826—SC)	92
Pagan River (529)	141
Palmers (558)	162
Pamunkey River (496)	149
Papermill Pond (551)	189
Parish Creek (550)	173
Parker Cove (826—SC)	87
Parker Creek (1221)	126
Parker Run (826—SC)	87
Parkers Landing (295)	105
Parkers Landing (826—SC)	88
Parramore Banks (1221)	124
Parramore Beach Coast Guard Station (1221)	124
Parramore Island (1221)	124
Parrotts Creek (605—SC)	154
Parson Island (550)	191
Parting Creek (1221)	125
Patapsco River (549)	195
Patcong Creek (826—SC)	90
Patuxent River (553,561)	171
Patuxent River Naval Air Station (561)	171
Paul Point (554)	186
Paulsboro (295)	105
Pea Patch Island (294)	101
Peachblossom Creek (551)	189
Peachorchard Cove (545)	202
Pealiquor Shoal (552)	190
Peck Bay (826—SC)	91
Pedricktown (295)	103
Pelican Island (824—SC)	86
Penns Grove (295)	103
Pennsville (294)	101
Pennsylvania Harbor (826—SC)	91
Pentagon Lagoon (101—SC)	169
Pepper Creek (411)	122
Pepper Creek (494)	150
Perch Cove (826—SC)	89
Perrin (492)	148
Perrin River (492)	148
Perry Cove (549)	195
Perry Point (572)	207
Perryville (572)	207
Persimmon Point (559)	164
Persimmon Point (566)	177
Petersburg (531)	144
Petersons Point (553)	172
Philadelphia (280)	106
Philadelphia Naval Shipyard (280)	111
Philpots Wharf (494)	150
Phoebus (400)	131
Piankatank River (534)	151
Pig Point (529)	140
Pigeon Point (294)	101
Pilotage	78
Piney Neck Point (550)	191
Piney Point (557)	160, 161
Pinner Point (452)	136
Piscataway Creek (560)	166
Piscataway Creek (605—SC)	154
Pleasantville (826—SC)	90
Plumtree Point (562)	146
Pocahontas Creek (550)	174
Pocomoke City (1224)	181
Pocomoke River (568,1224)	181
Pocomoke Sound (568)	180
Pohick Bay (560)	166
Point Bar Thorofare (826—SC)	89
Point Lookout (557)	159
Point Lookout Light (557)	159
Point No Point (557)	170
Point No Point Light (557)	170
Point of Shoals (529)	141
Point Patience (561)	172
Point Pleasant (824—SC)	85
Point Pleasant Beach (824—SC)	85
Point Pleasant Canal (824—SC)	85
Pomonkey Creek (560)	166
Pond Point (572)	205
Pooles Island (549)	204
Pooles Island Bar Light (549)	204
Pope Wharf (530)	143
Popes Creek (558)	163
Popes Creek (559)	164
Poplar Cove Wharf (568)	180
Poplar Harbor (550)	190
Poplar Island (550)	190
Poplar Island Narrows (550)	191
Poplar Neck Creek (534)	155
Poquessing Creek (296)	113
Poquoson River (494)	146
Poropotank Bay (495)	149
Poropotank River (495)	149
Porpoise Banks (1221)	124

Page
Port Conway (605—SC) 155
Port Covington (545) 203
Port Elizabeth (1218) 99
Port Mahon (1218) 98
Port Norris (1218) 99
Port Penn (294) 101
Port Republic (826—SC) 88
Port Richmond (496) 149
Port Royal (605—SC) 155
Port Tobacco (559) 164
Port Tobacco River (559) 164
Port Tobacco River Flats (559) 164
Possum Point (559) 165
Post Creek (826—SC) 92
Potomac Beach (556) 163
Potomac Creek (559) 164
Potomac River (557-560, 101—SC) 158
Potomac River Bridge (559) 164
Powell Creek (530) 143
Powell Creek (826—SC) 91
Powells Creek (559) 165
Powhatan Creek (529) 142
Princess Anne (555) 183
Princeton Harbor (826—SC) 91
Principal ports 78
Prissy Wicks Shoal (1219) 93
Prospect Bay (550) 191
Prospect Hill (558) 161
Public Health Service 5, 213
Public Landing (1220) 123
Publications 209
Pumps, eoatable 9
Pungoteague Creek (564) 179
Purnell Point (1220) 123

