14. HAWAII

(1) **Chart 540.–Hawaii,** a Polynesian kingdom until 1893 and then briefly a republic, requested and was granted annexation to the United States in 1898 and was given a territorial form of government in 1900. By Presidential proclamation of August 21, 1959, Hawaii officially became the 50th of the United States.

(2) The **Hawaiian Islands,** an archipelago, consist of eight large islands, plus many islets, reefs, and shoals, strung out from SE to NW for 1,400 nautical miles in the north-central Pacific Ocean. The archipelago extends from 18°55'N. to 28°25'N., and from 154°49'W. to 178°20'W., straddling the Tropic of Cancer. All the islands of the archipelago, except 2-square-mile Midway, are part of the State of Hawaii.

(3) The capital and chief population center of the State is Honolulu on the island of Oahu; the port is 2,091 nautical miles from San Francisco, 4,685 miles from the Panama Canal, and 2,477 miles from Anchorage, Alaska. Land area of the State totals 6,425 square statute miles, of which the "Big Island" of Hawaii alone accounts for nearly 63 percent. The other seven large islands are, in order of size, Maui, Oahu, Kauai, Molokai, Lanai, Niihau, and Kahoolawe.

(4) The major islands are mountainous and of volcanic origin; the Island of Hawaii has two volcanoes that are still active. Elevations range from sea level to nearly 14,000 feet, with many peaks in excess of 2,500 feet. Although coastal plains, valley floors, and certain plateaus are relatively flat, much of the surface is quite rugged, with high ranges and deep ravines or gorges.

(5) Nearly all of the island streams may be classified as mountain torrents, although some of them can be navigated for short distances by small boats. Most of the streams are on the N and E coasts, where rainfall generally is heaviest.

(6) The 20-fathom depth curve is seldom more than 1 mile from shore and usually is not far from the coral reefs that fringe much of the island coastline. The bottom generally pitches off rapidly to great depths from a narrow coastal shelf, and the few off-lying dangers usually are indicated by breakers or by a change in color of the water. Under normal conditions the color of the water changes from a deep blue in the open ocean to a blue-green between the 10- and 15-fathom curves; bottom features become visible at 6 to 7 fathoms.

(7) **Agriculture** is Hawaii's bedrock industry. Sugar exports total over a million tons annually, and the State produces and exports well over half of the world's output of canned pineapple. Truck farming is intensive, particularly on the Island of Oahu, and cattle ranches range from small to very large (one of the largest cattle ranches in the United States is on the Island of Hawaii). Military expenditures and tourist trade are major sources of income.

(8) **Fish Aggregating Devices** (FADs) along the coastal waters of the main Hawaiian Islands make the area very popular with commercial and recreational fishermen. For reasons unknown, fish in the N and W Pacific Ocean frequently gather in schools under floating objects. FADs may be as sophisticated as floating devices, often buoys, with electronic equipment attached for tracking or as crude as floating logs or other objects. The FADs in Hawaiian waters, established by the state, are yellow, 6 feet across at the base, and show a quick flashing yellow light atop a 5-foot steel pole. The buoys display 12-inch white letters. These buoys frequently break loose and/or become unlighted. Mariners are advised to use caution when in the vicinity of the FADs.

(9) **Polynesian-English Geographic Glossary**

(10) Following are the English meanings of Polynesian words that occur frequently in Hawaiian geographic names:

(11) Akau–north
(12) Ana–cave
(13) Awa–bay, cove
(14) Hale–house
(15) Hana–bay
(16) Heiau–place of worship, temple
(17) Hema–south
(18) Hikina–east
(19) Hono–bay, cove
(20) Kai–sea
(21) Kapu–prohibited
(22) Komohana–west
(23) Kona–leeward
(24) Koolau–north
(25) Kowa–channel, strait, sound
(26) Lae–cape, point
(27) Lapa–ridge
(28) Loko–pond
(29) Lua–crater, pit
(30) Mauna–mountain, hill, peak
(31) Moana–ocean
(32) Moku–islet, island, rock
(33) Pali–cliff, peak, point
(34) Pele–volcano
(35) Pohaku–rock
(36) Puu–hill(s), mountain, peak
(37) Wai–water
(38) Wailele–waterfall

(39) **Emergency signal flag.**–The State of Hawaii has adopted an emergency signal flag as one of the signals that may be used or displayed when a vessel is in need of assistance; the flag should be at least **2 feet square** and **international orange** in color. This distress signal is authorized by the Hawaii Boating Law.

(40) **Harbors and ports.**–Honolulu is by far the largest commercial deepwater facility in Hawaii. Other commercial deepwater harbors are Hilo and Kawaihae on Hawaii Island, Kahului on Maui, and Nawiliwili and Port Allen on Kauai. These ports service both overseas and interisland shipping.

(41) Hawaii has several commercial barge harbors engaged in interisland shipping. Some of the more important are at Kaumalaupau on Lanai, and Kaunakakai, Haleolono, and Kalaupapa on Molokai. These harbors service only light-draft vessels.

(42) **Marine radio communications.**–Honolulu is the only port that maintains a commercial radio communication watch. Vessels desiring services at other Hawaiian ports must make arrangements in advance.

(43) **COLREGS Demarcation Lines.**–The lines established for the Hawaiian Islands and United States Pacific Island Possessions are described in **80.1410 through 80.1495**, chapter 2.

(44) **Control over movement of vessels.**–Regulations require advance notice of vessel's time of arrival to Captain of the Port. (See **160.1 through 160.201**, chapter 2, for regulations.)

(45) All vessels are requested to exercise caution when navigating through the charted U.S. Navy submarine transit lanes.

(46) **Anchorages** are numerous except on the N and E sides of the islands where shelter from the trade winds is a major requirement. The anchorages on the S and W sides of the islands are unsafe during kona weather.

