# General Information

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## UNITED STATES COAST PILOT®

(2) The United States Coast Pilot, published by the National Oceanic and Atmospheric Administration (NOAA), is a series of ten nautical books (volumes) that encompasses a wide variety of information important to navigators of U.S. coastal/intracoastal waters and the waters of the Great Lakes. The Coast Pilot is intended to be used as a supplement to NOAA nautical charts. Much of the content cannot be shown graphically on the charts and is not readily available elsewhere. Topics which are covered include environmental factors of weather, climate, ice conditions, tides, water levels, currents, prominent coastal features and landmarks. Specific information on vertical clearances, wharf descriptions, small-craft facilities, hazards, dredged channels and depths are also provided. Navigation services and regulations are also identified including pilotage, towing, anchorages, routes and traffic separation schemes, environmental protection, and other Federal laws.

(3) New editions of each volume are issued annually. Fully updated files are posted weekly on the Internet, and are also available through NOAA Certified Chart Agents at *www.nauticalcharts.noaa.gov*.

(4) **Amendments** to this publication are available at *nauticalcharts.noaa.gov/publications/coast-pilot/index.html.*

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### Using the Coast Pilot

(6) **Chapter 1** contains definitions of general and standard terms used throughout the volume, discussions of NOAA charting products and services, descriptions of maritime services by various U.S. Government agencies, Notices to Mariners and other information pertinent to safe navigation.

(7) **Chapter 2** contains selected extracts from the Code of Federal Regulations (CFR) that affect mariners.

(8) **Chapter 3** contains general information that is peculiar to the region covered by a particular Coast Pilot volume. For example, practical information regarding offshore currents and dangers, coastal aids to navigation, prominent landmarks and the general character of the coast and depths helpful in approaching the region.

(9) In **Chapter 4 and the remaining numbered chapters**, the detailed description of the region begins. A map precedes each chapter and outlines the nautical charts used in the area to be discussed. In these chapters, as much as possible, the coastal description is in geographic sequence, north to south on the east coast, east to west on the gulf coast, clockwise around each of the Great Lakes and south to north on the west coast and Alaskan coast. Features are described as they appear on the largest scale chart, with that chart number prominently shown in blue.

(10) **Appendix A** contains contact information regarding the various products, services and agencies detailed throughout the volume.

(11) **Navigation Rules**— preceding Appendix A, contains the International (72 COLREGS) and Inland Navigation Rules, technical Annexes, and associated Federal rules and regulations.

(12) The **Weekly Record of Updates** is intended as a log for critical updates applied to this volume.

(13) The **Index** contains geographic names mentioned throughout a Coast Pilot volume. These names are boldfaced and indexed along with the number of the largest scale chart on which the entire feature appears. Asterisks preceding a chart number in the index of Coast Pilot 5 indicate charts published by the National Geospatial-Intelligence Agency, and in the index of Coast Pilot 6, charts published by the Canadian Hydrographic Service.

(14)

### Bearings

(15) Bearings and courses are in degrees true and are measured clockwise from **000°** (north) to **359°**. The bearings of an aid to navigation (e.g., directional light, light sector, range) are given as viewed from the bridge of a vessel toward the light.

(16)

### Bridges and Cables

(17) Vertical clearances of bridges and overhead cables are in feet above mean high water unless otherwise stated; clearances in Coast Pilot 6 are in feet above Low Water Datum unless otherwise stated. When the water level is above Low Water Datum, the bridge and overhead cable clearances given in the Coast Pilot and shown on the charts should be reduced accordingly. Clearances of drawbridges are for the closed position, although the open clearances are also given for vertical-lift bridges. Whenever a bridge span over a channel does not open fully to an unlimited clearance position, a minimum clearance for the sections over the channel is given; the same applies to swing and pontoon bridges with openings less than 50 feet horizontally. Clearances given in the Coast Pilot are those approved for nautical charting and are supplied by the U.S. Coast Guard (bridges) and U.S. Army Corps of

Engineers (cables). See charts for horizontal clearances of bridges, as these are generally given in the Coast Pilot only when they are less than 50 feet (15 meters). Tables listing structures across waterways, found in some Coast Pilots, show both horizontal and vertical clearances. Submarine cables are rarely mentioned.

(18)

### Cable ferries

(19) Cable ferries are guided by cables fastened to shore and sometimes propelled by a cable rig attached to the shore. Generally, the cables are suspended during crossings and dropped to the bottom when the ferries dock. Where specific operating procedures are known they are mentioned in the text. Since operating procedures vary, mariners are advised to exercise extreme caution and seek local knowledge. **DO NOT ATTEMPT TO PASS A MOVING CABLE FERRY.**

(20)

### Courses

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

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### Currents

(23) 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 (see chapter 3, this book).

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### Depths

(25) Depth is the vertical distance from the chart datum to the bottom and is expressed in the same units (feet, meters or fathoms) as those soundings found on the chart. (See Chart Datum, this chapter, for further detail.) The **controlling depth** is the least known depth of a channel. This depth is determined by periodic hydrographic surveys and restricts use of the channel to drafts less than that depth. The **centerline controlling depth** applies only to the channel centerline or close proximity; lesser depths may exist in the remainder of the channel. The **midchannel controlling depth** is the controlling depth of only the middle half of the channel. **Federal project depth** is the original design dredging depth of a channel planned by the U.S. Army Corps of Engineers (USACE) and may be deeper than current conditions. 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 the latest controlling depths.

(26) For all maintained channels with controlling depths detailed on charts in tabular form, the Coast Pilot usually states only the project depths. For all other channels which may be depicted on charts with depth legends, notes or soundings, the Coast Pilot will list where to find the most recent information on the latest known surveys. Depths may vary considerably between maintenance dredging.

(27)

### Under-keel clearances

(28) It is becoming increasingly evident that economic pressures are causing mariners to navigate through waters of barely adequate depth, with under-keel clearances being finely assessed from the charted depths, predicted tide levels and depths recorded by echo sounders.

(29) It cannot be too strongly emphasized that even charts based on modern surveys may not show all sea-bed obstructions or the shoalest depths, and actual tide levels may be appreciably lower than those predicted.

(30) In many ships an appreciable correction must be applied to shoal soundings recorded by echo sounders due to the horizontal distance between the transducers. This separation correction, which is the amount by which recorded depths therefore exceed true depths, increases with decreasing depths to a maximum equal to half the distance apart of the transducers; at this maximum the transducers are aground. Ships whose transducers are more than 6 feet (1.8 meters) apart should construct a table of true and recorded depths using the Traverse Tables. (Refer to the topic on echo soundings elsewhere in chapter 1.)

(31) Other appreciable corrections, which must be applied to many ships, are for settlement and squat. These corrections depend on the depth of water below the keel, the hull form and the speed of the ship.

(32) Settlement causes the water level around the ship to be lower than would otherwise be the case. It will always cause echo soundings to be less than they would otherwise be. Settlement is appreciable when the depth is less than seven times the draft of the ship and increases as the depth decreases and the speed increases.

(33) Squat denotes a change in trim of a ship underway, relative to her trim when stopped. It usually causes the stern of a vessel to sit deeper in the water. However, it is reported that in the case of mammoth ships, squat causes the bow to sit deeper. Depending on the location of the echo sounding transducers, this may cause the recorded depth to be greater or less than it ought to be. **Caution and common sense are continuing requirements for safe navigation.**

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### Distances

(35) 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.

(36) Coast Pilot 6 is in statute miles unless otherwise stated. A statute mile is 5,280 feet or about 0.87 nautical mile.

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### Geographic Coordinates

(38) Geographic coordinates listed in the Coast Pilot are referred to North American Datum of 1983 (NAD 83)

unless otherwise noted for certain CFR extracts in chapter 2.

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### Heights

(40) These are in feet (meters) 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 (meters) above the chart datum for depths.

(41) Coast Pilot 6 is in feet (meters) above the chart datum used for that purpose on the charts, usually Low Water Datum.

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### Light and Sound Signal Characteristics

(43) These are not described in the Coast Pilot. Also, light sectors and visible ranges are generally not fully described. This information can be found in U.S. Coast Guard Light Lists.

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### Obstructions

(45) Wrecks and other obstructions are mentioned only if they are relatively permanent and in or near normal traffic routes.

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### Radio Navigational Aids

(47) For detailed information on Radio Navigation Aids see the **United States Coast Guard Light Lists** and the National Geospatial-Intelligence Agency's **Radio Navigational Aids, Publication 117**.

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### Ranges

(49) These are not fully described. "**A 339°** Range" means that the rear structure bears **339°** from the front structure. (See United States Coast Guard Light Lists.)

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### Reported information

(51) Information received by NOAA from various sources concerning depths, dangers, currents, facilities, and other topics, which has not been verified by Government surveys or inspections, is often included in the Coast Pilot; such **unverified information** is qualified as "reported" and should be regarded with caution.

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### Tides

(53) Tidal information, including real-time water levels, tide predictions and tidal current predictions are available at *tidesandcurrents.noaa.gov*.

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### Time

(55) Unless otherwise stated, all times are given in local standard time in the 24-hour system. (Noon is 1200, 2:00 p.m. is 1400 and midnight is 0000.)

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### Winds

(57) Directions are the true directions from which the winds blow; however, sometimes (rarely) compass points are used. Unless otherwise indicated, speeds are given in knots, which are nautical miles per hour.

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## NAUTICAL CHARTS

(59) NOAA produces and maintains a suite of over 1,000 nautical charts that cover the U.S. coastal waters, the Great Lakes and U.S. territories. These charts provide a graphic representation of water depths, the shoreline, prominent topographic and man-made features, aids to navigation and other navigational information useful to the mariner. NOAA's charts are available in a variety of digital formats designed to meet the specific requirements of all mariners. Paper copies may also be obtained through one of NOAA's Print-on-Demand partners.

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### Paper Print on Demand Nautical Charts

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(61) The content of Print-On-Demand (POD) charts is updated weekly by NOAA with the most current U.S. Coast Guard Local Notice to Mariners and other critical safety information. POD charts are printed under the authority of NOAA and shipped through partnerships between NOAA and commercial providers. POD information and a list of participating POD chart agents can be found at *nauticalcharts.noaa.gov/publications/print-agents.html#paper-charts-mobile*.

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### Portable Document Format (PDF) Nautical Charts

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(63) Almost all of NOAA's nautical charts may be downloaded for free as Portable Document Format (PDF) files at *nauticalcharts.noaa.gov/charts/noaa-raster-charts.html#full-size-nautical-charts*. The PDF nautical charts are exact replicas of the images used to produce POD and Raster Navigational Charts (RNC). As such, they also have all the latest updates based on U.S. Coast Guard Local Notices to Mariners, National Geospatial-Intelligence Agency Notices to Mariners and other critical safety information.

(64) Most PDF charts can be printed at the proper scale from any plotter accommodating a 36-inch paper width. When printed properly, PDF charts and POD charts are very similar, but PDF charts have not yet been approved to meet Federal regulations for paper chart carriage requirements as POD charts have.

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### BookletCharts

(66) The NOAA BookletChart™ is a product that can be printed by the users for free. They are made to help recreational boaters locate themselves on the water. BookletCharts are reduced in scale and divided into pages for convenience but otherwise contain all the information of the full-scale nautical charts and are updated weekly. For more information visit *nauticalcharts.noaa.gov/charts/noaa-raster-charts.html#booklet-charts*.

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### Raster Navigational Charts (NOAA RNC®)

(68) NOAA Raster Navigational Charts (NOAA RNC®) are geo-referenced digital images of NOAA's entire suite of paper charts. NOAA RNCs are official data that can be used in many types of electronic charting systems (ECS), including Raster Chart Display Systems (RCDS) and some Electronic Chart Display and Information Systems (ECDIS). Current regulations support the use of RNCs as a primary means of navigation when ENCs are not available, but they require an accompanying minimal set of up-to-date paper charts. They can integrate position information from the Global Positioning System (GPS) and other navigational sensors, such as radar and automatic identification systems (AIS) to show a vessel's track, waypoints, and planned routes. NOAA RNCs and their weekly updates are available free of charge at *nauticalcharts.noaa.gov/charts/noaa-raster-charts.html*.

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### Electronic Navigational Charts (NOAA ENC®)

(70) NOAA Electronic Navigational Charts (NOAA ENC®) are databases of charted objects and their attributes with standardized content, structure and format. They comply with International Hydrographic Organization (IHO) specifications stated in IHO Publication S-57. They may be used as an alternative to paper charts required on SOLAS class vessels.

(71) ENCs are intended for use in electronic charting systems (ECS) as well as Electronic Chart Display and Information Systems (ECDIS). ECDIS are programmable to show as much or as little data as the user requires. They can integrate position information from the Global Positioning System (GPS) and other navigational sensors, such as radar and automatic identification systems (AIS) to show a vessel's track, waypoints and planned routes. Using this information ECDIS can use ENCs to give warning of impending danger in relation to the vessel's position and movement. NOAA ENCs and their updates are available free of charge at *nauticalcharts.noaa.gov/charts/noaa-enc.html*.

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### Nautical Chart—New Editions and Corrections

(73) New editions of paper Print-on-Demand (POD) charts are available on the Monday after NOAA clears a new edition for release. Once the authorized POD chart is available, it meets federal chart carriage requirements, and should be put into service immediately. It should be updated from the *last correction and cleared through* dates shown in the lower left corner of the chart.

(74) The chart date is of vital importance to the navigator. When charted information becomes obsolete, further use of the chart for navigation is dangerous. Natural and artificial changes, many of them critical, are occurring constantly; therefore it is important that navigators use up-to-date charts. Nautical charts and publications are available for purchase from authorized POD agents and their sales outlets.

(75) NOAA's "Nautical Chart Update" website allows mariners to update their nautical charts from one database that includes information from NOAA, NGA U.S. Notice to Mariners, U.S. Coast Guard Local Notices to Mariners and the Canadian Coast Guard Notices to Mariners at: *nauticalcharts.noaa.gov/charts/chart-updates.html*.

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### Nautical Chart Numbering System

(77) This chart numbering system, adopted by NOAA and National Geospatial-Intelligence Agency (NGA), provides for a uniform method of identifying charts published by both agencies. Nautical charts published by NGA and by the Canadian Hydrographic Service are identified in the Coast Pilot by an asterisk preceding the chart number.

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### Chart Scale

(79) The scale of a chart is the ratio of a given distance on the chart to the actual distance that it represents on the earth. For example, one unit of measurement on a 1:10,000 scale chart is equal to 10,000 of the same unit on the earth's surface. Large scale charts show greater detail of a relatively small area. Small scale charts show less detail but cover a larger area. Certain hydrographic information may be omitted on smaller scale charts. **Mariners should always obtain the largest scale coverage for near shore navigation**.