Quantico (559) 165
Quantico Creek (559) 165
Queen Anne (552) 190
Queen Creek (495) 148
Queens Creek (534) 151
Queenstown (548) 193
Queenstown Creek (548) 193
Quinby (1221) 124
Quinby Inlet (1221) 124
Quinton (294) 100

Raccoon Creek (295) 104
Radar 21, 69
Radio Aids to navigation 1
Radio 210
Radio Bearings 16
Radio shore stations providing medical advice 213
Radio warnings and weather 10
Radiobeacons 16
Ragged Island Creek (529) 140
Ragged Point (558) 161
Ramsay Lake (550) 174
Rancocas Creek (296) 112
Randle Cliff Beach (551) 173
Ranges 1
Rappahannock River (534,605—SC) 152
Rappahannock Spit (534) 153
Red Point (572) 208
Redhouse Cove (566) 177
Reed Bay (826—SC) 89
Reed Creek (548) 193
Reedville (534) 156
Reedy Island (294) 101
Reedy Point (570) 115
Rehobeth (1224) 181
Rehoboth Bay (411) 121
Reids Ferry (529) 140
Remlik Wharf (605—SC) 154
Repairs 78
Report from ships 11
Reported information 1
Reserve Basin (280) 111
Restricted areas 5
Retreat (496) 149

Page
Rhode River (550) 173
Rhodes Point (555) 182
Rich Neck (550) 191
Richmond (531) 144
Richmond Deepwater Terminal (531) 145
Richmond Upper Marine Terminal (531) 145
Richmond Yacht Basin (531) 144
Risley Channel (826—SC) 90
Riva (550) 174
Riviera Beach (824—SC) 85
Robins Grove Point (558) 163
Robins Point (549) 205
Robinson Creek (605—SC) 154
Robinsonville (411) 121
Rock Creek (101—SC) 169
Rock Creek (549) 195
Rock Hall Harbor (548) 194
Rock Point (549) 195
Rockhold Creek (550) 173
Rocklanding Shoal Channel (529) 141
Roebling (296) 113
Rolphs (548) 194
Romancoke (550) 191
Roosevelt Inlet (411) 120
Rose Haven Harbor (550) 173
Rosier Bluff (560) 166
Rosier Creek (556) 163
Round Bay (566) 176
Routes 70
Royal Oak (550) 192
Ruffins Wharf (530) 143

Salem Canal (294) 101
Salem Cove (294) 100
Salem River (294) 100
Sales agents 3
Salisbury (554) 184
Salters Creek (400) 131
San Domingo Creek (551) 188
San Marcos Wreck (1223) 156
Sanborn Anchorage (824—SC) 87
Sand Shoal Channel (563) 125
Sand Shoal Inlet (563) 125
Sandy Hook (1215) 79
Sandy Hook Bay (1215) 79
Sandy Island Channel (1221) 124
Sandy Point (530) 143
Sandy Point (559) 165
Sandy Point (561) 171
Sandy Point Shoal Light (566) 177
Sarah Creek (492) 148
Sassafras River (572) 205
Saunders Point (550) 174
Saxis (568) 181
Schellenger Creek (234) 82
Schley (494) 150
Schoolhouse Cove (545) 202
Schuylkill River (280) 110
Scotland (530) 142
Scott Creek (452) 136
Scow Landing (826—SC) 88
Sea Girt Light (1216) 80
Sea Isle City (826—SC) 82, 91
Seaford (554) 185
Search and rescue 6
Searchlights, improper use of 21
Seaside Heights (824—SC) 86
Sebastian Point (558) 163
Secretary (552) 190
Seiche 18
Seismic sea waves 18
Selby Bay (550) 174
Selby Beach (550) 174
Semi Point (554) 184
Seneca Creek (549, 1226) 205
Sevenfoot Knoll Light (549) 195
Severn (494) 150
Severn River (494) 150
Severn River (566) 174

