Line 26; insert after: Cape Deceit Light (66°06.0′ N., 162°44.0′ W.), 190 feet above the water, is shown from a small white house on the extremity of the point. The light is maintained from August 1 to November 1, annually. (LL–62)

Page 558.—Lines 5–6; read: feet above the water, is shown from a small white house on the cape. The light is maintained from August 1 to November 1, annually. (LL–62)

Page 561.—Lines 14–15; read: the coast trends northward, and a draft of 5 feet can be carried through the entrance. (9–555/61)

Lines 21–22; read:

Point Hope Light (68°22.0′ N., 166°40.0′ W.) is shown from the top of a school house near the center of the settlement of Point Hope. The light is maintained from August 1 to November 1, annually. (9–561/62; NM–37/4885/62)

Lines 32–39; read: Anchorage can be found south and north of Point Hope. The area south of the village is in 12 fathoms about 0.65 mile off the beach with Point Hope Light bearing 357°. The area north of the village is in 5 fathoms, 0.5 mile off the beach, with Point Hope Light bearing 211°. The bottom is hard mud throughout the Point Hope area. (9–555/61,–561/62)

Line 45; insert after: Mail and passenger flights call at Point Hope three times weekly. Charter service is available from Kotzebue. (9–555/61)

Page 563.—Coast Pilots, read:

1, Atlantic Coast, Eastport to Cape Cod, 1960.
2, Atlantic Coast, Cape Cod to Sandy Hook, 1960.
3, Atlantic Coast, Sandy Hook to Cape Henry, 1961.
4, Atlantic Coast, Cape Henry to Key West, 1959.
5, Atlantic Coast—Gulf of Mexico, Puerto Rico, and Virgin Islands, 1962.
7, Pacific Coast, California, Oregon, Washington, and Hawaii, 1963.
8, Pacific Coast, Alaska—Dixon Entrance to Cape Spencer, 1962.
9, Alaska, Cape Spencer to Arctic Ocean, 1954.

Distances between United States Ports, Third (1961) Edition.

Chart agencies.—Agents marked with an asterisk (*) also handle certain U.S. Navy Hydrographic Office publications. Those marked with a dagger (†) also handle U.S. Coast Guard publications.

Anchorage: Miller-Dalton Co., 335 2d St.
Cordova: Karls.
Craig: J. T. Brown's Store.
Homer: The Sporter Arms Co.
Juneau: †J. B. Burford, Inc., 113 4th St.; †Northern Commercial Co.
Ketchikan: *†Service Electric Co., Inc., 744 Water St.
Kodiak: †Kodiak Suppliers.
Pelican: Pelican Cold Storage Co.
Petersburg: The Trading Union, Inc.
Port Protection: B.S. Trading Post.
Sand Point: Aleutian Cold Storage Co.
Seldovia: H. S. Young Mercantile Co.
Seward: Durant's Hardware.
Sitka: †Sitka Arts & Crafts.
Tenakee Springs: Snyder Mercantile Co

Valdez: Valdez Drug Co., Inc.
Wrangell: Campbell & Hay, Inc.
Yakutat: Mallott's General Store.

Page 566.—Distance Table: the correct distance from Seattle (inside) to Cape Spencer is 976 miles. (9–566/61)

Page 568.—Coast Guard:

Commander, Seventeenth District. The Seventeenth Coast Guard District, with District office at Community Building, P.O. Box 2631, Juneau, Alaska, shall comprise the State of Alaska.

Marine Inspection Office: Juneau.

Captain of the Port Office, Coast Guard Base, Ketchikan, Alaska. All navigable waters of the United States and contiguous land areas within the following boundaries: On the east the 131°20'00'' W. meridian, on the south the 55°00'00'' N. parallel, on the west the 132°00'00'' W. meridian, and on the north the 55°30'00'' N. parallel. (20 FR–3/12/55)

Page 568.—Collector of Customs: Cordova, Craig, Eagle, and Hyder no longer ports of entry; marine documents no longer issued at Skagway. Anchorage is a customs port of entry. (FR–1/14/61; 20–FR/55; 21–FR–56; FR–11/21/62)

Page 568.—Forest Service: Change name to **Northern Forest Experimental Station, Johnson Bldg., Juneau.** Add **Chugach National Forest, Anchorage.** (9–568/61)

Page 569.—Weather Bureau Offices: barometers may be compared with standards at these offices:

Anchorage, International Airport.
Juneau, Juneau Airport. (WB–61)

Page 569.—Radiotelephone broadcasts of weather information: (local standard time)

ALB, Anchorage, 2312 kc., 8 a.m. and 7 p.m. daily.
ALB66, Cold Bay, 2312 kc., 11 a.m., 2 p.m., and 5 p.m. daily (seasonal).
ALB44, Cordova, 2300 kc., odd hours 8 a.m. to 5 p.m. weekdays (seasonal).
ALF, Juneau, 2784 kc., 6:30 and 8:30 a.m., 1, 6:30, and 8:30 p.m. daily.
ALE, Ketchikan, 2300 kc., 10:15 a.m., 4:15 and 10:15 p.m. daily.
ALB77, King Salmon, 2312 kc., 8:30 a.m., 2:30 and 7 p.m. daily (seasonal).
ALB90, Kodiak, 2784 kc., odd half-hour, 9 a.m. to 6 p.m. weekdays.
ALF44, Sitka, 2312 kc., 11 a.m., 2 and 5 p.m. weekdays.
ALD33, Unalaska, 2312 kc., 9 a.m. weekdays (seasonal). (ACS–63)

Weather broadcasts by commercial radio stations.—Taped or direct broadcasts of forecasts and storm warnings are made by commercial radio stations in the areas covered by this Coast Pilot. These usually are put on the air at least twice daily; broadcast times are published in local newspaper radio program schedules, and in the Coastal Warning Facilities Charts issued annually by the U.S. Weather Bureau. The charts are on sale, 10 cents each, at Superintendent of Documents, Washington 25, D.C. (WB–61)

Pages 647–673.—Index changes:

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U.S. GOVERNMENT PRINTING OFFICE: 1964

UNITED STATES COAST PILOT

9

PACIFIC AND ARCTIC COASTS

Alaska, Cape Spencer to Beaufort Sea

SEVENTH (October 3, 1964) EDITION

Corrected through NM-40/64

U.S. DEPARTMENT OF COMMERCE
LUTHER H. HODGES, *Secretary*
COAST AND GEODETIC SURVEY
H. ARNOLD KARO, *Director*

United States Government Printing Office : 1964
For sale by the Coast and Geodetic Survey and its sales agents
Price $2.50

Preface

United States Coast Pilot 9, Pacific and Arctic Coasts, Alaska, Cape Spencer to Beaufort Sea, Seventh (October 3, 1964) Edition, is based mainly upon the work of the U.S. Coast and Geodetic Survey but includes information obtained from the U.S. Coast Guard, the U.S. Army Engineers, the U.S. Weather Bureau, and others. The preceding Sixth (November 6, 1954) Edition is canceled.

The March 27, 1964, earthquake caused widespread upheaval, subsidence, and consequent port damage in Prince William Sound, Cook Inlet, and on Kodiak Island. Present text for those areas was written from post-earthquake investigations by USC&GS Ships HODGSON, PATHFINDER, and SURVEYOR and from an August 1964 field inspection by Marine Information Specialist Salvatore Bente.

Cumulative Supplements, containing revisions and new information reported since edition date of Coast Pilot, usually are issued early each year. Free copies of Supplements may be obtained by writing to Director, U.S. Coast and Geodetic Survey, Washington Science Center, Rockville, Md., 20852.

JOHN A. MCCORMICK,
Chief, Coast Pilot Branch.

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1. GENERAL INFORMATION

UNITED STATES COAST PILOTS.—The C&GS Coast Pilots are a series of eight nautical books that cover a wide variety of information important to navigators of United States coastal and intracoastal waters. Most of this book information cannot be shown graphically on the standard nautical charts and is not readily available elsewhere. Coast Pilot subjects include navigation regulations, outstanding landmarks, channel and anchorage peculiarities, dangers, weather, ice, freshets, routes, pilotage, and port facilities. A new edition of each Coast Pilot is published at intervals ranging from 4 to 10 years. Cumulative Supplements, containing changes reported since dates of editions, are published early each year and are distributed free.

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

Bridges and cables.—Clearances of bridges and overhead cables are in feet above normal high water unless otherwise stated; clearances of drawbridges are for the closed position. These are the vertical clearances approved by the Nautical Chart Division, C&GS. They may be as-built, authorized, or reported; see latest prints of nautical charts for possible modifier. Also see charts for horizontal clearances of bridges; these are repeated in the Coast Pilots only when they are less than 50 feet and then only in terms of channel width or length of span.

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

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

Depth units.—Depths are in feet or fathoms below the low-water tidal datum of the charts unless otherwise stated.

Distances.—These are in nautical miles unless otherwise stated. A nautical mile is 1 minute of latitude, or approximately 2,000 yards, and is about 1.15 statute miles.

Elevations.—These are in feet above the plane of reference used for that purpose on the charts.

Light and fog-signal characteristics.—These are not described, and light sectors are seldom defined. See Coast Guard Light Lists.

Radio navigational aids.—These are seldom described. See Coast Guard Light Lists.

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

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

The **COAST AND GEODETIC SURVEY** is required to provide charts and related information for the safe navigation of marine and air commerce, and to provide basic data for engineering and scientific purposes and for other commerical and industrial needs.

Field offices of the Coast and Geodetic Survey are located at some of the principal ports in the United States; see Appendix. Files of charts, Coast Pilots, and other publications are maintained at these offices for the use of mariners, who are invited to avail themselves of the facilities afforded.

Sales agents for Charts, Coast Pilots, Tide Tables, Tidal Current Tables, and Tidal Current Charts of the Coast and Geodetic Survey are located in many ports of the United States and in some foreign ports. See Appendix for list of sales agents. Orders mailed to C&GS headquarters should be accompanied by check or money order, made payable to C&GS, Department of Commerce. Indexes of charts and books will be furnished free, upon receipt of request designating areas of interest.

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

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

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

(c) By night a surveying vessel of the Coast and Geodetic Survey, underway and employed in hydro-

graphic surveying, shall carry the regular lights prescribed by the rules of the road.

(d) A vessel of the Coast and Geodetic Survey, when at anchor in a fairway on surveying operations, shall display from the mast during the daytime two black balls in a vertical line and 6 feet apart. At night two red lights shall be displayed in the same manner. In the case of a small vessel the distance between the balls and between the lights may be reduced to 3 feet if necessary.

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

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

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

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

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. Coast and Geodetic Survey charts are classified according to scale as follows:

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

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

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

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

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

The **date of a chart** is of vital importance to the navigator. When charted information becomes obsolete, further use of the chart for navigation may be dangerous. Up-to-date charts should be obtained at regular intervals.

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

Echo soundings.—Most of the various types of echo sounder are calibrated for a velocity of sound in water of 800 fathoms per second, but the actual velocity may differ from the calibrated value by as much as 5 percent, depending upon the temperature and salinity of the waters in which the vessel is operating; the highest velocities are found in warm, highly saline water, and the lowest in icy, fresh water. Variation in the line voltage can also cause errors of 10 percent or more in reading. Echoes can be obtained from schools of fish; in fact, trawlers are using the sounders for that purpose. The most serious error commonly occurs where the depth is greater than the scale range of the instrument; a 400-fathom scale indicates 15 fathoms visually and graphically when the depth is 415 fathoms. Where possible, wide variations from charted depths should be checked by wire soundings.

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

Compass roses on charts.—The annual change in variation gradually introduces an error in the magnetic compass roses on charts. The compass roses are replotted for every new edition of the chart if the error is appreciable; and the amount and date of the variation and the

amount of annual change are stated for each compass rose. On some of the sailing and general charts the magnetic variation is shown by isogonic lines.

Deviation of the compass.—The magnetic effect of the ship itself combines with any instrumental error of the compass to cause the deviation, which varies with the heading of the ship and with the magnetic latitude. It is customary to counteract the deviation as far as possible with soft iron and permanent magnets, suitably placed in or on the binnacle.

Local magnetic disturbance.—The charts show areas where the compass is disturbed by magnetic masses external to the ship. Such disturbances are fairly common in shallow waters but are never encountered over oceanic depths. Magnetic force diminishes so rapidly with distance that a magnetic center on land would have to be of unprecedented intensity to affect the compass of a vessel 0.5 mile from shore.

Overhead cables are shown on the charts and described in the Coast Pilots; the clearances given are for the lowest wires at high water. Vessels with masts, stacks, booms, or aerials should allow for an additional clearance under power cables equal to the distance between adjacent cables.

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

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

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

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

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

The **COAST GUARD** has among its duties the enforcement of the laws of the United States on the high seas and in coastal and inland waters of the U.S. and its possessions; enforcement of navigation and neutrality laws and regulations and the Oil Pollution Act; inspection of vessels of the Merchant Marine; search and rescue; issuance of Merchant Marine licenses and documents; investigation of marine casualties and accidents, and suspension and revocation proceedings; destruction of derelicts; operation of aids to navigation, and publication of Light Lists and Local Notices to Mariners; and operation of ice breaking facilities.

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

Light Lists.—Aids to navigation, consisting of lights, fog signals, buoys, lightships, daybeacons, and electronic aids, are described in the Light Lists, which are for sale by the Superintendent of Documents, Government Printing Office, Washington, D.C., 20402, and by sales agents in the principal seaports. Mariners should refer to these publications for detailed information regarding the characteristics and visibility of lights, and the descriptions of light structures, lightships, buoys, fog signals, and electronic aids.

Local Notices to Mariners.—Changes and deficiencies in aids to navigation maintained by or under the authority of the Coast Guard are published in Local Notices to Mariners issued by the District Commander of the area in which the aids are located. The local notices are

intended for local navigation interests operating within the limits of a Coast Guard district. Changes in aids to navigation of the United States are also contained in the weekly Notice to Mariners, prepared jointly by the Coast Guard and the Naval Oceanographic Office. The weekly notices are intended for mariners and others who have a definite need for them in connection with extended seagoing activities or for those operating in several Coast Guard districts.

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

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

Lights.—The visibility of lights is given in the Light Lists and shown on the charts. The distances 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.

Navigational lights should be used with caution because of the following conditions that may exist:

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

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

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

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

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

The apparent characteristic of a complex light may change with the distance of the observer. The characteristic as charted and shown in the light list may not be recognized until nearer the light.

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

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

Arcs drawn on charts around a light show the bearings between which the variation of visibility or obscuration occurs and do not indicate the distance at which it can be seen. On some bearings the distance may be reduced or increased by land or other obstructions, depending on the distance from the light.

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

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

Sound travels through the air in a variable manner with or without the effects of wind and, therefore, the hearing of fog signals cannot be implicitly relied upon. Experience indicates that distances must not be judged only by the intensity of the sound; that occasionally there may be areas close to a fog signal in which it is not heard; and that fog may exist not far from a station, yet not be seen from it, so the signal may not be operating. It is not always possible to start a fog signal immediately when fog is observed.

Lightships.—Courses should invariably be set to pass lightships with sufficient clearance to avoid the possibility of collision from errors of observation, current and wind effects, other vessels in the vicinity, defect in steering apparatus, and from other causes. Experience shows that lightships cannot be safely used as leading marks to be passed close aboard, but should always be left broad off the course, whenever searoom permits.

During extremely heavy weather and due to their exposed locations, lightships may be carried off station without the knowledge and despite the best efforts of their crews. A lightship known to be off station will secure her light, fog signal, and radiobeacon and fly the International Code signal "PC" signifying "Lightship is not at anchor on her station."

Station (watch) buoys are sometimes moored near lightships to mark the approximate station should the lightship be carried away or temporarily removed. Since these buoys are always unlighted and, in some cases, moored as much as a mile from the lightship, the danger of a closely-passing vessel colliding with them is always present, particularly so during darkness or periods of reduced visibility.

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

tics, or sound buoys may not function because of storm, ice, or collision.

Buoys may not always properly mark shoals or other obstructions due to shifting shoals and storms. 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 because of local conditions, and since sunken wrecks are not always static, extreme caution should be exercised when operating in the vicinity of such buoys.

Radiobeacons.—A list and descriptive details of all marine radiobeacons are given in the Light Lists. There is included in these publications the procedure to follow for the use of radiobeacons for calibration of radio direction-finders as well as a list of special radio direction-finder calibration stations.

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

Radio bearings.—No exact data can be given as to the accuracy to be expected in radio bearings taken by a ship, since the accuracy depends to a large extent upon the skill of the ship's operator, the condition of the ship's equipment, and the accuracy of the ship's calibration curve. Mariners are urged to obtain this information for themselves by taking frequent radio bearings, when their ship's position is accurately known, and recording the results. Bearings of aircraft ranges and standard broadcast stations should be used with particular caution due to coastal refraction and lack of calibration of their frequencies.

Conversion of radio bearings to Mercator bearings.—The increasing use of radio directional bearings for locations of ships' positions at sea, especially during foggy weather, has made it particularly desirable to be able to apply these radio bearings directly to the nautical chart. These radio bearings are the bearings of the great circles passing through the radio stations and the ship, and, unless in the plane of the Equator or a meridian, would be represented on a Mercator chart as curved lines. Obviously it is impracticable for a navigator to plot such lines on a Mercator chart, so it is necessary to apply a correction to a radio bearing to convert it into a Mercator bearing, that is, the bearing of a straight line on a Mercator chart laid off from the sending station and passing through the receiving station.

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

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

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

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

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

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

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

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

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

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

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

Numbering and recording of undocumented vessels.—Certain undocumented vessels are required to be numbered by the Federal Boating Act of 1958, effective April 1, 1960. They may be numbered either by the Coast Guard or by a state having an approved numbering system. Owners may obtain the necessary information from any Coast Guard District Commander.

Licensing of vessels.—Navigation laws pertaining to registry, enrollment, and licensing of vessels are administered by the **Bureau of Customs.** The bureau's functions also include issuing of commissions to yachts and the assignment of signal letters; the measurement of vessels, administration of tonnage duties, and the collection of tolls; the regulation of vessels in the coasting and fishing trade and limitation of the use of foreign vessels in waters under the jurisdiction of the United States; the recording of sales, conveyances, and mortgages of vessels; the protection of steerage passengers, and the remission of fines, penalties, and the forfeitures incurred under the laws governing these matters. Collection districts and ports of entry located within the area covered by this Coast Pilot are tabulated in the Appendix.

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

Minesweeper signals.—United States vessels engaged in minesweeping operations have their maneuvering powers considerably hampered. All other vessels, whether steamers or sailing craft, should keep out of the way of the sweepers, remembering especially that it is dangerous to pass between the vessels of a pair or group sweeping together.

All vessels towing sweeps are to show a black ball at the foremasthead, and at the yardarm on the side or sides on which it is dangerous to pass, **by day** and green lights instead of the black balls **by night;** the lights may only be exhibited when necessary to warn approaching friendly vessels. Other vessels are not to approach the sweepers nearer than 500 yards on either beam or 1,000 yards astern; under no circumstances is a vessel to pass through a formation of mine sweepers. The sweepers should be prepared to warn other vessels who persist in approaching too close by means of any of the appropriate signals from the International Code of Signals.

Improper use of searchlights prohibited.—No person shall flash or cause to be flashed the rays of a searchlight or other blinding light onto the bridge or into the pilothouse of any vessel under way (46 CFR 78.27–1(a). The International Code Signal "ZO" may be made by a vessel inconvenienced by the glare of a searchlight in order to apprise the offending vessel of the fact.

Unnecessary whistling prohibited.—The unnecessary sounding of the vessel's whistle is prohibited within any harbor limits of the United States (46 CFR 78.23–1(a)).

Search and rescue operations.—The Coast Guard coordinates search and rescue operations in the cases of surface vessels or aircraft that are in distress or overdue. Search and rescue planes have special markings consisting of a wide band of fluorescent red orange around the after part of the fuselage or hull. The cooperation of vessel operators with search and rescue planes may mean the difference between life and death for some seaman or aviator.

Operators of disabled wooden craft and persons adrift in rubber rafts or boats that are, or may consider themselves to be, the object of a search, should hoist on a halyard or otherwise place aloft as high as possible any metallic object that would assist their detection by radar. Coast Guard cutters and aircraft are radar equipped and thus are able to continue searching in darkness and during other periods of low visibility.

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

(a) Circling the surface craft at least once.

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

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

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

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

Note.—The above procedures are taken from the Convention on International Civil Aviation.

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

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

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

3. Be prepared to send homing signals for the aircraft on 410 kcs or 522 kcs.

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

5. Post extra lookouts.

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

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

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

9. Have ship's hospital prepared to receive injured persons.

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

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

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

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

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

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

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

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

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

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

Ships in distress.—Radio-equipped vessels requiring assistance may obtain the services of the Coast Guard by transmitting a request on the international distress and calling frequency 500 kc. to "Any Coast Guard Unit" (radio call NCU), or to any shore radio station addressed to "COGARD." Shore radio stations will forward to the Coast Guard all information regarding vessels requiring assistance unless such information is contained in a message specifically addressed elsewhere.

If the following information is included in the original request for assistance it will place the responsible Coast Guard officer in a position to determine immediately the types and numbers of vessels and aircraft required to render adequate aid, thus greatly facilitating the work of the Coast Guard and avoiding any unnecessary delay in the dispatching of assistance:

1. Name, type, and nationality of vessel; color, size and shape.
2. Position, course, and speed (including drift).
3. Nature of trouble and condition of vessel, sea and wind. Action taken, if any.
4. Number of persons on board.
5. State whether or not Coast Guard assistance is required.

Small craft in distress.—Under the provision of the international regulations, which permits the use of any means available to a vessel or aircraft in distress to draw attention and obtain help, small commercial and private craft equipped with radiotelegraph or radiotelephone apparatus that cannot be operated on the international distress frequency of 500 kc. (600 m.) may usually obtain Coast Guard assistance by transmitting the distress signal or call and the message on the 2182 kc. frequency.

Submarine emergency identification signals.—The following flare signals, fired from a submerged signal ejector to 300 feet in the air, are made by United States submarines when in emergency:

Green or black indicates torpedo has been fired; will be used to simulate torpedo firing on special exercises such as convoy exercises.

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

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

A submarine marker messenger buoy, about 3 feet in diameter, is painted international orange. The buoy has a wire cable to the submarine, to act as a downhaul line for a rescue chamber. The buoy may be accompanied by an oil slick release to attract attention. A submarine in distress may release this buoy. If sighted, such a buoy should be investigated and reported immediately to Naval authorities.

The submarine may transmit the International Distress Signal (SOS) on its sonar gear independently or in addition to the red signal. Submarines also may use these other means of attracting attention: release of dye marker or air bubble; ejection of oil, and pounding on hull.

The **CORPS OF ENGINEERS**, U.S. Army, 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 the 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 approval of plans of bridges, the alteration of obstructive bridges, the establishment of anchorage grounds and harbor lines, the removal of sunken vessels obstructing or endangering navigation, and the granting of permits for structures or operations in navigable waters.