(80) 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. NOAA charts are classified according to scale as follows:

(81) **Sailing charts**, scales 1:600,000 and smaller, are for use in fixing the mariner's position approaching 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, principal lights, outer buoys and landmarks visible at considerable distances are shown.

(82) **General charts**, scales 1:150,000 to 1:600,000, are for coastwise navigation outside of outlying reefs and shoals.

(83) **Coast charts**, scales 1:50,000 to 1:150,000, are for inshore navigation leading to bays and harbors of considerable width and for navigating large inland waterways.

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

(85) **Special charts**, at various scales, cover the Intracoastal waterway and miscellaneous small-craft areas.

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## Chart Projections

(87) 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.

(88) The **Polyconic projection** is used on most U.S. nautical charts of the Great Lakes. On this projection, parallels of latitude appear as non-concentric circles, and meridians appear as curved lines converging toward the pole and concave to the central meridian. The scale is correct along any parallel and along the central meridian of the projection. Along other meridians the scale increases with increased difference of longitude from the central meridian.

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## Chart Datum, Tidal Waters

(90) Chart Datum is the particular tidal level to which soundings and depth curves on a nautical chart or bathymetric map are referred. The tidal datum of **Mean Lower Low Water** is used on all NOAA charts, except for charts in the Great Lakes and non-tidal inland waterways. For information on **Chart Datum, Great Lakes System**, see Coast Pilot 6, chapter 3.

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## Horizontal Datum

(92) Nautical charts are constructed based on one of a number of horizontal datums which are adopted to best represent individual regions around the world. Note that the terms horizontal datum, horizontal geodetic datum, and horizontal control datum are synonymous.

(93) The exact placement of lines of latitude and longitude on a nautical chart is dependent on the referenced horizontal datum. Charts of the United States are currently referenced primarily to the North American Datum of 1983 (NAD 83), and the World Geodetic System 1984 (WGS 84). WGS 84 is equivalent to the NAD 83 for charting purposes.

(94) NAD 83 and WGS 84 have replaced the North American Datum of 1927 and other regional datums as the primary horizontal datum to which NOAA charts are referenced. Since some geographic positions may still be referenced to the older datums, NOAA has included notes on charts which show the amount to shift those positions in latitude and longitude to fit the chart's NAD 83 or WGS 84 projection.

(95) It should be noted that the physical shift between positions on older datums and NAD 83/WGS 84 was significant. Mariners should always be certain the positions they are plotting on a nautical chart are on the same datum as the chart.

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## Chart Accuracy

(97) 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 NOAA. It also 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.

(98) 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 the 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.

(99) 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 where irregular and sudden changes in depth indicate conditions associated with pinnacle rocks, coral heads, or boulders should be avoided.

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

(101)

## Source Diagrams and Zone of Confidence Diagrams

(102) The age and accuracy of hydrographic survey data that support nautical charts can vary. Depth information on nautical charts, paper or digital, is based on data from the latest available hydrographic survey, which in many cases may be quite old. Diagrams are provided on nautical charts to assist mariners in assessing hydrographic survey data and the associated level of risk to navigate in a particular area. There are currently two types of diagrams shown on NOAA paper and raster navigational charts (RNCs) of 1:500,000 scale and larger—**Zone of Confidence (ZOC) Diagrams** and **Source Diagrams**. ZOC information (designated CATZOC) is also found on electronic navigational charts (ENCs). This provides consistency in the display of source data between ENCs and newer paper charts.

(103) Both types of diagrams consist of a graphic representation of the extents of hydrographic surveys within the chart and accompanying table of related survey quality categories. CATZOC information on an ENC, unlike the diagrams on a paper chart or RNC, is displayed over the ENC data using symbols rather than letters. These symbols are displayed on a separate layer, which can be viewed when planning a route, then switched off until needed again at another time.

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## Zone of Confidence Diagrams

| ZOC CATEGORIES | | | | |
|---|---|---|---|---|
| ZOC | DATE | POSITION ACCURACY | DEPTH ACCURACY | SEAFLOOR COVERAGE |
| A1 | 2008–2016 | ± 16.4 ft | = 1.6 feet + 1% depth | All significant seafloor features detected |
| A2 | — | ± 65.6 ft | = 3.3 feet + 2% depth | All significant seafloor features detected |
| B | 2005 | ± 164.0 ft | = 3.3 feet + 2% depth | Uncharted features hazardous to surface navigation are not expected but may exist |
| C | — | ± 1640.4 ft | = 6.6 feet + 2% depth | Depth anomalies may be expected |
| D | — | Worse than ZOC C | Worse than ZOC C | Large depth anomolies may be expected |
| U | Unassessed – The quality of the bathymetric data has yet to be assessed. | | | |

(104) On **ZOC Diagrams**, the quality of the hydrographic data is assessed according to six categories; five quality categories for assessed data (A1, A2, B, C and D) and a sixth category (U) for data that has not yet been assessed. On the ENC, the categories are shown using a rating system of stars—the higher the quality, the greater the number of stars. Assessment of hydrographic data quality and classification into zones of confidence is based on a combination of: survey date, position accuracy, depth accuracy and sea floor coverage (the survey's ability to detect objects on the seafloor.)

(105) **Source Diagrams** provide the mariner with additional information about the density and adequacy of the sounding data depicted on the chart. The adequacy with which sounding data reflects the configuration of the bottom depends on the following factors: survey technology employed (sounding and navigation equipment), survey specifications in effect (prescribed survey line spacing and sounding interval) and type of bottom (e.g., rocky with existence of submerged pinnacles, flat sandy, coastal deposits subject to frequent episodes of deposition and erosion). Source diagrams will be replaced with ZOC diagrams as new editions are created.

(108)

### Chart Symbols, Abbreviations and Terms

(109) The standard symbols and abbreviations approved for use on nautical charts produced by the U.S. Government are described in **U.S. Chart No. 1: Symbols, Abbreviations and Terms used on Paper and Electronic Navigational Charts.** This reference, jointly maintained by the National Geospatial-Intelligence Agency (NGA) and NOAA, is available at *nauticalcharts.noaa.gov/publications/us-chart-1.html.*

(110) The publication **Chart 1: Symbols, Abbreviations and Terms** published by the Canadian Hydrographic Service, is available online at *charts.gc.ca/publications/chart1-carte1/index-eng.asp.*

(111) Some symbols and abbreviations used on foreign charts, including reproductions of foreign charts made by NGA, are different than those used on U.S. charts. It is recommended that mariners who use foreign charts also obtain the symbol sheet or Chart No. 1 produced by the appropriate foreign agency.

(112) Mariners are warned that the buoyage systems, shapes and colors used by other countries often have a different significance than the U.S. system.

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### Areas with Blue Tint

(114) 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 blue tint areas.

(115)

### Bridge and Cable Clearances

(116) For bascule bridges whose spans do not open to a full vertical position, unlimited overhead clearance is not

(107)

## Source Diagrams

Referring to the accompanying sample Source Diagram to the right and the previous discussion of survey methods over time, transiting from Point X to Point Y, along the track indicated by the dotted line, would have the following information available about the relative quality of the depth information shown on the chart.

Point X lies in an area surveyed by NOAA between 1900-1939. The sounding data in this area would have been collected by leadline. Depths between sounding points can only be inferred, and undetected features might exist between the sounding points in areas of irregular relief — caution should be exercised.

The transit then crosses an area surveyed by NOAA between 1940-1969. The sounding data in this area would have been collected by continuous recording single beam echo sounder. It is possible that features could have been missed between sounding lines, although echo sounders record all depths along a sounding line with varying beam widths.

The transit ends in an area charted from miscellaneous surveys. These surveys may be too numerous to depict or may vary in age, reliability, origin or technology used. No inferences about the fitness of the data can be made in this area from the diagram.

Referring again to the accompanying sample Source Diagram, and the previous discussion of survey methods over time, a mariner could choose to transit from Point X to Point Y, along the track shown with a dashed line.

The transit starts again in an area surveyed by NOAA between 1900-1939. The sounding data in this area would have been collected by leadline. Depths between sounding points can only be inferred, and undetected features might still exist between the sounding points in areas of irregular relief — caution should be exercised.

The transit then crosses an area surveyed by NOAA between 1990–present, with partial bottom coverage. The data is collected in metric units and acquired by continuous recording single beam echo sounder. It is possible that features could have been missed between the sounding lines, although echo sounders record all depths along a sounding line with varying beam widths.

The transit then crosses into an area surveyed by NOAA etween 1990–present, having full bottom coverage. This area of the charted diagram is shaded with a blue screen to draw attention to the fact that full bottom coverage has been achieved. The data in this area would have been collected in metric units and acquired by side scan sonar or multibeam sonar technology. Undetected features in this area, at the time of the survey, would be unlikely.

The transit ends in an area charted from miscellaneous surveys. These surveys may be too numerous to depict or may vary in age, reliability, origin or technology used. No inferences about the fitness of the data can be made in this area from the diagram. By choosing to transit along the track shown by the dashed line, the mariner would elect to take advantage of survey information that is more recent and collected with modern technology.

available for the entire charted horizontal clearance when the bridge is open, due to the inclination of the drawspans over the channel.

(117) Charted in black text, vertical clearances of overhead cables are for the lowest wires at mean high water as authorized and permitted by the U.S. Army Corps of Engineers (USACE). Reported clearances received from sources other than the USACE are labeled as such. When provided, safe vertical clearances are shown in magenta text and indicate the highest points of a ship that can pass under an overhead power cable without risk of electrical discharge from the cable to the ship or without making contact with a bridge. **Vessels with masts, stacks, booms or antennas should allow sufficient clearance under power cables to avoid arcing.**

(118)

## Submarine Cables and Submerged Pipelines

(119) **Submarine cables** and **submerged pipelines** cross many waterways used by both large and small vessels, but all of them may not be charted. For inshore areas, they usually are buried beneath the seabed, but for offshore areas they may lie on the ocean floor. Warning signs are often posted to warn mariners of their existence.

(120) The installation of submarine cables or pipelines in U.S. waters or the Continental Shelf of the United States is under the jurisdiction of one or more Federal agencies, depending on the nature of the installation. They are shown on the charts when the necessary information is reported to NOAA and they have been recommended for charting by the responsible agency. The chart symbols for submarine cable and pipeline areas are usually shown for inshore areas, whereas chart symbols for submarine cable and pipeline routes may be shown for offshore areas. Submarine cables and pipelines are not described in the Coast Pilots.

(121) In view of the serious consequences resulting from damage to submarine cables and pipelines, vessel operators should take special care when anchoring, fishing or engaging in underwater operations near areas where these cables or pipelines may exist or have been reported to exist. Mariners are also warned that the areas where cables and pipelines were originally buried may have changed and they may be exposed; extreme caution should be used when operating vessels in depths of water comparable to the vessel's draft.

(122) Certain cables carry high voltage, while many pipelines carry natural gas under high pressure or petroleum products. Electrocution, fire or explosion with injury, loss of life or a serious pollution incident could occur if they are broached.

(123) Vessels fouling a submarine cable or pipeline should attempt to clear without undue strain. Anchors or gear that cannot be cleared should be slipped, but no attempt should be made to cut a cable or a pipeline.

(124)

## Artificial Obstructions to Navigation

(125) **Disposal areas** are designated by the U.S. Army Corps of Engineers for depositing dredged material where there is sufficient depth not to cause shoaling or create a danger to surface navigation. The areas are charted without blue tint, and soundings and depth curves are retained.

(126) **Disposal sites** are areas established by Federal regulation (**40 CFR 220** through **228**) in which dumping of dredged and fill material and other nonbuoyant objects is allowed with the issuance of a permit. Dumping of dredged and fill material is supervised by the U.S. Army Corps of Engineers and all other dumping by the Environmental Protection Agency (EPA). (See U.S. Army Corps of Engineers and Environmental Protection Agency, this chapter, and Appendix A for office addresses.)

(127) **Dumping grounds** are also areas that were established by Federal regulation (**33 CFR 205**). However, these regulations have been revoked and the use of the areas discontinued. These areas will continue to be shown on nautical charts until such time as they are no longer considered to be a danger to navigation.

(128) Disposal Sites and Dumping Grounds are rarely mentioned in the Coast Pilot, but are shown on nautical charts. **Mariners are advised to exercise caution in the vicinity of all dumping areas.**

(129) **Spoil areas** are for the purpose of depositing dredged material, usually near and parallel to dredged channels. Spoil areas are usually charted from survey drawings from U.S. Army Corps of Engineers after-dredging surveys, though they may originate from private or other Government agency surveys. On nautical charts, spoil areas are tinted blue, labeled and have all soundings and depth curves omitted from within their boundaries. Spoil areas present a hazard to navigation and even the smallest craft should avoid crossing them.

(130) **Fish havens** are artificial shelters constructed of various materials including rocks, rubble, derelict barges/oil rigs and specially designed precast structures. This material is placed on the sea floor to simulate natural reefs and attract fish. Fish havens are often located near fishing ports or major coastal inlets and are usually considered hazards to shipping. Before such a reef may be built, the U.S Army Corps of Engineers must issue a permit specifying the location and depth over the reef. Constructed of rigid material and projecting above the bottom, they can impede surface navigation and therefore represent an important feature for charting. Fish havens may be periodically altered by the addition of new material, thereby possibly increasing the hazard. They are outlined and labeled on charts and show the minimum authorized depth when known. Fish havens are tinted blue if they have a minimum authorized depth of 11 fathoms or less. If the minimum authorized depth is unknown and they are in depths greater than 11 fathoms, they are considered a danger to navigation. Navigators

should be cautious about passing over fish havens or anchoring in their vicinity.

(131) **Fishtrap areas** are areas established by the U.S. Army Corps of Engineers, or State or local authority, in which traps may be built and maintained according to established regulations. The fish stakes that may exist in these areas are obstructions to navigation and may be dangerous. The limits of fishtrap areas and a cautionary note are usually charted. Navigators should avoid these areas.

(132)

### Local Magnetic Disturbances

(133) 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.

(134)

### Compass Roses

(135) 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.

(136)

### Echo Soundings

(137) The echo sounder on a ship 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 freshwater. 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 observation has been set on the echo sounder.

(138) Observational errors include misinterpreting false echoes from schools of fish, seaweed, etc., but the most serious error that 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.

(139)

## NOTICES TO MARINERS

(140) **Notices to Mariners** are published to advise operators 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.

(141) **Local Notices to Mariners** are issued by each Coast Guard District Commander for the waters under their jurisdiction. (See Appendix A for Coast Guard district(s) covered by this volume.) These notices are usually published weekly and are available at *navcen.uscg.gov*.