	Page
Sewell Point (234)	82
Sewells Point (400)	133
Sewells Point Spit (400)	133
Shad Island (826—SC)	89
Shad Landing State Park (1224)	181
Shad Point (554)	184
Shady Side (550)	173
Shannon Branch (557)	160
Shark River (795)	79
Shark River Inlet (795)	79
Sharkfin Shoal Light (558)	182
Sharps Island (551)	187
Sharps Island Light (551)	187
Sharptown (554)	185
Shell Pile (1218)	99
Shelltown (568)	181
Shelter Cove (824—SC)	86
Shelter Island (826—SC)	90
Shelter Island Bay (826—SC)	90
Sherwood (551)	188
Ship Bottom (824—SC)	87
Ship Channel (826—SC)	90
Ship Shoal Inlet (563)	125
Shipyard Landing (530)	143
Shooting Thorofare (826—SC)	88
Shrewsbury River (1215)	79
Shrewsbury Rocks (1215)	79
Sillery Bay (566)	177
Sinepuxent Bay (1220)	123
Skiffes Creek (529)	141
Skinners Neck (548)	193
Slaughter Creek (553)	187
Sledds Point (545)	202
Sloop Channel (1221)	126
Sloop Point (530)	143
Slough (tabs) Creek (557)	159
Small-craft facilities	78
Smith Creek (452)	136
Smith Creek (557)	159
Smith Island (555)	182
Smith Island (1222)	127
Smith Island Inlet (563)	125
Smith Island Shoal (1222)	127
Smith Point (559)	165
Smith Point Light (557)	159
Smithfield (529)	141
Smyrna (1218)	98
Smyrna Landing (1218)	98
Smyrna River (1218)	98
Snow Hill (1220)	123
Snow Hill (1224)	181
Snug Harbor (826—SC)	81
Solomons (561)	171
Solomons Island (561)	171
Solomons Lump Light (555)	182
Somers Cove (555)	183
Somers Point (826—SC)	90
South Channel (563)	125
South Marsh Island (555)	182
South Prong (554)	184
South River (550)	174
South Yeocomico River (557)	160
Southeast Channel (563)	125
Southeast Creek (548)	194
Southern Branch (452)	137
Southwest Branch (494)	150
Southwest Branch (562)	146
Spa Creek (385)	175
Sparrows Point (545)	201
Special signals for certain vessels	18
Spesutie Island (572)	206
Spesutie Narrows (572)	206
Spidercrab Bay (1222)	126
Spit Neck (549)	195
Spoil areas	13
Spry Island (549)	205
Standard time	78
Starling Creek (568)	181
Stevens Point (557)	159
St. Catherine Island (558)	162
St. Catherine Sound (558)	162
St. Clements (Blakiston) Island (558)	162
St. Clements Bay (558)	162
St. George Bar (557)	160
St. George Creek (557)	160
St. George Harbor (557)	160
St. George Island (557)	160
St. Helena Island (566)	176
St. Jerome Creek (557)	170
St. Jones River (1218)	97
St. Leonard Creek (553)	172
St. Margaret Island (558)	162
St. Marys City (557)	160
St. Marys River (557)	160
St. Michaels (550)	192
St. Michaels (551)	188
St. Patrick Creek (558)	162
St. Peters Creek (555)	183
St. Pierre Island (555)	183
Still Pond (572)	205
Stillpond Creek (572)	205
Stingray Point (534)	151
Stingray Point Light (534)	151
Stone Harbor (826—SC)	92
Stonehouse Cove (545)	202
Stony Creek (549)	196
Stony Point (562)	146
Storm Surge	18
Storm warning display	71
Story Island (826—SC)	88
Story Island Channel (826—SC)	88
Stove Point Neck (534)	152
Stow Creek (294)	100
Strathmere (826—SC)	91
Stratford Cliffs (558)	163
Stump Neck (559)	165
Stumps and sunken logs	70
Sturgeon Point (530)	143
Stutts Creek (534)	152
Submarine emergency identification signals	19
Sue Creek (549)	205
Suffolk (529)	140
Summit Bridge (570)	118
Sunnybank (557)	159
Sunset Creek (400)	131
Sunset Lake (826—SC)	92
Supplies	78
Supplements	1
Susquehanna River (572)	207
Swan Creek (548)	194
Swan Creek (572)	207
Swan Point (548)	194
Swan Point Bar (548)	194
Swan Point (549)	204
Swash Bay (1221)	126
Swedesboro (295)	104
Sweden Point (559)	165
Sweet Hall Landing (496)	149
Sweetwater (826—SC)	88
Tabbs Creek (534)	155
Tangier (568)	181
Tangier Island (568)	181
Tangier Sound (568,1224)	181
Tangier Sound Light (568)	181
Tanhouse Creek (1220)	123
Tanner Point (400)	135
Tapler Point (572)	205
Tappahannock (605—SC)	155
Tar Bay (553)	187
Taylor Creek (534)	153
Taylors Island (551)	187
Teagles Ditch (1221)	126
Tedious Creek (554)	185
The Corkscrew (531)	144
The Glebe (557)	159
The Haven (548)	194
The Narrows (481)	129