(47) **Tides.**–The periodic tides around Hawaii average only 1 to 2 feet. The tides along the N coasts usually occur about 1 to 1½ hours earlier than the tides along the S coasts. (See Tide Tables for daily predictions of times and heights of high and low waters for Honolulu.)

(48) The effect of strong winds added to normal tidal action may cause water level to fall considerably below chart datum and/or rise considerably above mean higher high water. A heavy surf, particularly from N, gives the impression of higher tides on the exposed beaches; there is usually little actual increase under such conditions. On the S side of Oahu, where the trades usually blow directly off the land, a shift to kona winds or to a calm has been observed to raise the tide level a few tenths of a foot.

(49) **Currents.**–The variable oceanic currents in the vicinity of Hawaii are believed to depend mostly upon the velocity and direction of the wind, but there are many reports of strong NE currents setting against the prevailing trades. There is a prevailing W oceanic drift in the vicinity of the larger islands and as far W as Necker Island.

(50) The tidal currents are generally rather weak and are influenced by winds and oceanic movements. Such currents are mainly reversing in the channels between the larger islands, but they are rotary in more open waters, particularly around the W islets, and shift direction continuously in a clockwise movement.

(51) **Tsunami (seismic sea wave).**–The Hawaiian Archipelago has been visited from time to time by tsunami, which causes enormous destruction. Loss of life and property can be lessened by intelligent response to warnings that such waves are imminent. (See chapter 1 for basic discussion.)

(52) The National Oceanic and Atmospheric Administration administers a tsunami warning system that alerts the Hawaiian Islands, other Pacific islands, and most of the countries bordering the Pacific. The system has an operating center at the Pacific Tsunami Warning Center, Ewa Beach, Oahu, and includes scattered seismograph stations for quick detection and location of submarine earthquakes, a network of wave-detecting and reporting stations throughout the Pacific, a high-priority communication setup, and an extensive international arrangement for broadcasting warnings of possible sea waves.

(53) Military authorities in Honolulu will issue warnings to all military bases that might be affected. Local base commanders will put into effect any precautions deemed necessary. Elsewhere warnings will be broadcast by civilian authorities. Disaster committees have been set up on all the major islands to alert the population and to assist in evacuation and rescue as needed. In Honolulu and Hilo, former air raid sirens now operated by the police department will be used. On Oahu, Civil Air Patrol planes equipped with sirens will fly the shoreline and sound the alarm. This service will later be extended to the other islands. On all the major islands, police cars equipped with sirens will patrol the coastal areas. Local commercial broadcasting stations will interrupt all programs to give the latest information and instructions.

(54) All warnings will also be broadcast by the National Weather Service on NOAA Weather Radio. (See appendix for locations and frequencies of the stations.)

(55) Should a warning occur when a radio station is closed down, it will come on the air immediately and remain on until the all clear is sounded. When an alarm is given, all persons are warned to turn on their radios to a local broadcasting station for information and instructions. If they have no radio and cannot find access to one nearby, they should seek high ground. Telephones are apt to be flooded with calls and therefore cannot be relied on during a warning.

(56) When a warning is received, persons should vacate waterfront areas and seek high ground. The safest procedure for ships will depend upon the amount of time available, and this may not always be known. A ship well out at sea would ride such waves safely, and hence, if time is available to put to sea, that would be the safest action. During the 1946 wave, the master of a ship lying offshore near Hilo felt no unusual waves, though he could see great waves breaking on the shore. Crews of fishing boats in the Hawaiian area also reported no unusual conditions at that time. On the other hand, the crew of a ship in the harbor may have a difficult time averting serious damage.

(57) The destructive force is usually greater on the sides of the islands facing the oncoming waves, but this directional effect is frequently lacking and the waves may reach their greatest heights on the leeward sides of the islands. The waves may also attain great heights in funnel-shaped bays and at capes or other places where a submarine ridge projects seaward toward the oncoming wave. Unusual heights may be attained at any place where two waves traveling different paths arrive at the same time to reinforce each other. There is still much to be learned about these waves, and the best policy is to avoid them in any way possible.

(58) **Weather, Hawaii.**–The climate of the Hawaiian Islands is unusually pleasant for a tropical area, the result principally of the marked marine influence and the persistent trade winds. Considering the latitude of the islands, there is relatively little uncomfortable heat. The discomfort that is occasionally experienced usually occurs when the trades are temporarily displaced by light variable or south winds, which are accompanied by comparatively higher humidities. The outstanding climatic features of the islands are the dominant trade-wind influences throughout all seasons, the remarkable variation in rainfall over adjacent areas, and the uniform temperature regime which varies slightly throughout the year.

(59) During the summer season the trades blow with a high degree of persistency. As a result, uncomfortable periods are usually delayed until fall, and thus follow by weeks or possibly as much as two months the period when the highest temperatures occur. Rains most frequently fall at night.

(60) Thunderstorms are infrequent and practically never severe. Hail seldom occurs. Occasionally local storms are accompanied by winds of sufficient force to do limited damage, but severe storms such as hurricanes or tornadoes are rare. So-called thick weather is almost unknown to the extent of seriously interfering with shipping, and is usually confined to mist and rain, rather than being in the form of fog. Interference to shipping or travel because of bad weather is almost unknown.

(61) The strongest influence in the pressure pattern underlying the general circulation of air over the Hawaiian Islands area is the persistent and semipermanent high-pressure cell known as the Pacific high. The clockwise circulation around this cell, coupled

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with a slight deflection of the surface winds away from the high pressure, result in the NE trades that are the dominant winds of the area.

(62) The trade-wind influence is dominant in all seasons throughout the greater part of all the islands. In some local areas, winds deviate from the general pattern because of topography. In coastal areas where mountains to the E project high above sea level, as they do in the kona districts of the Island of Hawaii, the trades are cut off, resulting in prevalent SW winds with land and sea breezes in evidence. Such effects may be rather general in some areas and extremely local in others.