(142) **U.S. Notice to Mariners**, published weekly by the National Geospatial-Intelligence Agency, are prepared jointly with NOAA 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. 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 No. 1. These items are important to the mariner and should be read for future reference. These notices are available at *msi.nga.mil/NGAPortal/MSI.portal*.

(143) **Broadcast Notices to Mariners** are made by the Coast Guard to report deficiencies and important changes in aids to navigation. (See Navigational Warnings, Information and Weather, this chapter.)

(144) The **Special Notice to Mariners** is an annual publication containing important information for mariners on a variety of subjects which supplements information not usually found on charts and in navigational publications. It includes excerpts from various Federal laws and regulations regarding marine pollution reporting, aids to navigation and Vessel Traffic Service (VTS) procedures. There are tips for trip planning, updates to the Rules of the Road and information on local hazards. Also included are points of contact, phone numbers and email addresses for various subject matter experts to assist the mariner in locating further information.

(145) Vessels operating within the limits of the Coast Guard districts can obtain information affecting NOAA 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.

(146)

## AIDS TO NAVIGATION

(147)

### U.S. Aids to Navigation System

(148) The navigable waters of the United States are marked to assist navigation using the U.S. Aids to Navigation System, a system consistent with the International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) Maritime Buoyage System. The **IALA Maritime Buoyage System** is followed by most of the world's maritime nations and will improve maritime safety by encouraging conformity in buoyage systems worldwide. IALA buoyage is divided into two regions made up of Region A and Region B. All navigable waters of the United States follow IALA Region B, except U.S. possessions west of the International Date Line and south of 10° north latitude, which follow IALA Region A. Lateral aids to navigation in Region A vary from those located within Region B. Nonlateral aids to navigation are the same as those used in Region B. Appropriate nautical charts and publications should be consulted to determine whether the Region A or Region B marking schemes are in effect for a given area.

(149) As standard protocol, the U.S. Coast Guard reported assigned positions of aids to navigation uses the North American Datum of 1983 (NAD 83). Due to the development of new navigational systems and the retirement of old systems, the World Geodetic System 1984 (WGS 84) has become the preferred standard. In 2020, the U.S. Coast Guard Chief of the Office of Navigation Systems (CG-NAV) announced that all geographic coordinates for aids to navigation assigned positions will be reported using WGS 84.

(150)

### Reporting Defects in Aids to Navigation

(151) 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.

(152) **Aids to navigation** in United States waters of the Great Lakes and their connecting waters, except for the St. Lawrence River, are maintained by the U.S. Coast Guard. Local jurisdiction for the region is assigned to the Commander, Ninth Coast Guard District. The Lake Champlain region and the Hudson River are under the jurisdiction of the Commander, First Coast Guard District. (See Appendix A for the addresses.)

(153) It is unlawful to establish or maintain any aid similar to those maintained by the U.S. Coast Guard without first obtaining permission from the Coast Guard District Commander. The licensed officer in command of a vessel which collides with any aid must report the fact promptly to the nearest U.S. Coast Guard Sector.

(154)

### Lights

(155) The range of visibility of lights as given in the U.S. Coast Guard Light Lists and as shown on the charts is the **nominal range**, which is the maximum distance at which a light may be seen in clear weather (meteorological visibility of 10 nautical miles) expressed in nautical miles. The Light Lists give the nominal ranges for all U.S. Coast Guard lighted aids except range and directional lights.

(156) **Luminous range** is the maximum distance at which a light may be seen under the existing visibility conditions. By use of the diagram in the Light Lists, luminous range may be determined from the known nominal range, and the existing visibility conditions. Neither the nominal nor the luminous ranges do not take into account elevation, observer's height of eye, or the curvature of the earth.

(157) **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, the geographic range 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", found in the United States Coast Guard Light List.

(158) 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 white lights. Navigational lights should be used with caution because of the following conditions that may exist.

(159) 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.

(160) 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.

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

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

(163) 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 not be mistaken for nearby lights showing similar characteristics at low intensity such as those on lighted buoys.

(164) 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.

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

(166) 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.

(167) 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 closer.

(168) 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.

(169) 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.

(170) Lights should not be passed close aboard, because in many cases riprap mounds are maintained to protect the structure against ice damage and scouring action.

(171) 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.

(172)

### Articulated Lights

(173) An articulated light is a vertical pipe structure supported by a submerged buoyancy chamber and attached by a universal coupling to a weighted sinker on the seafloor. The light, allowed to move about by the universal coupling, is not as precise as a fixed aid. However, it has a much smaller watch circle than a conventional buoy, because the buoyancy chamber tends to force the pipe back to a vertical position when it heels over under the effects of wind, wave or current.

(174) Articulated lights are primarily designed to mark narrow channels with greater precision than conventional buoys.

(175)

### Daybeacons

(176) Daybeacons are unlighted aids affixed to stationary structures. They are marked with dayboards for daytime identification. The dayboards aid navigation by presenting one of several standard shapes and colors which have navigational significance. Dayboards are sometimes referred to as daymarks.

(177) Daybeacons are found on-shore and in shallow water. They are frequently used to mark channel edges.

(178)

### Articulated Daybeacons

(179) Articulated daybeacons are similar to articulated lights, described above, except they are unlighted.

(180)

### Buoys

(181) The aids to navigation depicted on charts comprise a system consisting of fixed and floating aids with varying degrees of reliability. Therefore, prudent mariners will not rely solely on any single aid to navigation, particularly a floating aid.

(182) The approximate position of a buoy is represented by the dot or circle associated with the buoy symbol. The approximate position is used because of practical limitations in positioning and maintaining buoys and their sinkers in precise geographical locations. These limitations include, but are not limited to, inherent imprecisions in position fixing methods, prevailing atmospheric and sea conditions, the slope of and the material making up the seabed, the fact that buoys are moored to sinkers by varying lengths of chain and the fact that buoy body and/or sinker positions are not under continuous surveillance, but are normally checked only during periodic maintenance visits which often occur more than a year apart. The position of the buoy body can be expected to shift inside and outside of the charting symbol due to the forces of nature. The mariner is also cautioned that buoys are liable to be carried away, shifted, capsized, sunk, etc. Lighted buoys may be extinguished or sound signals may not function as a result of ice, running ice or other natural causes, collisions or other accidents.

(183) For the foregoing reasons, a prudent mariner must not rely completely upon the charted position or operation of floating aids to navigation but will also utilize bearings from fixed objects and aids to navigation on shore. Further, a vessel attempting to pass close aboard always risks collision with a yawing buoy or with the obstruction the buoy marks.

(184) 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 vicinity of such buoys.

(185)

### Automatic Identification System (AIS) Aids to Navigation

(186) AIS is an automatic communication and identification system intended to improve the safety of navigation by assisting the efficient operation of a Vessel Traffic Services (VTS), ship reporting, ship-to-ship and ship-to-shore operations. AIS is increasingly being used as an aid to navigation. An AIS-equipped aid to navigation may provide a positive identification of the aid. It may also have the capability to transmit an accurate position and provide additional information such as actual tide height and/or weather information.

(187) The AIS message may represent an aid to navigation that physically exists (physical AIS Aid to Navigation) or the message, transmitted from a remote location, may represent an aid to navigation that does not physically exist (virtual AIS Aid to Navigation). A virtual aid to navigation is a digital information object promulgated by an authorized service provider that can be presented on navigational systems.

(188) Physical AIS aids to navigation are charted with the symbol for the physical aid (such as a buoy or light) with a magenta circle surrounding the symbol and labeled AIS. Virtual aids to navigation are charted with a small central dot with a topmark symbol indicating the purpose of the aid, surrounded by a magenta circle and labeled V-AIS. Temporary AIS aids to navigation and stations remotely transmitting an AIS signal are not charted. See U.S. Chart No. 1, Section S, for additional information and examples.

(189)

**Examples of Charted AIS Aids to Navigation**

Physical AIS Aid to Navigation — Virtual AIS Aid to Navigation

(190)

### Bridge Lights and Clearance Gages

(191) 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.

(192) Bridge lights are fixed red or green and are privately maintained; they are generally not charted or described in the text of the Coast Pilot. All bridge piers (and their protective fenders) and abutments that 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.

(193) 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.

(194) Bridges and their lighting, construction and maintenance are set forth in **33 CFR 114**, **115**, **116**, and **118** (not carried in this Coast Pilot). Aircraft obstruction lights prescribed by the Federal Aviation Administration may operate at certain bridges.

(195)

### Sound Signals

(196) Caution should be exercised in the use of sound signals for navigation purposes. They should be considered solely as warning devices.

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

(198) Experience indicates that distances must not be judged only by the intensity of the sound; that occasionally there may be areas close to a sound 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 sound signal immediately when fog is observed.

(199)

### Channel Markers

(200) 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.

(201) 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.

(202) Temporary changes in aids are not included on the charts.

(203)

### Light Lists

(204) The Coast Guard Light Lists are a means for communicating aids to navigation information to the maritime public. They are updated weekly and available for download on the United States Coast Guard Navigation Center's website at *www.navcen.uscg.gov*. Mariners should refer to these lists for detailed

information regarding the characteristics and visibility of lights, and the description of light structures, buoys, sound signals and electronic aids.

(205)

## ELECTRONIC POSITIONING SYSTEMS

(206) **Global Positioning System (GPS)** permits land, sea, and airborne users to determine their three-dimensional position, velocity and time 24 hours a day, in all weather, anywhere in the world. The basic system is defined as a constellation of satellites, the navigation payloads which produce the GPS signals, ground stations, data links and associated command and control facilities, that are operated and maintained by the Department of Defense. Please report GPS problems or anomalies at *navcen.uscg.gov* or contact the USCG Navigation Information Service at 703–313–5900.

(207)

### LORAN-C

(208) LORAN, an acronym for LOng RAnge Navigation, was an electronic aid to navigation consisting of shore-based radio transmitters. In accordance with the Department of Homeland Security Appropriations Act, the U.S. Coast Guard terminated the transmission of all LORAN-C signals as of August 2010, rendering them unusable and permanently discontinued. For more details, visit *navcen.uscg.gov*. The Coast Guard strongly urges mariners accustomed to using LORAN-C for navigation to shift to a GPS navigation system and become familiar with its operation. NOAA is removing LORAN-C lines of position from all of its charts as new editions are published.

(209)

## SEARCH AND RESCUE

(210)

### Coast Guard Search and Rescue

(211) 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 vessels and aircraft have special markings, including a wide slash of red-orange and a small slash of blue on the forward portion of the hull or fuselage. Other parts of aircraft, normally painted white, may have other areas painted red to facilitate observation. 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.

(212) <Deleted Paragraph>

(212)

### Search and Rescue Great Lakes

(213) The United States Coast Guard has established a toll-free search and rescue telephone number for the Great Lakes. The number is intended for use when the telephone number of the nearest Coast Guard station is unknown or when that station cannot be contacted. The toll-free number should not be used without first attempting to contact the nearest Coast Guard station. In all Great Lakes States the telephone number is 800-321-4400. This number is to be used for public reports of distress incidents, suspicious sightings, pollution or other maritime concerns.

(214)

### Radiotelephone Distress Message

(215) 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 continue to listen on the frequency used for the emission of the distress call. This call should not be addressed to a particular station, and acknowledgment of receipt should not be given before the distress message which follows it is sent.

(216) Distress calls are made on VHF-FM channel 16 (MAYDAY). For less serious situations than warrant the distress procedure, the radiotelephone urgency signal consisting of three repetitions of the word PAN-PAN (pronounced PAWN-PAWN), or the safety signal SECURITE (pronounced SECURITAY) spoken three times, are used as appropriate. For complete information on emergency radio procedures, see **47 CFR 80** or **Radio Navigational Aids, Pub. 117**.

(217)

### Global Maritime Distress and Safety System (GMDSS)

(218) This international system, developed by the International Maritime Organization (IMO), is based on a combination of satellite and terrestrial radio services and has changed international distress communications from being primarily ship-to-ship based to primarily ship-to-shore (Rescue Coordination Center) based. Prior to the GMDSS, the number and types of radio safety equipment required to be carried by vessels depended upon the tonnage. Under GMDSS, the number and type of radio safety equipment vessels are required to carry depend on the areas in which they travel; GMDSS sea areas are defined by governments. All GMDSS-regulated ships must carry a satellite Emergency Position Indicating Radio Beacon (EPIRB), a NAVTEX receiver (if they travel in any areas served by NAVTEX), an Inmarsat-C SafetyNET receiver (if they travel in any areas not served by NAVTEX), a DSC-equipped VHF radiotelephone, two or more VHF handhelds and a search and rescue radar transponder (SART).

(219)

### Automated Mutual Assistance Vessel Rescue System (AMVER)

(220) AMVER is a worldwide voluntary ship reporting system operated by the United States Coast Guard to promote safety of life and property at sea. AMVER's mission is to quickly provide search and rescue (SAR) authorities, on demand, accurate information on the positions and characteristics of vessels near a reported distress. Any merchant vessel anywhere on the globe, on a voyage of greater than 24 hours duration, is welcome in the AMVER system and family. International participation is voluntary regardless of the vessel's flag of registry, the nationality of the owner or company or ports of call.

(221) According to U.S. Maritime Administration (MARAD) regulations, U.S. flag merchant vessels of 1,000 gross tons or more operating in foreign commerce and foreign flag vessels of 1,000 gross tons or more for which an Interim War Risk Insurance Binder has been issued under the provisions of Title XII, Merchant Marine Act, 1936, must report and regularly update their voyages and positions to AMVER in accordance with instructions set forth in the AMVER Ship Reporting System Manual. For more information contact AMVER Maritime Relations U.S. Coast Guard, 1 South Street Battery Park Building, New York, NY 10004; Phone: 212–668–7764, Fax: 212-668-7684, Telex: 127594-AMVER NYK, or go to *amver.com*.

(222)

### COSPAS-SARSAT

(223) COSPAS: Space System for Search of Distress Vessels - SARSAT: Search and Rescue Satellite-Aided Tracking. COSPAS-SARSAT is an international satellite system designed to provide distress alert and location data to assist search and rescue operations using satellites and ground facilities to detect and locate the signals of distress beacons operating on 406 MHz. For more information on the Cospas-Sarsat System go to *cospas-sarsat.int*.