Information concerning the various ports, improvements, channel depths, navigable waters, and the condition of the Intracoastal Waterways in the areas under their jurisdiction may be obtained direct from the District Engineer offices; see Appendix.

Anchorage areas and restricted areas in most places are defined and regulations governing them are established by the Corps of Engineers. The regulations are enforced by the U.S. Coast Guard, and the areas are shown on the large-scale charts of the Coast and Geodetic Survey. Copies of the regulations may be obtained at the offices of the Corps of Engineers. The regulations also are copied into the appropriate Coast Pilots.

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

Fish havens.—This is nautical-chart terminology for the artificial fishing reefs established (through 1962) in United States coastal waters to simulate the legitimate reefs and wrecks that attract fish. The Corps of Engineers issues permits to various interests, usually sport fishermen, to dump assorted junk ranging from old trolley cars to scrap building material in specified areas which may be of very small extent or may stretch many miles along a depth contour; old automobile bodies appear to be the favorite material of the reef builders. These underwater junk piles may rise only a few feet or as much as 10 feet (according to permit) above natural bottom. but the reef-builder's adherence to permit specifications can only be checked with a wire drag. Navigators should be cautious about passing over these artificial obstructions or anchoring in their vicinity.

WEATHER BUREAU.—Forecasts and warnings of the approach of storms over land and ocean areas are among the services of the Weather Bureau to navigation, commerce, agriculture, and the general public. Other warnings cover cold waves, frost, forest-fire hazard, and floods. Meteorological information is collected and transmitted at 1-hour, 3-hour, and 6-hour intervals from land stations, ships at sea, and aircraft. These reports form a basis for the forecasting service, for summarization and publication of climatological data having general value and applicability, and for research basic to improvement of the national weather service.

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

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

The hurricane and storm warning service was established primarily to aid marine interests. Storm warnings are prepared at regular district forecast centers and at special hurricane forecast centers. The warnings are distributed to the public through all neighboring Weather Bureau offices by radio, the press, and every other available means. During the West Indian hurricane season, June to November, inclusive, teletype circuits expedite the exchange of reports from the Atlantic and Gulf coasts; special reports are obtained from weather reconnaissance planes which fly near the storms and sometimes into the storm centers.

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

Storm warning displays.—The Weather Bureau employs the following system for displaying warning signals at stations along the United States coast, except Alaska, but including the Great Lakes and Puerto Rico, when winds dangerous to navigation are forecast.

Small-craft warning: One red pennant displayed by day and a red light above a white light at night to indicate that winds up to 33 knots and/or sea conditions dangerous to small craft operations are forecast for the area.

Gale warning: Two red pennants displayed by day and a white light above a red light at night to indicate that winds ranging from 34 to 47 knots are forecast for the area.

Whole gale warning: A single square red flag with black center displayed by day and two red lights at night to indicate that winds ranging from 48 to 63 knots are forecast for the area.

Hurricane warning: Two square red flags with black

centers displayed by day and a white light between two red lights at night to indicate that winds of 64 knots and above are forecast for the area.

The **NAVAL OCEANOGRAPHIC OFFICE** is required to provide accurate nautical charts and related information for foreign waters. Publications include Sailing Directions (pilots), Light Lists, Table of Distances, Radio Navigational Aids, Radio Weather Aids, International Code of Signals, and the American Practical Navigator (Bowditch). The weekly Notice to Mariners, a joint arrangement with the Coast Guard, contains corrections to charts and publications for both foreign and domestic waters; see Appendix for coverage.

The **IMMIGRATION AND NATURALIZATION SERVICE** administers the laws relating to admission, exclusion, and deportation of aliens, the registration and fingerprinting of aliens, and the naturalization of aliens lawfully resident in the United States.

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

The **PUBLIC HEALTH SERVICE** administers hospitalization and outpatient treatment to legal benficiaries of the Government; it also administers foreign and domestic quarantine laws and conducts medical examinations of aliens.

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

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

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

National quarantine regulations will be found at the stations of the Public Health Service and at United States consulates and will be furnished to vesssels upon application to officers of the Service or to Chief, Division of Foreign Quarantine, Public Health Service, DHEW, Washington, D.C., 20201.

Medical service.—United States merchant seamen are entitled to medical relief obtainable through the Public Health Service. A United States seaman is one engaged on board in care, preservation, or navigation of any registered, enrolled, or licensed vessel of the United States, or in the service, on board, of those so engaged. Hospitals, outpatient clinics, and outpatient offices of the Public Health Service are located at the addresses given in the Appendix. Free medical advice is furnished to seamen by radio.

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

Marine weather broadcasts.—Information on weather over North Atlantic and North Pacific waters is issued by the Weather Bureau for broadcast by commercial and Government radio stations. Marine bulletins for the western North Atlantic are broadcast by Navy station NSS, Washington, D.C.; those for the eastern North Pacific are transmitted by KPH, Bolinas, Calif., and KTK, San Francisco, Calif. A separate bulletin for Central Pacific waters is broadcast by KHK, Kahuku, Hawaii. The marine bulletins include storm advisories, forecasts, and coded weather-map analyses and reports. Station frequencies, broadcast times, and areas affected are stated in the radio publications; see Appendix.

Advisories and forecasts also are broadcast by Navy stations NBA, Balboa, C.Z.; NPG, San Francisco, Calif.; NHB, Kodiak, Alaska; and NPM, Honolulu, Hawaii.

Local weather bulletins, containing coastal-area forecasts, storm advisories, and weather summaries for specific areas, are broadcast on regular scheludes by many Government and commercial radio stations.

Emergency broadcasts by Navy radio stations.—Storm advisories and notices concerning the safety of navigation

at sea are broadcast by Navy radio stations in accordance with the degree of urgency, as follows:

A. Notices of tidal waves, hurricanes, typhoons, and cyclones so imminent as to warrant immediate broadcasting: (1) One transmission immediately on receipt; (2) one transmission at the end of the first ensuing silent period; and (3) one transmission during the first ensuing on-watch period for ships with one operator, in case both previous transmissions were made during the off-watch period.

B. Storm warnings and notices of less urgency than those specified in (A) and other than those normally included in scheduled hydrographic broadcasts: (1) One transmission at the end of the first ensuing silent period; and (2) one transmission during the on-watch period for ships with one operator in case the previous transmission was made during an off-watch period.

These broadcasts are preceded by transmission of the Urgent Signal (XXX) or the Safety Signal (TTT) and a preliminary announcement on 500 kc. of the message to follow on the station working frequency.

Emergency broadcasts by Coast Guard radio stations.—Storm and hurricane warnings, advisories and other urgent marine information are broadcast by Coast Guard radio stations:

A. By radiotelegraph on the station's medium frequency immediately following the first silent period after receipt of the message at the radio station (HH+18 or HH+48) preceded by an initial call on 500 kc. These safety broadcasts are preceded by the Safety Signal (TTT). Whenever this transmission occurs outside the watch hours for single radio operator ships, the message will be repeated at the end of the next silent period falling within the radio watch hours for such vessels. If a station makes daily broadcasts of marine information, the message will also be included in its next scheduled transmission.

B. By radiotelephone on 2182 kc. immediately following receipt of the message at the radio station and repeated at the station's next scheduled broadcast.

Radiotelephone broadcasts of weather information (United States).—Transmission by voice of weather information from the Weather Bureau is made through certain radio stations of the Coast Guard and of the commercial coastal radiotelephone service. These broadcasts are followed immediately by reports of dangerous obstructions and changes in aids to navigation.

This service gives to yachts, fishing craft, tugboats, and other vessels equipped with a radio receiving set having a band covering the frequency range of 2 to 3 megacycles, official weather information from the Weather Bureau in plain language and on regular schedules.

These radiotelephone broadcasts are made twice and, in some cases, four times daily at definite times and include marine forecasts, and storm warnings whenever they are issued, for coastal waters in or adjacent to the areas served by the radio stations.

Certain local radio stations in the standard broadcast band have microphones installed in nearby Weather Bureau offices. From these stations forecasts, weather summaries, and warnings are broadcast on regular schedule. Stations in this area are listed in the annual Weather Bureau Coastal Warning Facilities Charts.

West Indies.—Coast Guard station NMR, San Juan, P.R., broadcasts twice daily by radiotelephone and radiotelegraph a weather bulletin consisting of marine forecasts and weather summary for the Caribbean Sea area and small-craft, storm, and hurricane warnings when applicable.

Mexico and Canada.—Scheduled broadcasts of weather information affecting the coasts of Mexico and Canada are made by designated stations of those countries on marine frequencies by both radiotelegraph and radiotelephone.

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

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

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

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

The **National Bureau of Standards** broadcasts time signals from its radio station **WWV** near Washington, D.C., on radio frequencies of 2.5, 5, 10, 15, 20, and 25 megacycles, which are on the air at all times, day and night. This insures reliable coverage of the United States and extensive coverage of other parts of the world. The services include time announcements, standard time intervals, standard audio frequencies, and radio-propagation disturbance-warning notices.

Time announcements.—The audio frequencies are interrupted at precisely 2 minutes before each hour. They are resumed precisely on the hour and each 5 minutes thereafter. The beginnings of the periods, when the audio

frequencies are resumed, are in agreement with the basic service of the U.S. Naval Observatory, and accordingly they accurately mark the hour and successive 5-minute periods.

Greenwich Mean Time is announced in telegraphic code each 5 minutes. The zero- to 24-hour system is used. This announcement refers to the end of the announcement interval. A voice announcement of eastern standard time is given following each telegraphic code announcement.

Standard time intervals.—On each carrier frequency is a pulse which occurs at intervals of precisely 1 second. The pulse is omitted at the beginning of the last second of every minute. The 1-minute, 4-minute, and 5-minute intervals, synchronized with the second pulses, are marked by the beginning or ending of the periods when the audio frequencies are off.

A radio-propagation disturbance warning forecast is transmitted in Morse code twice each hour at 19½ and 49½ minutes past the hour. These warnings tell users of radio transmission paths over the North Atlantic, the condition of the ionosphere at the time of the announcement, and how good or bad communication conditions are expected to be for the next 12 hours. During a period of radio-propagation disturbance, direction-finder observations may be unreliable; the letters "N", "U", and "W" signify that radio propagation conditions are, respectively, normal, unsettled, or disturbed.

Radio station WWVH, on the island of Maui, Hawaii, broadcasts on 5, 10, and 15 megacycles. The schedule of broadcasts is the same as that of station WWV for standard time intervals, time announcements in code, standard audio frequencies, and accuracy. Simultaneous reception of WWV and WWVH does not interfere with ordinary use of the standard frequency and time signals.

The WWVH broadcast is interrupted for 4 minutes following each hour and half hour and for periods of 34 minutes each day beginning at 1900 GMT.

DESTRUCTIVE WAVES.—Unusual sudden changes in water level can be caused by seismic sea waves 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.

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

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

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

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

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

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

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

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

2. NAVIGATION REGULATIONS

THIS chapter contains the sections of **Code of Federal Regulations, Title 33, Navigation and Navigable Waters,** that are of most importance in Alaska.

PART 82—BOUNDARY LINES OF INLAND WATERS:

§ 82.1 General basis and purpose of boundary lines. By virtue of the authority vested in the Commandant of the Coast Guard under section 101 of Reorganization Plan No. 3 of 1946 (3 CFR, 1946 Supp., Ch. IV), and section 2 of the act of February 19, 1895, as amended (28 Stat. 672, 33 U.S.C. 151), the regulations in this part are prescribed to establish the lines dividing the high seas from rivers, harbors, and inland waters in accordance with the intent of the statute and to obtain its correct and uniform administration. The waters inshore of the lines described in this part are "inland waters," and upon them the inland rules and pilot rules made in pursuance thereof apply. The waters outside of the lines described in this part are the high seas and upon them the international rules apply. The regulations in this part do not apply to the Great Lakes or their connecting and tributary waters.

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

§ 82.275 Bays, sounds, straits, and inlets on the coast of southeastern Alaska between Cape Spencer Light and Sitklan Island. A line drawn from Cape Spencer Light due south to a point of intersection which is due west of the southernmost extremity of Cape Cross; thence to Cape Edgecumbe Light; thence through Cape Bartolome Light and extended to a point of intersection which is due west of Cape Muzon Light; thence due east to Cape Muzon Light; thence to a point which is 1 mile, 180° true, from Cape Chacon Light; thence to Barren Island Light; thence to Lord Rock Light; thence to the southernmost extremity of Garnet Point, Karagunut Island; thence to the southeasternmost extremity of Island Point, Sitklan Island. A line drawn from the northeasternmost extremity of Point Mansfield, Sitklan Island, 040° true, to where it intersects the mainland.

PART 124—CONTROL OVER MOVEMENT OF VESSELS:

§ 124.10 Advance notice of vessel's time of arrival to Captain of the Port. (a) The master or agents of every registered vessel of the United States, and every foreign vessel arriving at a United States port or place from a port or place outside the United States, or any such vessel destined from one port or place in the United States to another port or place in the United States, shall give at least 24 hours' advance notice of arrival to the Captain of the Port at every port or place where the vessel is to arrive, except as follows:

(1) Registered United States pleasure vessels and registered United States fishing vessels are not required to submit advance notice of arrival report.

(2) When the port of arrival is not located within the geographical area assigned to a particular Captain of the Port, this advance notice of time of arrival shall be made to the Commander of the Coast Guard District in which such port or place is located.

(3) When the arrival is a direct result of the operation of "force majeure," and it is not possible to give at least 24 hours' advance notice of time of arrival, then advance notice as early as practicable shall be furnished.

(4) When the vessel, while in United States waters, does not navigate any portion of the high sea, i.e. does not navigate beyond the low water mark along the coasts or beyond the waters contained within the headlands of the United States.

(5) When a vessel is engaged upon a scheduled route if a copy of the schedule is filed with the Captain of the Port for each port of call named in the schedule and the times of arrival at each such port are adhered to.

(6) When the master of a merchant vessel (except on a coastwise voyage of 24 hours or less) reports in accordance with the U.S. Coast Guard's voluntary Atlantic Merchant Vessel Report (AMVER) System, he shall be considered to be in constructive compliance with the requirements of paragraph (a) of this section and no additional advance notice of vessel's arrival reports to the Captain of the Port is required. The master or agent of a vessel on coastwise voyages of 24 hours or less shall report the advance notice of vessel's arrival to the Captain of the Port at next port of call prior to or upon departure from port.

(7) For that vessel which is engaged in operations in

and out of the same port to sea and return without entering any other port, or on coastwise voyages between ports in the same Coast Guard District, or on voyages between ports in the First, Ninth, Thirteenth, or Seventeenth Coast Guard Districts and adjacent Canadian ports, or between ports in the Commonwealth of Puerto Rico and ports in the Lesser Antilles, the Coast Guard District Commander having jurisdiction may, when no reason exists which renders such action prejudicial to the rights and interests of the United States, prescribe conditions under which such vessels may be considered by the Captains of the Port as being in constructive compliance with the requirements of this section without the necessity for reporting each individual arrival.

(8) A westbound vessel which is to proceed to or through United States waters of the St. Lawrence River and/or the Great Lakes shall be subject to compliance with paragraph (b) of this section.

(b) The master or agent of every vessel other than vessels of United States or Canadian nationality engaged in the coastal trade of their respective countries or in trade between their two countries without calling at any other country en route, when proceeding westbound to United States waters of the St. Lawrence River and/or the Great Lakes shall:

(1) At least 24 hours in advance of the vessel's arrival at the Snell Lock, Massena, N.Y., advise the Commander, Ninth Coast Guard District, Cleveland, Ohio, of estimated time of arrival of such vessel at the Snell Lock.

(2) In addition, at least 24 hours in advance of the vessel's arrival at the first United States port-of-call, advise the Commander, Ninth Coast Guard District, Cleveland, Ohio, of the estimated time of arrival at that port.

(3) (Revoked.)

(4) A master of a vessel who reports in accordance with the U.S. Coast Guard's voluntary Atlantic Merchant Vessel Report (AMVER) System and who includes in this report an estimated time of arrival at the Snell Lock, Massena, N.Y., shall be considered to be in constructive compliance with the requirements of subparagraph (1) of this paragraph and no additional advance notice of vessel's arrival at the Snell Lock is required. Likewise a master of such vessel who indicates in this report the name of the first intended United States port of call and estimated time of arrival at that port shall be considered in constructive compliance with subparagraph (2) of this paragraph and no additional advance notice of arrival is required.

(5) A master or agent of a vessel who files a copy of the scheduled route with the Commander, Ninth Coast Guard District, Cleveland, Ohio, at least 24 hours prior to arrival at Snell Lock, and who includes in the schedule the estimated time of arrival at the Snell Lock, Massena, N.Y., shall be considered to be in constructive compliance with requirements of subparagraph (1) of this paragraph and no additional advance notice of the vessel's arrival at the Snell Lock is required. Likewise, a master or agent of such vessel who indicates in this schedule the name of the first intended United States port of call and estimated time of arrival at that port shall be considered in constructive compliance with subparagraph (2) of this paragraph and no additional advance notice of arrival is required.

(6) When the arrival is a direct result of the operation of "force majeure," and it is not possible to give at least 24 hours' advance notice of time of arrival, then advance notice as early as practicable shall be furnished.

§ 124.14 Advance notice of arrival of vessel laden with explosives or certain specified dangerous cargoes. (a) The master, agent, or person in charge of any domestic or foreign vessel which is bound for a port or place in the United States and which is carrying as cargo any of the dangerous cargoes described in this paragraph, whether for discharge in the United States or not, shall, at least 24 hours in advance of arrival at each port or place, notify the Captain of the Port or the Commander of the Coast Guard District in which such port or place is located concerning the amount and location of stowage on board the vessel of any of the following:

(1) Explosives, Class A (commercial or military).

(2) Oxidizing materials for which a special permit for water transportation is required by 46 CFR 146.22.

(3) Radioactive materials for which a special approval by the Commandant for water transportation is required by 46 CFR 146.25–30.

(b) When the arrival is a direct result of "force majeure," and it is not possible to give at least 24 hours' advance notice, then advance notice as early as possible shall be furnished.

§ 124.16 Advance notice of fire or other abnormal condition on arriving vessel. (a) The master, agent, or person in charge of any domestic or foreign vessel which is bound for a port or place in the United States shall give notice to the Captain of the Port or the Commander of the Coast Guard District in which such port or place is located as early as possible in advance of arrival of any fire or other abnormal condition which may jeopardize the vessel's safety or that of other vessels or facilities in port.

§ 124.20 Penalties for violations. Failure to give advance notice will subject the master or agents of a vessel to the penalties of fine and imprisonment, as well as subject the vessel to seizure and forfeiture, as provided in section 2, Title II of the Act of June 15, 1917, as amended, 50 U.S.C. 192. In addition, such failure may result in delay in the movement of the vessel from the harbor entrance to her facility destination within the particular port.

PART 202—ANCHORAGE REGULATIONS

§ 202.1 General. (a) The areas described in Subpart A of this part are designated as special anchorage areas pursuant to the authority contained in an act

amending laws for preventing collisions of vessels approved April 22, 1940 (54 Stat. 150). Section 1 of the act amended Article 11 of the Navigation Rules for Harbors, Rivers, and Inland Waters Generally (33 U.S.C. 180), section 2 amended Rule 9 of the Navigation Rules for Great Lakes and Their Connecting and Tributary Waters (33 U.S.C. 258), and section 3 amended Rule 10 of the Navigation Rules for Red River of the North and Rivers Emptying into Gulf of Mexico and Tributaries (33 U.S.C. 319). Vessels not more than 65 feet in length, when at anchor in any special anchorage area, shall not be required to carry or exhibit the white anchor lights required by the Navigation Rules.

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

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

Subpart A—Special Anchorage Areas:

§ 202.129 Favorite Channel between Point Stephens and Point Louisa, Alaska. (a) North Area. The waters of Lena Cove south and east of a line beginning at a point on shore at latitude 58°24'35", longitude 134°45'52"; thence south 21°15' west, 800 feet to a small unnamed island; and thence south 11°30' east, approximately 3,500 feet to Lena Point at latitude 58°23'48", longitude 134°-45'42", except the waters fronting the Lena Cove Recreation Area from the mean low water line channelward 300 feet.

(b) South Area. The waters south of Lena Point and north of a line beginning at a point on shore at latitude 58°23'04", longitude 134°45'32"; thence south 33°15' east, 1,300 feet to an unlighted buoy at latitude 58°22'56", longitude 134°43'24"; thence south 57°30' east, 6,900 feet to an unlighted buoy at latitude 58°22'18", longitude 134°43'36"; and thence due north 900 feet to the shore at Point Louisa.

NOTE. The areas are reserved for recreational and other small craft. Temporary floats and buoys will be allowed in the areas. Anchors must not be placed outside the areas, nor shall any vessel be so anchored that any portion of the hull or rigging will, at any time, extend into the cable areas to the west of the anchorage areas.

Subpart B—Anchorage Grounds.

None.

PART 204—DANGER ZONE REGULATIONS

§ 204.222a Bristol Bay, Alaska; air-to-air weapon range, Alaskan Air Command, U.S. Air Force. (a) The danger zone. An area in Bristol Bay beginning at latitude 58°33'00", longitude 159°25'30"; thence to latitude 57°57'10", longitude 158°28'30"; thence to latitude 57°-08'30", longitude 160°15'30"; thence a latitude 57°50'00", longitude 161°22'30"; thence to latitude 58°33'00", longitude 159°50'30"; and thence to the point of beginning.

(b) The regulations. (1) Intermittent firing will be conducted over two to three day periods about 2 hours a day between the hours of 10:00 a.m. and 4:00 p.m. during the months of May through August.

(2) The fact that practice firing is to take place over the designated area shall be advertised to the public 72 hours in advance through the usual media for the dissemination of such information. Notice to the U.S. Coast Guard and NOTAM shall be issued at least 48 hours before firing is to be conducted on the range. Information as to the dates, time, and characteristics of the firing shall be advertised in advance of each session of firing.

(3) Prior to conducting each practice firing, the danger zone shall be patrolled by aircraft to note the location of all vessels within the area. The practice firing exercise shall be conducted in the portion of the danger zone not occupied by surface craft.

(4) This section shall be enforced by the Commander, Alaskan Air Command, U.S. Air Force, Seattle, Washington, or such agencies as he may designate.

PART 207—NAVIGATION REGULATIONS

§ 207.785 Tongass Narrows, Alaska; navigation— (a) Definitions. The term "Tongass Narrows" includes the body of water shown on United States Coast and Geodetic Survey Chart No. 8094 lying between Revillagigedo Channel and Guard Islands in Clarence Strait.

(b) No vessel shall exceed a speed of seven knots between Idaho Rock and Charcoal Point.

(c) No vessel shall while moored or at anchor, or by slow passage or otherwise while underway, unreasonably obstruct the free passage and progress of other vessels.