(63) The Hawaiian Islands lie on the extremities of both the Western North Pacific typhoon area and the Eastern North Pacific hurricane area. Therefore, a tropical cyclone from either region is rare. **Typhoons** can form in any month, but they rarely cross 180°; when they do they are usually extratropical and well N of the islands. It is not impossible, but highly improbable, that a typhoon will move through the Hawaiian Islands.

(64) It is more probable that an Eastern North Pacific hurricane would hit the islands. These storms, prevalent from May through November, originate from the North American coast W between 10°N and 20°N. Most hurricanes either recurve or dissipate before reaching the Hawaiian Islands. August is the most favorable month for one of these storms to reach the area, although they have occurred from July through November. Since 1842 at least six storms have hit the Big Island. However, all six storms were in the dissipation stage and no major damage was reported.

(65) It is a different case however, for the western islands especially Kauai. Since 1842, Kauai has had a direct impact from a northeast Pacific hurricane at least four times. Perhaps the most noteworthy storms were Hurricane Dot on August 7, 1959. Dot was a minimal hurricane with only 75-knot winds. Hurricane Iniki, with maximum winds estimated at 125 knots and gusts estimated at 150 knots slammed into Kauai early on September 12, 1992. Damage was extensive throughout Kauai. Damage from the ocean was heaviest along the south shore of Kauai and affected shoreline hotels and condominiums. Wind damage was extremely heavy throughout Kauai, as many houses or buildings were flattened or lost their roofs. Iniki left 14,350 damaged or destroyed homes on the island. Electric and telephone services were lost throughout the island and only 20% of the power had been restored four weeks after the event. Crop damage was extensive, especially to fruit trees and sugar cane. The monetary value of the damage caused by Iniki on Kauai was estimated at $1.8 billion. Six deaths were connected to the storm.

(66) The word "kona" is of Polynesian origin and means leeward. It refers to the S winds and accompanying weather on the normally leeward slopes of the principal Hawaiian Islands which, because of the wind shift, have temporarily become the windward slopes.

(67) The konas, which occur most frequently during October through April, provide the major climatic variations of the Hawaiian Islands. During these storms, heavy rainfall and cloudiness can be expected on the lee sides of coasts and slopes, which, under the usual wind pattern, receive less cloudiness and may have almost no rain. Near gales may occur, especially near points where the air tends to funnel into sharp mountain passes near the coasts. At such times leeward anchorages may become unsafe for smaller craft.

(68) The complicated rainfall pattern over the islands results chiefly from the effects of the rugged terrain on the persistent trade winds. Frequent and heavy showers fall almost daily on windward and upland areas, while rains of sufficient intensity and duration to cause more than temporary inconvenience are infrequent over the lower sections of leeward areas.

(69) In the districts where the trade winds are dominant, rains are decidedly heavier at night than during the day. This applies generally to the greater part of the islands. Daytime showers, usually light, often occur while the sun continues to shine.

(70) Considerably more rain falls from November through April over the islands as a whole than from May through October. It is not unusual for an entire summer month to go by without measurable rain falling at some points on the Maui isthmus; at times considerably longer dry periods may occur in that locality.

(71) Elevation is the major control factor in determining temperatures, although location, whether in a leeward or windward position, is also a noticeable factor. The highest temperatures reached during the day in leeward districts are usually higher than those attained in windward areas. The daily range is also greater over leeward districts where, because of less cloudiness, the maximum temperatures are higher and the minimum temperatures usually lower.

(72) August and September are the warmest months, and January and February are the coldest. At Honolulu there is an average monthly range between a low of 73.0°F (22.8°C) in January and February, and a high of 81.3°F (27.4°C) in August. The extreme range of temperature at Honolulu for the 46-year period of record is from a low of 52°F for January 1969, to a high of 95°F recorded in September 1994. This spread of only 43°F (24°C) between the extreme high and extreme low temperatures is small when compared with ranges at Pacific coast ports.

(73) All coastal areas are subject to the relatively high humidities associated with a marine climate. Humidities, however, vary considerably, with high percentages over and near the windward slopes to low percentages on the leeward sides of the higher elevations.

(74) At Honolulu the normally warm months of August and September are usually comfortable because of the persistency of the NE trades which bring moderate humidities. Unpleasant weather is more likely later during the autumn or early winter when the trades may diminish and give way to S winds. During these periods known locally as "kona weather" ("kona storms" when stormy), the humidity may become oppressively high.

(75) **Routes.**–Between the islands, proceed on rhumb lines as direct as safe navigation permits.

(76) **Honolulu to Panama.**–Rhumb lines through 21°14'N., 157°39'W., and 21°18'N., 157°00'W.; thence great circle to 8°40'N., 88°00'W., off shoals reported S of Guardian Bank; thence rhumb lines through 7°05'N., 81°45'W.

(77) **Honolulu to San Diego, Los Angeles, San Francisco,** and **Strait of Juan de Fuca.**–(See routes in chapter 3.)

(78) **Honolulu to Anchorage.**–Rhumb lines through 21°19'N., 157°36'W., and 59°00'N., 151°20'W.

(79) **Loran and Radar.**–There is no Loran coverage in the Hawaiian Island chain. Most mariners rely on a combination of visual and radar piloting for interisland navigation. It is reported that landfall at a distance of 20 to 30 miles is not uncommon. The generally high, rugged coastline of the islands provide good and well-defined radar returns; some navigators have reported radar contact at 40 miles.

(80) **Pilotage, Hawaii, General**.–Pilotage is compulsory for all foreign vessels and for U.S. vessels under register in the for-

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eign trade; it is optional for U.S. vessels in the coastwise trade. Hawaii Pilots provide pilotage service to several ports in the islands, namely, Honolulu Harbor, Hilo Harbor, Kahului Harbor, Port Allen Harbor, Nawiliwili Harbor, and Kawaihae Harbor. Specific information is given in the description of the various ports.

(81) **Towage.–**Tugs are available at the more important ports. (See description of port for further information.) Honolulu has some salvage equipment.