(224)

### Digital Selective Calling (DSC)

(225) The U.S. Coast Guard offers VHF and MF/HF radiotelephone service to mariners as part of the Global Maritime Distress and Safety System. This service, called digital selective calling (DSC), allows mariners to instantly send an automatically formatted distress alert to the Coast Guard or other rescue authority anywhere in the world. Digital selective calling also allows mariners to initiate or receive distress, urgency, safety and routine radiotelephone calls to or from any similarly equipped vessel or shore station, without requiring either party to be near a radio loudspeaker. Each ship or shore station equipped with a DSC terminal has a unique Maritime Mobile Station Identity (MMSI). This is a nine-digit number that specifically identifies a ship, coast station, or group of stations. The DSC system alerts an operator when a distress call is received. It will provide the operator with a pre-formatted message that can include the distressed vessel's nine-digit MMSI, location, nature of distress, desired mode of communication and preferred working frequency.

(226)

### Emergency Position Indicating Radiobeacons (EPIRB)

(227) EPIRBs emit a radio signal that can be used to locate mariners in distress. SARSAT satellites can locate the position of a 406 MHz EPIRB which greatly increases a mariner's chances of survival. While orbiting the earth, the satellites continuously monitor EPIRB frequencies. When SARSAT receives an EPIRB signal, it determines the beacon's position that is ultimately relayed to the nearest Coast Guard Rescue Coordination Center where rescue units are dispatched to the scene.

(228) Mariners should ensure that their EPIRB is in working condition and stowed properly at all times to avoid non-distress emissions. Mariners are required to register their 406 MHz EPIRBs for improved search and rescue response and keep the registration current at all times. Registration can be accomplished online at *beaconregistration.noaa.gov*.

(229) <Deleted Paragraph>

(229)

**EPIRB Types**

| Type | Frequency | Description |
|---|---|---|
| Cat I | 406 MHz | Float-free, automatically activated EPIRB. Detectable by satellite anywhere in the world. Recognized by the Global Maritime and Distress Safety System (GMDSS). |
| Cat II | 406 MHz | Similar to Category I, except is manually activated. Some models are also water activated. |

(230) <Deleted Paragraph>

(230)

### Medical Advice

(231) Ships at sea with no medical personnel embarked and experiencing a medical emergency onboard can receive medical advice via radiotelex, radiotelephony or Inmarsat. Messages are generally addressed RADIOMEDICAL followed by the name of the coast station to which the message is sent. The priority of the message should depend on the severity of the ailment. In extreme emergency, the urgency signal (PAN-PAN) should precede the address. Messages are sent using distress and safety frequencies.

(232)

### Vessel Identification

(233) Coast Guard search and rescue aircraft and surface craft use radar to assist in locating disabled vessels. Wooden and fiberglass vessels are often poor radar targets. Operators of disabled craft that are the object of a search are requested to hoist, as high above the waterline as possible, a radar-reflecting device. If no special radar-reflecting device is aboard, an improvised device can be used. This should consist of metallic objects of irregular shape. The more irregular the shape, the better will be the

(241)

## U.S. VHF Channels

| Channel | Ship Frequency (MHz) Transmit | Receive | Channel Usage |
|---|---|---|---|
| 01A | 156.050 | 156.050 | Port Operations and Commercial, VTS (Available only in New Orleans/Lower Mississippi area) |
| 05A | 156.250 | 156.250 | Port Operations or VTS in the Houston, New Orleans and Seattle areas |
| 06 | 156.300 | 156.300 | Intership Safety |
| 07A | 156.350 | 156.350 | Commercial |
| 08 | 156.400 | 156.400 | Commercial (Intership only) |
| 09 | 156.450 | 156.450 | Boater Calling; Commercial and Non-commercial |
| 10 | 156.500 | 156.500 | Commercial |
| 11 | 156.550 | 156.550 | Commercial; VTS in selected areas |
| 12 | 156.600 | 156.600 | Port Operations; VTS in selected areas |
| 13 | 156.650 | 156.650 | Intership Navigation Safety (bridge-to-bridge) Ships greater than 20m maintain a listening watch on this channel in US waters. |
| 14 | 156.700 | 156.700 | Port Operations; VTS in selected areas |
| 15 | – | 156.750 | Environmental (Receive only) Used by Class C EPIRBs |
| 16 | 156.800 | 156.800 | International Distress, Safety and Calling. Ships required to carry radio, USCG, and most coast stations maintain a listening watch on this channel. |
| 17 | 156.850 | 156.850 | State and local government maritime control |
| 18A | 156.900 | 156.900 | Commercial |
| 19A | 156.950 | 156.950 | Commercial |
| 20 | 157.000 | 161.600 | Port Operations (duplex) |
| 20A | 157.000 | 157.000 | Port Operations |
| 21A | 157.050 | 157.050 | U.S. Coast Guard only |
| 22A | 157.100 | 157.100 | Coast Guard Liaison and Maritime Safety Information Broadcasts (Broadcasts announced on channel 16) |
| 23A | 157.150 | 157.150 | U.S. Coast Guard only |
| 24 | 157.200 | 161.800 | Public Correspondence (Marine Operator) |
| 25 | 157.250 | 161.850 | Public Correspondence (Marine Operator) |
| 26 | 157.300 | 161.900 | Public Correspondence (Marine Operator) |
| 27 | 157.350 | 161.950 | Public Correspondence (Marine Operator) |
| 28 | 157.400 | 162.000 | Public Correspondence (Marine Operator) |
| 63A | 156.175 | 156.175 | Port Operations and Commercial, VTS (Available only in New Orleans/Lower Mississippi area) |
| 65A | 156.275 | 156.275 | Port Operations |
| 66A | 156.325 | 156.325 | Port Operations |
| 67 | 156.375 | 156.375 | Commercial. Used for bridge-to-bridge communications in lower Mississippi River (Intership only.) |
| 68 | 156.425 | 156.425 | Non-Commercial |
| 69 | 156.475 | 156.475 | Non-Commercial |
| 70 | 156.525 | 156.525 | Digital Selective Calling (voice communications not allowed) |
| 71 | 156.575 | 156.575 | Non-Commercial |
| 72 | 156.625 | 156.625 | Non-Commercial (Intership only) |
| 73 | 156.675 | 156.675 | Port Operations |
| 74 | 156.725 | 156.725 | Port Operations |
| 77 | 156.875 | 156.875 | Port Operations (Intership only) |
| 78A | 156.925 | 156.925 | Non-Commercial |
| 79A | 156.975 | 156.975 | Commercial (Non-commercial in Great Lakes only) |
| 80A | 157.025 | 157.025 | Commercial (Non-commercial in Great Lakes only) |
| 81A | 157.075 | 157.075 | U.S. Government only (environmental protection operations) |
| 82A | 157.125 | 157.125 | U.S. Government only |
| 83A | 157.175 | 157.175 | U.S. Coast Guard only |
| 84 | 157.225 | 161.825 | Public Correspondence (Marine Operator) |
| 85 | 157.275 | 161.875 | Public Correspondence (Marine Operator) |
| 86 | 157.325 | 161.925 | Public Correspondence (Marine Operator) |
| 87 | 157.375 | 157.375 | Public Correspondence (Marine Operator) |
| 88A | 157.425 | 157.425 | Commercial (Intership only) |
| AIS 1 | 161.975 | 161.975 | Automatic Identification System (AIS) |
| AIS 2 | 162.025 | 162.025 | Automatic Identification System (AIS) |

Boaters should normally use channels listed as Non-Commercial. Channel 16 is used for calling other stations or for distress alerting. Channel 13 should be used to contact a ship when there is danger of collision. All ships of length 20m or greater are required to guard VHF-FM channel 13, in addition to VHF-FM channel 16, when operating within U.S. territorial waters.

Note that the letter “A” indicates simplex use of the ship station transmit side of an international duplex channel, and that operations are different than international operations on that channel. Some VHF transceivers are equipped with an *International - U.S.* switch for that purpose. “A” channels are generally only used in the United States, and use is normally not recognized or allowed outside the U.S. The letter “B” indicates simplex use of the coast station transmit side of an international duplex channel. The U.S. does not currently use “B” channels for simplex communications in this band.

(247)

radar-reflective quality. For quick identification at night, shine spotlights straight up. If aircraft are involved, once you are identified, turn lights away so as not to blind aircraft crew.

(234)

### Float Plan

(235) Small craft operators should prepare a float plan before starting a trip and leave it ashore with a yacht club, marina, friend or relative. It is advisable to regularly use a checking-in procedure by radio or telephone for each point specified in the float plan. A float plan is vital for determining if a boat is overdue and will assist in locating a missing vessel in the event search and rescue operations become necessary.

(236)

## NAVIGATIONAL WARNINGS, INFORMATION AND WEATHER

(237) Marine radio warnings and weather are disseminated by many sources and through several types of transmissions. For complete information on radio warnings and weather, see **Radio Navigational Aids, Pub. 117** and the National Weather Service (NWS) publication **Worldwide Marine Radiofacsimile Broadcast Schedules**.

(238) Radio navigational warning broadcasts are designed to provide the mariner with up-to-date marine information vital to safe navigation. There are three types of broadcasts: coastal and local, long range and worldwide.

(239) Coastal and local warnings are generally restricted to ports, harbors and coastal waters and involve items of local interest. Usually, local or short-range warnings are broadcast from a single coastal station, frequently by voice and also radiotelegraph, to assist small craft operators in the area. The information is often quite detailed. Foreign area broadcasts are frequently in English as well as the native language. In the United States, short-range radio navigational warnings are broadcast by the U.S. Coast Guard Districts via NAVTEX and subordinate coastal radio stations.

(240) Long range warnings are intended primarily to assist mariners on the high seas by promulgating navigational safety information concerning port and harbor approaches, coastlines and major ocean areas. Long-range radio navigational warnings are usually broadcast by means of radiotelegraphy and in many instances by radio-teletypewriter. A NAVAREA system of navigational warning areas has been developed providing worldwide coverage using standard format and procedures. The U.S.

(258)

## Standard Abbreviations Used in Broadcasts

### Aids to Navigation

AERO RBN — Aeronautical Radiobeacon
ART DBN — Articulated Daybeacon
ART LT — Articulated Light
DESTR — Destroyed
DISCONTD — Discontinued
ESTAB — Established
ELB — Exposed Location Buoy
FOG SIG — Fog Signal Station
LNB — Large Navigation Buoy
LT — Light
LLNR — Light List Number
LBB — Lighted Bell Buoy
LB — Lighted Buoy
LGB — Lighted Gong Buoy
LHB — Lighted Horn Buoy
LWB — Lighted Whistle Buoy
ODAS — Ocean Data Acquisition System
PRIV MAINTD — Privately Maintained
RACON — Radar Beacon
RA REF — Radar Reflector
TRUB — Temporarily Replaced by Unlighted Buoy
TRLB — Temporarily Replaced by Lighted Buoy
WHIS — Whistle

### Light Characteristics

AL — Alternating
CHAR — Characteristic
FL(2+1) — Composite Group-Flashing
OC(2+1) — Composite Group-Occulting
Q — Continuous Quick-Flashing
FFL — Fixed and Flashing
F — Fixed
FL(3) — Group-Flashing
OC(2) — Group-Occulting
IQ — Interrupted Quick-Flashing
ISO — Isophase
MO(A) — Morse Code
OC — Occulting
FL — Single-Flashing

### Colors (Color refers to light characteristics of Aids to Navigation only)

B — Black
BU — Blue
G — Green
OR — Orange
R — Red
W — White
Y — Yellow

### Organizations

CCGD(#) — Commander, Coast Guard District (#)
CG — Coast Guard
COE — Corps of Engineers
NGA — National Geospatial-Intelligence Agency
NOS — National Ocean Service
NWS — National Weather Service

### Vessels

A/C — Aircraft
F/V — Fishing Vessel
LNG — Liquified Natural Gas Carrier
M/V — Motor Vessel*
P/C — Pleasure Craft
R/V — Research Vessel
S/V — Sailing Vessel

* M/V includes: Steam Ship, Container Vessel, Cargo Vessel, etc.

### Compass Directions

N — North
S — South
E — East
W — West
NE — Northeast
NW — Northwest
SE — Southeast
SW — Southwest

### Various

ANCH — Anchorage
ANCH PROHIB — Anchorage Prohibited
APPROX — Approximate
ATLC — Atlantic
AUTH — Authorized
AVG — Average
BRG — Bearing
BKW — Breakwater
BNM — Broadcast Notice to Mariners
CHAN — Channel
CFR — Code of Federal Regulations
CONT — Continue
DEG — Degrees (temp, geo-position)
DIA — Diameter
ED — Edition
EFF — Effect/Effective
ENTR — Entrance
EXPLOS ANCH — Explosive Anchorage
FM(S) — Fathoms
FT — Foot/Feet
HBR — Harbor
HT — Height
HZ — Hertz
HOR CL — Horizontal Clearance
HR — Hour
COLREGS — International Regulations for Preventing Collisions at Sea
KHZ — Kilohertz
KM — Kilometer
KT(S) — Knot(s)
LAT — Latitude
LNM — Local Notice to Mariners
LONG — Longitude
MAINTD — Maintained
MAX — Maximum
MHZ — Megahertz
MB — Millibar
MM — Millimeter
MIN — Minute (time, geo position)
MOD — Moderate
MT —Mountain, Mount
NM — Nautical Mile(s)
NTM — Notice to Mariners
OBSTR — Obstruction
OCCASION — Occasion/Occasionally
OPAREA — Operating Area
PAC — Pacific
PT(S) — Point(s)
POS — Position
PA —Position Approximate
PRES — Pressure
PRIV — Private/Privately
PROHIB — Prohibited
PUB — Publication
RGE — Range
REP — Reported
RESTR — Restricted
RK — Rock
ST — Saint
SEC — Second (time, geo position)
SIG STA — Signal Station
STA — Station
SM — Statute Mile(s)
S SIG STA — Storm Signal Station
TEMP — Temporary
TSTORM — Thunderstorm
THRU — Through
T — True
UNCOV — Uncovers
UTC — Universal Coordinate Time
UMIB — Urgent Marine Information Broadcast
VEL — Velocity
VERT CL — Vertical Clearance
VIS — Visibility
YD — Yard(s)
WARN — Warning
WX — Weather
WK — Wreck

participates as Area Coordinator for both NAVAREA IV (Western North Atlantic) and NAVAREA XII (Eastern North Pacific).

(242) The United States also maintains worldwide coverage using the HYDROLANT/HYDROPAC Navigational Warning System outside of NAVAREAs IV and XII.