(d) No vessel shall moor or anchor to any structure of the United States other than mooring piers, wharves, and floats without the consent of the District Engineer, Alaska District, Anchorage, Alaska, or his authorized representative.

§ 207.790 Port Alexander, Alaska; speed of vessels—(a) Definition. The Term "Port Alexander" includes the body of water so indicated on United States Coast and Geodetic Survey Chart No. 8261 from its head to its entrance from Chatham Strait.

(b) Speed. The speed of all vessels of 5 tons or more gross, ships register, shall not exceed 3 miles per hour either in entering, leaving, or navigating within Port Alexander, Alaska.

§ 207.800 Wrangell Narrows, Alaska; use, administration, and navigation—(a) Definitions. (1) The term "Wrangell Narrows" includes the entire body of water shown on United States Coast and Geodetic Survey Chart

No. 8170 between Wrangell Narrows North Entrance Lighted Bell Buoy 63 and Midway Rock Light.

(2) The term "raft section" refers to a standard raft of logs or piling securely fastened together for long towing in Alaska inland waters in the manner customary with the local logging interests, i.e., with booms, swifters, and tail sticks. It normally contains 30,000 to 70,000 feet board measure of logs or piling and has a width of 45 to 60 feet and a length of 75 to 100 feet.

(3) The term "horsepower" refers to the manufacturer's rating of the towboat engine as shown in standard catalogs or on the name plate fixed to the engine.

(b) Fish traps. No fish traps shall be towed through Wrangell Narrows without specific authority, in each case, from the District Engineer, Alaska District, Corps of Engineers, Anchorage, Alaska.

(c) Speed restrictions. No vessel shall exceed a speed of seven (7) knots between Wrangell Narrows Channel Light 52 and an unmarked point in the channel one (1) nautical mile to the southward and between Wrangell Narrows Channel Light 58 and Wrangell Narrows Lighted Buoy 60.

(d) Tow Channel. (1) The following route shall be taken by all tows passing through Wrangell Narrows when the towboat has a draft of nine feet or less (northbound, read down; southbound, read up);

East of Battery Islets:
East of Tow Channel Buoy 1TC.
East of Tow Channel Buoy 3 TC.
West of Tow Channel Buoy 4 TC.
East of Colorado Reef:
East of Wrangell Narrows Channel Light 21.
West of Wrangell Narrows Channel Lighted Buoy 23.
East of Tow Channel Buoy 5 TC.
East of Tow Channel Buoy 7 TC.
West of Petersburg:
East of Wrangell Narrows Channel Light 54 FR.
East of Wrangell Narrows Channel Light 56 Qk FR.
East of Wrangell Narrows Channel Light 58 FR., thence proceeding to west side of channel and leaving Wrangell Narrows by making passage between Wrangell Narrows Channel Daybeacon 61 and Wrangell Narrows North Entrance Lighted Bell Buoy 63 F.

(2) For towboats drawing more than nine feet, application shall be made to the District Engineer, Alaska District, Corps of Engineers, Anchorage, Alaska, for authority to use the ship channel for each trip.

(e) Size of tows. The maximum tows permitted shall be as follows:

(1) Towboats of 25 horsepower or less. Not permitted to take any tows through Wrangell Narrows other than fuel logs, not to exceed 500 feet board measure per horsepower up to a maximum of 10,000 feet board measure.

(2) Towboats of 26 to 49 horsepower. Fuel logs not to exceed 10,000 feet board measure, or one freighting scow not larger than 30 feet by 60 feet, or one raft section.

(3) Towboats of 50 to 89 horsepower. Fuel logs, not to exceed 10,000 feet board measure if in "tandem" (not bound together) or 15,000 feet board measure if chained or cabled, or one anchor lifter, or one pile driver, or two units of other towable equipment, or two raft sections.

(4) Towboats of 90 horsepower or over. Fuel logs not to exceed 10,000 feet board measure if in "tandem" (not bound together) or 15,000 feet board measure if chained or cabled, or one anchor lifter, or one pile driver, or three units of other towable equipment, or seven raft sections.

(f) Arrangement of tows. (1) No towline or aggregate of towlines between towboat and separated pieces shall exceed 150 feet in length.

(2) Tows shall not exceed 65 feet in width overall.

(3) Tows other than rafts shall be taken alongside the towboat whenever possible.

(g) Anchorage. No craft or tow shall be anchored in Wrangell Narrows in either the main ship channel or the towing channel, nor shall any craft or tow be anchored so that it can swing into either of these channels.

(h) Disabled craft. Disabled craft in a condition of absolute necessity are exempt from the regulations in this section.

§ 207.801 Lutak Inlet, Alaska; restricted area—(a) The area. (1) The waters of Lutak Inlet bounded as follows: Beginning at the water's edge 900 feet northwest of the centerline of the landward end of the POL dock; thence 800 feet, 51° true; thence 1,400 feet, 113° true, thence 450 feet, 211° true to the water's edge at a point approximately 720 feet from the most southwest corner of the seaward end of the POL dock; thence along the water's edge to the point of beginning.

(2) The area will be marked at points approximately 200 feet apart along the shore by white signs containing the word "Warning". The signs will not be lighted.

(b) The regulations. (1) No vessels or other craft shall enter or remain in the area when tankers are engaged in discharging oil at the POL dock.

(2) The regulations in this section shall be enforced by the District Engineer, Corps of Engineers, Anchorage, Alaska, and such agencies as he may designate.

§ 207.802 Kuluk Bay, Adak, Alaska; Naval restricted area. (a) The area. The northwest portion of Kuluk Bay bounded as follows: Beginning at Zeto Point at latitude 51°54'36", longitude 176°33'08"; thence due south to latitude 51°52'00', longitude 176°33'08"; thence due west to the shore at latitude 51°52'00", longitude 176°37'35"; thence along the shore line to the point of beginning.

(b) The regulations. (1) Except in great emergency, no vessel shall anchor in the restricted area described in paragraph (a) of this section.

(2) Dragging of anchors in or across the restricted area is prohibited and no object attached to a vessel shall be placed on or near the bottom.

(3) The regulations in this section shall be enforced by the Commander, Alaskan Sea Frontier, Kodiak, Alaska, and such agencies as he may designate.

§ 207.804 Bering Strait, Alaska; naval restricted area off Cape Prince of Wales. (a) The area. An area 2,000 feet wide extending from a point on Cape Prince of Wales marked by a triangular cable marker located approximately midway between the village of Wales and Cape Prince of Wales Light to a point four statute miles due west of the cable marker with the axis of the area passing through the two points.

(b) The regulations. (1) No vessel shall anchor in the restricted area described in paragraph (a) of this section.

(2) Dragging of anchors in or across the restricted area is prohibited and no object attached to a vessel shall be placed on or near the bottom.

(3) The regulations in this section shall be enforced by the Commandant, Seventeenth Naval District, Seattle, Washington, and such agencies as he may designate.

3. CAPE SPENCER TO BEAUFORT SEA

ALASKA, the largest of the United States, occupies the northwestern part of the North American continent. The State is bordered on the east and south by Canada and on the west and north by the Pacific and Arctic Oceans. The northernmost point of Alaska is Point Barrow (71°23′ N., 156°28′ W.); the westernmost point is Cape Wrangell (52°55′ N., 172°26′ E.) on Attu Island; and the southernmost point is Cape Muzon (54°40′ N., 132°41′ W.) on the historic parallel which is the coastal boundary between Alaska and Canada's British Columbia. Cape Muzon is on the north side of Dixon Entrance and is 480 miles northwestward of Cape Flattery, Washington; between the two United States capes is the coastal area of British Columbia.

Alaska was purchased from Russia in 1867 and became an organized territory of the United States in 1912. By Presidential proclamation of January 3, 1959, Alaska officially became the 49th of the United States. The population of the State was 226,157 in 1960. Principal resources are fisheries, minerals, timber, and furs. Alaska has a general ocean coastline of 5,770 nautical miles and a tidal shoreline of 29,462 miles. The State is so huge that its description requires two complete volumes of the Coast and Geodetic Survey's eight-volume series of United States Coast Pilots.

Coast Pilot 9 deals with the Pacific and Arctic coasts of Alaska from Cape Spencer to Beaufort Sea; general ocean coastline totals 5,520 nautical miles, and tidal shoreline totals 18,377 miles. Included are the Gulf of Alaska coast and islands, the Alaska Peninsula, the Aleutian Islands, and the United States coasts and islands of Bering Sea, Chukchi Sea, and Beaufort Sea.

Between Cape Spencer and Cape St. Elias, the coast is fairly regular. Along this stretch are Lituya Bay, Yakutat Bay, and Icy Bay. The great Malaspina Glacier comes down to the ocean westward of Yakutat Bay.

From Cape St. Elias to Cook Inlet, the characteristic formation is generally rocky; the waters are mostly deep, but there are also great variations in depth. The visible topographic features, such as the mountains and the elevated islands, probably are duplicated under water. The principal ports are Cordova, Valdez, and Whittier in Prince William Sound and Seward in Resurrection Bay.

In Cook Inlet, the characteristic formation is the result of glacial action. The shores are strewn with boulders, some of great size, and soundings indicate the existence under water of similar boulders, particularly in areas of rocky bottom where the boulders have not been buried by silt. The principal port in Cook Inlet is Anchorage.

Southwestward from Cook Inlet, and throughout the islands off the southeast side of the Alaska Peninsula, rock formation is again found. The principal harbors are Kodiak on Kodiak Island, Sand Point in the Shumagin Islands, and King Cove and False Pass on the southeast side of the Peninsula.

The Aleutian Islands are rugged and mountainous, with numerous off-lying islets, rocks, and reefs. Some of the larger islands provide more or less sheltered anchorage. The principal ports are Unalaska and Kuluk Bay.

Bering Sea is characterized in general by shallow waters, with extensive sand and mud flats along the shores, particularly in the approaches to the various bays and rivers. There is little rock formation, and its occurrence, where found, is limited in area. The principal ports are Naknek in Kvichak Bay, Dillingham on Nushagak Bay, Bethel on Kuskokwim River, and Nome on Norton Sound.

The Arctic coast is mostly low, especially to the northward of Cape Lisburne. The principal landing places are Kotzebue and Barrow.

Boundary lines of inland waters.—At all buoyed entrances from seaward to bays, sounds, or rivers for which specific lines are not described, **Inland Pilot Rules** apply shoreward of the outermost buoy or other aid to navigation of any system of aids; **International Pilot Rules** apply outside the aids. **See Part 82, Chapter 2.**

Control over movement of vessels.—See Part 124, Chapter 2, for regulations requiring advance notice of vessel's time of arrival in port.

Anchorages.—Many of the harbors in the mountainous areas are subject to violent williwaws. These severe gusts may come from any direction and should be considered when selecting an anchorage.

Kelp grows on nearly every rocky bottom and should always be considered a sign of danger. Dead, detached kelp floats on the water in masses, while live kelp attached to rocks streams away level with the surface. Live kelp is usually an indication of depths less than 10 fathoms.

Fishtraps are numerous in Alaska's outside and inside waters. The piles often break off and become dangers to navigation. Strangers should proceed with caution when crossing present or former fishtrap areas. Corps of Engineers regulations limit the areas where fishtraps may be established and also require that traps be lighted from sunset to sunrise.

Tides.—The greatest diurnal range of tide in the United States is the 33.3 feet in Turnagain Arm, Cook Inlet. In contrast, Point Barrow has a diurnal range of only 0.5 foot. **See Tide Tables.**

Currents.—See Tidal Current Tables for predictions. The nontidal current that sets northward and westward

along the coasts of British Columbia and Alaska is greatly affected by strong winds and may reach velocities of 1.5 knots; the offshore extent of this current is not known but it is believed to be strongest between the 100-fathom curve and the coast.

Tide rips and **swirls** in regions of strong currents usually are encountered in the vicinities of shoals, islands, or points and are, therefore, generally positive indications of danger. The backwash from seas striking steep cliffs often is felt at a considerable distance. In thick weather, any change in the feel of a moving vessel should be considered a warning of possible danger.

Earthquakes.—The March 27, 1964, earthquake had wide effect on Prince William Sound, Cook Inlet, and Kodiak Island. Post-earthquake tidal observations indicate bottom changes ranging from a sinkage of 6 feet to a rise of 32 feet. Caution is advised in the affected areas because many of the depths and rocks yet to be resurveyed may be considerably different than represented on the nautical charts or in this Coast Pilot.

Seismic sea waves.—There is no record of any destructive seismic sea wave along the mainland north of the Alaska Peninsula. The rest of Alaska, especially the area from Attu Island to Cape Spencer, occasionally is subject to severe waves which cause widespread damage to waterfront areas and shipping. Loss of life and property can be reduced by correct response to warning that such waves are imminent. **See Chapter 1** for basic discussion.

One of the world's most active seismic belts parallels the south sides of the Aleutian Islands and the Alaska Peninsula. Another active belt parallels southeast Alaska and Canada. Earthquakes are frequent in both these areas but only a very few generate seismic waves. Since it is impossible for the Warning System to provide timely warnings to places near the source of a seismic sea wave, any unexplained withdrawal or advance of the sea within an hour or so after an earthquake is felt should be considered nature's warning of an approaching wave.

WEATHER.—The coastal area included in this summary may be divided into two distinctive climatic zones. One is the zone of dominant marine influence which covers the southern and southwestern coasts, including the Aleutian Islands, and extends northward to Bering Strait. The second is the zone of dominant Arctic influence which extends from Bering Strait to the Arctic boundary between Alaska and Canada.

The major part of the coastal area under marine influence is composed of rugged terrain, particularly the south coast as far west as Kenai Peninsula. In the section from Cape Douglas to Stepovak Bay the ruggedness is less pronounced, but even in this latter area the topography exerts a strong effect upon local weather conditions and tends to produce marked differences in temperature and precipitation in localities separated by relatively short distances.

Despite the ranges of temperature and precipitation resulting from the rugged topography, these variations usually are well within the limits normally associated with a purely maritime climate. Consequently, small temperature ranges, high humidity, high fog frequency, considerable cloudiness, and abundant precipitation are characteristic features of the climatic regime in this maritime zone.

The climate of the Arctic coast has several unique aspects that set it apart from the other regions of Alaska. Most of the coastal plain is low rolling tundra with numerous lakes. The Brooks Range acts as a partial topographic barrier, and the narrow limits of temperature variation over this region seem to result chiefly from maritime factors. However, the extremely light precipitation is in sharp contrast to the high precipitation normally associated with maritime climates. The basic reason for this difference lies in the relatively lower moisture-carrying capacity of the colder air that prevails over the Arctic.

Pressure.—The Alaska region is one of great barometric activity, particularly during the colder season; in summer the pressure pattern is relatively flat. The primary pressure systems are the Aleutian LOW which dominates much of the northern Pacific from October to March, the North Pacific HIGH which covers the region to the southeastward during winter and spreads northward into the Gulf of Alaska in summer, and the great continental anticyclone which covers the land masses of Siberia, Alaska, and British Columbia in winter.

Over the ocean area north of the 45th parallel the primary control factor is the great Aleutian LOW. Pressure in this cyclone, the mean winter center of which lies somewhere over or near the extreme western Aleutians, usually begins to fall in August and continues to fall until December or early January, after which it rises slowly until spring and then more rapidly until it reaches its peak in June or July.

In summer, because of the increased heating of the great land masses, comparatively low pressure exists over the continent and, since the Aleutian LOW has weakened almost to the disappearing point, the continental depression becomes the area of most pronounced low pressure.

In winter, because of the chilling of the land masses, the pressure over the continent rises while the Aleutian LOW reaches its lowest over the comparatively warm ocean. This is the season of strong pressure gradients and is, in general, the stormiest part of the year. It is at this time that the majority of the traveling cyclonic disturbances pass through the Aleutian LOW in their west-to-east or south-to-north movements. Additional disturbances originate in the Aleutian LOW itself, and altogether this system exerts a powerful influence on the weather of Alaska, as well as that of the Canadian Provinces to the east and of the northern part of the conterminous United States to the southeast.

During the colder months more lows are found in the Gulf of Alaska than in any other part of the Northern Hemisphere. Mountainous areas present something of a barrier to the eastward movement of these depressions from the northern Pacific with the result that many of them stagnate in the Gulf of Alaska for days at a time, particularly if the Pacific high-pressure area has a tendency to move northeastward. When unable to move

forward, some of these depressions dissipate and others retreat to the northwestward through Bering Strait and into the Arctic Ocean. Enough depressions take this course to have Bering Strait considered a secondary track for the passage of these storms.

Winds.—The Gulf of Alaska, with a rim of rather high coastal mountain ranges, is a sort of natural basin that catches the frequent storms which move in from the southwest. On reaching the Gulf these storms may weaken and disappear without affecting the coast, but frequently they retain their intensity and often produce strong winds. Along the coast as far west as Kodiak Island, winds of 50 to 60 knots are not unusual and may occur in any month of the year. The strongest winds are usually south of Yakutat, but the rugged terrain along the entire coast makes for highly localized wind conditions. The stations most frequently affected by strong winds are those along the exposed coast or on islands, but funneling effects intensify wind speeds at more protected stations.

As a general rule, intense Gulf lows tend to create strong easterly or southeasterly winds over southeastern Alaska, east or northeasterly winds along the northern Gulf coast, and north to northwesterly winds from Resurrection Bay to eastern Kodiak Island.

The Aleutian Islands are subject to even stronger winds. The location of the chain with relation to the polar front makes the area a natural breeding ground for strong cyclones. These storms frequently cover a large area, and a single storm may produce strong winds all along the chain.

The islands experience strong winds from practically all directions, depending upon the position and source of the storm. Wind speeds of 60 knots occur almost monthly during the winter season at some of the island stations. Occasionally these storms retain considerable intensity as their centers move eastward across the mainland. This occurs most frequently during late winter or early spring as the mean position of the Aleutian LOW shifts eastward along the chain and over the Kodiak Island area. Around late May or early June the LOW tends to become less intense and to shift westward and thence northward with the building of the large Pacific HIGH during late spring and early summer.

The average wind is relatively light over the Copper River and Cook Inlet areas, due chiefly to the sheltering effects of nearby mountain ridges. However, strong localized winds develop in some sections as a result of downslope air drainage. These winds become stronger when reinforced by flow patterns usually associated with lows entered in the Kodiak Island or Gulf of Alaska areas. Such winds may persist for days at a time and are particularly noticeable in the immediate vicinities of the river channels.

The relatively unsheltered area of Bristol Bay and the West Central section of Alaska are frequented by relatively strong winds. These winds are generally most pronounced during the winter months when the mainland is dominated by a strong high-pressure system and lows dominate the central and northern Bering Sea. Winds for the entire month may average as high as 25 to 30 knots. Intense lows approaching the coast or entering the mainland may result in strong winds of 50 to 60 knots persisting for two or three days at a time.

Over the Arctic coast of Alaska local topography determines the deviations from the general windflow that results from the movement of cyclonic and anticyclonic airmasses. Between Icy Cape and Point Barrow in summer, the predominant winds over the ocean are from the northeast quadrant; by quadrants, 68 percent are from north to east, 24 percent are from southeast to southwest, and 8 percent are from all other directions. In winter and east of Point Barrow at all seasons, the scarcity of observations from vessels makes summarization impractical.

Williwaws.—These are the violent winds which frequently occur on the leeward side of the mountains of the Aleutians and western Alaska. The williwaw is an especially dangerous wind due to the suddenness of its occurrence as well as to its violence and extreme gustiness. It occurs when the air dams up in great quantity on the windward side of a mountain and then spills over suddenly as an overwhelming surge. The local topography determines the direction from which williwaws will blow, and the probability of occurrence of such a wind at a particular station is governed by the pressure pattern at the time. When, for example, a well-developed low is located in the Gulf of Alaska and a large high-pressure area dominates the Bering Sea, then the strong northerly and northwesterly winds are likely to cause williwaws over many of the leeward coasts of the Aleutian chain. The violence and exact direction of these winds will depend both on the steepness of the mountainous elevations and on the exact position of such elevation relative to the coast affected.

Temperature.—The south coast of Alaska has cool summers and mild winters, and the extremes of temperature which do occur are usually of short duration. In July and August mean temperatures average around the mid-50's, and record high readings have reached the mid-80's. January is usually the coldest month with mean temperatures averaging from the mid-20's to around the freezing mark. At stations on rivers or protected bays the winter temperatures are much lower than the average. Extreme minimum temperatures in this section have dropped to −30° and below.

The Aleutian Islands are not extremely cold. The general temperature pattern is that of a marine climate with none of the extremes that would be expected at these latitudes. The possibility of low temperatures in winter increases somewhat toward the Alaska Peninsula where winds may come off the land, and over the most westerly islands where the tendency toward lower temperatures is enhanced by nearness of the cold Siberian anticyclone.

February is normally the coldest of the winter months with mean temperatures near freezing. August is the warmest month with mean temperatures averaging about 50°.

Mean annual temperatures along the Arctic coast range from 10° to 20°. Extremes range from a high of 85° to a low of −59°.

Precipitation.—Practically all lows developing in or traversing the Gulf of Alaska bring general precipitation to the southeastern Alaska area. The moisture-laden air which moves into southeastern Alaska and across the Gulf of Alaska north coast frequently has traversed the warmer ocean areas of the central Pacific and carries considerably more moisture than the air which traverses the cooler waters of Bering Sea. In addition, a slight eastward or northeastward shift of the Pacific HIGH during the summer months may produce a strong onshore flow and create widespread precipitation over southeastern Alaska and, to a lesser extent, over the northern Gulf coast during periods when precipitation elsewhere in the maritime zone is relatively light.

The Yakutat Bay area receives slightly more than 130 inches of precipitation annually. Along the Gulf of Alaska coast west of Yakutat the annual average drops to less than 100 inches. From Seward southwestward to Kodiak the annual average runs aronnd 60 to 70 inches.

To the westward along the Aleutian Chain the heavier annual amounts exceed 60 inches, but at some sheltered locations the annual average is around 25 to 30 inches. At most Aleutian stations the autumn months August through September generally have the largest precipitation amounts. Precipitation is generally less over the Bering Sea than it is over areas to the south. In the vicinity of St. Paul Island the annual average is about 24 inches.

There is a strong dissimilarity between precipitation on the western and northern coasts of Alaska when compared with the southern coasts. In the south the coasts are exposed to the moist and comparatively warm winds from the Pacific Ocean while in the north the mountains of the Alaska Peninsula and Alaska proper not only shut off the flow of moisture to the northward, but the winds, drying by descent over the northern slopes, lose most of the dampness gained during their passage over the ocean. The Bering Sea, having less warmth in the open season, and being largely icebound in the closed cold season, is incapable of supplying much moisture and as a result the Bering Sea coast and the Arctic coast to the north are dry.