Page
The Notch (568) ... 180
The Shears (411) ... 96
The Swash (1221) ... 126
The Thorofare (529) ... 142
The Thorofare (568) ... 180
Theodore Roosevelt Island (101—SC) ... 169
Thimble Shoal Channel (481, 562) ... 128
Thimble Shoal Light (400) ... 130
Thomas Point (550) ... 174
Thomas Point Shoal Light (550) ... 174
Thompson Point (295) ... 105
Three Sisters Islands (101—SC) ... 169
Tidal Basin (101—SC) ... 169
Tidal Current Charts ... 4, 209
Tidal Current Tables ... 3, 209
Tide Tables ... 8, 209
Tides ... 71
Tidwells (558) ... 161
Tilghman (551) ... 188
Tilghman Creek (550) ... 191
Tilghman Island (551) ... 188
Tilghman Point (550) ... 191
Time ... 2
Time signals ... 11
Tippity Wichity Island (557) ... 160
Titlow Creek (568) ... 180
Tobacco Island (568) ... 180
Toddville (554) ... 186
Tolly Point (385) ... 174
Tolly Point Shoal (385) ... 175
Toms Cove (1220) ... 124
Toms River (824—SC) ... 86
Torresdale (296) ... 113
Totuskey Bridge (605—SC) ... 154
Totuskey Creek (605—SC) ... 154
Towage ... 78
Town Creek (534) ... 153
Town Creek (561) ... 172
Town Creek (551) ... 189
Town Point (529) ... 140
Town Point (553) ... 172
Town Point (561) ... 172
Townsend Channel (826—SC) ... 91
Townsend Inlet (826—SC) ... 82
Townsends Inlet (826—SC) ... 82, 91
Traffic separation schemes (Traffic lanes) ... 20, 69
Trappe Landing (551) ... 189
Tred Avon River (551) ... 189
Trenton (296) ... 114
Trenton Marine Terminal (296) ... 114
Trippe Bay (551) ... 188
Tropical cyclones ... 73
Tsunamis ... 18
Tuckahoe (826—SC) ... 90
Tuckahoe Bridge (552) ... 190
Tuckahoe Creek (552) ... 190
Tuckahoe River (826—SC) ... 90
Tuckerton (826—SC) ... 88
Tuckerton Creek (826—SC) ... 87
Tue Marshes Light (492) ... 148
Tue Point (492) ... 148
Tunis Mills (550) ... 192
Turkey Island Bend (531) ... 144
Turkey Island Cutoff (531) ... 144
Turkey Point (550) ... 191
Turkey Point (572) ... 206
Turner Creek (572) ... 206
Tyaskin (554) ... 185
Tyler Creek Cove (554) ... 186
Tyler Ditch (555) ... 182
Tylers Beach (529) ... 141
Tylerton (555) ... 182

U. S. Naval Amphibious Base (481) ... 129
Uniform State Waterway Marking System ... 17
Upper Cedar Point (559) ... 164
Upper Chippokes Creek (530) ... 143
Upper Ferry (554) ... 184
Upper Hooper Island (554) ... 186

Page
Upper Machodoc Creek (556) ... 163
Upper Thorofare (555) ... 184
Upshur Bay (1221) ... 124
Urbanna (605—SC) ... 154
Urbanna Creek (605—SC) ... 153

Ventnor City (826—SC) ... 89
Ventnor Heights (826—SC) ... 89
VHF-FM Weather Broadcasts ... 212
Vienna (554) ... 185
Virginia Beach (562) ... 127
Virginia Channel (101—SC) ... 169
Virginia Inside Passage (1220-1222) ... 125