(82) **Quarantine, customs, immigration, and agricultural quarantine.**–(See chapter 3, Vessel Arrival Inspections, and appendix for addresses.)

(83) **Quarantine** is enforced in accordance with regulations of the U.S. Public Health Service. (See Public Health Service, chapter 1.) There are good hospitals on Hawaii, Molokai, Maui, Lanai, Oahu, and Kauai.

(84) Honolulu is a **customs port of entry.** (See appendix for lists of other ports of entry.)

(85) **Harbor regulations.–**These are established by the Harbors Division, Hawaii Department of Transportation, which also assigns harbormasters to the deepwater ports and the commercial barge harbors.

(86) **Supplies.–**Honolulu is the principal supply center for the State. Water is available at most of the wharves and piers at the deepwater ports. Gasoline, diesel fuel, ice and minor items of marine supplies are available at the smaller ports.

(87) **Repairs.–**Honolulu has a floating drydock that can handle medium-size vessels. The other ports have only minor facilities for small vessels.

(88) **Communications.–**Honolulu is a major port of call for transpacific passenger and cargo vessels; air service, passenger and freight, includes scheduled flights to the other islands, to the mainland, and to W and SW Pacific areas. The other deepwater ports have regular interisland barge service and are irregular ports of call for transpacific vessels; interisland passenger travel is almost entirely by air.

(89) **Standard Time**.–The State of Hawaii uses Hawaii-Aleutian standard time, which is 10 hours slow of Greenwich mean time. Example: When it is 1200 at Greenwich, it is 0200 in Honolulu. Midway Islands use Samoa standard time, which is 11 hours slow of Greenwich mean time. Example: When it is 1200 at Greenwich, it is 0100 at Midway Islands.

(90) **Daylight saving time.**–Daylight saving time is not observed in the State of Hawaii.

(91) **Chart 19320.–Hawaii,** at the SE end of the archipelago, is the "Big Island"; its area of 4,021 square statute miles is twice that of all the other islands in Hawaii State combined. The island is roughly triangular in shape, 82 nautical miles N to S and 72 miles E to W.

(92) Hawaii is also the **Volcano Island;** it has five volcanoes, two of which–Mauna Loa and Kilauea–are still active. **Mauna Kea** and **Mauna Loa,** the two volcanoes that dominate the island, rise to heights of nearly 14,000 feet and are the highest in the State; from their summits, the land descends gradually with occasional cinder cones and lesser peaks dotting the slopes. Lava flows are numerous, and some reach the coast. **Kilauea,** 20 miles E of Mauna Loa and 9 miles from the SE coast, appears to be a crater in the side of its towering neighbor, but is really a separate peak with an elevation of more than 4,000 feet.

(93) **Hualalai,** a volcano dormant since 1801, rises to an elevation of 8,269 feet near the middle of the W coast. A peak of the **Kohala Mountains** rises to an elevation of 5,505 feet from the **Kohala Peninsula** at the NW end of the island.

(94) A highway encircles the island, and another leads from Hilo to Waimea by way of the pass between Mauna Kea and Mauna Loa.

(95) **Anchorages.–**There is little shelter from the NE trades along the NE and SE sides of the island. Good anchorage is available along much of the W coast, but there are some areas so steep-to that anchorage is not practicable.

(96) **Currents.–**The currents generally follow the NE trade wind, but occasionally set against it. One current follows the coast NW from Cape Kumukahi, the E extremity of Hawaii, and around Upolu Point, the N extremity. Another current follows the coast SW from Cape Kumukahi around Ka Lae, the S extremity, and thence N to Upolu Point; the latter flow is accompanied by an inshore counter current which sets SE from Hanamalo Point around Ka Lae and thence NE to Keauhou Point. An inshore current sets N from Hanamalo Point and sometimes attains considerable velocity. There are reports of strong NE currents off Makolea Point and strong N currents at Mahukona; another report states that currents offshore from Makolea Point set E toward the coast. Currents are weak at Kawaihae; SW currents with velocities of 0.5 knot have been observed in Honokaope and Kiholo Bays.

(97) **Weather, The Big Island.–**The NE trade winds seem to divide at Cape Kumukahi, one part following the coast Northwestward and losing its force when it rounds Upolu Point, the other part following the coast Southwestward and around Ka Lae. On the W coast of Hawaii, except at Mahukona, the sea breeze sets in about 0900 and continues until displaced by the land breeze that usually springs up after sundown. Vessels bound E to ports on the windward side of the island should pass Upolu Point close-to and avoid the heavier offshore winds.

(98) During the trades, the NE coast frequently is clouded over in early morning, but there is clear weather 1 or 2 miles (2 to 4 km) offshore; when the breeze picks up about 0900 the clouds are driven inland. Rainfall varies greatly with locality; the greatest amount is along the windward side, the kona highlands get a moderate amount, and a little reaches the Kau District and the W coast.

(99) The NE coast of Hawaii Island has a length of about 77 miles between Upolu Point, the N extremity, and Cape Kumukahi, the E extremity. This coast is mostly bold, and all dangers can be avoided by giving it a berth of 2 miles. Hilo Bay is the only sheltered harbor or anchorage.

(100) **Chart 19327.–**The numerous bluffs in the vicinity of **Upolu Point** appear quite similar from seaward. Several structures are prominent on the point: two buildings on the S side of Upolu Point Airport, an aerobeacon atop a wooden tripod, and three blue silos with white tops S of the airport. The country back of the point is cattle range; the camps and villages are generally situated high on the bluffs and among the occasional clumps of trees.

(101) **Kauhola Point Light** (20°14.8'N., 155°46.3'W.), 116 feet above the water, is shown from an 86-foot white cylindrical concrete tower on the low point 5 miles E of Upolu Point. A dangerous reef, usually marked by breakers, extends 0.3 mile from

Kauhola Point; passing vessels should give the point a berth of 2 miles.