(243)

### NAVTEX

(244) NAVTEX is a standard international method of broadcasting notices to mariners and marine weather forecasts using small, low cost receivers designed to be installed in the pilothouse of a vessel. NAVTEX receivers screen incoming messages, inhibiting those which had been previously received or are of a category not of interest to the user, and print the rest on adding machine-size paper. NAVTEX not only provides marine information previously available only to those knowledgeable in Morse code but also allows any mariner who cannot man a radio full time to receive safety information at any hour. All NAVTEX transmissions are made on 518 kHz. Mariners who do not have NAVTEX receivers but have Simplex Teletype Over Radio (SITOR) radio equipment can also receive these broadcasts by operating it in the Forward Error Correction (FEC) mode and tuning to 518 kHz.

(245) Information broadcast over NAVTEX includes offshore weather forecasts, offshore marine advisory warnings, search and rescue information and navigational information that applies to waters from the line of demarcation (separating Inland Rules from COLREG Rule waters) to 200 miles offshore. Navigational information that affects the safety of navigation of deep draft (15 feet or more) vessels within the U.S. Inland Rules waters will also be included. Gulf Stream location is also included from Miami and Portsmouth. Coastal and high seas weather forecasts are not being broadcast over NAVTEX. The Safety of Life at Sea Convention, as amended in 1988, requires vessels regulated by that convention to carry NAVTEX receivers.

(246) See Appendix A, U.S. NAVTEX Transmitting Stations, for a list of NAVTEX broadcast stations and message content covered by this Coast Pilot.

(248)

### Broadcast Notice to Mariners

(249) The U.S. Coast Guard broadcasts marine safety information on VHF-FM channel 22A (157.1 MHz). These safety broadcasts contain information such as notices to mariners, storm warnings, distress warnings and other pertinent information that is vital for safe navigation. Following a preliminary call on VHF-FM channel 16 (156.8 MHz), mariners are instructed to shift to VHF-FM channel 22A simplex (157.1 MHz). Operators of vessels who plan to transit U.S. waters and who do not have VHF radios tunable to U.S. channel 22A are urged to obtain the necessary equipment.

(250)

### NOAA Weather Radio Broadcasts

(251) NOAA Weather Radio provides continuous broadcasts of the latest weather information directly from (NWS) offices. In addition to general weather information, marine weather is provided by stations along the sea coasts and the Great Lakes. During severe weather, NWS forecasters can interrupt the regular broadcasts and substitute special warning messages. The stations operate 24 hours daily, and messages are repeated every 4 to 6 minutes and are routinely revised every 1 to 3 hours or more frequently if necessary. The broadcasts are made on seven VHF-FM frequencies, 162.40 to 162.55 MHz. The 162.475 MHz frequency is only used in special cases where needed to avoid channel interference. They can usually be heard as far as 40 miles from the antenna site, sometimes more. The effective range depends on many factors, including the height of the broadcast antenna, terrain, quality of the receiver and the type of receiving antenna. As a general rule, listeners close to or perhaps beyond the 40 mile range should have a good quality receiver system to get reliable reception. (See Appendix A for a list of these stations in the area covered by this Coast Pilot.)

(252)

### Commercial Maritime Coast Stations and Weather Nets

(253) Commercial maritime coast stations, which provide communications services, broadcast weather information to ships at sea as a public service, or make forecast information available on demand, either free or for a nominal fee. These transmissions are most commonly performed using HF SITOR and Pactor/E-Mail; however, several of these stations also offer services via Inmarsat satellite and other means.

(254) There are also a number of maritime weather *nets* operating on commercial marine VHF, MF and HF, where weather information is exchanged. These *nets* are extremely popular in areas of the world that have a large yachting population and where weather is dynamic, such as in the Caribbean, and typically incorporate volunteers ashore.

(255) Information on commercial maritime coast stations, including schedules and frequencies, is available in the **Radio Navigational Aids, Pub. 117**.

(256)

### Standard Abbreviations for Broadcasts

(257) A listing of Standard Abbreviations for Textual Maritime Safety Broadcasts can be found in this chapter. These abbreviations were jointly approved by the U.S. Coast Guard, National Weather Service, National Geospatial-Intelligence Agency and the Radio Technical Commission for Maritime Services. In addition to appearing in radio broadcasts of the U.S. Coast Guard and National Weather Service, they appear in Notices to Mariners of the U.S. Coast Guard and National Geospatial-Intelligence Agency and in NAVTEX.

(259)

### Voluntary Observing Ship Program (VOS)

(260) The Voluntary Observing Ship program is organized for the purpose of obtaining weather and oceanographic observations from moving ships. An international program under World Meteorological Organization auspices, the VOS has over 5000 vessels participating from 23 countries. Any vessel willing to take and transmit observations in marine areas can join the program. Weather observations are essential to meteorologists preparing weather forecasts for coastal, offshore and high seas areas. For more information on the VOS, visit *vos.noaa.gov*.

(261)

### National Institute of Standards and Technology (NIST)

(262) The National Institute of Standards and Technology maintains the standards for time and frequency for most users in the United States. NIST provides a variety of services designed to deliver time and frequency signals to the people who need them. The signals are broadcast via several mediums, including high and low frequency radio, the Internet and telephone lines. Broadcasts of time and frequency signals are made by stations operating in the part of the radio spectrum that is properly known as high frequency (HF) but is commonly called shortwave. Station WWV is located just north of Fort Collins, Colorado, and station WWVH is located on the island of Kaua‘i, Hawaii. Both stations broadcast continuous time and frequency signals on 2.5, 5, 10 and 15 MHz; WWV also broadcasts on 20 MHz.

(263) **NIST Time and Frequency Services, Special Publication 432** gives a detailed description of the signals and services offered by NIST, how they work and how you can use them. The publication is available for download at *nist.gov/pml/div688/generalpubs.cfm*.

(264)

## CAUTIONARY INFORMATION

(265)

### Hurricanes and Tropical Storms

(266) Hurricanes, tropical storms and other major storms may cause considerable damage to marine structures, aids to navigation and moored vessels, resulting in submerged debris in unknown locations. Fixed aids to navigation may have been damaged or destroyed. Buoys may have been moved from charted positions, damaged, sunk, extinguished or otherwise made inoperative. Mariners should not rely upon the position or operation of an aid to navigation. Charted soundings, channel depths and shoreline may not reflect actual conditions following these storms. Wrecks and submerged obstructions may have been displaced from charted locations. Pipelines may have become uncovered or moved. Mariners are urged to exercise extreme caution and are requested to report aids to navigation discrepancies and hazards to navigation to the U.S. Coast Guard.

(267)

### Destructive Waves

(268) 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.

(269) **Tsunamis** (seismic sea waves) are ocean waves generated by any rapid large-scale disturbance of the sea water. Most tsunamis are generated by earthquakes, but they may also be caused by volcanic eruptions, landslides, undersea slumps or meteor impacts.

(270) The waves radiate outward in all directions from the disturbance and can propagate across entire ocean basins. Tsunami waves are distinguished from ordinary ocean waves by their great length between peaks, often exceeding 100 miles in the deep ocean, and by the long interval of time between these peaks, ranging from five minutes to an hour. The speed at which tsunamis travel depends on the ocean depth. A tsunami can exceed 500 knots in the deep ocean but slows to 20 or 30 knots in the shallow water near land. In less than 24 hours, a tsunami can cross the entire Pacific Ocean.

(271) In the deep ocean, a tsunami is barely noticeable and will only cause a small and slow rising and falling of the sea surface as it passes. Only as it approaches land does a tsunami become a hazard. As the tsunami approaches land and shallow water, the waves slow down and become compressed, causing them to grow in height. In the best of cases, the tsunami comes onshore like a quickly rising tide and causes a gentle flooding of low-lying coastal areas. In the worst of cases, a bore will form.

(272) A bore is a wall of turbulent water that can exceed several yards in height and can rush onshore with great destructive power. Behind the bore is a deep and fast-moving flood that can pick up and sweep away almost anything in its path. Minutes later, the water will drain away as the trough of the tsunami wave arrives, sometimes exposing great patches of the sea floor, then the water will rush in again as before, causing additional damage. This destructive cycle may repeat many times before the hazard finally passes. 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.

(273) Tsunamis do not have a season and do not occur regularly or frequently. Yet they pose a major threat to the coastal populations of the Pacific and other world oceans and seas. Nothing can be done to prevent them, but their adverse impact can be reduced with proper planning. The loss of life and property can be lessened if shipmasters and others acquaint themselves with the behavior of these waves so that intelligent action can be taken when they become imminent.

(274) <Deleted Paragraph>

(274) NOAA oversees the U.S. Tsunami Program with its mission to provide a 24-hour detection and warning system and increase public awareness about the threat of tsunamis. The NOAA National Weather Service operates two tsunami warning centers The West Coast/Alaska Tsunami Warning Center in Palmer, Alaska, and the Richard H. Hagemeyer Pacific Tsunami Warning Center in ‘Ewa Beach, Hawaii: *www.tsunami.gov*. These centers continuously monitor data from seismological and tidal stations, evaluate earthquakes that have the potential to generate tsunamis and disseminate tsunami information and warning bulletins to government authorities and the public.

(275) A tsunami warning is issued when a potential tsunami with significant inundation is imminent or expected. Warnings alert the public that widespread, dangerous coastal flooding accompanied by powerful currents is possible and may continue for several hours after arrival of the initial wave. Warnings also alert emergency management officials to take action for the entire tsunami hazard zone. When a tsunami warning has been issued, use a NOAA Weather Radio or stay tuned to a Coast Guard emergency frequency station or a local radio or television station for updated emergency information.

(276)

## Storm Surge

(277) <Deleted Paragraph>

(277) 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 dept,h 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.

(278) **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 on the water, it is called **surge**.

(279) <Deleted Paragraph>

(279) 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.

(280) <Deleted Paragraph>

(280)

## Immersion Hypothermia

(281) Immersion hypothermia is the loss of heat when a body is immersed in water. With few exceptions, humans die if their core temperature of approximately 99.7° F drops below 78.6° F. Cardiac arrest is the most common direct cause of death. During prolonged immersion, the main threat to life is cold or cold and drowning combined.

(282)

SURVIVAL TIME VERSUS WATER TEMPERATURE

| Water Temperature (°F) | Exhaustion or Unconsciousness | Expected Time of Survival |
|---|---|---|
| 32 | 15 minutes | 15 to 45 minutes |
| 32 to 41 | 15-30 minutes | 30 to 90 minutes |
| 41 to 50 | 30-60 minutes | 1 to 3 hours |
| 50 to 59 | 1-2 hours | 1 to 6 hours |
| 59 to 68 | 2-7 hours | 2 to 40 hours |
| 68 to 77 | 3-12 hours | 3 hours to indefinite |
| 77 and above | indefinite | indefinite |

(283) The length of time that a human survives in water depends on the water temperature and to a lesser extent on the person’s behavior and body type. The table shows approximate human survival time in the sea. Body type can cause deviations, as small people become hypothermic more rapidly than large people. The cooling rate can be slowed by the person’s behavior and insulated gear. The Heat Escape Lessening Posture (HELP) was developed for those in the water alone and the huddle for small groups. Both require a PFD (personal flotation device), or life preserver. HELP involves holding the arms close to the body, keeping the thighs together, and raising the knees to protect the groin area. In the huddle, people face each other and keep their bodies as close together as possible. These positions improve survival time to approximately two times that of a swimmer and one and a half times that of a person in the passive position.

(284) Near-drowning victims in cold water (less than 70° F) are revivable for much longer periods than usual. Keys to a successful revival are immediate cardiopulmonary resuscitation (CPR) and administration of pure oxygen. Total re-warming is not necessary at first. The whole revival process may take hours and require medical help.

(285)

## Wind Chill and Frostbite

(286) When the body is warmer than its surroundings, it begins to lose heat. The rate of loss depends on barriers such as clothing and insulation, the speed of air movement and air temperature. Heat loss increases dramatically in moving air that is colder than skin temperature (91.4° F). Even a light wind increases heat loss, and a strong wind can lower the body temperature if the rate of loss is greater than the body’s heat replacement rate.

(287) When skin temperature drops below 50° F, there is a marked constriction of blood vessels, leading to vascular stagnation, oxygen want and cellular damage. The first

indication that something is wrong is a painful tingling. Swelling of varying extent follows, provided freezing has not occurred. Excruciating pain may be felt if the skin temperature is lowered rapidly, but freezing of localized portions of the skin may be painless when the rate of change is slow. Possible effects of cold include cold allergy (welts), chilblains, which appear as reddened, warm, itching, swollen patches on the fingers and toes, and trench foot and immersion foot, which present essentially the same picture. Both result from exposure to cold and lack of circulation. Wetness can add to the problem as water and wind soften the tissues and accelerate heat loss.

(288) Frostbite usually begins when the skin temperature falls within the range of 14° to 4° F. Ice crystals form in the tissues and small blood vessels. The rate of heat loss determines the rate of freezing, which is accelerated by wind, wetness, extreme cold and poor blood circulation. Parts of the body susceptible to freezing are those with surfaces large in relation to their volume, such as toes, fingers, ears, nose, chin and cheeks.

(289) Injuries from the cold may, to a large extent, be prevented by maintaining natural warmth through the use of proper footgear and adequate, dry clothing, by avoiding cramped positions and constricting clothing and by active exercise of the hands, legs and feet.

(290)

## MARINE POLLUTION

(290) <Deleted Paragraph>

(291)

### The Federal Water Pollution Control Act (Clean Water Act)

(291) <Deleted Paragraph>

(292) The Federal Water Pollution Control Act (FWPCA) or Clean Water Act (CWA) was passed to restore and maintain the chemical, physical and biological integrity of the waters within the United States.

(293) <Deleted Paragraph>

(293)

### No-Discharge Zones

(294) Section 312 of the FWPCA gives the Environmental Protection Agency (EPA) and States the authority to designate certain areas as No-Discharge Zones (NDZ) for vessel sewage. Freshwater lakes, freshwater reservoirs or other freshwater impoundments whose entrances and exits prohibit traffic by regulated vessels (vessels with installed toilets) are, by regulation, NDZs. Rivers that do not support interstate navigation vessel traffic are also NDZs by regulation. Water bodies that can be designated as NDZs by States and EPA include the Great Lakes and their connecting waterways, freshwater lakes and impoundments accessible through locks and other flowing waters that support interstate navigation by vessels subject to regulation.

(295) Inside NDZ waters, discharge of any sewage, whether treated or untreated, is completely prohibited.

(296) Discharge of sewage in waters not designated as NDZs is regulated by the Marine Sanitation Device Standard (see **40 CFR 140** in chapter 2.)

(297) Additional information concerning the regulations may be obtained from *water.epa.gov*.