Visibility.—Surface visibility over the open waters of the North Pacific is heavily influenced by fogs in summer and by frequent snows in winter. Haze, mist, and rains add to visibility restriction. Because of the heavy fogs and the prevalence of low clouds of stratus or cumulus structure the ceilings over surface vessels are at a low altitude, particularly in summer. Along the steamship routes, a vessel may pass for a day to two or more days through unbroken fog in summer or continuous snow in winter. Sea fog has a high seasonal variation in frequency over these northern waters. In the warm season, the air is most sluggish and flows from more southerly directions than in the cold season. These comparatively warm winds from southwest to southeast are most frequently associated with fog, especially since in moving northward they are most likely to pass over colder water. The fog thus induced is sometimes general over a large area but at other times is encountered in patches. There is no strong diurnal variation in these fogs. While light winds are most favorable for fog formation, it is nevertheless found to persist with winds of 30 knots or more, and in occasional observations it is reported to be carried along with gales of Beaufort force 10 and 11.

Sea fog forms more frequently on the southern than on the norther sides of islands. With southerly winds fog may persist for long periods, but with northerly winds, persisting for several days, the first day, particularly on the windward side, is likely to be foggy followed by improved visibility during the period of continuing northerly winds. Radiation fogs that form over the land areas are most likely to occur in the morning and dissipate later in the day.

Ice.—Ports in the Aleutian Islands and in the Gulf of Alaska, except at the upper end of Cook Inlet, are ice free and open to navigation the year around. Ports north of Unimak Pass are icebound in varying degrees; **see appendix** for dates of breakup and freezeup.

ROUTES.—These are the usually traveled routes in western Alaska. In laying out courses to pass through the geographic positions of the turning points listed, allowance must be made for wind and current. Departure from these routes may become necessary because of weather conditions and ice in the more northerly latitudes. Special attention should be given to the continual current setting northward and westward along the coast of Alaska. Where necessary, directions for entering a port are given in the text for the place concerned, including information about dangers, prominent features, and other pertinent information.

Strait of Juan de Fuca to Prince William Sound ports (Cordova, Valdez, Whittier).—Rhumb lines through:

48°31′ N., 125°00′ W.; Swiftsure Bank, Washington.
48°50′ N., 125°39′ W.; of Amphitrite Point, Canada.
50°01′ N., 128°03′ W.; off Solander Island, Canada.
51°49′ N., 131°12′ W.; off Cape St. James, Canada.
60°13′ N., 146°41′ W.; off Cape Hinchinbrook, Alaska.

Strait of Juan de Fuca to Seward.—Same as to Prince William Sound ports to 51°49′ N., 131°12′ W., thence great circle to 59°51′ N., 149°17′ W., south of Barwell Island off Cape Resurrection.

Strait of Juan de Fuca to Cook Inlet ports (Seldovia, Homer, Anchorage).—Same as to Prince William Sound ports to 50°01′ N., 128°03′ W., thence great circle to 59°03′ N., 151°26′ W., off East Chugach Island.

Strait of Juan de Fuca to Kodiak.—Same as to Prince William Sound ports to 50°01′ N., 128°03′ W., thence great circle to 57°42′ N., 152°09′ W., north of Cape Chiniak.

Strait of Juan de Fuca to Unimak Pass.—Great circle from 48°31′ N., 125°00′ W., to 54°00′′ N., 163°00′ W., thence rhumb line to 54°20′ N., 164°45′ W., off Scotch Cap.

Cape Spencer to Prince William Sound ports.—Rhumb lines through:

58°10′ N., 136°38′ W.; off Cape Spencer.
59°43′ N., 144°38′ W.; south of buoy off Cape St. Elias.
60°13′ N., 146°41′ W.; off Cape Hinchinbrook.

Cape Spencer to Seward.—Rhumb lines through:
58°10′ N., 136°38′ W.; off Cape Spencer.
59°21′ N., 146°19′ W.; south of Middleton Island.
59°51′ N., 149°17′ W.; south of Barwell Island off Cape Resurrection.

Cape Spencer to Cook Inlet ports.—Rhumb line from 58°10′ N., 136°38′ W. to 59°03′ N., 151°26′ W.

Cape Spencer to Kodiak.—Rhumb line from 58°10′ N., 136°38′ W. to 57°42′ N., 152°09′ W.

Prince William Sound ports to Seward.—From Elrington Passage clear Cape Puget and Cape Junken by 1 mile, thence to 59°51′ N., 149°17′ W., south of Barwell Island off Cape Resurrection.

Prince William Sound ports to Cook Inlet.—From Elrington Passage, rhumb lines through:
59°33′ N., 149°38′ W.; north of Seal Rocks.
59°21′ N., 150°14′ W.; off Outer Island.
59°09′ N., 150°57′ W.; off Gore Point.
59°03′ N., 151°26′ W.; off East Chugach Island.

Prince William Sound ports to Kodiak.—From Elrington Passage, rhumb line to 57°50′ N., 152°17′ W.; off Spruce Cape.

Prince William Sound ports to Unimak Pass.—Same as to Cook Inlet, thence Shelikof Strait route.

Seward to Cook Inlet.—Rhumb lines through:
59°45′ N., 149°26′ W.; off Pilot Rock.
59°36′ N., 149°32′ W.; off Chiswell Island.
59°31′ N., 149°40′ W.; off Seal Rocks.
59°21′ N., 150°14′ W.; off Outer Island.
59°09′ N., 150°57′ W.; off Gore Point.
59°03′ N., 151°26′ W.; off East Chugach Island.

Seward to Kodiak.—Same as to Cook Inlet to 59°31′ N., 149°40′ W., thence rhumb lines through:
58°21′ N., 151°54′ W.; off Tonki Cape.
58°13′ N., 151°56′ W.; Marmot Strait.
57°50′ N., 152°17′ W.; off Spruce Cape.

Seward to Unimak Pass.—Same as to Cook Inlet, thence Shelikof Strait route.

Cook Inlet to Kodiak.—Rhumb lines through:
59°03′ N., 151°53′ W.; south of Cape Elizabeth Island.
58°21′ N., 151°54′ W.; off Tonki Cape.
58°13′ N., 151°56′ W.; Marmot Strait.
57°50′ N., 152°17′ W.; off Spruce Cape.

Cook Inlet to Unimak Pass.—Shelikof Strait route.

Shelikof Strait route—Cook Inlet to Unimak Pass.—Rhumb lines through:
59°03′ N., 151°26′ W.; off East Chugach Island.
59°01.6′ N., 152°19.0′ W.; north of Ushagat Island.
57°38.5′ N., 154°33.8′ W.; off Cape Uyak.
56°27.0′ N., 156°48.0′ W.; off Foggy Cape.
55°46.0′ N., 158°37.8′ W.; southeast of Mitrofania Island.
55°21.6′ N., 160°03.6′ W.; north of Andronica Island.
55°22.8′ N., 160°21.7′ W.; north of Popof Island.
55°26.0′ N., 160°43.5′ W.; off Unga Spit.
55°17.5′ N., 161°15.2′ W.; off Seal Cape Light.
55°17.2′ N., 161°39.5′ W.; north of Ukolnoi Island.
55°10.9′ N., 161°54.2′ W.; off Arch Point.
55°07.5′ N., 161°55.6′ W., off Moss Cape.
55°06.7′ N., 161°56.2′ W.; northwest of Goloi Island.
55°02.6′ N., 161°54.5′ W.; easterly of Iliasik Islands Light.
55°02.0′ N., 161°55.5′ W.; southeasterly of Iliasik Islands Light.
55°00.5′ N., 162°20.1′ W.; north of Deer Island.
54°57.4′ N., 162°27.6′ W.; west of Fox Island.
54°48.1′ N., 162°44.6′ W.; west of Umga Island.
54°37.8′ N., 163°03.6′ W.; off Cape Pankof.
50°20′ N., 164°45′ W.; off Scotch Cap.

Kodiak to Unimak Pass.—Proceed via Narrow Strait, Whale Passage, Kupreanof Strait, and Shelikof Strait route.

Unimak Pass to Aleutian Islands ports.—Rhumb lines along the northern coast of the Aleutian chain through:

To Dutch Harbor and Unalaska
54°20′ N., 164°45′ W.; off Scotch Cap.
54°20′ N., 165°38′ W.; off Akun Head.
54°16′ N., 166°00′ W.; off North Head.
54°02′ N., 166°24′ W.; off Priest Rock Light.
53°55′ N., 166°29′ W.; off Ulakta Head.

To Kuluk Bay
54°20′ N., 164°45′ W.; off Scotch Cap.
54°20′ N., 165°38′ W.; off Akun Head.
54°08′ N., 166°40′ W.; off Cape Cheerful.
53°36′ N., 168°14′ W.; north of Umnak Island.
52°28′ N., 172°26′ W.; north of Seguam Island.
52°28′ N., 174°00′ W.; off North Cape Light (Atka Island).
52°10′ N., 176°09′ W.; off Swallow Head Light (Great Sitkin Island).
51°54′ N., 176°30′ W.; east of Kuluk Shoal.

To Kiska
Same as to Kuluk Bay to 52°10′ N., 176°09′ W., thence rhumb lines through:
52°07′ N., 179°46′ E.; north of Semisopochnoi Island.
52°08′ N., 178°05′ E.; north of Segula Island.
52°05′ N., 177°46′ E.; east of Haycock Rock.
51°58′ N., 177°35′ E.; off North Head.

To Alcan Harbor
Same as to Kiska to 52°08′ N., 178°05′ E., thence rhumb lines through:
52°13′ N., 177°38′ E.; off Sirius Point (Kiska Island).
52°47′ N., 174°05′ E.; north of Shemya Island.

To Massacre Bay
Same as to Alcan Harbor, thence rhumb lines through:
52°40′ N., 173°53′ E.; north of Alaid Island.
52°47′ N., 173°19′ E.; off Alexai Point.
Vessels may also proceed from Unimak Pass to Massacre Bay by great circle.

Unimak Pass to Bering Sea ports.—Rhumb lines through:

To Port Moller
54°20′ N., 164°45′ W.; south of Scotch Cap Light.
54°24′ N., 164°59′ W.; west of Scotch Cap Light.
54°36′ N., 165°04′ W.; off Cape Sarichef Light.

55°00′ N., 164°36′ W.; off Cape Mordvinof.
55°31′ N., 163°18′ W.; off Sea Lion Rock.
55°53′ N., 162°15′ W.; off Black Hill.
56°06′ N., 160°50′ W.; thence to entrance buoy.

To Kvichak Bay

Same as to Port Moller to 55°00′ N., 164°36′ W.; thence rhumb lines through:
57°44′ N., 157°53′ W; off Cape Greig Light.
58°14′ N., 157°53′ W.; off Red Bluff Light.
58°27′ N., 157°41′ W.; off Middle Bluff Light; thence to the anchorage off the entrance to Naknek River.

To Nushagak Bay

Same as to Port Moller to 55°00′ N., 164°36′ W.; thence rhumb line to 57°44′ N., 157°53′ W. (off Cape Greig Light); thence to entrance buoy.

To St. Michael

54°20′ N., 164°45′ W.; south of Scotch Cap Light.
54°24′ N., 164°59′ W.; west of Scotch Cap Light.
54°36′ N., 165°04′ W.; off Cape Sarichef Light.
60°14′ N., 168°04′ W.; off Cape Mohican Light (Nunivak Island).
63°00′ N., 167°40′ W.; 32 miles eastward of St. Lawrence Island.
63°41′ N., 165°18′ W.; Norton Sound.
63°41′ N., 162°21′ W.; north of Stuart Island.
63°32′ N., 161°55′ W.; off St. Michael.

To Golovnin Bay

Same as to St. Michael to 63°00′ N., 167°40′ W. thence rhumb line to 64°20′ N., 163°00′ W.

To Nome

Same as to St. Michael to 63°00′ N., 167°40′ W., thence rhumb line to 64°29′ N., 165°26′ W.

To Port Clarence

Same as to St. Michael to 63°00′ N., 167°40′ W., thence rhumb lines through:
64°58′ N., 167°40′ W.; east of King Island.
65°19′ N., 167°40′ W.; off Cape York.
65°19′ N., 166°51′ W.; off Point Spencer.
65°17′ N., 166°25′ W.

Unimak Pass to Arctic Ocean ports:

To Point Hope

Same as to St. Michael to 63°00′ N., 167°40′ W., thence rhumb lines through:
64°58′ N., 167°40′ W.; east of King Island.
65°38′ N., 168°31′ W.; east of Fairway Rock.
68°21′ N., 167°18′ W.

To Point Barrow

Same as to Point Hope to 68°21′ N., 167°18′ W., thence rhumb lines through:
68°58′ N., 166°40′ W.; off Cape Lisburne.
70°34′ N., 162°25′ W.; off Icy Cape.
71°20′ N., 156°55′ W.

Pilotage.—Licensed pilots are available at Port Angeles and Seattle, Washington, and at Anchorage, Alaska, but they must be arranged for in advance; harbor pilots for some Alaska ports are available at Ketchikan, Alaska. Pilotage is not compulsory for Alaska ports or for the inside passage through British Columbia but it is frequently advisable. Vessels calling at canneries usually can arrange by radio to have one of the cannery men come out and pilot the ship to its berth. Arrangements for Alaska pilotage should be made through ships' agents well in advance of requirements.

Towage.—Tugboats are stationed at the principal ports of Washington and British Columbia. In the absence of tugs in southeastern Alaska, any towing that is required is done by cannery tenders and other small local craft.

Supplies.—Provisioning is generally accomplished by vessels at Puget Sound ports prior to departure for Alaska. Groceries and limited amounts of marine hardware are available at the prinicpal towns in western Alaska, and nearly all of the canneries can supply some groceries.

Water is available at most of the ports and canneries in western Alaska. Gasoline, diesel fuel, and lubricating oils are available in all the larger towns and at many of the canneries.

Repairs.—There are no repair facilities for large vessels in western Alaska. The nearest major facilities are in British Columbia and Washington. Most principal ports do, however, have facilities for minor emergency repairs to machinery, engines, and small boats.

Some of the ports and canneries have small marine railways, slipways, or grids, but these are subject to frequent change due to destruction from ice, abandonment of canneries, or discontinuance of service.

Communications.—There is scheduled steamer service from Seattle to ports in western Alaska, with limited service to nearby smaller ports. Air service is also available to most major ports in western Alaska, with connections to nearly every community in the State.

The U.S. Air Force operates the **Alaska Communication System,** a radio network that includes coastal stations with ship-to-shore service. Connecting with the network are the stations operated by other government agencies and various mining, logging, and cannery activities. The Alaska Communication System stations listen on 500 kc. and are open to public correspondence; most of the other stations have no fixed hours of service and some are closed between the normal periods of Alaska fishing operations. Additional information about Alaska radio stations may be obtained from the 1929 Communication Group, Alaska Communication System, U.S. Air Force, Seattle, Washington, or from the Federal Communications Commission, Washington, D.C.

Standard time.—Alaska uses four standard times. When it is **Greenwich standard time** 12 noon, it is **Pacific standard time** 4 a.m. at Craig, Haines, Juneau, Ketchikan, Petersburg, and Sitka; **Yukon standard time** 3 a.m. at Skagway and Yakutat; **Alaska standard time** 2 a.m. at Anchorage, Barrow, Barter Island, Bethel, Cold Bay, Cordova, Fairbanks, False Pass, Kodiak, King Cove, King Salmon, Naknek, Sand Point, Seward, Valdez, Wainwright, and Whittier; and **Bering standard time** 1 a.m. at Kotzebue, Kuluk Bay, Nome, Point Hope, Unalaska, and Wales.

4. CAPE SPENCER TO COOK INLET

Charts 8002, 8502.—From Cape Spencer the coast extends northwestward for about 130 miles to Yakutat Bay. The Fairweather Range begins 20 miles from Cape Spencer and extends to Alsek River. The monntains are snowcapped and have elevations of 10,000 to more than 15,000 feet. From Alsek River to Yakutat Bay the mountains are 4,000 to nearly 6,000 feet high. Along the coast are numerous glaciers with terminal moraines. The most conspicuous are La Perouse Glacier, with a sea face 200 to 300 feet high and partly vertical; Yakutat Glacier, 25 miles eastward of the bay; and the great Malaspina Glacier, westward of Yakutat Bay.

Weather.—From **Cape Spencer to Cape St. Elias** the numerous glaciers have a decided effect on the local weather. Westerly winds are common in summer and easterly winds in winter. Brief squalls, or williwaws, are encountered in windy weather and are especially dangerous because they may follow one another in quick succession from different directions.

At Cape Spencer there is a prevalence of northeast winds in all seasons except summer, when the directions are about equally divided between northeast and west; the strongest winds occur in autumn, the maximum velocity observed being 74 knots from the northeast. At Yakutat, east winds prevail in all seasons; northeast winds also are frequent in autumn and winter and southeast and west winds in summer. The strongest winds at Yakutat occur in winter, the maximum velocity observed being 50 knots from the southeast.

Precipitation is heavy along this part of the coast; the average annual total is 109 inches at Cape Spencer, 134 inches at Yakutat, and 110 inches at Cape St. Elias. Fall and winter are the wettest seasons and summer is the driest. Much of the precipitation during the colder months is in the form of snow (10 inches of snow equals 1 inch of precipitation); the average annual snowfall is 84 inches at Cape Spencer, 216 inches at Yakutat, and 71 inches at Cape St. Elias.

Temperatures are mild for these latitudes; the average annual mean is about 40° F. The summer maximum seldom exceeds 75° and only occasionally is the winter minimum as low as zero. Sea water temperatures average about 4° higher than air temperatures in winter and about 1° lower in summer. This section of the coast is never considered closed to navigation because of ice; the rivers and bays may freeze partially beginning about the first of December, but the ice clears out by the middle of May and usually does not prevent vessels from entering the available harbors.

Poor visibility due to advection or sea fog is greatest from June through September. In summer the coastal fog usually sets in after midnight and remains until the following noon. Continuous fogs of varying densities have been known to last 2 to 10 days. During severe winter gales from the north or northeast, spindrift and falling or drifting snow cause poor visibility. The percentage of sunshine is low in all parts of the area, and cloudy days exceed the combined total of clear and partly cloudy days.

The coastal section from **Cape St. Elias to Kenai Peninsula** includes the ragged indentation of Prince William Sound and is bordered completely by high mountains. Winds over this section are quite variable. In summer the winds over Controller Bay range from east through south and into the southwest at times. At Cordova, winds are most frequently from the east. At Valdez the winds blow from the southwest about half the time from May through August and from the northeast about half the time from October through March. At Seward the prevailing wind direction is south from April through September and north during the other months of the year; the Seward region is subject to violent williwaws. Gales are recorded frequently over the open waters along this coast.

Average annual precipitation is 99 inches at Cordova, 60 inches at Valdez, 174 inches at Whittier, 184 inches at Latouche, and 66 inches at Seward. Annual snowfall averages 127 inches at Cordova, 202 inches at Valdez, 260 inches at Whittier, 153 inches at Latouche, and 78 inches at Seward.

Mean annual temperatures range from 36° F. at Valdez to 42° at Latouche. Temperatures above 80° have been recorded at all points along this coast, and an extreme low temperature of −29° has been recorded at Whittier. Sea water temperatures average about 2° higher than air temperatures in late fall, winter, and early spring and are about the same as air temperatures in midsummer. In the coldest weather, ice forms in the upper part of Prince William Sound and in the rivers after the first of December, and floating ice is sometimes seen in the sound until late spring. The ice which forms in this area usually does not interfere with navigation.

Fog quite frequently hangs over the headlands and entrances while it is clear over the bays. At Cordova, fogs are most frequent during the summer.

In **Cook Inlet,** winds are most frequently from the north, with topography causing shifts to northwest and northeast at certain locations. The prevailing direction also varies somewhat with the season. At Anchorage the prevalent north winds shift to south in midsummer and to north-northeast in midwinter; an extreme velocity of 66 knots has been recorded at Anchorage. At Kenai the winds are southerly and southwesterly in summer and

★ (1043) **ALASKA—Gulf of Alaska—Cross Sound to Yakutat Bay—Obstruction reported.**—An obstruction (PA) (depth unknown) has been reported (1964) about 7.7 miles 245° from the summit (2895) (59°00′ N., 137°59′ W. approx.).

(N.M. 8/65.)

(L.N.M. 2, C.G., Juneau, Jan. 12, 1965.)

C & G.S. Charts **8402, 8002, 8500, 9000.**

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northerly the rest of the year; however, easterly gales are frequent at Kenai in the fall, and winter gales are most frequently from the southeast. At Homer northeasterly winds prevail from late fall to early spring, and southwesterly winds are most frequent the rest of the year; the winds are strongest during late summer and early fall.

Average annual precipitation is 14 inches at Anchorage and 19 inches at Kenai. Fall is the season of most rainfall. Annual snowfall averages 80 inches at Anchorage.

Mean annual temperature is 35° F. at Anchorage. Highest temperature noted in Cook Inlet was 89° at Kenai in June; the lowest was —46° at Kenai in February. Water temperatures are 1° to 2° higher than air temperature in late fall, winter, and early spring and about 1° lower in summer. The upper end of Cook Inlet usually is closed by ice to all except heavily built vessels from December until late March.

Fogs are common over Cook Inlet. Ground fogs occur most frequently in winter, with January the month of heaviest fog. The fogs set in during the late night or early morning and usually are gone by noon. Fog banks frequently hang over the open water after the harbors have been cleared. There is considerable cloudiness over the area. At Homer it is reported that easterly winds and rain can be expected when clouds cap the nearby mountains. Late summer and early fall is the cloudiest period of the year at Kenai.

Chart 8410.—Cape Spencer, 873 miles from Seattle by the outside route and 976 miles by the inside passage, is a conspicuous headland on the northwest side of the entrance to Cross Sound. The large shoal area that extends about a mile southward from the cape has rocky islets, some of the inner ones wooded, and rocks, the outermost of which break. The cape rises rapidly to timbered ridges about 1,800 feet high.

Cape Spencer Light (58°11.9′ N., 136°38.3′ W.), 105 feet above the water, is shown from a 25-foot white square tower on a rectangular concrete building on the outermost large rocky islet south of the cape; a fog signal and a radiobeacon are at the light.

Cross Sound, between Cape Spencer and Cape Bingham, 8 miles to the southeastward, is the northernmost passage to the inside waters of Southeast Alaska. The sound is described in U.S. Coast Pilot 8, Pacific Coast, Alaska—Dixon Entrance to Cape Spencer.

Dicks Arm, a narrow inlet less than 200 yards wide in places, extends in a northerly direction for about 2 miles along the southeast side of Cape Spencer. From the head of the arm, a gradually rising valley passes over a saddle to Taylor Bay. A narrow channel, with depths of 5 to 12 fathoms, leads through the off-lying rocks and islets to the inlet, where depths of 4 to 7 fathoms are found to within 0.3 mile of the head, where it is shoal. A buoy marks the northwest side of a 2½-fathom shoal on the eastern side of the entrance channel. **Zip Rock,** 20 feet high and bare, is on the west side of the channel.