(102) Local vessels sometimes anchor in **Keawaeli Bay,** on the W side of Kauhola Point, in depths of about 4 fathoms with the light 0.3 mile distant on bearing 090°. Protection is afforded vessels forced to leave anchorage on the W coast during kona storms. **Kohala Mill,** the principal village in the vicinity, is 1 mile inland from the light; a stack is prominent. Another stack 1.7 miles W, at Union Mill, is also prominent.

(103) **Akoakoa Point,** 2.8 miles SE of Kauhola Point, is the E limit of the Kohala District sugar plantations. The country SE of Akoakoa Point rises gradually to the **Kohala Mountains,** which are heavily wooded to their summits.

(104) **Chart 19320.–**The 10-mile stretch of coast between Akoakoa Point and Waipio Valley is backed by cliffs ranging up to 1,300 feet in height, and deep gorges that extend well inland. Waterfalls are numerous. The cliff faces have a general brownish appearance, but in some places they are covered with vegetation from top to bottom.

(105) **Honokane Iki Stream** empties into a narrow bay about 9.2 miles SE of Upolu Point. The bay affords fair protection and possible landing places for small boats. A rock awash, 0.5 mile offshore from the stream, is surrounded by depths of 12 to 14 fathoms. A rock, covered 2 fathoms, is about 0.75 mile E of the bay in about 20°12'01"N., 155°42'20"W.

(106) Three rocky islets, the largest 230 feet high, are about 300 yards offshore 0.8 mile SE of Honokane Iki Stream. Between Akoakoa Point and the islets, the bottom is fairly regular and slopes gradually to the 20-fathom depth curve, which is about 0.7 mile offshore.

(107) **Waimanu Valley,** 14.5 miles SE of Upolu Point, splits the highest cliffs in the vicinity and is the second largest ravine along this coast. Waimanu Bay may be used as an anchorage in favorable weather; there are depths of 7 fathoms 0.2 mile offshore from the ravine.

(108) **Waipio Valley,** the largest ravine along this coast, is 17.5 miles SE of Upolu Point. The valley is a remarkable cleft in the bluffs and is easily recognized. Taro is grown in the vicinity of **Waipio,** a small village near the mouth of the valley. In favorable weather, anchorage may be found in depths of 7 to 9 fathoms 0.3 mile off the valley or under the bluffs to the E.

(109) From Waipio Valley E the cliffs become lower, and at Kukuihaele the coast is a comparatively low bluff 30 to 300 feet high. The slopes between Waipio Valley and Hilo are planted in sugarcane to an elevation of about 2,000 feet; continuing upward toward Mauna Kea, the slopes are wooded to about 2,600 feet and then present a barren appearance. Mauna Kea is frequently snowcapped during the winter.

(110) **Chart 19322.–Kukuihaele Light** (20°07.7'N., 155°33.3'W.), 154 feet above the water, is shown from a 34-foot white concrete tower at **Kukuihaele,** 19 miles SE of Upolu Point.

(111) **Honokaa,** 24 miles SE of Upolu Point, is marked by two storage tanks on a low bluff. A reef that usually breaks extends 170 yards N from the landing and is marked by several bare rocks. No shelter is available during normal weather, as the landing is open to the N and E.

(112) **Chart 19326.–Paauhau,** 26 miles SE of Upolu Point, is marked by the masonry of the abandoned inclined railway that leads to the top of the bluff. The shore at the foot of the bluff consists of rocks and ledges over which the sea breaks constantly. The small concrete landing at the foot of the masonry incline offers little protection from the NE trades.

(113) **Chart 19320.–Paauilo** is 31 miles SE of Upolu Point and a mile inland.

(114) **Ookala,** about 36 miles SE of Upolu Point, is on the edge of a bluff on the S side of a deep gulch. A lighted microwave tower is prominent.

(115) **Kaawalii Gulch** is about 1.5 miles SE of Ookala. In this locality the country back of the coast changes slightly in appearance; hummocky fields are noticeable.

(116) **Laupahoehoe Point,** 39 miles SE of Upolu Point, is low and flat and makes out about 0.3 mile from a deep gulch. **Laupahoehoe Point Light** (19°59.6'N., 155°14.2'W.), 39 feet above the water, is shown from a pole with a black and white diamond-shaped daymark on the point. The outer end of the point is a mass of black lava rock which is broken into detached ledges that extend 250 yards seaward from the light. The seas usually break with considerable force over the ledges.

(117) **Laupahoehoe** is at the inner end of the point. A boat ramp is in a 30-foot opening in the rock on the SE side of the point. A breakwater, marked by a light, offers some protection for small boats in the area.

(118) **Papaaloa,** 1.5 miles SE of Laupahoehoe, can be identified by a waterfall directly under a mill and stack on the edge of the bluff. A horizontal string of bright lights makes a good mark at night.

(119) **Maulua Bay,** 1.7 miles SE of Papaaloa, is a 0.3-mile indentation in the coast at the mouth of a gulch which is spanned by a high bridge. In favorable weather, small boats can be beached on the shingle at the head of the bay. Only slight protection is afforded from the NE trades. **Ninole** is 1.5 miles SE of the bay.

(120) **Honohina,** 6.5 miles SE of Laupahoehoe Point, is a settlement on the plain between two gulches. No stacks or prominent buildings are to be seen from seaward. The land has lost its hummocky appearance, and the cane-covered fields are more uniform, although still broken by gulches. Between Honohina and Hilo the bluffs gradually decrease in height and finally disappear.

(121) **Hakalau Bay,** 8.5 miles SE of Laupahoehoe Point, lies at the mouth of **Hakalau Gulch.** Prominent from offshore are a high trestle spanning the gulch and several buildings on the highland just S of the gulch and quite close to the edge of the bluff. At night, a row of prominent lights extends from the highland down to the gulch.

(122) **Wailea** is a small settlement a mile S of Hakalau Bay and just N of **Kolekole Gulch.**

(123) **Honomu** is at the mouth of a gulch 10.5 miles SE of Laupahoehoe Point.