(298)

### Oil Spill Reporting

(299) Reporting requirements for any oil discharge, noxious liquid substance or harmful substance occurring in waters under U.S. jurisdiction are found in **33 CFR 153**, subpart B (not in this Coast Pilot.) Any person in charge of a vessel or an onshore/offshore facility must, as soon as they have knowledge of any discharge of oil or a hazardous substance, immediately notify the National Response Center (NRC) at 800-424-8802 or NRC@uscg.mil.

(300)

### Ocean Dumping

(301) The Marine Protection Research and Sanctuaries Act of 1972, as amended (33 USC 1401 et seq.), regulates the dumping of all material, except fish waste, into ocean waters. Radiological, chemical and biological warfare agents and other high level radioactive wastes are expressly banned from ocean disposal. The USACE issues permits for the disposal of dredged spoils; the EPA is authorized to issue permits for all other dumping activities. Surveillance and enforcement to prevent unlawful transportation of material for dumping or unlawful dumping under the Act has been assigned to the U.S. Coast Guard. The Act provides civil penalties of up to $50,000 and criminal penalties of up to $50,000 and/or one year imprisonment.

(301) <Deleted Paragraph>

(302)

## SELECT NAVIGATION RULES

(303)

### Improper use of searchlights

(304) 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.

(305)

### Use of Radar

(306) <Deleted Paragraph>

(306) Navigation Rules, International-Inland, Rule 7, states, in part, that every vessel shall use all available means appropriate to the prevailing circumstances and conditions to determine if risk of collision exists. If there is any doubt such risk shall be deemed to exist. Proper use shall be made of radar equipment if fitted and operational, including long-range scanning to obtain early warning of risk of collision and radar plotting or equivalent systematic observation of detected objects.

(321)

Figure 1: Offshore extent of the maritime zones recognized under international law

(307) <Deleted Paragraph>

(307) This rule places an additional responsibility on vessels that 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.

(308) <Deleted Paragraph>

(308) Navigation Rules, International-Inland, Rules 6, 7, 8, and 19 apply to the use of radar.

(309)

### Danger signal

(310) Navigation Rules, International-Inland, Rule 34(d), states that when vessels in sight of one another are approaching each other and from any cause either vessel fails to understand the intentions or actions of the other or is in doubt whether sufficient action is being taken by the other to avoid collision, the vessel in doubt shall immediately indicate such doubt by giving at least five short and rapid blasts on the whistle. Such signal may be supplemented by a light signal of at least five short and rapid flashes.

(311)

### Narrow channels

(312) Navigation Rules, International-Inland, Rule 9(b) states that a vessel of less than 20 meters in length or a sailing vessel shall not impede the passage of a vessel that can safely navigate only within a narrow channel or fairway.

(313)

## REGULATED WATERS

(314)

### Traffic Separation Schemes (Traffic Lanes)

(315) To increase the safety of navigation, particularly in converging areas of high traffic density, routes incorporating traffic separation have been adopted by the IMO in certain areas of the world. In the interest of safe navigation, it is recommended that through traffic use these schemes, as far as circumstances permit, by day and by night and in all weather conditions. When approved or established, traffic separation scheme details are announced in Notice to Mariners and later depicted on appropriate charts and included in the U.S. Coast Pilot. See **33 CFR 167**, chapter 2, for regulations.

(316) The IMO is recognized as the only international body responsible for establishing and recommending measures on an international level concerning ships' routing. In deciding whether or not to adopt or amend a traffic separation scheme, IMO will consider whether the scheme complies with the design criteria for traffic separation schemes and with the established methods of routing. IMO also considers whether the aids to navigation proposed will enable mariners to determine their position with sufficient accuracy to navigate the scheme in accordance with Rule 10 of the International Regulations for Preventing Collisions at Sea (72 COLREGS).

(317) The IMO approved routing measures which affect shipping in or near U.S. waters are:

(318)

| IMO-Approved Traffic Separation Routes |
|---|
| Portland, Maine (approaches to) |
| Boston, Massachusetts (approaches to) |
| Narragansett Bay, Rhode Island (approaches to) |
| Buzzards Bay, Massachusetts (approaches to) |
| New York, New York |
| Delaware Bay |
| Chesapeake Bay (approaches to) |
| Cape Fear River (approaches to) |
| Galveston Bay (approaches to) |
| Off San Francisco, California |
| Los Angeles/Long Beach, California (approaches to) |
| Strait of Juan de Fuca (approaches to and in) |
| Puget Sound (approaches to and in) |
| Haro Strait, Boundary Pass and the Strait of Georgia |
| Prince William Sound, Alaska |

(319)

## Maritime Zones

(320) The maritime zones recognized under international law include internal waters, territorial sea, contiguous zone, exclusive economic zone, continental shelf, the high seas and the Area (see Figure 1). The following zones are depicted on NOAA's nautical charts: internal waters, territorial sea, contiguous zone and exclusive economic zone. The limits of these zones are subject to modification as depicted on future charts; limits shown on the most recent chart edition take precedence.

(322)

## Internal Waters

(323) Internal waters are the waters (harbors, bays and rivers) on the landward side of the baseline from which the breadth of the territorial sea is measured. The United States has full sovereignty over its internal waters and ports as if they were part of its land territory. NOAA's nautical charts depict the baseline from which the limits of the U.S. territorial sea, contiguous zone and exclusive economic zone are measured as well as the Three Nautical Mile Line and Natural Resources Boundary, as described below.

(324)

## Territorial Sea

(325) The territorial sea of the United States extends beyond the land territory and internal waters and also includes the Commonwealth of Puerto Rico, Guam, American Samoa, the U.S. Virgin Islands, the Commonwealth of the Northern Mariana Islands and any other territory or possession over which the United States exercises sovereignty. (Presidential Proclamation No. 5928. December 27, 1988.) The United States exercises sovereignty over the territorial sea that extends to the airspace over the area and to the bed and subsoil. Under customary international law as reflected in the 1982 United Nations Convention on the Law of the Sea (UNCLOS), the territorial sea of the United States extends to 12 nautical miles (nm) from the baseline from which the breadth of the territorial sea is measured; determined in accordance with international law except as otherwise established in a maritime boundary treaty of the United States. While the United States may adopt certain laws and regulations, vessels of all countries navigating through the territorial sea enjoy the right of innocent passage; vessels and aircraft of all countries enjoy the right of transit passage through international straits.

(326)

## Contiguous Zone

(327) The contiguous zone of the United States is a zone measured 24 nm from the territorial sea baseline and is contiguous to the territorial sea of the United States, including the Commonwealth of Puerto Rico, Guam, American Samoa, the U.S. Virgin Islands, the Commonwealth of the Northern Mariana Islands and any other territory or possession over which the United States exercises sovereignty. (Presidential Proclamation No. 7219. August 2, 1999.) Under customary law as reflected in UNCLOS, the U.S. may exercise the control necessary to prevent infringement of its customs, fiscal, immigration or sanitary laws and regulations within its territory or territorial sea and to punish infringement of these laws and regulations committed within its territory or territorial sea. The United States may also prescribe and enforce laws against foreign flagged vessels and nationals to protect the underwater cultural heritage to the outer boundary of the contiguous zone (24 nm).

(328)

## Exclusive Economic Zone

(329) The exclusive economic zone of the United States extends no more than 200 nm from the territorial sea baseline and is adjacent to the 12 nm territorial sea of the United States, including the Commonwealth of Puerto Rico, Guam, American Samoa, the U.S. Virgin Islands, the Commonwealth of the Northern Mariana Islands and any other territory or possession over which the United States exercises sovereignty. (Presidential Proclamation No. 5030 of March 10, 1983 and Federal Register, volume 60 - number 163, August 23, 1995, "Exclusive Economic Zone and Maritime Boundaries: Notice of Limits") As such, the exclusive economic zone overlaps the 12 nm-24 nm contiguous zone.

(330) Within the EEZ, the U.S. has (a) sovereign rights for the purpose of exploring, exploiting, conserving and managing natural resources, whether living and nonliving, of the seabed and subsoil and the superjacent waters and with regard to other activities for the economic exploitation and exploration of the zone, such as the production of energy from the water, currents and winds; (b) jurisdiction as provided for in international and domestic laws with regard to the establishment and use of artificial islands, installations, and structures, marine scientific research, and the protection and preservation of

the marine environment; and (c) other rights and duties provided for under international and domestic laws.

(331) Note: In certain U.S. fisheries laws, the term "exclusive economic zone" (EEZ) is used. While its outer limit is the same as the EEZ on NOAA charts, the inner limit generally extends landward to the seaward boundary of the coastal states of the U.S.

(332)

### Three Nautical Mile Line

(333) The Three Nautical Mile Line, as measured from the territorial sea baseline and previously identified as the outer limit of the U.S. territorial sea, is retained on charts because it continues to be used in certain Federal laws.

(334) Note: Since the "coast line," a term used in the Submerged Lands Act, and the baseline are determined using the same criteria under international law, the Three Nautical Mile Line is generally the same as the seaward boundary of states under the Submerged Lands Act. There are exceptions; therefore, the Three Nautical Mile Line does not necessarily depict the seaward limit of states under the Submerged Lands Act.

(335)

### Natural Resources Boundary

(336) The 9 nm Natural Resources Boundary is the seaward limit of the submerged lands of Puerto Rico, Texas and the Gulf coast of Florida. It coincides with the inner limit of the U.S. outer continental shelf under the Outer Continental Shelf Lands Act.

(337)

### Notification of Arrival and Vessel Response Plans

(338) A **Notification of Arrival (NOA)** must be submitted by all U.S. and foreign vessels bound for or departing from ports or places in the United States. (See **33 CFR 160 – Subpart C**, chapter 2). Additionally, tank vessels and non-tank vessels are required to submit an oil spill response plan. (See **33 CFR 155**– Subparts D and J, not contained in this Coast Pilot.)

(339)

### Marine Protected Area (MPA)

(340) Marine Protected Areas (MPAs) are particular places in ocean, coastal and estuarine ecosystems where vital natural and cultural resources are given greater protection than in surrounding waters. MPAs have been established in the U.S. for more than a century. Currently, there are over 1,700 MPAs in U.S. marine waters and the Great Lakes, with levels of protection ranging from a few "no-take" areas that prohibit all extractive uses to the more common multiple use areas that allow vessel access, anchoring, fishing and non-consumptive activities. MPAs are managed by dozens of Federal, state, tribal and local authorities. For detailed information on MPA locations, types, interactive map, purposes and legal restrictions, visit *marineprotectedareas.noaa.gov.*

(341)

### Archaeological Resource Preservation

(342) Under Federal and state laws it is illegal to destroy, deface, collect, transport, sell or trade archaeological, cultural, submerged and historic resources without authorization. Applicable laws include, but are not limited to, the Historic Sites Act, the Archaeological Resource Protection Act, the National Historic Preservation Act the Abandoned Shipwreck Act, and the Sunken Military Craft Act. These laws protect archaeological resources on lands administered by the National Park Service, U.S. Fish and Wildlife Service, Bureau of Land Management, and National Marine Sanctuaries as well as state, private and Native lands.

(343)

## DEPARTMENT OF AGRICULTURE

(344)

### Animal and Plant Health Inspection Service

(345) The Animal and Plant Health Inspection Service is 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, animal products, plants, plant products, soil, injurious insects, and associated items that may introduce or spread plant pests and animal diseases which may be 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.

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

(347)

## DEPARTMENT OF COMMERCE

(348)

### National Oceanic and Atmospheric Administration (NOAA)

(349) The National Oceanic and Atmospheric Administration (NOAA) conducts research and gathers data about the global oceans, atmosphere, space and sun, and applies this knowledge to improve our understanding and stewardship of the environment.

(350) NOAA provides services to the nation and the public through five major organizations: the National Ocean Service; the National Weather Service; the National Marine Fisheries Service; the National Environmental Satellite, Data and Information Service (NESDIS); and NOAA Research; and numerous special program units. In addition, NOAA research and operational activities are

supported by the Nation's seventh uniformed service, the NOAA Corps, a commissioned officer corps of men and women who operate NOAA ships and aircraft and serve in scientific and administrative positions.

(351)

### National Ocean Service (NOS)

(352) The National Ocean Service's primary concern is the health and safety of our Nation's coastal and oceanic environment. Within NOS, the **Office of Coast Survey** is responsible for producing and maintaining the suite of over 1000 nautical charts and the Coast Pilots that cover the coastal waters of the U.S. and its territories. Nautical charts are published primarily for the use of the mariner but serve the public interest in many other ways. Cartographers in Coast Survey receive and compile information from a variety of government and non-governmental sources for portrayal on nautical charts and the Coast Pilots. In addition, Coast Survey hydrographers, as well as private contractors, conduct new surveys that are used to update these products. The principal facilities of Coast Survey are located at NOAA headquarters in Silver Spring, MD; Norfolk, VA (Marine Operations Center Atlantic); and Seattle, WA (Western Regional Center).

(353) The **Center for Operational Oceanographic Products and Services (CO-OPS)** collects and distributes observations and predictions of water levels and currents to ensure safe, efficient and environmentally sound maritime commerce. Users can find a variety of information, including observed water level and currents data, tide and current predictions, sea level trends and coastal inundation information. TIdes and Currents information is available at *tidesandcurrents.noaa.gov.*

(354) **PORTS® (Physical Oceanographic Real-Time System)** is a decision support tool that improves the safety and efficiency of maritime commerce and coastal resource management. Data from PORTS® supports navigation safety, improves the efficiency of U.S. ports and harbors, and ensures the protection of coastal marine resources. PORTS® collects and disseminates observations of water levels, currents, salinity, bridge air gap and meteorological parameters (e.g., winds, atmospheric pressure, air and water temperatures) that mariners need to navigate safely and allows seaport and terminal facilities to make good decisions. PORTS® data and information is provided via the internet at *tidesandcurrents.noaa.gov/ports_info.html* and, in some areas, via telephone voice response.

(355)

### NOAA Tide Predictions and Tidal Current Predictions

(356) NOAA discontinued the annual printed Tide Tables and Tidal Current Tables in 2020, and has transitioned to providing this information digitally online. The online prediction service equals or exceeds the accuracy of the historically printed publications. Tide and tidal current predictions needed for navigation can be generated in real-time for any time period required by the mariner, for as short as one day, or as long as an entire year. All predictions for U.S. waters are available at *tidesandcurrents.noaa.gov*.

(357) U.S. Coast Guard regulations do not consider access to NOAA's online prediction service "while navigating" as meeting carriage requirements. In order to use predictions from these services, the predictions must be generated in advance and either be stored on the user's device as an electronic file (PDF, screen image, data table, etc.), or as a printed page.