Polka Rock, 20 feet high, is 2 miles northwestward of Cape Spencer and at the outer edge of the foul ground, marked by kelp, which extends about 0.5 mile from shore in this general vicinity. Small craft approaching Graves Harbor from the southeastward usually pass between Polka Rock and Graves Rocks.

Graves Rocks are a group of islets about 3.5 miles northwestward of Cape Spencer and a mile from shore. Near the north end of the group is a wooded islet about 125 feet high. Rocks and kelp patches extend to the mainland and along the shore to Cape Spencer.

Libby Island, 5.3 miles northwestward of Cape Spencer and 0.7 mile from the mainland, is high and wooded. Bare rocks and rocks that cover extend about 0.3 mile southward from the island. **Libby Island Light (58°16.4′ N., 136°46.3′ W.),** 50 feet above the water, is shown from a small white house on an islet southeastward of the island. **Horn Mountain** is a sharp, bare peak on the mainland north of Libby Island.

Graves Harbor has an entrance about 1.2 miles wide between Graves Rocks and Libby Island Light and extends inland for about 3 miles. Depths in the harbor are 12 to 76 fathoms. The cove, which makes off to the southward from the head of Graves Harbor, affords good landlocked anchorage in 7 to 15 fathoms and is easily entered. A buoy marks a shoal on the west side of the entrance to the cove. A fish-bnying scow anchors along the west shore from May to September and supplies gasoline, diesel and fuel oils, provisions, aud fresh water to fishermen.

Murphy Cove, on the southeast side of Graves Harbor 1.7 miles above Graves Rocks, has depths of 11 fathoms or more in its outer part and affords snug anchorage for small vessels. **Murk Bay,** opposite Murphy Cove, is clear but too deep and open for good anchorage.

Torch Bay, 7 miles northwestward of Cape Spencer, extends inland more than 3 miles in a northerly direction and varies in width from 1 mile at the entrance to 0.3 mile at the head of the western arm. Rocks, which uncover 7 feet and always marked by breakers, lie a mile south of **Venisa Point,** on the west side of the entrance; vessels can pass on either side of these rocks when entering the bay. The bay has depths of 20 to 50 fathoms and is not a good anchorage for large vessels; small vessels can find protected anchorage in the northeastern arm.

Sugarloaf Island, 9 miles northwestward of Cape Spencer, was named from its shape as seen from southward, from which direction it appears barely detached from the isletlike point projecting from the mainland. The island is high and wooded. From westward, it has a uniform north slope; the south slope has a step and is separated from the narrow southern extremity by a deep V-shaped ravine. Bare rocks and some that cover, fringe the shore from south around to west.

Sugarloaf Island Shoal, about 0.5 mile in extent, is about a mile southward of Sugarloaf Island. A rock awash and submerged rocks on the shoal usually break. A lighted whistle buoy is off the western end of the shoal. With moderate easterly gales temporary anchorage is possible in 10 to 18 fathoms, rocky bottom, in the cove

northeast of Sugarloaf Island. The cove is 0.3 mile wide and open to the northwestward.

Local magnetic disturbance.—Differences from normal variations of as much as 3¼° have been observed at the south end of Sugarloaf Island.

Astrolabe Point, 11 miles northwestward of Cape Spencer, is rugged and has bare cliffs on its western side; the south face of the point is moderately wooded halfway up. **Astrolabe Rocks,** some covered and uncovered, are 0.3 mile south of the point.

Dixon Harbor, with its entrance between Sugarloaf Island and Astrolabe Point, has depths of 60 to 20 fathoms over an average width of 0.8 mile for 2 miles northward to Thistle Cove, the northwestern arm. A glacier above the head of the harbor is visible from the entrance.

Thistle Cove is a mile long in a northerly direction. At the point on the northeast side of the entrance is a grass-covered rock, 20 feet high, from which a shoal extends southwestward across the entrance, leaving a channel 200 yards wide and about 2 fathoms deep close along the southwest shore. The sea and swell from outside are well broken before reaching the cove and vessels have no difficulty in entering. The head of the cove is a secure anchorage with 7 fathoms, muddy bottom. A fish-buying scow anchors each year from May to September on the west side of the cove just above the entrance. Gasoline, diesel fuel, and provisions are available on the scow, and fresh water can be obtained nearby.

Palma Bay lies between Astrolabe Point and Icy Point, 6 miles to the northwestward. This large body of water, sometimes called **Icy Bay,** has depths of 20 to 60 fathoms; large vessels have anchored close inshore in 15 to 20 fathoms.

Boussole Head, in the extreme southeastern part of Palma Bay, is a prominent wooded 650-foot-high peninsula which extends a mile into the bay. The outer end of the head is a natural arch which rises 60 feet above the water and is quite prominent from the south. **Alder Rock,** 0.3 mile south of Boussole Head, uncovers 4 feet.

Astrolabe Bay, southeast of Boussole Head, and **Boussole Bay,** on the northwest side of the head, are open to the southward but afford protection to small vessels in northerly or easterly weather. Anchorage is possible in 6 to 10 fathoms, sand bottom, near the head of each bay; the better in Boussole Bay.

Another anchorage, which affords some protection for small craft in westerly weather, is off the mouth of **Kak Creek,** a large stream which empties into Palma Bay on the northeastern side of Icy Point; recommended anchorage is close inshore in 6 to 10 fathoms, sand bottom.

Icy Point, on the west side of Palma Bay and 17 miles northwestward of Cape Spencer, is low and wooded; from southward La Perouse Glacier can be seen over the point. Some rocks fringe the point but deep water is only 0.3 mile offshore. There is a hot spring at the tree line on the northeast side of Icy Point.

Chart 8402.—From Icy Point to La Perouse Glacier, a distance of about 8 miles, the coast is low and wooded, with rolling hills that gradually increase in height to the bare mountain peaks. Rocks extend along the coast about halfway from the point to the glacier; the rest of the way is mostly smooth sand beach.

La Perouse Glacier, 24 miles northwestward of Cape Spencer, is an outstanding landmark along this coast because the mountains are often covered by clouds. The face of the glacier is 200 to 300 feet high and is nearly perpendicular; at the foot of the glacier is a narrow strip of sand beach strewn with boulders.

Between La Perouse Glacier and Lituya Bay, 15 miles northwestward, the coast is low and densely wooded. About 2 miles inland are hills that rise in a succession of terraces to the snowcapped peaks of the **Fairweather Range.** Most of the shore is sandy, with occasional boulders; huge boulders cover the last 1.5 miles to Lituya Bay.

Chart 8505.—Lituya Bay, 39 miles northwestward of Cape Spencer, affords protected anchorage in all weather, but the entrance is dangerous and should never be attempted except at slack water because of the strong current. The bay extends about 6 miles in a northeasterly direction and has widths of 1 to 2 miles. The shoaler area along the shore around the bay is obstructed by tree trunks and for about 200 yards above the waterline the area is barren of trees as a result of the July 1958 earthquake. Anchorage for small boats close to the shore is not recommended because of the possibility of fouling anchors in the debris of trees and roots.

At the head of Lituya Bay are two arms, each leading to a glacier. **Gilbert Inlet,** on the northwest, has **Lituya Glacier** at its head; **Crillon Inlet,** on the southeast, has **North Crillon Glacier** at its head. **Cascade Glacier,** which discharges into the head of the bay between the two arms, can be seen far at sea. Depths in the bay are as much as 78 fathoms. Vessels can obtain fresh water from streams near the head.

Harbor Point, on the east side of the entrance to Lituya Bay, can easily be identified from offshore by **The Paps,** two conical, wooded hills a mile to the northeastward; the northwesterly hill is the higher and rises to 540 feet. Large boulders, 20 to 35 feet high, are strewn along the beach. **Cormorant Rock,** 16 feet high, is the largest of three bare rocks off the south side of Harbor Point.

La Chaussee Spit, on the northwest side of the entrance to Lituya Bay, is 100 to 225 yards wide and about 0.7 mile long. The spit, 2 to 12 feet high, is bare of trees, except for a lone tree near the base; the outer side of the spit is covered with large boulders.

The entrance to Lituya Bay between Harbor Point and La Chaussee Spit is about 350 yards wide but is mostly foul. The channel has a controlling depth of about 5 fathoms but is only about 50 yards wide; the water shoals abruptly on either side and there are many rocks. The entrance is marked by a lighted range.

Anchorage Cove behind La Chaussee Spit, has depths of 3 to 5 fathoms, but is obstructed by numerous tree trunks and rocks awash and is not suitable for anchorage. On a

★(1044) **ALASKA—Gulf of Alaska—Yakutat Bay—Point Manby—Shoal depth reported.**—A depth of (approx.) 1¾ fathoms (PA) has been reported (1964) about 13.4 miles 297° from Ocean Cape Light (59°32′ N., 139°51′ W. approx.).

(N.M. 8/65.)

(L.N.M. 2, C.G., Juneau, Jan. 12, 1965.)
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flood tide with southerly weather, the cove has considerable swell.

Cenotaph Island, in midbay and about 3 miles from the entrance, is densely wooded and has several hills, the highest rising about 320 feet. The north and west sides of the island slope gently, but the south side is an abrupt, high cliff with depths of 75 fathoms only 100 yards away. The island is named for a wooden monument, or cenotaph, which was erected by La Perouse in 1786 in memory of officers and men who were lost in the entrance to the bay. No trace of the monument or its site have been found in recent years.

Tides and currents.—The diurnal range of tide is 9.7 feet two miles inside the entrance. The current velocity at the entrance is 5.1 knots on the flood and 4.1 knots on the ebb. Ebb currents, running against a southwest swell, cause bad topping seas or combers in which no small boat can live. Small powered vessels in the bay should stay away from the entrance on the ebb to avoid being swept through. The ebb current follows a narrow path for several miles ont to sea and can be seen for some distance. On the flood, the entrance is smooth and local fishing boats often negotiate it with a calm sea but are quickly swept through the channel by the powerful current. Strangers should not attempt to enter except at slack water. See the Tidal Current Tables for predictions.

Ice.—The bay has never been known to freeze over but icebergs can always be found in the upper part. With northeasterly breezes these icebergs often reach the entrance to the bay before melting. Ice is usually heaviest during October. The many streams flowing from the glaciers at the head of the bay give the water a murky discolored appearance.

Chart 8402.—From Lituya Bay northwestward to Yakutat Bay, the shore is mostly gently curving sand beaches but boulders are found in the vicinity of Cape Fairweather and at other places. Prevailing currents set northwestward about parallel to the shore, but it has been observed that winds have a great influence on directions and strengths.

Cape Fairweather, 54 miles northwestward of Cape Spencer, is an evenly rounded point sloping gently to the sea and abruptly back to the mountains. The summit of the cape is bare of vegetation but is covered with large piles of glacial drift, some of a bright iron-rust color. **Mount Fairweather,** 15,320 feet high, is 15 miles inland from the cape and is on the Alaska-Canada boundary.

Protection from southeasterly weather can be had northward of Cape Fairweather, which appreciably breaks both wind and swell. Small-boat landings can be made on the sand beach in moderate southeasterly or southwesterly weather. Just northward is a high rocky slide, with a cataract several hundred feet high, which is prominent from offshore.

Alsek River empties into a delta about 84 miles northwestward of Cape Spencer; 8 miles back of the coast is **Alsek Glacier.** The delta is filled with bars and small islands between which are constanly changing channels. The entrance to the bay, about 400 yards wide with depths of about 6 feet, has been used to some extent by small craft. The tidal current has a velocity of about 2.5 knots on the ebb; during heavy weather the sea breaks fully 2 miles offshore.

From Alsek River to Yakutat Bay, the mountains are 5 to 15 miles from the coast, and between is a low wooded plain cut by numerous streams. The principal rivers between Alsek River and Yakutat Bay have shifting bars at their entrances and lagoons or tidal basins inside; they can be used only by small boats or launches at high water and with a smooth sea. The mountains back of the coastal plain carry numerous glaciers; **Yakutat Glacier,** about 100 miles northwestward of Cape Spencer and 30 miles eastward of Yakutat Bay, is 3 miles wide and very prominent.

Chart 8455.—Yakutat Bay, 130 miles northwestward of Cape Spencer, has a 15-mile-wide entrance between Ocean Cape on the southeast and Point Manby on the northwest; the bay is 7 miles wide at **Blizhni Point,** 15 miles above the entrance, and 2 miles wide a few miles farther up. Yakutat Bay, the best anchorage between Cape Spencer and Prince William Sound, is mostly clear of islands and dangerous shoals. Depths in the bay range from 6¼ fathoms westward of Khantaak Island to 166 fathoms off **Point Latouche,** 23 miles above the entrance. Two to 3 miles outside the line between Ocean Cape and Point Manby is a submarine ridge, very narrow on top, with depths of 8½ to 16 fathoms; the water deepens rapidly to more than 30 fathoms on either side except near Point Manby, and the ridge curves northeastward near Ocean Cape to join shallower water. During very heavy weather, it has been observed that breakers or pronounced increased height of swell occur across the entire entrance to Yakutat Bay; at such times entrance is dangerous.

Ocean Cape, on the southeast side of the entrance to Yakutat Bay, is low and well wooded. Three bare light-colored bluffs 50 to 70 feet high, the westernmost point of the cape, are unmistakable landmarks. **Ocean Cape Light (59°32.2′ N., 139°51.3′ W.),** 130 feet above the water, is shown from a white daymark on a skele
on one of the bluffs. A lighted whistle buoy, 3 m
of Ocean Cape Light, marks the entrance to Yak

Point Manby, on the northwest side of the e
Yakutat Bay, is low and wooded. There is
heavy surf on the beach, making it dangerous
to land.

Point Carrew is on the east side of Yakut
miles above Ocean Cape. A lighted whistle bu
miles northward of Point Carrew, marks the northern
of a bank of shoaler water extending from the point, and
the turn into Monti Bay.

Point Munoz, the westernmost extremity of **Khantaak Island,** is 3.5 miles above Ocean Cape. The island is about 5 miles long in a northeast-southwest direction and the greatest width is between Point Munoz and **Point Turner,** 2 miles to the southeastward. Khantaak Island is low and wooded except at Point Turner, which is a tongue of sand covered with grass and bushes. **Khantaak**

Island Light (59°33.6′ N., 139°46.9′ W.), 28 feet above the water, is shown from a skeleton tower with a red square daymark on the southern end of the island near Point Turner.

Monti Bay, entered between Point Carrew and Point Munoz, extends about 3 miles southeastward to Yakutat, then turns northward to Yakutat Roads anchorage. Depths in Monti Bay are 20 to 40 fathoms, except for a 10-fathom obstruction 0.4 mile south of Point Turner; the south side is clear but the Khantaak Island side is foul.

Ankau Creek, on the south side of Monti Bay a mile southeastward of Point Carrew, is the outlet of an intricate system of shallow lagoons within the peninsula between the bay and the ocean. A depth of 9 feet can be carried through the entrance to Ankau Creek near the east side; currents are strong and entrance should not be attempted except at or near slack water.

Southeast Shoal, about midway between Point Turner and the Yakutat mainland, has on its north side a rock 5 feet high; the bare shoal is about 300 yards in diameter at low water. Two rocks, awash at lowest tide, are about 0.2 mile north of the shoal. A buoy marks the southeast side of the shoal.

Yakutat (1960 population 230; P.O.), a town at the eastern end of Monti Bay, has a small hospital, a school, and two general stores. Steamship service is irregular, stops being made only as the movement of freight demands.

Tide.—The diurnal range of tide is 10.1 feet at Yakutat.

The Government wharf, on the south side near the head of Monti Bay, has a 250-foot face with 35 feet alongside. Gasoline, diesel fuel, and other petroleum products can be delivered by truck from stock carried at the airfield. This service can be arranged for by phone through the cannery storekeeper. Water is not available at this wharf. In 1962, the wharf was reported in poor condition and was not being maintained. Its use is confined to fueling operations.

The Yakutat cannery wharf, 300 yards across the head of Monti Bay from the Government wharf, has a 225-foot face with about 18 feet alongside, and 42 feet about 18 feet out from the face. A strong surge is often felt at this wharf. Fresh water is available only during the cannig s been son, but the cannery store is open the year round. The N., 1 al radio station has the call letters KWJ–56, Yakutat. maintains a radio watch on 2512 kc. from 0800 to 2000, (N. ly.

The Yakutat airfield is about 3 miles southeast of the wn. Scheduled service to Anchorage, Cordova, and uneau is available three times weekly. Other stops are ade for two or more passengers or in emergencies. The Federal Aviation Agency maintains telephone connections with Seattle from 0800 to 2000, daily.

Yakutat Roads, between Yakutat and the shoals extending southeastward from Khantaak Island, has a clear width of 0.4 mile, eastward of Southeast Shoal, a length of nearly a mile and depths of 5 to 25 fathoms, muddy bottom. The best anchorage for large vessels is in 23 fathoms 700 yards northwestward of the point at the north end of Yakutat.

Port Mulgrave, on the west side of Yakutat Roads behind Point Turner, Khantaak Island, is a mile long and about 200 yards wide; on the side opposite Point Turner is **Village Shoal,** parts of which show at high water. The entrance to Port Mulgrave is 60 feet wide and 16 feet deep; the arm is usable only by small boats.

Rurik Harbor, the next arm indenting the inner side of Khantaak Island northeastward of Port Mulgrave, has depths of 9 to 15 fathoms in its entrance. **Prince Shoal,** partly bare at low water, extends out 0.4 mile from the point on the northeast side of the entrance. Small vessels can anchor in the entrance to Rurik Harbor.

Johnstone Passage, at the northeast end of Yakutat Roads, connects with several bays and arms between the numerous islands and rocks behind Khantaak Island. The connecting channels are navigable only for small craft at low water.

Just northward of Point Latouche, in the upper bay and mentioned earlier, temporary anchorage can be had in 20 fathoms about 400 yards off the sand beach; heavy ice probably will be troublesome at times. **Haenke Island** is near the east side of Yakutat Bay 5 miles above Point Latouche; anchorage in 6 fathoms is reported available behind the island.

Northward of Haenke Island, Yakutat Bay becomes **Disenchantment Bay.** Reefs and rocks, some reported to show at some stage of the tide, are said to lie in midbay; reported positions are shown on the chart and it is quite probable that there are others.

At the head of Disenchantment Bay, 4 miles above Haenke Island, is **Hubbard Glacier.** On the south side, opposite the glacier, is **Osier Island,** 95 feet high. **Russell Fiord,** with depths of well over 100 fathoms, extends 27 miles southward from Hubbard Glacier and Osier Island. **Nunatak Fiord** (see chart 8402) extends eastward for 8 miles from a point in Russell Fiord about 11 miles southeastward of Osier Island.

Ice.—The ice in Yakutat Bay comes from the glaciers at the head of Disenchantment Bay and from **Nunatak Glacier,** at the head of Nunatak Fiord. It is usually quite thick from Nunatak Fiord to Point Latouche, but at times is scarce. Ordinarily, the ice banks on the west side of Yakutat Bay as far south as Blizhni Point. Scattered bergs usually are found in the bay proper, and occasional drifts find their way as far south as Ocean Cape and Point Manby.

See appendix for **Yakutat climatological table.**

Chart 8002.—Between Yakutat Bay and Cape Suckling, the coast is formed by river and glacier deposit and is relatively regular. Coastal currents are discussed in chapter 3.

A short way inland, the St. Elias Range rises to 18,008 feet at **Mount St. Elias,** on the Alaska-Canada boundary, and culminates in the 19,850-foot **Mount Logan** in Canada. These towering snow-clad peaks, only 25 miles apart, are surpassed in all Canada and the United States only by central Alaska's 20,300-foot Mount McKinley.

Stretching from Yakutat Bay to the Bering River in one continuous icefield are the tremendous **Malaspina** and

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Bering Glaciers. Malaspina's 80-mile front barely reaches salt water at Icy Bay and **Sitkagi Bluffs**, the latter a cliff of ice 5 miles long on the open coast.

Chart 8457.—**Icy Bay** has been formed by the recession of **Guyot Glacier**, a part of Malaspina. The bay is about 5 miles wide and over 10 miles long, its northwest and southwest sides being nearly parallel. Oil prospects have been reported in the vicinity. The bay has no settlements.

A bar extends across the entrance of Icy Bay, roughly in the shape of a crescent, at depths, in midchannel, of 7 to 10 fathoms. Breakers extend out from each entrance point along the crest of the bar, varying with the size of the seas, but have never been observed to encroach on the channel. A lighted whistle buoy marks the entrance.

Both entrance points are low sandspits. Behind the eastern spit is **Riou Bay.** Several rocks awash, the positions of some doubtful, have been reported in the entrance.

The western spit forms **Mud Bay,** a shallow lagoon whose entrance is obstructed by a bar nearly bare at low water. The mudflats in Mud Bay are good places for beaching launches or scows.

Tides and currents.—The diurnal range of tide at Icy Bay is 9.9 feet. Currents in the bay are weak. The combined effect of the ebb current and the discharge from the glacial streams is most pronounced in the northwest part of the bay. In the entrance to Mud Bay, the ebb current attains a velocity of 2 knots or more. The tidal current at the entrance to Icy Bay floods northward and ebbs southward, with a velocity of about 0.5 knot.

Weather.—The prevailing winds are east and northeast. A breeze off the glacier usually brings rain. Winds from other quarters were seldom observed, although offshore winds are known to blow at times. Breakers on the ontside coast are generally heavy and plainly audible on either side in entering. Within the bay, west of **Claybluff Point,** breakers are frequently heavy enough to make landing difficult in small boats. There is no surf along the eastern shore of the bay.

Ice.—In the southern part of the bay ice is never thick enough to menace navigation. Large bergs either melt or ground before getting very far from the face of the glacier. The eastern shore is generally free from ice except during the spring tides. The shore north of Clayhluff Point is invariably covered with stranded ice. Riou Bay usually is free from ice.

Fresh water suitable for drinking is not available in quantity. Small streams and ponds can be found in the northeast arm behind **Moraine Island.** Ice from the bergs, taken on board and melted, provides good potable water.

Anchorage.—Possibly the best anchorage in Icy Bay is east of Moraine Island. Protection is afforded from all winds in 9 fathoms, mud bottom, but caution must be used in approaching the anchorage because of lack of surveys and on account of the drift ice. Do not anchor between Moraine Island and the small island eastward, as bergs drift through this area, sometimes with considerable velocity. Anchorage can also be had off the entrance to Riou Bay.

Chart 8002.—From Icy Bay to Cape Yakataga, the coast is backed by a continuous ridge of stratified mountains 3,000 to 6,000 feet high. Numerous streams cut the foothills, and a dense growth of alders and bushes line the shore.

Yakataga Reef extends about 0.5 mile from shore at **Cape Yakataga** (P.O.) and parts of it show above high water. This is the best landing place between Icy Bay and Controller Bay, but landing is possible only with occasionally smooth seas. **Yakataga Aero Light (60°05.0′ N. 142°28.7′ W.)** and Radio Range are several miles westward of the cape.