(124) **Pepeekeo Point,** 52 miles SE of Upolu Point and 25 miles NW of Cape Kumukahi, is the most prominent point in the vicinity. **Pepeekeo Point Light** (19°50.8'N., 155°04.9'W.) 147 feet above the water, is shown from a 75-foot white pyramidal skeleton tower on the N side of the entrance to Hilo Bay. During the day, the light tower is obscured by trees. **Papaikou,** 4 miles S of Pepeekeo Point, is on the W side of Hilo Bay.

(125) **Chart 19324.–Hilo Bay** has an entrance width of 8 miles between Pepeekeo Point on the N and Leleiwi Point on the SE;

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the head of the bay is 4 miles inland. **Hilo,** on the SW side of the bay, is second in importance of the commercial deepwater harbors in the State of Hawaii.

(126) The W shore of Hilo Bay is bluff, but the S and SE shores are low. The outer bay is exposed to the NE trades, but the inner harbor is protected by a breakwater on Blonde Reef. There is frequently a heavy swell which is deflected E by the W shore and causes considerable surge at the wharves behind the breakwater. The W end of the breakwater is marked by a light.

(127) **Prominent features.–Paukaa Point Light** (19°45.7'N., 155°05.4'W.) 145 feet above the water, is shown from a white pyramidal concrete tower about 2 miles N of Hilo. A lighted red and white water tank is on the SE side of Kuhio Bay.

(128) The marine terminal is in **Kuhio Bay,** behind the inner end of the breakwater. S of the terminal is a large commercial airport; the aero light at the airport can be seen many miles at sea.

(129) A flashing amber warning light, privately maintained and shown 2 feet above the SW corner of the roof of the shed on Pier 2, is activated when there is a gas leak or the likelihood thereof. Anyone observing the light flashing should remain well clear and upwind, and sources of ignition should be secured.

(130) **COLREGS Demarcation Lines.**–The lines established for Hilo Harbor are described in **80.1480**, chapter 2.

(131) **Channels.–**From deep water on the N, the channel to the inner harbor leads between the breakwater and the W shore, then turns sharply E and follows the S edge of Blonde Reef to the wharves in Kuhio Bay. A Federal project provides for an entrance channel 35 feet deep and a harbor basin of same depth in Kuhio Bay. Channel and basin are maintained at or near project depth; markers include lighted and unlighted buoys and a **097°30'** lighted range. In 2001, the harbormaster was enforcing a vessel draft restriction of 32½ feet.

(132) **Anchorages.–**Anchorages may be obtained anywhere under the lee of the breakwater where depths are suitable. Good anchorage is available W of Kaulainaiwi Island in depths of 25 to 35 feet over good holding ground. Well protected small-craft anchorages with fair holding ground may be found in S of Kuhio Bay, and in the basin E of Pier 1. The Hilo harbormaster usually assigns deep-draft anchorages.

(133) **Special anchorages** are on the S side of Hilo Bay and in the E part of Kuhio Bay at the S end of the breakwater. (See **110.1 and 110.128b**, chapter 2, for limits and regulations.)

(134) **Dangers.–Blonde Reef** has depths of 4 to 25 feet and extends 1.5 miles in a NW direction from the SE side of Hilo Bay. In general, the shoaling is abrupt on all sides of the reef. A lighted buoy is off the outer end of the breakwater, which extends the length of the reef.

(135) Opposite Blonde Reef are two small islands on a reef that makes out 0.3 mile from the S shore; bare **Kaulainaiwi Island** is near the outer end of the reef and wooded **Coconut Island,** connected to the mainland by a footbridge, is close to shore. A lighted buoy marks the outer end of the reef.

(136) A large fleet of fishing boats operates in the outer part of Hilo Bay; the movements of these boats are uncertain, and approaching vessels should maintain a sharp lookout. The approach should be made from N, favoring the W shore and avoiding the NW part of Blonde Reef; vessels have gone aground on the N side of the breakwater.

(137) **Tides.**–The mean range of tide is 1.7 feet and the diurnal range of tide is 2.4 feet at Hilo.

(138) **Currents.–**A NNW current of about 1 knot has been reported in the approach to the harbor. After heavy rains, currents from **Wailoa River** and **Wailuku River** set N in the inner harbor.

(139) **Weather, Hilo.–**Hawaii lies well within the belt of NE trade winds generated by the semipermanent Pacific high-pressure cell to the N and E. The climate of the island is greatly influenced by terrain. Its outstanding features are the marked variations in rainfall with elevation and from place to place, the persistent NE trade winds in areas exposed to them, and the equable temperatures from day to day and season to season in localities near sea level.

(140) Over the island's windward slopes, rainfall occurs principally in the form of showers within the ascending moist trade winds. Mean annual rainfall increases from 100 inches or more (>2540 mm) along the coasts, to a maximum of over 300 inches (>7620 mm) at elevations of 2,000 to 3,000 feet (610 to 915 m), and then declines to about 15 inches (381 mm) at the summits of Mauna Kea and Mauna Loa. In general, leeward (south and west) areas are topographically sheltered from the trades, hence from trade-wind showers and are therefore drier; although sea breezes created by daytime heating of the land move onshore and upslope, causing afternoon and evening cloudiness and showers. Where mountain slopes are steeper, mean annual rainfall may range from 30 inches (762 mm) along the coast to 120 inches (3048 mm) at elevations of 2,500 to 3,000 feet (763 to 915 m). The driest locality on the island and in the State, with an average annual rainfall of less than 10 inches (254 mm), is the coastal strip just leeward of the south portion of the Kohala Mountains and of the saddle between the Kohalas and Mauna Kea.

(141) These marked contrasts in rainfall are reflected in soil and vegetation, with frequent abrupt transitions from lush tropical growth to near-desert conditions, such as occurs between Kilauea's wet windward slopes and the Kau Desert just to the S.