(358) **NOAA Tide Predictions** - *tidesandcurrents.noaa.gov/tide_predictions.html* - allows the generation of predicted tides for more than 3000 locations along the U.S. coastline. Tide predictions may be generated as times and heights of high and low tides for all locations, or as interval predictions (hourly, 15-minute, 6-minute, etc.) for many locations. Tide predictions may be generated for past, present, or future dates; with lengths of 1 day to 1 month, or the full calendar year. The Users Guide - *tidesandcurrents.noaa.gov/PageHelp.html* - describes the displays, formats, additional capabilities, and uses of this online service.

(359) **Caution** –When using Tide Predictions, slack water should not be confused with high or low water. For ocean stations there is often little difference between the time of high or low water and the start of flood/ebb currents; but for places in narrow channels, landlocked harbors or on tidal rivers, the time of slack current may differ by several hours from the time of high or low water. The relationship of the times of high or low water to the flood and ebb of the current depends upon a number of factors unique to each location; no simple general rule can be given which applies to every location. For navigation or other activities which depend on slack water, tidal current predictions should be used to provide times of slack water.

(360) **NOAA Tidal Current Predictions** –*tidesandcurrents.noaa.gov/noaacurrents/Regions* - allows the generation of predicted currents for more than 2500 locations along the U.S. coastline. Tidal current predictions may be generated as times and speeds of flood/ebb currents and times of slack water for all locations; or as interval predictions of speed (hourly, 30-minute, 6-minute) for many locations. Tidal current predictions may be generated for past, present or future dates; with length of 1 day to 2 weeks, or the full calendar year. The Users Guide - *tidesandcurrents.noaa.gov/noaacurrents/Help* - describes the displays, formats, additional capabilities, and uses of this online service.

(361)

### National Weather Service (NWS)

(362)

### National Data Buoy Center Meteorological Buoys

(363) The National Data Buoy Center (NDBC) deploys moored meteorological buoys that provide weather data directly to the mariner as well as to marine forecasters.

(363) <Deleted Paragraph>

(364) These buoys have a watch circle radius (WCR) of 2,000 to 4,000 yards from assigned position (AP). In addition, any mooring in waters deeper than 1,000 feet will have a floating "loop" or catenary that may be as little as 500 feet below the surface. This catenary could be anywhere within the buoy's WCR. Any underwater activity within this radius may contact the mooring, causing a failure.

(365) To avoid cutting or damaging a mooring, mariners are urged to exercise extreme caution when navigating in the vicinity of meteorological buoys and to remain well clear of the watch circle. If a mooring is accidentally contacted or cut, please notify NDBC at 228-688-2835 or 228-688-2436.

(366) For further information relating to these buoys visit *ndbc.noaa.gov*.

(367)

## Marine Weather Forecasts

(368) The NWS provides marine weather forecasts and warnings for the U.S. coastal waters, the Great Lakes, offshore waters and high seas areas. Scheduled marine forecasts are issued four times daily from **National Weather Service Offices** with local areas of responsibility around the United States, Guam, American Samoa and Puerto Rico. (See Appendix A for NWS Offices located in the area covered by this Coast Pilot.)

(369) Typically, the forecasts contain information on wind speed and direction, wave heights, visibility, weather and a general synopsis of weather patterns affecting the region. The forecasts are supplemented with special marine warnings and statements, radar summaries, marine observations, small-craft advisories, gale warnings, storm warnings and various categories of tropical cyclone warnings, e.g., tropical depression, tropical storm and hurricane warnings. Specialized products such as coastal flood, seiche, and tsunami warnings, heavy surf advisories, low water statements, ice forecasts and outlooks and lake shore warnings and statements are issued as necessary. (For further information, go to *nws.noaa.gov/om/marine/home.htm*.)

(370) The principal means of disseminating marine weather services and products in coastal areas is **NOAA Weather Radio**. This network of more than 900 transmitters, covering all 50 states, adjacent coastal waters, Puerto Rico, the U.S. Virgin Islands and the U.S. Pacific Territories, is operated by the NWS and provides continuous broadcasts of weather information for the general public. These broadcasts repeat recorded messages every 4 to 6 minutes. Messages are updated periodically, usually every 2-3 hours and amended as required to include the latest information. When severe weather threatens, routine transmissions are interrupted and the broadcast is devoted to emergency warnings. (See Appendix A for NOAA Weather Radio Stations covered by this Coast Pilot.)

(371) In coastal areas, the programming is tailored to the needs of the marine community. Each coastal marine forecast covers a specific area. For example, "Cape Henlopen to Virginia Beach, out 20 miles." The broadcast range is about 40 miles from the transmitting antenna site, depending on terrain and quality of the receiver used. When transmitting antennas are on high ground, the range is somewhat greater, reaching 60 miles or more. Some receivers are equipped with a warning alert device that can be turned on by means of a tone signal controlled by the NWS office concerned. This signal is transmitted for 13 seconds preceding an announcement of a severe weather warning.

(372) Marine weather warnings are displayed to small-craft operators and others within sight of the shore by the flags, pennants and lights of the **Coastal Warning Display** program. These displays are meant to warn the public of approaching storm conditions and visually communicate that citizens should take personal responsibility for individual safety in the face of an approaching storm. Anyone observing the signals displayed by the program is urged to tune to the NWS radio broadcasts for the latest information. (See **National Weather Service Coastal Warning Displays** illustration for additional information.)

(374) NWS marine weather products are also disseminated to marine users through the broadcast facilities of the Coast Guard, Navy and commercial marine radio stations. Details on these broadcasts including times, frequencies and broadcast content are listed on the NWS internet site, **Marine Product Dissemination Information**, *nws.noaa.gov/om/marine/home.htm.*

(375) Ships of all nations share equally in the effort to report weather observations. These reports enable meteorologists to create a detailed picture of wind, wave and weather patterns over the open waters that no other data source can provide and upon which marine forecasts are based. The effectiveness and reliability of these forecasts and warnings plus other services to the marine community are strongly linked to the observations received from mariners. There is an especially urgent need for ship observations in the coastal waters, and the NWS asks that these be made and transmitted whenever possible. Many storms originate and intensify in coastal areas. There may be a great difference in both wind direction and speed between the open sea, the offshore waters and on the coast itself.

(376) Information on how ships, commercial fishermen, offshore industries and others in the coastal zone may participate in the marine observation program is available from **National Weather Service Port Meteorological Officers (PMOs)**. PMOs are located in major U.S. port cities where they visit ships in port to assist masters and mates with the weather observation program, provide instruction on the interpretation of weather charts, calibrate barometers and other meteorological instruments and discuss marine weather communications and marine weather requirements affecting the ships'

(373)

# NATIONAL WEATHER SERVICE COASTAL WARNING DISPLAYS

DAYTIME SIGNALS

SMALL CRAFT ADVISORY

GALE WARNING

STORM WARNING

HURRICANE WARNING

NIGHT (LIGHT) SIGNALS

SMALL CRAFT ADVISORY

GALE WARNING

STORM WARNING

HURRICANE WARNING

**SMALL CRAFT ADVISORY**: An advisory issued by coastal and Great Lakes Weather Forecast Offices (WFO) for areas included in the Coastal Waters Forecast or Nearshore Marine Forecast (NSH) products. Thresholds governing the issuance of small craft advisories are specific to geographic areas. A Small Craft Advisory may also be issued when sea or lake ice exists that could be hazardous to small boats. There is no precise definition of a small craft. Any vessel that may be adversely affected by Small Craft Advisory criteria should be considered a small craft. Other considerations include the experience of the vessel operator, and the type, overall size, and sea worthiness of the vessel. There is no legal definition of "small craft". The Small Craft Advisory is an advisory in Coastal Waters and Nearshore forecasts for sustained winds, frequent gusts, or sea/wave conditions, exceeding defined thresholds specific to geographic areas. A Small Craft Advisory may also be issued when sea or lake ice exists that could be hazardous to small boats.

Eastern (ME to SC, Lake Erie, Lake Ontario) – Sustained winds or frequent gusts ranging between 25 and 33 knots (except 20 to 25 knots, lower threshold area dependent, to 33 knots for harbors, bays, etc.) and/or seas or waves 5 to 7 feet and greater, area dependent.

Central (MN to OH) – Sustained winds or frequent gusts (on the Great Lakes) between 22 and 33 knots inclusive, and/or seas or waves greater than 4 feet.

Southern (GA to TX and Caribbean) – Sustained winds of 20 to 33 knots, and/or forecast seas 7 feet or greater that are expected for more than 2 hours.

Western (WA..CA) - Sustained winds of 21 to 33 knots, potentially in combination with wave heights exceeding 10 feet (or wave steepness values exceeding local thresholds).

Alaska (AK) – Sustained winds or frequent gusts of 23 to 33 knots. A small craft advisory for rough seas may be issued for sea/wave conditions deemed locally significant, based on user needs, and should be no lower than 8 feet.

Hawaii (HI), Samoa – Sustained winds 25 knots or greater and seas 10 feet or greater.

Guam and the Northern Mariana Islands – Sustained winds 22 to 33 knots and/or combined seas of 10 feet or more. "Frequent gusts"are typically long duration conditions (greater than 2 hours).

For a list of NWS Weather Offices by Region, refer to the following website: http://www.nws.noaa.gov/organization.php

**GALE WARNING**: To indicate winds within the range 34 to 47 knots are forecast for the area.

**STORM WARNING**: To indicate 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 indicates that winds within the range 48-63 knots are forecast.

**HURRICANE WARNING**: Issued only in connection with a tropical cyclone (hurricane) to indicate that winds 64 knots and above are forecast for the area.

NOTE: A "HURRICANE WATCH" is an announcement issued by the National Weather Service via press and television broadcasts whenever a tropical storm or hurricane becomes a threat to a coastal area. The "Hurricane Watch" announcement is not a warning, rather it indicates that the hurricane is near enough that everyone in the area covered by the "Watch" should listen to their radios for subsequent advisories and be ready to take precautionary action in case hurricane warnings are issued.

NOTE: A SPECIAL MARINE WARNING is issued whenever a severe local storm or strong wind of brief duration is imminent and is not covered by existing warnings or advisories. No visual displays will be used in connection with the Special Marine Warning Bulletin; boaters will be able to receive thesespecial warnings by keeping tuned to a NOAA Weather Radio station or to Coast Guard and commercial radio stations that transmit marine weather information.

operations. (For further information on the Voluntary Observing Ship Program and PMOs, go to *vos.noaa.gov*.)

(377)

### Space Weather Prediction Center (SWPC)

(378) The Space Weather Prediction Center provides real-time monitoring and forecasting of solar and geophysical events that impact satellites, power grids, communications, navigation and many other technological systems. (See Space Weather Prediction Center in Appendix A.)

(379)

### National Environmental Satellite, Data, and Information Service (NESDIS)

(380) Among its functions, NESDIS archives, processes and disseminates the non-real-time meteorological and oceanographic data collected by government agencies and private institutions. Marine weather observations are collected from ships at sea on a voluntary basis. About one million observations are received annually at NESDIS's National Climatic Center. They come from vessels representing every maritime nation. These observations, along with land data, are returned to the mariners in the form of climatological summaries and atlases for coastal and ocean areas. They are available in such NOAA publications as the **U.S. Coast Pilot, Mariners Weather Log** and **Local Climatological Data, Annual Summary**. They also appear in the National Geospatial-Intelligence Agency's **Pilot Chart Atlases** and **Sailing Directions Planning Guides**.

(381)

## DEPARTMENT OF DEFENSE

(382)

### National Geospatial-Intelligence Agency (NGA)

(383) The National Geospatial-Intelligence Agency provides hydrographic, navigational, topographic, and geodetic data, charts, maps and related products and services to the Armed Forces, other Federal Agencies, the Merchant Marine and mariners in general. Publications include Sailing Directions, List of Lights, Distances Between Ports, Radio Navigational Aids, International Code of Signals, American Practical Navigator (Bowditch) and Notice to Mariners. (See NGA Procurement Information in Appendix A.)

(383) <Deleted Paragraph>

(384)

### Army Corps of Engineers

(385) The U.S. Army 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 and for discharges and deposits of dredged and fill materials in these waters.

(386) **Restricted areas** in most places are defined and regulations governing them are established by the USACE. 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 Service. Copies of the regulations may be obtained at the District offices of the USACE. The regulations also are included in the appropriate Coast Pilot.

(387) 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 A for addresses.)

(388) The USACE has general supervision of location, construction and manner of maintenance of all **fishtraps,** weirs, pounds or other fishing structures in the navigable waters of the United States. Where state and/or local controls are sufficient to regulate these structures, including that they do not interfere with navigation, the USACE leaves such regulation to the state or local authority. (See **33 CFR 330** (not carried in this Pilot) for applicable Federal regulations.) Construction permits issued by the Engineers specify the lights and signals required for the safety of navigation.

(389) **Fish havens**, artificial reefs constructed to attract fish, can be established in U.S. coastal waters only as authorized by a USACE permit; the permit specifies the location, extent and depth over these mounds of rubble.

(390)

### Naval Observatory

(391) The United States Naval Observatory (USNO) provides a wide range of astronomical data and products and serves as the official source of time for the U.S. Department of Defense and a standard of time for the entire United States. The USNO provides earth orientation products such as the latest 24-hour and 48-hour sets of GPS satellite orbits, the latest determinations and predictions for polar motion and information for GPS users. The USNO also maintains a reference for precise time (USNO Master Clock) and monitors the GPS constellation. For extensive information on the USNO products available, visit: *https://www.public.navy.mil/fltfor/cnmoc/Pages/usno_test_page.aspx* or contact by telephone at 202-762-1467.

(392)

## DEPARTMENT OF HEALTH AND HUMAN SERVICES

(393)

### Food and Drug Administration (FDA)

(394) Under the provisions of the Control of Communicable Diseases Regulations (**21 CFR 1240**) and Interstate Conveyance Sanitation Regulations (**21 CFR 1250**), vessel companies operating in interstate traffic must obtain potable water for drinking and culinary purposes

only at watering points found acceptable to the FDA. Water supplies used in watering point operations must also be inspected to determine compliance with applicable Interstate Quarantine Regulations (**42 CFR 72**). These regulations are based on authority contained in the Public Health Service Act (PL 78–410). Penalties for violation of any regulation prescribed under authority of the Act are provided for under Section 368 (42 USC 271) of the Act.

(395)

### Public Health Service

(396) The Public Health Service administers foreign quarantine procedures at U.S. ports of entry.

(397) All vessels arriving in the United States are subject to public health inspection. Vessels subject to routine boarding for quarantine inspection are only those which have had on board during the 15 days preceding the date of expected arrival or during the period since departure (whichever period of time is shorter) the occurrence of any death or ill person among passengers or crew (including those who have disembarked or have been removed). The master of a vessel must report such occurrences immediately by radio to the quarantine station at or nearest the port at which the vessel will arrive.