Chart 8513.—**Cape Suckling,** 25 miles northeastward of Cape St. Elias, is low and wooded. Two miles north of the cape a prominent mountain ridge 1,500 to 2,500 feet high extends about 8 miles northeastward. Three bluffs about 100 feet high are 1.5 to 2.9 miles westward of Cape Suckling. From the eastern bluff a sunken reef extends 0.6 mile southwestward to three rocks, close together which uncover.

Southwest Breaker is a rock bare at low water, 3.8 miles 260° from Cape Suckling.

Okalee Spit, forming the south side of Controller Bay, is low with bare sand dunes, and is 7 miles long in an east and west direction. The southeastern entrance to Controller Bay between the north end of Kayak Island and Okalee Spit is of little use except for very small vessels that can cross the flats eastward of Wingham Island.

Two prominent rocks about 75 feet high are in the approach, 1.5 miles eastward of **Lemesurier Point** at the northeast end of Kayak Island, and 1.2 miles southward of Okalee Spit. Ledges which uncover are between the two rocks, and extend about 300 yards eastward and westward from them. Foul ground with 13 feet over its outer half extends from Lemesurier Point almost to the shoal surrounding the rocks.

The channel is over a bar with least depths of 17 to 19 feet, thence between Okalee Spit and the two prominent rocks. Northward from the rocks, the channel has depths of 5 to 6 fathoms until about 1 mile inside the north end of Kayak Island; thence, through the flats, about 12 feet can be carried to Kayak Entrance, and 6 feet to Okalee Channel.

Kayak Island is 17.5 miles long, has peaks 1,110 to 1,390 feet high in the central portion, and slopes gradually to its northern part, which is low and wooded.

Cape St. Elias, the south end of Kayak Island, is an important and unmistakable landmark. It is a precipitous, sharp, rocky ridge, about 1 mile long and 1,665 feet high, with a low, wooded neck between it and the high parts of the island farther north. About 0.2 mile off the cape is the remarkable **Pinnacle Rock,** 494 feet high.

Cape St. Elias Light (59°47.8′ N., 144°36.3′ W.), 85 feet above the water, is shown from a 55-foot white square

tower at the corner of a rectangular building on the southwestern end of Kayak Island. A fog signal and radiobeacon are at the light.

Boats generally can land on the south side of Cape St. Elias just east of a small point which extends toward Pinnacle Rock. The better approach is from westward, keeping close to the island to clear a ledge which extends 0.2 mile northwestward from Pinnacle Rock. In approaching, care should be exercised in crossing the shoal extending from the cape to Pinnacle Rock. The depths here are reported to be shoaling.

A breaking reef extends 1 mile southwestward from Pinnacle Rock. About a mile eastward of Cape St. Elias, another breaking reef extends 2 miles southward from Kayak Island and then continues as a submerged ridge of 4 to 8 fathoms to **Southeast Rock,** which uncovers 11 feet. Broken ground with 7 to 10 fathoms continues 2.5 miles southwestward of the rock. A lighted whistle buoy, 3.2 miles from Cape St. Elias Light, is on the broken ground. Tidal currents have considerable velocity across the reefs.

The eastern coast of Kayak Island is strewn with boulders and landing is impracticable. Rocky shoals with 11 feet over them are 1.8 miles 172° from Lemesurier Point. Lying 3.2 miles southwestward of the point and 1 mile offshore is a reef 0.5 mile long. Its northern end is a rock 10 feet high and its south end uncovers 5 feet. For 6 miles northward from Cape St. Elias, boulders uncover and breakers extend 0.8 mile off the eastern coast of the island.

Sea Ranger Reef is off the western coast of Kayak Island 3.8 miles northward of Cape St. Elias. The inner shoal is 1 mile from shore, has 11 feet over it and often breaks. The outer shoal is 1.5 miles from shore, has a least known depth of 24 feet, and seldom breaks. Tide rips occur around it at times.

The tidal currents on the western side of Kayak Island set northward on the flood and southward on the ebb, with an estimated velocity of 0.6 knot.

Anchorage.—Good protection from all winds except southerly can be found on the west side of Kayak Island. The smoothest water usually will be found between Sea Ranger Reef and Kayak Entrance, an anchorage which is used by fishing vessels during the halibut season. Indifferent anchorage can be had on the east side of Kayak Island in 15 to 20 fathoms, about 1.5 miles offshore midway between Cape St. Elias and Lemesurier Point. The anchorage ground is poor and a vessel should be ready to leave on short notice.

Controller Bay is formed by Okalee Spit and Kayak Island on the south and Wingham and Kanak Islands on the west. For some distance back from the eastern shore the land is but slightly above high water, and is broken by many streams. Quicksand has been found in the channel at the mouth of Edwardes River. The bay is filled by flats through which are two principal channels, one from Kayak Entrance to the northern end of Kayak Island; the other, Okalee Channel.

Kayak Entrance, between Kayak and Wingham Islands, is rocky and foul with shoals on which the least depth found is about 2 fathoms. The channel is 0.5 mile wide between spits, which largely uncover, projecting out from Kayak and Wingham Islands. Kayak Entrance should be used with caution and only at high water.

Anchorage can be made in 3 to 4 fathoms, bottom soft in places, anywhere in the channel from the southeast end of Wingham Island to the northern end of Kayak Island. There is some local chop with strong winds, but no outside swell enters the bay either through Kayak Entrance or around the northern end of Kayak Island.

Wingham Island is 4 miles long and wooded, and has three hills; the highest is 832 feet near its northern end. The western shore of the island is precipitous. With heavy easterly winds, anchorage and shelter can be found in 16 to 18 fathoms 0.5 mile off the western side of Wingham Island.

Small vessels can anchor in the narrow channel close to the eastern side of Wingham Island. This channel is about 300 yards wide and has depths of 7 to 12 fathoms for 1 mile, then shoals gradually southward. The flats on the eastern edge of the channel have depths of 7 to 11 feet. At times the tidal currents in the channel have a velocity of 3 knots or more.

Okalee Channel, between Wingham and Kanak Islands, is 0.6 mile wide at the entrance, and has depths of 6 fathoms or more throughout most of its length. The channel is a secure anchorage.

The shoal on the south side of Okalee Channel 1.5 miles northeastward from Wingham Island uncovers shortly after high water, and this shoal and the one on the opposite side of the channel are usually indicated by breakers. The shoal extending southward from Kanak Island is mostly uncovered at low water. Above these shoals the flats bordering Okalee Channel are partly uncovered at low water only, and there is nothing to indicate the channel when the flats are covered.

Vessels sometimes anchor in Okalee Channel about 2 miles above the northern end of Wingham Island. This part of the channel is generally easy of access in clear weather. Above this point Okalee Channel should be navigated at low water only, in the absence of local knowledge.

Kanak Island is 3.2 miles long, very low and flat, and wooded in the middle. Breakers mark the extensive shoal which makes out from the west side of the island. The southern edge of the shoal is within 1.2 miles of the north end of Wingham Island.

The passage between Kanak Island and Strawberry Point is used only by small boats at high water. A buoy marks the westerly approach to the passage.

Tides and currents.—The diurnal range of tide is 10.1 feet at the north end of Wingham Island. The current velocity is 1.5 knots on the flood and 1.2 knots on the ebb off the north end of Wingham Island, and 1.7 knots on the flood and 2.0 knots on the ebb in the channel southeast of Kanak Island. The currents set into Controller Bay through all the entrances on the flood and out on the ebb. In Kayak Entrance the ebb has greater velocity than the

flood and the estimated velocity is not over 3 knots. Tide rips occur at times in the channels south of Wingham Island and southeastward of Kanak Island.

Weather.—During the summer the prevailing winds are from the east around through south to southwest. During the early spring and fall, northwest winds blow with great force over the flats. There is a great deal of cloudy misty weather during the summer. Fog is infrequent and usually clears before noon.

Point Hey is a projecting and prominent point, high and narrow, on the northwest side of Controller Bay 1 mile northward of Kanak Island. **Chilkat** is on the west side of the mouth of **Bering River,** which flows into the northeast end of Controller Bay.

Katalla Bay, 23 miles northward from Cape St. Elias, is between Strawberry Point on the east and Martin Islands on the west, a distance of 5 miles, and indents the coast about 2 miles to the mouth of Katalla River. The bay is a roadstead sheltered from offshore winds, but exposed to winds from southeast, south, and southwest.

Strawberry Point is low and bare at the end and wooded toward the foot of a prominent hill on the point which has a low break between it and the higher land northward. A shoal with little water over it, and on which the sea generally breaks at low water, extends nearly 1.2 miles southward from the point.

The northeastern shore of the bay from Strawberry Point to the mouth of Katalla River is a steep sand beach. The northwestern shore from Katalla to Martin Islands is foul and should be given a berth of about 0.8 mile.

Palm Point is 1.5 miles southwest of Katalla. A boulder reef, bare at low water, extends 0.4 mile southward from it.

Martin Islands, two in number about 60 feet high, have steep rocky sides, and are 0.5 miles from shore. The northern island is joined to the shore by a flat, bare at extreme low water.

Martin Islands Light (60°09.7′ N., 144°36.7′ W.), 150 feet above the water, is shown from a white house on the southwest point of **Kiktak Island,** the outer island of the Martin group.

Katalla is at the head of the bay, on the western side of **Katalla River.** A landing is available for lighters, which can be towed over the bar except at low water. The bar at the mouth of the river has a depth of about 3 feet, and the sea generally breaks on it. The entrance, which is narrow and rocky, requires local knowledge. With a smooth sea, lighters formerly landed in the bight on the northeast side of Palm Point. The beach always has some surf, and with southeasterly or southwesterly winds, landing is impracticable.

The engine of the steamer PORTLAND, wrecked on the Katalla beach in 1910, is reported to lie in the vicinity of the 5-fathom curve, about 1 mile northeastward of Palm Point. Shoals make out on both sides of the river mouth to the wreck.

The anchorage in the bay is 1.5 to 2 miles southward of Katalla, in 6 to 7½ fathoms, hard sand bottom. The holding ground is generally good, but quicksand southward of Palm Point has caused the loss of many anchors. There are no dangers if the shore be given a berth of over 0.8 mile, but the wreck of the PORTLAND and the shoal extending 1.5 miles southward from Strawberry Point should be kept in mind.

Chart 8502.—Copper River emerges from the mountains between **Miles** and **Childs Glaciers,** above which are rapids. Below the rapids, the river flows through broad flats in many changeable channels which vary in depth from 5 to 20 feet at high stages. It is not navigable, the current is swift, and tidal effects are felt only near the mouth.

The delta is low and marshy except for sand dunes, 50 to 150 feet high, on the islands and banks of the main channel. From seaward, the vicinity of Copper River shows as a vast, rugged range, with numerous glaciers filling its gorges. From **Point Martin** to Hinchinbrook Island is a chain of low sand islets, 4 to 5 miles offshore. Back of the islets are tidal flats of mud and sand, intersected by sloughs which drain into the Copper River passes and into Glacier and Eyak Rivers.

The shoals extending seaward from the islets off the Copper River Delta have not been surveyed; however, danger can be avoided by giving the islets a berth of more than 3 miles and by avoiding depths less than 10 fathoms.

Alaganik Slough, the westernmost and main outlet of Copper River, is 0.5 to 1 mile wide, with depths from 5 to 15 feet depending upon the stages of tide and river. The mean range of tide is about 9 feet at the mouth, and is reported to be 2 to 3 feet at **Alaganik** about 10 miles up the slough. The flood current is felt as far as Katalla.

Chart 8520.—Eyak River, 6 miles northeastward of Point Whitshed, flows from Eyak Lake and has a swift current. At favorable stages of the tide it is navigable for small, light-draft craft to the lake. **Mountain Slough** is 1.5 miles westward from the mouth of Eyak River. There are two clam canneries on this slough.

Egg Islands, about 5 miles southeastward of mainland Point Whitshed and 10 miles eastward of Hinchinbrook Island, are low and partly grass covered. Just eastward of the islands is a channel which leads northeastward between sand and mudflats to Alaganik Slough. The seaward approach to the channel is marked by a lighted whistle buoy.

Egg Island Light (60°22.3′ N., 145°43.9′ W.), 20 feet above the water, is shown from a white square daymark on a skeleton tower, on the southeastern island of the group.

The current in the channel is strong. East of Egg Islands, flood and ebb velocities of 3 to 3.5 knots, respectively, setting in the direction of the channel, have been observed. Northward of the islands a current of 1.5 knots, flooding northwestward and ebbing southeastward, was found. Southeastward of Point Whitshed a westward flood of 1.5 knots was observed.

Navigation in this area is limited to small craft with local knowledge. Anchorage can be found in the wider

parts of the sloughs northward of the Egg Islands. There is no protection from prevailing winds but seas are broken up by the surrounding flats.

Point Whitshed is at the southern extremity of the **Heney Range,** the steep eastern side of which flanks the alluvial coastal region of the Copper River. The waterfall, 1 mile from the point on the coastal side of the ridge, is a prominent landmark, seen for several miles over the mudflats, and shows well when the peaks and higher land are cloud covered. The higher peaks on Heney Range, as well as those on Hinchinbrook Island, are generally sharp and bare topped. The end of the peninsula westward from Heney Range is rolling hills. **Government Rock,** at Point Whitshed, is 30 feet high and rounded in outline.

The irregular slough, marked by stakes, trending east and west near Point Whitshed and **Twin Rocks** has a controlling depth of about 1 foot. When the Twin Rocks are just covered, the depth in the slough is increased to about 6 feet. Twin Rocks can be avoided by bringing the summit of Mummy Island, a rounded wooded knoll, in range with the 1,845-foot mountain peak on Hawkins Island.

An abandoned radio tower is near **Gravel Point** on the mainland about 1 mile eastward from Mummy Island. Two clam canneries are at Gravel Point.

Mummy Island is about 425 feet high and wooded. There is a clam cannery on the island. A light is on the islets east of Mummy Island, where there is an approach through a slough. The islet 0.2 mile southwest of Mummy Island has two steep ends, 75 feet high, with a low, flat strip between.

Little Mummy Island is rounded in outline and profile.

About a mile southward of Mummy Island is **Pinnacle Rock,** on the edge of a slough extending from Point Bentinck to Mummy Island.

Orca Inlet northward to Cordova from Mummy Island is filled largely with flats. The unmarked channels through the shifting flats are subject to change and have not been surveyed in recent years. Local knowledge is necessary. The inlet is described later in the chapter.

Point Bentinck, at the eastern end of Hinchinbrook Island, is low, sandy, and grass covered, with sand dunes and brush 0.5 mile back. The brush covers a ridge extending southwest from **Strawberry Hill** at the south shore of Boswell Bay. The 798-foot knoll northward of Boswell Bay is prominent.

At low water sandflats bare for 2 miles off Point Bentinck. Part of this area is above ordinary high water offering a footing for sparse grass and a lodging place for driftwood. Shoal water continues off the point in a southeasterly direction, and about 4 miles from the point the shoal drops off into deeper water.

A lighted bell buoy southeastward of Point Bentinck marks the seaward approach to a channel that leads between the flats a mile eastward of the point to Orca Inlet. After crossing the bar the channel becomes deep and narrow abreast of Point Bentinck. Low water is the best time to negotiate the entrance as the flats are bare and of some aid. A stranger should not attempt this entrance.

Current velocities up to 3 knots on the flood and 2 knots on the ebb were observed in this channel. On the bar, flood and ebb velocities of about 1 knot were found setting northeastward and southward, respectively. South of the flats which extend westward from Egg Islands, a northwestward flood of 0.5 knot and a southeastward ebb of 1 knot were observed.

A ¾-fathom rock, in midchannel about 1 mile northward of Point Bentinck, stands squarely in a swift current and is often indicated by surface ripples. It can be avoided by choosing a safe range on the northeast point of Hinchinbrook Island.

Boswell Bay, indenting the eastern end of Hinchinbrook Island, affords anchorage for small craft just inside the entrance. Massive **Boswell Rock** is 100 yards off the northern point. Immediately adjacent to the point itself is an undercut rock. A very small rock is 100 yards outside of Boswell Rock.

To enter bring the 65-foot rock, brown in color and near the southern shore of the bay, just clear of the southernmost pinnacle inside the entrance, and steer on this range until abreast of Boswell Rock. Then haul southward a little and anchor when the northeast point of Hinchinbrook Island is just shut in on the undercut rock. Flood and ebb velocities of 1.5 and 2 knots, respectively, have been observed in the narrow entrance.

Hinchinbrook Island, southeast coast.—A mountain ridge parallels the southeast coast of Hinchinbrook Island. The tree line is about 1,000 feet high and the summits of the island are bare. The peaks are not prominent and from offshore they are difficult to identify.

The promontory between **Point Steele** and **Hook Point** is 2 miles broad and is faced with 200-foot bluffs; back of the bluffs is swampland. Lowland and sand beaches are adjacent to the promontory on either side. A boat can land in good weather on the northwest side of Hook Point and 0.5 mile northward of Point Steele. Reefs make out 0.4 mile from the promontory.

Northeastward of Cape Hinchinbrook, the seaward face of Hinchinbrook Island is steep, with rocky bluffs at the water, for 12 miles to an open bight with a broad sand beach on the west side of Hook Point.

Hinchinbrook Entrance is described later.

Chart 8551.—Prince William Sound is an extensive body of water with an area of about 2,500 square miles. It is very irregular in outline, with great arms spreading in all directions. The entrance, from Cape Hinchinbrook to Cape Puget, is 58 miles across, but is almost closed off by islands. The largest is Montague Island which extends well out into the ocean.

Many of the islands and peninsulas in the sound are low and tree covered but behind these rise eternal barriers of ice and snow. The **Chugach Mountains** stretch northwestward from the St. Elias Range and enclose the sound round through north and west. On the north shore glaciers come down to the heads of the bays.

The waters of the sound are very deep and are chilled by large amounts of ice from the surrounding glaciers. The meeting of cold water and the colder air from the

on it was 4½ fathoms although shoaler water may exist. It should be given a good berth.

Wessels Reef, awash at low water, 2 miles long northeast and southwest, is about 19 miles north of Middleton Island. Depths of 30 fathoms or more are close to the reef, and with smooth seas it can hardly be detected. A buoy is on the north side of the reef.

Montague Island, on the west side of the approach to Prince William Sound, is high, mountainous, and wooded to about 1,000 feet. There are no distinctive peaks, although Montague Peak, the most northerly one of the range, can be distinguished from the southward. A striking characteristic of the eastern part of the north half of the island is the regularity of the succession of spurs reaching from the mountain range to the coast, where the spurs terminate in dirt bluffs with comparatively steep slopes.

Chart 8515.—Purple Bluff, 5 miles north of Box Point, has a purple hue especially in the afternoon. Southward of Purple Bluff, a conspicuous valley, drained by a river, trends far inshore.

A constant southwest current is reported along the east coast of Montague Island; see remarks on currents in chapter 3.

There are no settlements on Montague Island; brown bears are numerous on the island, and they are said to be ferocious.

From Zaikof Point to Purple Bluff, the outer coast of Montague Island is unbroken and free from outlying dangers excepting Seal Rocks. About 3.5 miles southward of Purple Bluff, a spit extends 0.5 mile offshore, terminating in a group of rocks awash.

Montague Island was subjected to extensive upheaval during the March 1964 earthquake. Thirty-one feet was measured at Macleod Harbor, 11 feet at Port Chalmers, and 15 feet at Patton Bay. Mariners should exercise extreme caution when navigating in depths under 10 fathoms or areas of uneven bottom.

Box Point, 20 miles northeastward of Cape Cleare, is about 180 feet high and comparatively level, with steep cliffs, giving a rectangular appearance. Two box-shaped islets are on foul ground extending 1.7 miles eastward to 6-fathom depths.

Patton Bay, 17 miles northeast of Cape Cleare, is about 5 miles square with Box Point on the northeast side and Wooded Islands on the southeast side. The deeper entrance, about 3.5 miles wide, is between the rocky foul ground extending eastward from Box Point and the irregular rocky ground extending northeastward from the Wooded Islands.

Inside the bay, foul areas make 0.3 mile southward and 0.3 mile westward of the southern tip of Box Point; 0.7 mile offshore from the head of the bay due west of the entrance; and 0.7 mile northward and 0.3 mile eastward from the prominent pinnacle rock on the rocky islet 2 miles northwest of the largest of the Wooded Islands. **Nellie Martin River,** on the south side of the bay, is blocked by a bar across its mouth.

There is good anchorage, except during northeasterly to southerly weather, for small boats in the bights at the northeast, west, and southwest parts of the bay in 3 to 10 fathoms, sand bottom, and for larger vessels in 15 fathoms or more, sand and mud bottom.

The March 1964 earthquake caused a bottom uplift of 15 feet in Patton Bay. Shoaling and new dangers may exist requiring extreme caution until a complete survey is made of the area.

Wooded Islands, on the southeast side of Patton Bay, are 16 miles northeastward from Cape Cleare. The largest of the three is wooded and flat topped, with a prominent square-topped pinnacle rock about 175 yards off its west end. **Tanker Island,** the middle islet about 0.4 mile eastward of the largest island has a small clump of trees near one end that appear similar to the stack and wheelhouse of a tanker. The easternmost island is small with a few trees on the western summit. The area between the islands is foul, and the small passage southwest of the largest island is shoal and foul. These islands should be given a berth of at least 2 miles, and without local knowledge, the shoal rocky passage southwestward of the islands should not be used by small boats.

A survey of the coast from Wooded Islands to Cape Cleare disclosed no outlying dangers, but there are areas of broken bottom near the shore and vessels are advised to give the coast a berth of 3 miles.

Jeanie Cove, a bight 10 miles northeastward from Cape Cleare, is exposed to the southward and affords no protected anchorage. There are numerous reefs and rocky patches in this vicinity which should be avoided.

A rock which uncovers is 0.8 mile off the western entrance point, and a reef which uncovers is 0.8 mile off Jeanie Point, the eastern entrance point.

Jeanie Point is bold with rock cliffs. Back of the cliffs the land is timbered and rolling. A prominent detached rock is a short distance off the point.

Neck Point, the first prominent point northeastward from Cape Cleare is a bold headland with eroded bluffs. A prominent pinnacle rock is about 100 yards off the point and deep water extends close to shore. The point is separated from the higher peaks back of it by a neck of land somewhat lower than the outside point. The headland and the 1,900-foot peak are separated from the main ridge by a deep valley. When viewed from a position southwestward of Cape Cleare the peak has the appearance of a detached conical island.

Cape Cleare, the southwestern extremity of Montague Island, is gently rounding and consists of eroded bluffs with rocky beaches. Back of the cliffs the cape is timbered and undulating with the ground gradually rising to the mountain masses nearby. A detached rock with a double head 25 feet high is about 75 yards off the southwest extremity of the cape. The cape should be given a berth of at least 1.5 miles. Strong tidal currents sweep around the cape and tide rips are frequently encountered.