(142) Within the city of Hilo itself, average rainfall varies from about 130 inches (3302 mm) a year near the shore to as much as 200 inches (5080 mm) in mountain sections. The wettest part of the island, with a mean annual rainfall exceeding 300 inches (7620 mm), is about 6 miles (11 km) upslope from the city limits. Rain falls on about 280 days a year in the Hilo area. At the Hilo airport, the average precipitation is 130 inches (3302 mm) annually and has ranged from 211 inches (5360 mm) in 1990 to 68 inches (1727 mm) in 1983. The mean number of days with precipitation is 314. The wettest month is November with 15.35 inches (390 mm) and the driest month June, with a mean amount of 6.44 inches (164 mm). On 20 February 1979, 16.87 inches of rainfall fell at the Hilo airport; the wettest 24-hour period on record for the site. Snowfall has never been documented at Hilo.

(143) Hawaii's equable temperatures are associated with its mid-ocean location and the small seasonal variation in the amount of energy received from the sun. At Hilo, the range in average temperature from February, the coldest month, to August, the warmest, is only 4.9°F (2.7°C) and the average daily range, 14.4°F (8°C). The highest temperature of record at Hilo Airport is 94°F (34.4°C) recorded in May 1966; the lowest 53°F (11.7°C) recorded in February 1962. Greater variations occur in localities with less rain and cloud cover, but temperatures in the mid-nineties (33.9° to 36.1°C) and low fifties (10.6° to 11.1°) are uncommon anywhere on the island near sea level. Every month except April and July (more cloud cover) have seen extreme maximum temperatures of 90°F (32.2°C) or greater and each month from

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November through May has recorded extreme minimum temperatures below 60°F (15.6°C).

(144) The trade winds prevail throughout the year (although they may be absent for days or even weeks at a time) and profoundly influence the climate. However, the island's entire W coast is sheltered from the trades by high mountains, except that unusually strong trade winds may sweep through the relatively low (2,600-foot, (793 m)) saddle between the Kohala Mountains and Mauna Kea and reach the areas to the lee. But even places exposed to the trades may be affected by local mountain circulations. For example, the prevailing wind at Hilo Airport is not the NE trade, but the SW wind that drifts downslope off Mauna Loa during the night and early morning hours.

(145) Except for heavy rain, really bad weather seldom occurs. Thunderstorms average only ten per year, most likely in March, and are rarely severe. During the winter, cold fronts or the cyclonic storms of subtropical origin (the so-called kona storms) may bring blizzards to the upper slopes of Mauna Loa and Mauna Kea, with snow extending at times to 9,000 feet (2745 m) or below and icing nearer the summit.

(146) Storms crossing the Pacific a thousand miles to the N, or kona storms closer by, may generate seas that cause heavy swell and surf along the N, E, and SW shores of the island.

(147) The National Weather Service office is at the Hilo Airport; **barometers** may be compared there or by telephone.

(148) (See page T–10 for **Hilo climatological table.)**

(149) **Pilotage, Hilo.–**Pilotage is compulsory for all foreign vessels and for U.S. vessels under register in the foreign trade; it is optional for U.S. vessels in the coastwise trade with a Federal licensed pilot on board.

(150) The pilot boat, IMUA, is yellow and 22 feet long with the word PILOT in black letters on the hull. The boat displays the standard pilot lights at night and the International Code flag "H" by day.

(151) The pilot boarding station is about 1 mile E of Paukaa Light. The pilots monitor and use as a working frequency VHF-FM channel 12.

(152) Mariners are requested to give 24 hours advance notice of arrival and gross tonnage, length, and draft of vessel; telephone (808-537-4169). Additionally, vessels are requested to rig the pilot ladder 2 feet above the water on the lee side and maintain a speed of not more than 5 knots.

(153) **Towage.–**One diesel-powered tug up to 1,600 hp is based in Hilo. A second assist tug from another island may be arranged with advance notice. This may require a minimum of 12 to 24 hours transit time to get to the Port of Hilo from either Maui or Oahu.

(154) **Quarantine, customs, immigration, and agricultural quarantine.–**(See chapter 3, Vessel Arrival Inspections, and appendix for addresses.)

(155) **Quarantine** is enforced in accordance with regulations of the U.S. Public Health Service. (See Public Health Service, chapter 1.)

(156) Hilo is a **customs port of entry.**

(157) A Coast Guard patrol boat moors in the basin E of Pier 1.

(158) **Harbor regulations** are established by the Harbors Division of the Hawaii Department of Transportation. In 1980, vessels with a draft of more than 32½ feet were restricted from the harbor. The **harbormaster** enforces the regulations and assigns anchorages.

(159) **Wharves.–**The State-owned and operated piers are on the E side of Kuhio Bay. General cargo is usually handled by ships' tackle; fork lift trucks, a 20-ton mobile hoist, and two electric traveling bulk sugar loading towers are available. Transit sheds with 103,000 square feet of covered space, and 7.5 acres of open storage space are also available. For a complete description of the port facilities refer to Port Series No. 50, published and sold by the U.S. Army Corps of Engineers. (See appendix for address.)

(160) Pier 1: 1,255 feet of berthing space, 34 feet reported alongside; deck height, 9 feet; receipt of dry bulk fertilizer, and lumber; shipment of bulk raw sugar and molasses; receipt and shipment of general and containerized cargo.

(161) Pier 2: 722 feet of berthing space, 35 feet reported alongside; deck height, 10 feet; receipt and shipment of general and containerized cargo by barge; receipt of bulk cement and lumber.

(162) Pier 3: 636 feet of berthing space, 35 feet reported alongside; deck height, 9½ feet; receipt of occasional cruise ships, petroleum products, liquefied petroleum gas, and lumber; shipment of molasses; and occasional receipt and shipment of general and containerized cargo by barge.

(163) Hilo Bay is subject to heavy surge, particularly between October and mid-April. Large vessels make fast to mooring buoys when coming alongside Pier 1; this is necessary to assist in leaving the pier and for breasting off when the surge is excessive. The use of wire mooring lines is not advised.