(398) In addition, the master of a vessel carrying 13 or more passengers must report by radio 24 hours before arrival the number of cases (including zero) of diarrhea in passengers and crew recorded in the ship's medical log during the current cruise. All cases that occur after the 24 hour report must also be reported not less than 4 hours before arrival.

(399) *Ill person* means a person who:

(400) 1. Has a temperature of 100°F (or 38°C) or greater, accompanied by a rash, glandular swelling or jaundice, or which has persisted for more than 48 hours; or

(401) 2. Has diarrhea, defined as the occurrence in a 24 hour period of three or more loose stools or of a greater than normal (for the person) amount of loose stools.

(402) Vessels arriving at ports under control of the United States are subject to sanitary inspection to determine whether measures should be applied to prevent the introduction, transmission or spread of communicable disease.

(403) Specific public health laws, regulations, policies and procedures may be obtained by contacting U.S. Quarantine Stations, U.S. Consulates or the Chief Program Operations, Division of Quarantine, Centers for Disease Control, Atlanta, GA 30333. (See Appendix A for addresses of U.S. Public Health Service Quarantine Stations.)

(404)

## DEPARTMENT OF HOMELAND SECURITY

(405)

### Citizenship and Immigration Services

(406) The **U.S. Citizenship and Immigration Service** (USCIS) is the federal agency that oversees lawful immigration to the United States. the Service enhances security and improves the efficiency of national immigration services by exclusively focusing on the administration of benefit applications. No person may enter the United States until they have been inspected by an immigration officer. A list of the offices covered by this Coast Pilot is given in Appendix A.

(407)

### U.S. Coast Guard

(408) The U.S. 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 U.S. navigational rules apply; administration of the Oil Pollution Act of 1990, as amended; establishment and administration of 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; maintenance and issuance of Light Lists and Local Notices to Mariners; and operation of ice-breaking facilities.

(409) Issuance of certificates of registry (more commonly referred to as Certificates of Documentation) with endorsements indicating eligibility of vessels that measure at least 5 net tons to engage in various trades for commercial vessels and certain recreational vessels that are numbered either by the Coast Guard or by a state having an approved numbering system (the latter is the most common) and the administration of the various laws pertaining thereto are functions of the Coast Guard and specifically the National Vessel Documentation Center. Owners of vessels may obtain the necessary information from the National Vessel Documentation Center either by mail to the National Vessel Documentation Center, 792 T.J. Jackson Drive, Falling Waters, WV 25419-9502; via toll free number: 800-799-8362; or via online at: *dco.uscg.mil/Our-Organization/Deputy-for-Operations-Policy-and-Capabilities-DCO-D/National-Vessel-Documentation-Center/*.

(410)

### U.S. Customs and Border Protection

(411) The U.S. Customs and Border Protection administers certain laws relating to:

(412) – entry and clearance of vessels and permits for certain vessel movements between points in the United States

(413) – prohibitions against coastwise transportation of passengers and merchandise

(414) – salvage

(415) – dredging and towing by foreign vessels

(416) – certain activities of vessels in the fishing trade

(417) – regular and special tonnage taxes on vessels

(418) – landing and delivery of foreign merchandise (including unlading, appraisement, lighterage, drayage, warehousing and shipment in bond)

(419) – collection of customs duties, including duty on imported pleasure boats and yachts and 50% duty on foreign repairs to American vessels engaged in trade

(420) – customs treatment of sea and ship's stores while in port and the baggage of crewmen and passengers

(421) – illegally imported merchandise

(422) – remission of penalties or forfeiture if customs or navigation laws have been violated.

(423) Customs and Border Protection also cooperates with many other Federal agencies in the enforcement of statutes for which they are responsible for. Customs districts and ports of entry are listed in Appendix A.

(424) The Customs and Border Protection office may issue, without charge, a **cruising license**, normally valid for one year, to a yacht of a foreign country that has a reciprocal agreement with the United States. A foreign yacht holding a cruising license is exempt from having to undergo formal entry and clearance procedures such as filing manifests and obtaining permits to proceed as well as from payment of tonnage tax and entry and clearance fees at all but the first port of entry. These vessels must not engage in trade, violate the laws of the United States or visit a vessel not yet inspected by a Customs Agent and does, within 24 hours of arrival at each port or place in the United States, report the fact of arrival to the nearest customhouse. Countries that have reciprocal agreements granting these privileges to U.S. yachts are:

(425)

| Countries with U.S. Cruising License Reciprocity | |
|---|---|
| Argentina | Honduras |
| Australia | Ireland |
| Austria | Italy |
| Bahama Islands | Jamaica |
| Belguim | Liberia |
| Bermuda | Marshall Islands |
| Canada | Netherlands |
| Denmark | New Zealand |
| Finland | Norway |
| France | Sweden |
| Germany | Switzerland |
| Great Britain | Turkey |
| Greece | |

(426) Further information concerning cruising licenses may be obtained from the headquarters port for the customs district in which the license is desired or at *cbp.gov*. U.S. yacht owners planning cruises to foreign ports may contact the nearest customs district headquarters as to customs requirements.

(427)

## ENVIRONMENTAL PROTECTION AGENCY (EPA)

(428) The U.S. EPA provides coordinated governmental action to ensure the protection of the environment by abating and controlling pollution on a systematic basis. The ocean dumping permit program of the EPA provides that except when authorized by permit, the dumping of any material into the ocean is prohibited by the "Marine Protection, Research, and Sanctuaries Act of 1972, Public Law 92–532," as amended (33 USC 1401 et seq.).

(429) Permits for the **dumping of dredged material** into waters of the United States, including the territorial sea, and into ocean waters are issued by the U.S. Army Corps of Engineers. Permits for the dumping of fill material into waters of the United States, including the territorial sea, are also issued by the U.S. Army Corps of Engineers. Permits for the dumping of other material in the territorial sea and ocean waters are issued by the EPA.

(430) U.S. Army Corps of Engineers regulations relating to the above are contained in **33 CFR 323** and **324**; EPA regulations are in **40 CFR 220** though **228**. (See Disposal Sites, this chapter.)

(431) Persons or organizations who want to file for an application for an ocean dumping permit should write the EPA Regional Office for the region in which the port of departure is located. (See Appendix A for addresses of regional offices and States in the EPA coastal regions.)

(432) The letter should contain the name and address of the applicant, name and address of person or firm, the name and usual location of the conveyance to be used in the transportation and dumping of the material involved, a physical description where appropriate, and the quantity to be dumped and proposed dumping site.

(433) Everyone who writes EPA will be sent information about a final application for a permit as soon as possible. This final application is expected to include questions about the description of the process or activity giving rise to the production of the dumping material, information on past activities of applicant or others with respect to the disposal of the type of material involved, and a description about available alternative means of disposal of the material with explanations about why an alternative is thought by the applicant to be inappropriate.

(434)

## FEDERAL COMMUNICATIONS COMMISSION (FCC)

(435) The Federal Communications Commission controls non-government radio communications in the United States, Guam, Puerto Rico and the Virgin Islands. 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 U.S. ports. (See Appendix A for addresses.) Information concerning ship radio regulations and service documents may be obtained from the Federal Communications Commission, Washington, DC 20554, or from any of the field offices.

(452) <452-456 Deleted>

(436)

## Measurements and Equivalencies

nautical mile — 1,852 meters / 6,076.12 feet
statute mile — 5,280 feet / 1,609.3 meters / 1.6093 kilometers
cable — 0.1 nautical mile (CN) / 720 feet (US)
fathom — 6 feet / 1.8288 meters
foot — 0.3048 meter
inch — 2.54 centimeters
pound (avoirdupois) — 453.59 gram
kilometer — 1,000 meters
knot — 1.6877 feet per second / 0.5144 meters per second
miles/hour (statute) — 1.466 feet per second / 0.44704 meters per second
acre — 43,560 square feet / 4,046.82 square meters
gram — 0.0022046 pound (avoirdupois) / 0.035274 ounce
meter — 39.37 inches / 3.281 feet / 1.0936 yards
short ton — 2,000 pounds
long ton — 2,240 pounds
metric ton — 2,204.6 pounds
kilogram — 2.2 pounds
liter — 1.0567 quarts
barrel (petroleum) — 42 gallons (US)

## Conversion Factors

### Linear

inches — muiltiply by 25.40 — millimeters
inches — multiply by 2.540 — centimeters
centimeters — multiply by 0.032808 — feet
feet — multiply by 30.48 — centimeters
feet — multiply by 0.3048 — meters
feet — multiply by 0.00016458 — nautical miles
yard — multiply by 0.9144 — meters
meters — multiply by 3.2808 — feet
meters — multiply by 1.094 — yards
meters — multiply by 0.0005399 — nautical miles
statute miles — multiply by 0.86897 — nautical miles
statute miles — multiply by 1.6093 — kilometers
statute miles — multiply by 1,609.3 — meters
nautical miles — multiply by 1.151 — statute miles

### Area

acres — multiply by 4,046.9 — square meters
acres — multiply by 43,560 — square feet
acres — multiply by 0.404685 — hectare
hectare — multiply by 2.471054 — acres
hectare — multiply by 10,000 — square meters
hectare — multiply by $1.07639 \times 10^5$ — square feet
square feet — multiply by 0.0929 — square meters
square feet — multiply by 0.00002296 — acres
square meters — multiply by 10.764 — square feet
square meters — multiply by 0.0002471 — acres

### Depths

fathoms — multiply by 1.8288 — meters
feet — multiply by 0.3048 — meters
meters — multiply by 0.54681 — fathoms
meters — multiply by 3.2808 — feet

### Rate

feet/second — multiply by 0.5925 — knots
feet/second — multiply by 0.6818 — miles/hour
feet/second — multiply by 30.48 — centimeters/second
statute miles/hour — multiply by 0.8689 — knots
statute miles/hour — multiply by 1.467 — feet/second
statute miles/hour — multiply by 0.447 — meters/second
knots — multiply by 1.151 — miles/hour
knots — multiply by 0.5144 — meters/second
knots — multiply by 1.6878 — feet/second
centimeters/second — multiply by 0.01944 — miles/hour
centimeters/second — multiply by 0.02237 — miles/hour
centimeters/second — multiply by 0.032808 — feet/second

### Mass

grams — multiply by 0.035275 — ounces
grams — multiply by 0.002205 — pounds
ounces — multiply by 28.349 — grams
pounds — multiply by 0.45359 — kilograms
short tons — multiply by 2,000 — pounds
short tons — multiply by 0.89286 — long tons
short tons — multiply by 0.9072 — metric tons
long tons — multiply by 2,240 — pounds
long tons — multiply by 1.12 — short tons
long tons — multiply by 1.016 — metric tons
metric tons — multiply by 1,000 — kilograms
metric tons — multiply by 0.9842 — long tons
metric tons — multiply by 1.1023 — short tons
metric tons — multiply by 2,204.6 — pounds

### Volume

barrels (petroleum) — multiply by 42 — gallons (US)
barrels (petroleum) — multiply by 158.99 — liters
barrels (liquid, US) — multiply by 31.5 — gallons (US)
barrels (liquid, US) — multiply by 26.229 — gallons (British)
barrels (liquid, US) — multiply by 119.24 — liters
gallons (US) — multiply by 0.02381 — barrels (petroleum)
gallons (US) — multiply by 3.7854 — liters
liters — multiply by 0.26417 — gallons (US)

(437)

# *Tips for* BOATING CLEAN AND GREEN

**Practice preventative engine maintenance**
Keep your engine well tuned and practice preventative engine maintenance by regularly checking hoses and lines for chaffing or deterioration.

**Use oil absorbants**
Place and secure an oil absorbent under the engine and in the bilge. Avoid using bilge cleaners as they may get discharged overboard. It is illegal to use soap to disperse fuel and oil spills. Report oil and chemical spills by calling the EPA National Response Center at 800–424–8802.

**Spill-proof your fueling practices**
Use a spill proof system like a portable oil change pump to change your oil. Use oil absorbents when fueling and changing the oil. Do not top-off your fuel tank; leave it 10 percent empty to allow fuel to expand as it warms.

**Reduce greywater discharges**
Use shore-side facilities for laundry, showers, and dish washing whenever possible. Use only phosphate-free and biodegradable soaps. The legality of discharging greywater into a marina or within three miles off the coast varies from place to place. In some areas, there are local ordinances and codes that allow harbor patrol to issue citations for any discharge that is not "clean and clear." To avoid any potential fines and to protect the aquatic environment, do not discharge greywater overboard.

WARNING
HAZARDOUS WASTE

**Dispose of hazardous waste properly**
Recycle and properly dispose of absorbents, used oil, oil filters, paint, and batteries at your local household hazardous waste collection site.

**Minimize boat cleaning and maintenance conducted on the water**
- Use more elbow grease.
- Use products that are water-based, biodegradable, phosphate-free, and labeled as less toxic.
- Check out less toxic cleaning alternatives for all types of uses. Visit http://dbw.parks.ca.gov/?page_id=29184.
- Buy only the amount that you need and use products for spot cleaning only.
- Properly handle and store materials. Dispose of hazardous waste legally and safely.

**Reduce discharges from bottom paints**
- Consider alternative, non-biocide hull coatings.
- Clean the bottom with a soft, non-abrasive sponge.
- Use hull cleaning companies who use green management practices such as monitoring their divers and using non-abrasive scrubbing agents that do not release paint into the water. For more information visit https://www3.epa.gov/npdes/pubs/vgp_hull_husbandry.pdf.

**Stow it, don't throw it**
Keep your trash on-board. Recycle plastic, glass, metal, and paper. Avoid excess packaging.

P
Pump-out

**Dump at the pump!**
It is illegal to discharge untreated sewage anywhere within the three-mile territorial limit including lakes, rivers, reservoirs or coastal waters. Never discharge treated sewage into "restricted waters" such as a marina, swimming/wading areas, a sanctuary, poorly flushed areas, lakes, reservoirs, or freshwater impoundments and federal No Discharge Zones. Use sewage pumpouts, dump stations, or mobile-pumpout services.

**Prevent the spread of aquatic invasive species**
Before leaving any body of water, examine your boat and equipment and remove any visible mud, plants, or animals before transporting equipment. Never release plants or animals into a body of water or storm drains unless they came out of that body of water. Use cleaning procedures for anything that contacts the water. Visit https://invasivemusselcollaborative.net/wp-content/uploads/2018/11/NOAA-Decon-Watercraft.pdf.

For hazardous waste recycling or collection centers call 800–CLEAN–UP or visit http://www.earth911.com