Exposed anchorage can be had in the bight about 5 miles northeastward from Cape Cleare in 10 to 20 fathoms, sand and gravel bottom.

The west and north coasts of Montague Island are described later.

Chart 8520.—Hinchinbrook Entrance, the main entrance to Prince William Sound, is about 6 miles wide, and clear with the exception of Seal Rocks.

Seal Rocks, off the entrance, are 6 to 7 miles southwestward from Cape Hinchinbrook and over 6 miles from Montague Island. They are two bare rocks, 30 and 37 feet high, surrounded by low rocks. Covered rocks extend 1 mile northeastward and a short distance southwestward from them. The entire reef within the 10-fathom curve forms an obstruction nearly 2.5 miles long.

The tidal currents in the entrance set directly in or out of the sound. In Hinchinbrook Entrance, Montague Strait, and Latouche Passage, the velocity of the current is about 1 knot. The ebb current running out against a large swell causes overfalls, especially in the deep water 2 or 3 miles eastward of Zaikof Point, which have been mistaken for breakers. There are also tide rips on the broken ground around Cape Hinchinbrook. The flood entering westward of Montague Island sets northeastward past Montague Point and causes rips between it and Johnstone Point.

Outside the entrance along the southeast coast of Hinchinbrook Island the current sets southwestward almost constantly. See remarks on current in chapter 3. Current observations in Elrington Passage indicate a velocity of 1.5 knots.

With a strong southerly gale and ebb tide, very heavy overfalls and tide rips occur in Hinchinbrook Entrance, and are dangerous to small craft. Tremendous seas, steep and breaking, are sometimes encountered just outside the entrance. During heavy weather, there are tide rips and confused seas in the vicinity of Wessels Reef. Many halibut schooners have foundered between Cape St. Elias and Montague Island.

Cape Hinchinbrook is on the eastern side of Hinchinbrook Entrance, the principal entrance to Prince William Sound from the eastward.

A few rocky islets are close to the southeast side of the cape, and sunken reefs on which the sea breaks in a moderate swell, are 0.4 mile southeastward and southward from the cape. The cape should be given a berth of over 0.8 mile.

Cape Hinchinbrook Light (60°14.3′ N., 146°38.8′ W.), 235 feet above the water, is shown from a 67-foot white square tower on the corner of a building on the southwestern point of the cape; a fog signal and radiobeacon are at the light.

Zaikof Point is on the western side of Hinchinbrook Entrance and is one of the three prominent points on the northeastern end of Montague Island. **Schooner Rock,** a pinnacle 75 feet high, is about 0.3 mile off Zaikof Point.

Between the three prominent points are Zaikof and Rocky Bays. Low depressions run through from the heads of these bays to the western side of Montague Island.

Zaikof Bay is clear, but exposed to northeast winds. Anchorage can be selected with the aid of the chart along the southeast shore, from 2 miles inside Schooner Rock to the head, also on a bar with 10 to 15 fathoms which extends across the bay 2.5 miles from the head. A swell makes in during southeast gales.

A small vessel can anchor in the cove on the southeast side 1.6 miles from the head, with shelter from northeast winds. Anchor close to the southern side of the point, about 0.1 mile from the short spit making out from it, in 8 to 10 fathoms. There is no swell, but the williwaws blow with great force over the lower land inside the point. When the wind hauls southeastward or southward the williwaws come from all directions, and it is well to shift anchorage farther from the spit. A small shallow lagoon is at the head of the cove, and the bank is steep-to.

Foul ground marked by kelp extends 0.6 mile off **Middle Point,** which separates Zaikof and Rocky Bays.

Rocky Bay is deep, and exposed to northerly and easterly winds. A small vessel can anchor in good weather about 0.6 mile from the head and 0.2 mile from the northwest side, in 8 to 10 fathoms. Small craft can anchor in the lagoon, on the southern side 1 mile from the head, where a small area has a depth of 10 feet. When entering the lagoon care should be taken to avoid a reef, partly bare at low water, extending westward and northwestward from the north point.

A reef that uncovers extends nearly 0.8 mile eastward from Montague Point which forms the west side of Rocky Bay.

Port Etches, an inlet in the southwest end of Hinchinbrook Island, has secure anchorage, the best in Hinchinbrook Entrance, and is easy of access. The strongest gales are northeast and are not steady, but descend from the surrounding mountains in heavy williwaws of varied direction, and at times blow hard in Port Etches when comparatively light winds prevail outside. Fresh water can be obtained from streams in Garden Cove and on the northwest side of Constantine Harbor.

The best anchorage for large vessels is abreast Garden Cove, in 12 to 15 fathoms, muddy bottom. A flat extends 1.5 miles from the head, but can easily be avoided. The swell is quite perceptible in heavy southerly weather.

Garden Cove, on the southeast side 2 to 2.5 miles from the head of Port Etches, is the best anchorage for small vessels. **Garden Island,** wooded and having a break through it, is in the middle of the entrance; there is no safe passage northeastward of it. **Point Horn,** the southwest point of the cove, is the most prominent of the projecting points on the southeast shore of Port Etches.

Anchor with Point Horn in line with the southernmost of the Porpoise Rocks, and about 250 yards southeastward of Garden Island in 4 to 5 fathoms, sticky bottom. No ocean swell reaches the anchorage, but, as elsewhere in Port Etches, the williwaws are bad in easterly gales.

English Bay, on the south side of the entrance to Port Etches, is a bight about 0.4 mile wide. It can be used as a temporary anchorage by small vessels, but is exposed to the ocean swell in heavy weather and open to northerly and westerly winds. Easterly gales blow in williwaws from all directions but do not raise much sea in the inner cove. The holding ground is good. The chart shows a

sunken rock, position doubtful, in the center of the bay, and for that reason the bay should be used with caution.

The two bights on the southeast shore of Port Etches, 1.2 and 3.5 miles northeastward of English Bay, are rocky and should be avoided.

Porpoise Rocks, on the northwest side of the entrance to Port Etches, are three principal rocks about 48 feet high, with numerous small rocks among and eastward of them. The westernmost and largest is flat on top and grass-covered, and has a rock covered at high water 200 yards westward from it. Deep water is close to the rocks except on their northeast side where foul ground extends to Point Barber at Nuchek, a distance of 1 mile, with no safe channel between. Kelp surrounds Porpoise Rocks and extends 0.4 mile southwestward of Point Barber.

Nuchek is an abandoned Indian village on the southeast end of the shingle spit at the southwest end of Constantine Harbor.

In good weather steamers have anchored off the shingle spit northwestward of Nuchek. It is an uncomfortable anchorage because of the swell. The best anchorage in about 10 fathoms, sandy bottom, is abreast the spit midway between the village and the rocky wooded knob in the middle of the spit, with the southeast one of the three largest Porpoise Rocks in line with the end of Hinchinbrook Island.

Constantine Harbor, the lagoon on the northwest side of Port Etches, has its entrance at **Phipps Point.** It is suitable only for small craft on account of the very narrow entrance channel, which is 50 to 100 yards wide with depths of 18 to 19 feet. The tidal currents have considerable velocity in the entrance. The best time to enter is at high water, preferably near slack. The harbor is mostly shallow, but has an area 0.5 mile long and 0.4 mile wide with depths of 3 to 4¼ fathoms, sticky bottom, but exposed to williwaws.

On the northeast side of the entrance are three small rocky wooded islets with overhanging sides. Among them are rocks which bare, and 60 yards south-southeastward from the western islet is a sunken rock, all marked by kelp at slack water. The channel is close to the western islet, between the foul ground at the islets and a shoal of 9 to 10 feet extending 0.3 mile eastward from Phipps Point.

Temporary anchorage in 10 to 12 fathoms, sticky bottom, can be had about 0.5 mile southeastward of the rocky islets in the entrance of Constantine Harbor; there is considerable swell in heavy weather.

The diurnal range of tide in Port Etches is 11.2 feet.

Bear Cape, steep and high, is the southwest end of the northwest mountain ridge of Hinchinbrook Island. A small cove, 3 miles northward of Bear Cape, has anchorage a little southward of the middle of the entrance in 5 to 10 fathoms, with shelter from easterly and southeasterly winds.

Shelter Bay has a shallow entrance with strong currents, and cannot he used even by small craft. Temporary anchorage, with shelter from offshore winds, can be had about 0.5 mile from shore, off the middle of the bight at the entrance of Shelter Bay, in 5 to 10 fathoms, sandy and muddy bottom. A shoal, with rocks in places, extends about 0.3 mile from the shore in the bight.

A vessel has anchored in 10 fathoms, about 0.3 mile northwestward of **The Seven Sisters** and found the williwaws less strong with southeast winds than at the anchorage in the cove 3 miles northward of Bear Cape.

Temporary anchorage, with shelter from offshore winds, can be had southward of the sharp point, with two rocks about 30 feet high close-to, 0.4 mile southward of Johnstone Point. The anchorage is about 0.5 mile off the sand beach, in 10 fathoms, sandy bottom.

Johnstone Point, the northwest end of Hinchinbrook Island, is low and wooded with a small bluff at the water's edge; it is marked by a light, shown from a small red house on the pillar rock off the point.

Eastward of Johnstone Point the shore is low, and broken by two shallow bays or lagoons. The easterly bay has secure anchorage for small craft. The entrance, 4 miles eastward of Johnstone Point, is westward of a large island, and leads between two rocks. The one on the west side is bare at half tide and is at the end of a sandspit making out from the shore; it should be given a berth of about 40 yards. The rock on the east side is bare at extreme low water. When inside the rocks, head for the cove in the southwest side of the bay, and anchor in about 3 fathoms, sticky bottom, about 250 to 300 yards from shore, and about halfway between the sandspit mentioned above and the south shore of the bay.

Middle Ground Shoal, between Hinchinbrook and Hawkins Islands, extends for 3 miles into Orca Bay. General depths are 2 to 6 feet on the shoal which is a danger for vessels entering Orca Bay from southward. A lighted bell buoy marks its northwest end. Anchorage can be selected off the shore, southwestward of Middle Ground Shoal, in 12 to 20 fathoms, soft bottom, with shelter from southerly and easterly winds.

Hawkins Island Cutoff, between Hinchinbrook and Hawkins Islands, leads from Prince William Sound into Orca Inlet and is navigable only for small craft with local knowledge. It is full of shoals, and in its eastern end are extensive flats which bare and are largely covered at high water. Strong tidal currents are in its narrower parts.

Orca Bay is the eastern arm of Prince William Sound, northward of Hinchinbrook and Hawkins Islands. From its entrance between Johnstone Point on the south and Knowles Head on the north, Orca Bay extends about 30 miles in a general easterly direction. The city of Cordova is on Orca Inlet at the head of the bay. The southern side of the bay is clear with the exception of Middle Ground Shoal. The northern side is indented by large bays of no commercial importance.

Knowles Head, the southwest end of the mountainous peninsula between Port Gravina and Fidalgo Bay, is a steep massive headland, with a prominent yellowish landslide down its southern face. There are numerous rocks close to shore and a 4-fathom shoal is about 3 miles westward of Knowles Head.

Red Head, 4 miles east-southeastward of Knowles Head,

is a high hill with a long, low, wooded neck behind it. It is the western entrance point to Port Gravina.

Gravina Point, on the north side of Orca Bay, is low and wooded, and at its southern end is a bare spit with a large and a small clump of trees on it. It is marked by a light, 27 feet above the water, shown from a small white house on white skeleton tower.

Gravina Island, low and wooded, is 1.5 miles northwestward of the point and 0.6 mile offshore. Anchorage in about 10 fathoms, with shelter from northeast winds, can be had about 0.5 mile offshore between the island and Gravina Point.

Sheep Bay has its entrance between Gravina and Sheep Points, and extends northward about 7 miles. The bay has not been closely surveyed, the bottom is exceedingly broken, and vessels should proceed with caution. Foul ground extends 0.2 to 0.4 mile from the eastern shore for 2 miles northward of Sheep Point. Indifferent anchorage in 18 to 20 fathoms can be selected in the middle about 3 miles above Sheep Point and 0.4 mile below the point where the bay narrows. Proceeding with care and preferably at low water, small vessels can follow the deep channel among the islands in the upper part of the bay and select anchorage in 6 to 15 fathoms.

Sheep Point is moderately low and wooded at the end. and backed by high land. A wooded islet is 0.3 mile westward of the point with bare rocks between, and foul ground extends 0.3 mile southward and westward from the islet.

Hanks Island, small and wooded, is 0.8 mile eastward of Sheep Point and 0.5 mile from shore. **Gatherer Rock,** 0.6 mile 124° from Hanks Island, is a pinnacle with 13 feet over it and deep water close-to. Broken ground on which the least depth found was 8 feet, extends 0.8 mile southward from Hanks Island, and is marked at its south end by a lighted bell buoy.

Simpson Bay is just eastward of Sheep Bay. **Bomb Point** is the eastern entrance point to Simpson Bay. The shores of the bay are fringed with numerous rocks and islets. In navigating the northerly arm, avoid the rock awash at extreme low water 400 yards southward of the eastern entrance point of the inner part of the bay. Anchorage can be had at the head of the arm in about 15 fathoms.

The east arm of Simpson Bay is clear except near the shores. Good anchorage in 12 to 15 fathoms, can be had on either side of the twin islands in the upper part of the arm. The Coast Guard uses the east arm for wet-pool storage of buoys. Occasionally lanterns are attached to the buoys, but at no time are they lighted. Mariners should not confuse these buoys with navigational aids.

Hawkins Island is about 20 miles long and mountainous. **Canoe Passage,** dividing the island about 8 miles from its southwest end, is navigable only at high water. The northwest shore westward of Canoe Passage is low tundra with patches of trees. Northeastward of Canoe Passage the high land is nearer the northwest shore of the island; there are bluffs in places, and it is more densely wooded.

With the aid of the chart, anchorage can be selected in places along the northwest shore of Hawkins Island with shelter from easterly and southerly winds. The best anchorage in 9 to 12 fathoms, soft bottom, is 0.2 to 0.4 mile off the spit at the south end of Cedar Bay. A round, wooded islet is at the north end of this spit, and a larger wooded one is 0.5 mile northward. Small craft, entering at high water and passing northward of the awash and covered rocks inside, can anchor east of the spit, where there is a limited area with a depth of 7 feet.

Windy Bay is a small inlet on the northwest coast of Hawkins Island about 5 miles northeastward from Canoe Passage.

Chart 8525.—Channel Islands, wooded and nearly 1 mile long, are on the northwest side of Orca Bay 6 miles above Sheep Point. The channel at the islands, 0.5 mile wide, is called **The Narrows.** A rock with 3 feet over it, 0.4 mile southwestward of the southwest end of Channel Islands, is marked by a buoy. The southeastern point of the larger island is marked by **Channel Island Light (60° 36.8′ N., 145°48.2′ W.),** 26 feet above the water and shown from a small white house, on the south end of the island.

Orca Inlet extends in a southerly direction from the head of Orca Bay to Mummy Island. From North Island to Spike Island, the western side of the inlet is shoal, and southward of Spike Island the inlet is largely blocked by flats. Northward of North Island it has depths of 25 to 30 fathoms, and a flat extends 1 mile from the head at its north end.

Salmo Point, the northern extremity of Hawkins Island, is just above Channel Islands. **Knot Point,** the northeast end of Hawkins Island, is 1.5 miles south of Salmo Point, with a bay 1.5 miles long and 0.5 mile wide between. This bay has depths of 20 to 40 feet, but a shoal with 7 to 12 feet over it lies in the entrance. The bay can be used as an anchorage by vessels able to cross the shoal.

Observation Island, 0.8 mile long, high and wooded, is 0.4 mile northeastward of Knot Point.

North Island, 0.4 mile long, low and wooded, is 1 mile northeastward of Salmo Point.

Shepard Point is a sandspit 1.5 miles eastward of North Island and 6 miles northward of Cordova. Ruins of a cannery and wharf are on the point.

The ruins of a cannery and wharf are on the south shore of Orca Inlet about 1.5 miles northeastward of Shepard Point.

At **Orca,** on the eastern shore 2.5 miles northeastward from Cordova, is one of the most modern canneries in Alaska. The 200-foot long wharf, in May 1964, had controlling depths of 19 feet alongside its face, 11 feet off the northeast end, and 9 feet off the southwest end. Large vessels make port landings, the dock heading being 224°. Docking on the flood is difficult as the current tends to set off the wharf.

Cordova (1960 population 1,128; P.O.) is on the eastern shore of Orca Inlet opposite **Spike Island,** which is wooded. **Cordova is 1,221 miles from Seattle via the**

ocean route and 1,363 miles via inside passages through British Columbia and Southeast Alaska to Cape Spencer. It is one of the most important towns in southwestern Alaska and is the supply and distribution point for numerous outlying fishing localities.

The March 1964 earthquake caused a bottom uplift of 6.3 feet at Cordova. Shoaling and new dangers may exist requiring extreme caution until a complete survey is made of the area.

Prominent features.—Mt. Eyak, 2,498 feet, and Mt. Eccles, 2,680 feet, dominate the approach, the town nesting at the foot of Mt. Eyak.

Channels.—The deepest channel, and the one used by larger vessels, leads north of North Island and then follows the eastern shore southward to Orca and Cordova. The buoyed channel had a controlling depth of 22 feet in April 1964.

Anchorages.—Good anchorage can be had in the channel westward of Ocean Dock and Spike Island in 30 to 43 feet, sand bottom.

Dangers.—The area extending from **North Island Rock,** marked by a light 1.6 miles northward of Observation Island to over 2 miles southward of the island has several visible rocks and shoals with little water over them. The eastern limit of the shoal area is buoyed.

Tides and currents.—The diurnal range of tide at Cordova and Orca is 12.4 feet; for predictions, see the Tide Tables.

The flood current enters the northeast end of Orca Inlet and sets southwestward past Orca and Cordova. Off Orca the current velocity is about 1 knot, but a flood of nearly 5 knots has been observed.

The current sets directly off the face of Ocean Dock on both flood and ebb, due to the fact that the dock is built off a small point with a decided bight in the shore on either side.

Off Cordova the velocity is 1.8 knots on the flood and 1 knot on the ebb. For predicted times see the Tidal Current Tables.

In the channel west of Big and Gravel Points, 6 miles southwestward of Cordova, velocities up to 2 knots have been observed setting along the channel. A northeastward current can be expected at low water and a southwestward current at high water.

See appendix for **Cordova climatological table.**

Routes.—Eastward: From the entrance point to Prince William Sound, 1.5 miles southwest of Cape Hinchinbrook Light, clear the western side of Hinchinbrook Island by 3 miles then follow the marked passage through Orca Bay and Orca Inlet to Cordova.

Westward: Enter Prince William Sound through Elrington Passage, pass 1 mile eastward of Point Helen Light, 4 miles westward and northward of Seal Island Light, and set a course to enter the marked passage in Orca Bay. Fishing vessels sometimes approach Cordova through Orca Inlet from the south by one of the unmarked channels.

Pilotage.—Vessels may obtain a pilot at Seattle, Ketchikan, Juneau, or on advance notice from Anchorage. A local pilot for Cordova may be obtained by calling AKO–44 Cordova on 2134 kc; pilot will board vessel off the buoy at Sheep Point on advance notice.

Quarantine.—There is a Public Health Service outpatient office at the Cordova Hospital.

Customs and Immigration.—These services are provided by the Anchorage offices.

Harbor regulations.—The harbormaster's office is at the head of City Dock; regulations and tariffs are on file.

Wharves.—City Dock, city owned, extends from the town of Cordova over the flats toward Spike Island. It has a 300-foot face with depths of 15 feet along its northern half and 19 feet alongside its southern half. A depth of 14 feet is about 10 feet channelward of the north end of the dock. There is a combination cold storage and cannery located on the dock and a crab canning and freezing plant alongside its approach. A U.S. Coast Guard vessel regularly stationed in Cordova uses this dock. Water is available on the dock. A 30-ton vertical boom is available on the dock.

Ocean Dock, owned and operated by the Alaska Steamship Company, is about 0.6 mile northward of City Dock. It has a 596-foot face with a controlling depth of 19 feet alongside. Water is available on the dock; wharfage charges are made. There are two warehouses on the dock which have no provision for the protection of freezable items. A 60-foot long pier at the south end of Ocean Dock is used as an oil distribution facility for the delivery of bulk fuel oil and light oils. Controlling depths are 17 feet alongside its western face, 9 feet on its eastern face, and 14 feet alongside its southern face.

A small-craft commercial fishing basin is on the south side of City Dock. It is protected by two breakwaters, the south breakwater is marked by a light. Federal project depth for the basin is 10 feet. In April 1964, the controlling depth in the basin was 4½ feet. The Cordova-Valdez ferry ramp is located in the basin.

Supplies.—Gasoline, fuel oil, and water are available at the wharves. Coal can be purchased in limited quantities. Provisions of all kinds can be obtained. The town has stores and hotels.

Repairs.—Several machine shops can handle minor engine repairs.

Communications.—Regular freight steamship service to and from Seattle use Ocean Dock. Radiotelephone and radiotelegraph services are maintained with other Alaskan ports and Seattle by the Alaska Communication System. Several airlines maintain frequent service with Alaskan localities and Seattle. Ferry service is available to Valdez.

Chart 8519.—Port Gravina has its entrance between Gravina Point and Red Head. A 5½-fathom bank is near the middle of Port Gravina, between Gravina Rocks and St. Matthews Bay.

Gravina Rocks are about 0.8 mile offshore near the southeastern entrance point.

Comfort Cove is a small inlet on the southeast shore about 6 miles from Gravina Rocks. The entrance is narrow and the cove is suitable for small craft only.

The March 1964 earthquake caused a bottom uplift of

4.6 feet in Comfort Cove. Shoaling and new dangers may exist requiring extreme caution until a complete survey is made of the area.

Beartrap Bay is a narrow inlet near the head of Port Gravina. There are rocks awash and areas of broken bottom in midchannel just within the entrance. About 1.2 miles from the entrance, an island nearly blocks the channel. The deep channel is on the north side of the island. Depths of 28 to 30 fathoms, mud bottom, will be found in the upper basin.

The upper end of Port Gravina is deep, and terminates in mudflats which extend for 1.3 miles to the head of the bay.

Parshas Bay is a small bay on the north side of Port Gravina. Depths of 40 to 30 fathoms extend nearly to the head of the bay, but there is no suitable anchorage. An extensive area of rocks, islets, and foul ground extends about 1 mile southwestward from Parshas Bay.

Olsen Bay, 1.5 miles westward from Parshas Bay, shoals gradually from 20 fathoms at the entrance to mudflats at the head. In entering, the western shore should be followed at distance of 0.5 mile or less to avoid the foul ground extending southwestward from the western entrance point of Parshas Bay.