Wachapreague (1221) ... 124
Wachapreague Channel (1221) ... 124
Wachapreague Inlet (1221) ... 124
Wading River (826—SC) ... 89
Wakefield (558) ... 163
Walker Point (1221) ... 125
Walkerton (496) ... 149
Wall Cove (549) ... 195
Wallops Island (1221) ... 124
Walt Whitman Bridge (280) ... 106
Wardells Neck (824—SC) ... 86
Wards Creek (530) ... 143
Ware River (494) ... 150
Waretown (824—SC) ... 87
Waretown Creek (824—SC) ... 87
Warwick River (529) ... 141
Warwick River (552) ... 190
Washington Channel (560) ... 169
Washington, D.c. (560) ... 167
Washington Harbor (560) ... 168
Washington National Airport (560) ... 167
Watch (station) buoys ... 16
Watermelon Point (551) ... 189
Waterview (605—SC) ... 154
Watts Island (568) ... 180
Weather ... 71
Weather Broadcasts By Commercial Radio Stations ... 212
Webster Cove (554) ... 184
Weems Creek (566) ... 176
Wells Cove (548) ... 193
Wenona (555) ... 184
Wescoat Point (563) ... 179
West Annapolis (385) ... 175
West Atlantic City (826—SC) ... 90
West Branch (492) ... 148
West Canal (826—SC) ... 90
West Creek (824—SC) ... 87
West Fork (548) ... 193
West Norfolk (452) ... 136
West Point (495) ... 149
West Point Island (824—SC) ... 86
West River (550) ... 173
West Yeocomico River (557) ... 160
Western Branch (452) ... 136
Western Branch (529) ... 140
Western Branch (534) ... 153
Westecunk Creek (824—SC) ... 87
Westville (280) ... 111
Wetipquin Creek (554) ... 185
Whistling ... 21
White Creek (411) ... 122
White House (496) ... 149
White Point Creek (557) ... 160
White Rocks (549) ... 195
White Shoal (529) ... 141
Whitehall Bay (385) ... 176
Whitehall Creek (385) ... 176
Whitehall Flats (385) ... 176
Whitehaven (554) ... 184
Whitehouse Creek (534) ... 153
Whites Neck Creek (558) ... 162
Whitestone Point (560) ... 166
Whiting Creek (534) ... 153
Wicomico Creek (554) ... 184
Wicomico River (555) ... 184

	Page
Wicomico River (558)	162
Wilcox Wharf (530)	143
Wildwood (826—SC)	92
Wildwood Beach (605—SC)	154
Wildwood Crest (826—SC)	92
William P. Lane Jr. Memorial (chesapeake Bay) Bridge (556)	176
Williams Creek (556)	164
Williams Wharf (494)	150
Williamsburg (529)	142
Williamsburg Landing (529)	142
Willis Wharf (1221)	125
Williston (552)	190
Willoughby Bank (400)	132
Willoughby Bay (400)	132
Willoughby Spit (400)	132
Wills Hole Thoroughfare (824—SC)	85
Wilmington (294)	102
Wilmington Marine Terminal (294)	102
Wilson Creek (494)	150
Wilsonia Neck (564)	179
Windmill Point (534)	152
Windmill Point (562)	146
Windmill Point Light (534)	153
Winds	2
Wingate (554)	186
Wingate Point (554)	186
Winter Harbor (494)	151
Winter Quarter Shoal (1220)	123
Wire drags	19 Wire Passage

	Page
	(1221)
Wise Point (563)	178
Wise Point (1222)	127
Wittman (550)	188
Wolf Trap (494)	151
Wolf Trap Light (494)	151
Woodbury Creek (295)	105
Woodhouse Landing (605—SC)	154
Woodland (554)	185
Woodrow Wilson Memorial Bridge (560)	166
Wormley Creek (492)	148
Worton Creek (549)	204
Worton Point (549)	204
Wreck Island (563)	125
Wright Island Landing (530)	143
Wroten Island (554)	186
Wye East River (550)	192
Wye Island (550)	192
Wye Narrows (550)	192
Wye River (550)	191
Wynne (557)	160
Yeocomico River (557)	160
York River (494, 492, 495, 496)	147
York Spit (494)	147
York Spit Channel (1222)	146
York Spit Light (494)	147
Yorktown (492)	148
Yorktown Monument (492)	148
Yorktown Naval Weapons Station (492)	148
Yorkville (494)	147