St. Matthews Bay indents the northern shore of Port Gravina 5.5 miles northeastward from Red Head. The only known dangers are a reef extending 0.4 mile off the eastern point and a rock awash 0.1 mile south of the prominent point on the west side of the bay, 1 mile within the entrance. Good anchorage can be had near the head of the bay in 14 fathoms, mud bottom.

Between Red Head and St. Matthews Bay are a series of lagoons. **Hells Hole** is the local name for the northeasternmost one. This shore should be given a berth of 0.8 mile or more.

Port Fidalgo, an eastern arm of Prince William Sound, has its entrance between Goose and Bligh Islands and extends eastward about 22 miles. There are abandoned mines on the shores of Boulder and Landlocked Bays and on the south shore of Port Fidalgo, between Irish Cove and Whalen Bay.

The waters of the main arm of Port Fidalgo are deep and free from outlying dangers. Vessels can navigate with safety as far as the southeasterly arm at the head of the bay by keeping over 0.3 mile offshore.

Goose Island, on the south side of the entrance to Port Fidalgo, is wooded, and has two prominent knolls. **Gull Island,** small and rocky, is midway between Goose Island and the shore. The passages between the islands and the shore should be avoided by strangers.

Goose Island Light (60°42.8′ N., 146°43.6′ W.), 41 feet above the water, is shown from a small white house on the southwestern side of the island, and marks the entrance to Port Fidalgo.

Porcupine Point is a round, high, wooded bluff, with a low depression between it and Knowles Head. A rock, which uncovers and marked by kelp, is 350 yards north of the point.

Snug Corner Cove, on the northeast side of Porcupine Point, has good anchorage except with northwest winds, but the bottom is irregular and should be avoided by large vessels. A rocky patch with 4½ fathoms, possibly less, lies in the entrance 0.5 mile off the northeast side of Porcupine Point. A low divide is at the head of the cove and another is across Porcupine Point.

To enter Snug Corner Cove, avoid the rock off Porcupine Point and follow the southwest shore at a distance of about 0.3 mile. Anchor about 0.3 mile off the bight in the southwest shore in 10 to 11 fathoms, soft bottom. Small vessels can find better shelter from northerly winds in the basin at the head of the cove, in a depth of 5 fathoms. Favor the southwest shore slightly when entering and anchoring. The shores of the basin should be given a berth of over 0.2 mile.

Two Moon Bay indents the southeast shore of Port Fidalgo. Low divides cut the peninsula from the heads of its two arms. Good anchorage can be had in the bay at the entrance to either arm, and vessels of moderate size can anchor in the arms in about 10 to 15 fathoms, bottom generally sticky. A midchannel course should be followed in the arms. At the head of the southeast arm is a basin trending southwestward where small vessels can anchor in 6 to 8 fathoms. The channel is between the west point and a reef bare at low water near the middle of the entrance.

Irish Cove, on the south shore of Port Fidalgo, is a narrow inlet about 1 mile long. Small craft can find secure anchorage in the widest part near its head in 5 fathoms. To enter, favor the eastern side of the narrows and then keep in midchannel.

In **Whalen Bay** mudflats, bare at low water, extend across the bay for a distance of 0.5 mile from the head. Small vessels can enter the bay on a midchannel course, and find anchorage in 7 to 10 fathoms 1 mile inside the entrance to the bay.

A group of islands is near the head of Port Fidalgo. A single islet is about 900 yards southwestward of this group, the passage to the bight northward lying between the groups. This bight is not recommended as an anchorage. Its head is obstructed by mudflats, and it is reported that strong williwaws are encountered.

The entrance to the east arm at the head of Port Fidalgo is 2 miles southeastward of the group of islands. A dangerous rock that uncovers is 400 yards off the northeasterly entrance point. The head of the arm terminates in a narrow passage which opens out into a circular lagoon. It is reported that this passage is foul and should not be attempted.

A well-sheltered anchorage is in midchannel 0.6 mile westward from the above mentioned dangerous rock in 15 fathoms, mud bottom. Small vessels can find anchorage near the head of the southeast arm in midchannel, 0.8 mile beyond the rock, in 7 fathoms.

Fish Bay, on the north shore of Port Fidalgo 9 miles above Porcupine Point, is an indifferent anchorage and should be avoided by large vessels. The williwaws are very heavy with northeast winds drawing through the bay from the high mountains above its head. A small

wooded island is just inside the entrance and 0.2 mile from the west side. The channel is eastward of the island and is obstructed near the middle by a rock covered 3½ fathoms, possibly less. Rocks which uncover are 200 yards off the eastern point at the entrance. Anchorage can be had in the middle of the bay, 0.3 to 1 mile above the island, in 8 to 13 fathoms, with soft bottom in places.

Landlocked Bay is on the north shore of Port Fidalgo between Bidarka Point and **Graveyard Point.** Secure anchorage is afforded in the widest part above the narrows, in 14 to 15 fathoms, sticky bottom. The bay is easily entered during daylight, but the shadows cast by the hills at night obscure the narrow entrance, rendering it difficult for vessels not equipped with searchlights.

The islands on the eastern side below the narrows have covering rocks near them. Near the middle of the narrows is a rock with 12 feet or less over it. The channel is northwest of the rock, but the northwest shore abreast it should be given a berth of about 100 yards. There is a flat at the head of the bay with an islet at its lower edge. Water can be obtained from a fall on the south side of the bay southeastward of an old mine.

There are no commercial enterprises in this bay. The mines are abandoned and the wharves are in ruins.

Bidarka Point is a high wooded hill with a lower strip at its south end. A shoal extends 0.3 mile southward from the point.

Boulder Bay, between Bligh Island and Bidarka Point, has several dangers, the depths are very irregular, and the anchorage is not desirable.

In the approach to Boulder Bay, a reef bare at lowest tide lies 0.6 mile from Bligh Island. About 0.3 mile eastward of this reef is a spot with 2½ fathoms on it. A sunken rock, nearly awash at low water, is 0.4 mile from a point on the eastern shore and 1.6 miles northwestward from Bidarka Point. A reef, partly bare at low water, lies 0.2 to 0.4 mile southeastward from the small wooded island in the middle near the head of Boulder Bay.

Bligh Island, on the eastern shore of Prince William Sound, is mountainous. The southwest end of the island is a high, steep, wooded head, with yellow landslides near the water. On the northwest side are islands with foul ground between.

Reef Island, off the west side of Bligh Island, is level and wooded, and has a single knoll in the middle. A rock which uncovers, is 0.3 mile 208° from the southwest end of the island.

Bligh Reef, 0.8 mile long with depths from 7 to 28 feet, is marked at its southwestern end by a lighted buoy. The passage between this reef and Reef Island is deep and is used at times by vessels rounding Bligh Island; the line of the light on Bushy Island and the daybeacon on Rocky Point, leads through the middle of the channel. The steamship OLYMPIA was lost on Bligh Reef in 1910.

Busby Island, off the northwest end of Bligh Island, is high, and partly wooded. Its western point is long, steep, and wooded, and is surrounded by a reef to a distance of nearly 0.3 mile. The point is marked by a light.

Tides and currents.—The diurnal range of tide is 12 feet in Snug Corner Cove in Port Fidalgo. At the entrance to Port Fidalgo, north of Goose Island, the velocity of the current is about 0.5 knot.

Tatitlek Narrows separates Busby and Bligh Islands from the main shore, and offers a more direct route for small craft between Port Valdez or Ellamar and points on Port Fidalgo. The channel has a depth of about 4 fathoms, but it is narrow with foul ground on both sides and should not be used without local knowledge.

Tatitlek (1960 population 96: P.O.), an Indian village on the northeast shore at the southeast end of the narrows, has a Bureau of Indian Affairs school and small store. The mail boat from Cordova calls twice monthly.

Virgin Bay is a shallow bight 0.5 to 0.8 mile long on the northeast shore of Tatitlek Narrows. There is little water in the bay, and on the north side of the entrance is a long reef bare at low water.

Ellamar, on the northeast side of Virgin Bay, has a wharf with a face 170 feet long and depths of 33 feet alongside. The long, narrow inner part of the wharf crosses shallow water. Large vessels make port landings on face heading of 150°. Small craft find shelter south of the wharf; the approach is marked by a lighted buoy.

Anchorage can be had 0.3 to 0.4 mile from the northeast shore of Tatitlek Narrows, and 0.5 to 0.8 mile northwestward of the old ore dock at Ellamar, in 12 to 16 fathoms, sticky bottom.

Larger vessels can find anchorage between Busby Island and Black Point, 1.4 miles northwestward of Ellamar, in about 30 fathoms, fair holding ground.

Valdez Arm, the main northern arm of Prince William Sound, extends about 13 miles northeastward from Busby Island and **Point Freemantle** to the northern end of Valdez Narrows, then turns eastward for 11 miles to the town of Valdez at its head. The water is very deep and there are no outlying dangers except Middle Rock. Anchorages are few on account of the great depths.

Sawmill Bay, on the western shore of Valdez Arm 9 miles from Point Freemantle, has depths of about 6 fathoms in its 0.4-mile-wide entrance. Secure anchorage, with a clear width of over 0.2 mile, can be had behind the west entrance point, in 9 fathoms, sticky bottom. The south and west ends of the basin forming the anchorage are shoal, and a flat fills the head of the bay down to the narrows at the north end of the basin.

Rocky Point is the western end of the peninsula between Tatitlek Narrows and Galena Bay. A rocky grass-covered islet is 0.2 mile north of the point. A daybeacon is on a small island west of the point. The diurnal range of tide at Rocky Point is 12.1 feet. The currents in Valdez Arm are too weak or variable to be predicted.

Galena Bay is about 5 miles long in a general easterly direction. The depths are great throughout except for flats off the mouths of streams. Care should be observed in the vicinity of **The Narrows,** about 3 miles from the entrance, as that area has not been thoroughly surveyed. The only anchorage is about 0.2 mile southward of the

★ (5250) **ALASKA—Prince William Sound—Tatitlek Narr[redacted]—B[redacted]ys [redacted] established.**—About August 19, 1966, Tatitlek Narrows Buoy 1, a [redacted] with a white reflective band, will be established in 30 feet of wat[redacted] miles 123° from Busby Island Light (60°53.8′ N., 146°48.9′ W. approx.).

(N.M. [redacted])

(L.N.M. 29, C.G., Juneau, July 19, 1966.)
C. & G.S. Charts 8519, 8551.
C.G. Light List, Vol. III, 1965, page 237.
C. & G.S. Coast Pilot 9, 1964, page 39.

★ (5772) **ALASKA—Prince William Sound—Tatitlek Narrows—Buoys established.**—A red nun buoy with red reflector has been established in each of the following positions as indicated, distances and bearings from Busby Island Light (60°54′ N., 146°49′ W. approx.):

(*a*) No. 2, in 20 feet of water, about 4.05 miles 119°.
(*b*) No. 4, in 25 feet of water, about 3.63 miles 116°.
(*c*) No. 6, in 40 feet of water, about 3.23 miles 112°.

(N.M. **40/65.**)

(L.N.M. 37, C.G., Juneau, Sept. 14, 1965.)
C. & G.S. Charts **8519, 8551.**
C.G. Light List, Vol. III, 1964, page **240.**
C. & G.S. Coast Pilot 9, 1964, page **39.**

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[redacted] (5700) **ALASKA—Prince William Sound—Tatitlek Narrows—Buoy estab-[redacted]d.**—Tatitlek Narrows Buoy 1, a black can buoy with a white reflective band, [redacted] been established in 48 feet of water about 9,380 yards (4.63 miles) 123° from [redacted]y Island Light (60°53.8′ N., 146°48.9′ W. approx.).
([redacted]upersedes N.M. 33 (5250) 1966.)

(N.M. 36/66.)

(L.N.M. 32, C.G., Juneau, Aug. 9, 1966.)
C. & G.S. Charts **8519, 8551.**
C.G. Light List, Vol. III, 1965, page **237.**
C. & G.S. Coast Pilot 9, 1964, page **39.**

★ (5862) **ALASKA—Prince William Sound—Boulder Bay approach—Rock and depth.**—The Coast and Geodetic Survey reports the existence of the following rock and depth in the approach to Boulder Bay:

(*a*) A rock, bare at M.L.L.W., in 60°50′50.5″ N., 146°38′59.0″ W.
(*b*) A depth of 6 fathoms, at M.L.L.W., in 60°49′08.5″ N., 146°41′30′0″ W.

(N.M. 37/66.)

(C. & G.S. CL–1030/66.)
C. & G.S. Charts **8519, 8551.**
C. & G.S. Coast Pilot 9, 1964, page **39.**

islets on the north side at the head of the bay, in about 15 fathoms, bottom soft in places.

A group of rocky grass-covered islets extends 0.5 mile off the north point at the entrance of Galena Bay. Anchorage can be had in the middle of the cove northeast of the islets, in 10 to 12 fathoms, sticky bottom.

Jack Bay, on the eastern shore southward of Valdez Narrows, is 0.8 mile wide at the entrance and 0.2 to 0.4 mile wide in the upper 3 miles. Anchorage can be had in midchannel or closer to the southern shore 1.5 miles inside the entrance in 10 to 12 fathoms, sticky bottom in places; also for small vessels in the entrance of the short arm, northeastward of the islands in the bay, in the same depths. The passages northward and eastward of the islands have not been thoroughly surveyed and should be used with caution. The first cove on the south side is foul. A small vessel can anchor about 300 yards westward of the islet near the lower end of the flat at the head, and the same distance from the south shore in about 15 fathoms. The diurnal range of tide is 12.1 feet in Jack Bay.

Valdez Narrows is about 0.8 mile wide, with deep water and bold shores. A wooded islet is 300 yards from the western shore at the north end of the narrows. **Middle Rock,** a pinnacle barely covered at extreme high tides, is in the middle of the north end and is marked by a light, 30 feet above the water shown from a small white house on a black cylindrical base. The tidal currents in the narrows are too weak and variable to be predicted.

Entrance Point, 1 mile northward of Jack Bay, and **Entrance Island,** eastward of Middle Rock, are marked by daybeacons.

Port Valdez is the designation given the body of water extending from Valdez Narrows to the head of the bay.

Shoup Bay, at the face of **Shoup Glacier,** is closed by a sandspit nearly dry at low water and over which the best depth is about 7 feet. The bay is often filled with floating ice, some of which escapes into Port Valdez when the wind and tide are favorable.

Dayville (Swanport) is a small anchorage under **Jackson Point,** the west end of the easterly of two islands on on the south side of Port Valdez. The bottom drops off abruptly, but a small vessel will have swinging room if anchored in 10 fathoms, 350 yards 242° from Jackson Point and the same distance from the south shore. This is the best anchorage between Valdez Narrows and Valdez. The cove inside the island is nearly filled by a flat on which vessels can be beached.

About 0.5 mile east of Jackson Point, submerged piling of an abandoned cannery wharf may exist. Ruins of the inactive Midas mine wharf are 2.3 miles eastward of Jackson Point.

Valdez (1960 population 555; P.O.), at the head of Port Valdez, is at the southern end of **Richardson Highway,** which connects with Fairbanks, 374 miles distant. Open all year, the highway also serves Anchorage and Seward and links with the **Alaska Highway.**

Valdez is 1,234 miles from Seattle via the outside route through Strait of Juan de Fuca and 1,376 miles via the inside passages to Cape Spencer.

Prominent features.—The stack of the large asphalt and steam plant, painted in red and white horizontal bands, and the yellow water tank at the eastern edge of the city are prominent landmarks when approaching Valdez. **Port Valdez Light (61°07.0′ N., 146°17.0′ W.),** 15 feet above the water, is shown from a white square daymark on a dolphin on the edge of the shoal about 0.4 mile northwestward of the Valdez City Wharf.

The approach to Valdez is deep and clear of dangers once through Valdez Narrows. There are no safe anchorages at Valdez except for a narrow shelf 100 yards off the wharves in 13 to 20 fathoms. Convenient anchorages in the approaches in Valdez Arm and Port Valdez have been described.

Tides and currents.—The diurnal range of tide is 11.8 feet at Valdez. The current velocity is about 0.5 knot in Valdez Arm west of Rocky Point, and too weak and variable elsewhere to be predictable.

Routes.—Eastward: From the entrance point to Prince William Sound, 1.5 miles southwest of Cape Hinchinbrook Light, pass 3 miles westward of Porpoise Rocks and enter Valdez Arm 1.5 miles westward of Bligh Reef, thence through Valdez Narrows and Port Valdez to Valdez.

Westward: Enter Prince William Sound through Elrington Passage, pass 1 mile eastward of Point Helen Light, 1.5 miles westward of Seal Island Light, 2 miles eastward of Smith Island, and enter Valdez Arm 1.5 miles westward of Bligh Reef.

Pilotage.—Vessels desiring a pilot can obtain one before leaving Seattle, Ketchikan, Juneau, or from Anchorage on a week or ten days' advance notice.

Quarantine.—Arrangements for quarantine inspection are made through Anchorage; there is a hospital in Valdez.

Customs and **Immigration.**—These services are provided by the Anchorage offices.

The 1964 earthquake destroyed all of the permanent berthing facilities including the small-boat basin at Valdez. A temporary wooden 200-foot long pier has been constructed, with berthing along its northern face with about 14 feet alongside; the pier is awash at high water. Two dolphins about 75 feet apart are about 15 feet off the end of the pier. A covered storage shed is about 400 yards off the head of the pier.

The Cordova-Valdez ferry ramp and small-boat float are about 300 feet northward of the temporary pier.

Supplies.—Gasoline and diesel oil, in limited amounts, are available for small craft; some marine supplies can be obtained in Valdez.

Repairs of a minor nature can be made to small craft.

Communications.—Air Service is available to Valdez, and small planes are for hire. Ferry service is available to Cordova. Radiotelephone communication is maintained with the Alaska Communication System.

Glacier Island is on the north side of Prince William Sound, westward of the entrance to Valdez Arm. It is mountainous and indented by a number of bays, of which

Chamberlain Bay and Jackson Cove are the only ones that have been sounded.

Chamberlain Bay, on the south side of Glacier Island, is exposed southward but affords anchorage for small vessels about 0.4 mile from the head, in about 15 fathoms, muddy bottom. Rocks, which partly bare at low water, extend 0.2 mile from the western side of the bay about 0.6 mile from the head.

Jackson Cove, on the west side of Chamberlain Bay, is a secure harbor for small craft. The entrance has a least width of about 50 yards and a depth of about 12 feet; at the narrowest part of the entrance favor the north side. The upper half of the cove has rocks on both sides, and a careful midchannel course should be followed. Anchorage can be selected in the lower part of the cove, in 10 to 15 fathoms, also about 350 yards from the head, in about 5 fathoms. A divide about 75 feet high extends through to **Jackson Hole.** The diurnal range of tide is 11.9 feet in Jackson Cove.

Columbia Bay is westward of Point Freemantle. It is unsurveyed, but is known to be deep. **Columbia Glacier** discharges into the head of the bay at a rate which, though varying greatly, at times is sufficient to block passage north of Glacier Island for short periods. Sometimes the tide and wind will combine to fill all the bays on the north side of the island with ice. Large bergs may be expected at any time along the north shore from Point Freemantle to Fairmount Island. Summer excursion vessels often enter the bay to let their passengers view the glacier. Good small-craft anchorage may be had in **Emerald Cove** on the east side 1 mile northeast of **Elf Point;** fresh water can be obtained from a small cascade at its eastern extremity.

Long Bay, 3.5 miles west of Columbia Bay, extends in a northerly direction for about 6 miles and at its head divides into two arms, each about 2 miles long. There are numerous islands and rocks that bare at various stages of tide. The bay is unsurveyed, but the bottom is known to be very broken. There are no apparent secure anchorages. The small cove on the eastern side 0.5 mile north of the entrance is foul.

Moderate-sized vessels find good anchorage in 8 to 12 fathoms, mud bottom, in the small cove just west of the western entrance point to Long Bay. Commercial fishermen use the cove as a transfer point. Just west of this cove is a small unsurveyed bay about 2 miles long with a depth of 4 fathoms, possibly less, near the middle of the entrance.

Charts 8517, 8551.—The northwestern part of Prince William Sound has long, deep bays, and passages ranging in depth from 100 to 250 fathoms. The shores are mostly steep, wooded, and rise abruptly to about 1,000 feet. The rugged peaks are of gray rock formation, the higher ones are covered with snow the year-round. There are many glaciers in this area, but most of them are inactive. The bottom of the entire area is a bluish-gray glacial mud of very fine texture, and often quite sticky even though the deposit is only a few inches thick over the rock. In selecting an anchorage, care should be exercised to determine the true character of the bottom, for it is often difficult to get an anchor to hold on the underlying rock, even though the sounding lead shows a sticky bottom.

Naked Island, Peak Island, and **Storey Island,** near the center of Prince William Sound, form a group about 8 miles long north and south, with a greatest width of 6 miles. They are high and wooded to the summits.

The bottom in the vicinity of the islands, including the passages among them, is rocky and very broken. As a measure of safety it is advisable for vessels, especially large ones, to avoid areas with depths less than about 20 fathoms in the vicinity of the islands and to avoid the passages between them.

It is safer for vessels to keep in the deeper part of the passage between Naked Island and Smith Island, preferably between the 50-fathom curves.

The best anchorages are in the southerly part of the large bay on the north side of Naked Island in 20 to 30 fathoms for large ships, and in the easterly bight of this bay in 10 to 20 fathoms for vessels up to 500 tons. The bottom is rock and mud.

Small craft can anchor in the small bight on the north side of Naked Island and in the small bight on the southwest side of Peak Island. They may also anchor in the bay on the north side of the eastern part of Storey Island with protection from all winds except northerly. Anchorage in 6 to 10 fathoms on the east side of Naked Island affords protection only from the north and west.

Cabin Bay, on the western side of Naked Island, offers some protection from easterly winds for vessels up to 500 tons, but the bottom is broken and not ideal holding ground.

Fairmount Island, 7.5 miles north of Storey Island, is high. Buildings of a former fox farm are on the gravel beach on the southwest side but they are not prominent. The channel between the island and the mainland is about 0.6 mile wide at its narrowest part, but has numerous rocks that bare at various stages of tide; passage should not be attempted without local knowledge. Foul ground extends about 2 miles from southeast through south-southwest of the south shore of the island.

Wells Bay is a large bay just eastward of Unakwik Inlet and separated from it by a narrow peninsula. The bay extends 8 miles northward, terminating in a forked head, and is about 2 miles wide at the mouth, narrowing to 0.6 mile about 4 miles north of the entrance. The eastern side is indented by two bays. **Granite Bay,** 1.3 miles from the mouth, extends east-northeasterly about 2.3 miles and is about 0.3 mile wide at the entrance. A constricted passage about 100 yards wide is about a mile from its head. The sides are unusually bold. **Cedar Bay,** 2.5 miles from the mouth of Wells Bay, extends about 3.5 miles in a northeasterly direction and averages 0.5 mile in width; an island near its head almost closes the upper part of the bay.

A group of islands and bare rocks between Granite and Cedar Bays extends westward past the center of Wells