(164) Most of the small craft of the area berth at **Wailoa River Small Boat Harbor**, 0.1 miles S of Wailoa River mouth; lights mark the entrance to the river. In 2001, the reported depths were 9 feet in the river channel and 7 to 10 feet in the berthing area. The Wailoa River mouth is subject to extensive shoaling, especially during the winter months. Mariners are advised to use caution in the area. Vessels drafting more than 4 feet should not attempt to enter the river. The fixed highway bridge at the entrance has a clearance of 12 feet.

(165) **Supplies.–**Gasoline, diesel fuel, bunker C, and water are available at the State piers; all fuels must be trucked in. Ice and some marine supplies are available in Hilo.

(166) **Repairs.–**Hilo has no facilities for drydocking or making repairs to deep-draft vessels, the nearest facilities are in Honolulu. A marine railway at Hilo has a capacity of 50 tons. Several machine, electrical, and welding shops off the waterfront are available for making above-waterline repairs to vessels at the port.

(167) **Communications.–**Hilo has regular interisland barge service and is a port of call for trans-pacific vessels. Inter-island passenger travel is available by air and through two cruise ships that make weekly calls in Hilo. Telephone communication is available to the other islands and to the mainland.

(168) **Chart 19320.–Leleiwi Point,** on the SE side of the entrance to Hilo Bay, is marked by a mass of bare, black lava rock about 20 feet high that extends 100 yards seaward from the tree line; the low point is difficult to identify at night.

(169) The 17-mile stretch of coast between Leleiwi Point and Cape Kumukahi is a series of low bluffs meeting the ocean with abrupt descents of 10 to 40 feet. The shoreline is a jumble of lava boulders. **Keaau,** 6 miles S of Leleiwi Point and 3 miles inland, is marked by two mill stacks and a water tank; the seaward stack is the most prominent. The Olaa plantations rise to an elevation of about 2,000 feet, above which the forest may be seen. An old lava flow reaches the sea 4 miles NW of Cape Kumukahi and is

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marked by two black hills, about 50 feet high, lying close together at its seaward end.

(170) **Cape Kumukahi Light** (19°31.0'N., 154°48.6'W.), 156 feet above the water, is shown from a 115-foot white pyramidal skeleton tower on the E extremity of Hawaii Island. The cape is a low mass of bare, black lava with a jagged top and is clearly defined from all sides; sharp pinnacles mark the end of the point. A chain of old craters, or cinder cones, extends 7 miles SW from the cape; the nearest cone, 1.4 miles from the cape, is 245 feet high and is topped with scattered coconut palms; a large water tank is prominent atop the NE rim of the cone.

(171) The SE coast of Hawaii Island is 63 miles long between Cape Kumukahi, the E extremity, and Ka Lae, the S extremity. This coast is mostly bold, but passing vessels are advised to keep at least 1 mile offshore. There are no all-weather harbors or anchorages.

(172) The country SW of Cape Kumukahi is heavily wooded, and there are numerous coconut groves along the beach. Characteristic of this coast are the lava flows, bare and rough in appearance, which extend from the hills to the sea. The old craters SW from the cape join the ridge which forms the divide between the **Puna District** and **Kau District.**

(173) **Pohoiki,** a small village 4 miles SW of Cape Kumukahi, has a boat launching ramp on the N shore of a small bight. The bight is protected by a breakwater marked by a light.

(174) **Puu Honuaula,** 5 miles SW of Cape Kumukahi and 3 miles inland, is 844 feet high and quite prominent. The SE side is blown out, but the remaining slopes are covered with vegetation and the rim is fringed with trees.

(175) **Opihikao,** a village 7 miles SW of Cape Kumukahi, is marked by a prominent grass-covered mound, 125 feet high, near its NE beach.

(176) The shoreline between**Waupuku Point** and **Kupapau Point**, 11 to 17 miles SW of Cape Kumukahi, was reported in 2001 to be constantly changing and extending further seaward due to steady lava flows.

(177) **Apua Point,** 27 miles SW of the cape, is low and bare; shallow water extends 300 yards or more offshore. **Keauhou Point,** 2 miles W of Apua Point, is another prominent feature.

(178) From 3 miles SW of Kupapau Point to Keauhou Point, the coastal plain and the lower slopes of the mountains are devoid of vegetation; higher up the mountains are wooded. Beginning 2 miles W of Kupapau Point is a series of bluffs several hundred feet high and 1 to 3 miles back of the shore. The bluffs are marked by numerous lava flows. The crater of **Kilauea** cannot be seen from seaward, but its location, when active, is indicated in daytime by the smoke that it discharges and at night by the glare on the clouds.

(179) At Keauhou Point the bluffs are yellow, steeper, and near the beach. The plain at the foot of the bluffs is low, and on a dark night the beach is hard to see. A small shallow bay just W of Keauhou Point is the only area between Pohoiki and Punaluu that offers small craft protection from the seas; it offers little protection from the winds. **Keauhou Landing** is along the shallow bay just W of Keauhou Point. When entering the bay, favor the W shore to avoid a reef, covered 2 feet, in the entrance. The reported depth in the entrance channel along the W shore is 6 feet. An anchorage, with a restricted swinging area and a reported depth of 9 feet, is inside the reef in the entrance. **Puu Kapukapu,** about 2 miles W of Keauhou Point, is a yellow bluff about 1,053 feet high at its NE end. This bluff is the most prominent landmark near the beach on this part of the coast.

(180) About 1.5 miles W of Keauhou Point is **Keaoi Island,** which is low, close inshore, and separated from the mainland at its E extremity only by shoal water. Small boats find shelter behind this islet by entering from the W.

(181) **Kau Desert,** the country S of Kilauea volcano, is devoid of vegetation. The **Great Crack,** on the W side of the 1823 lava flow from Mauna Loa, marks the W limits of the desert. The Great Crack, which is visible from seaward, passes along the E side of **Puu Ulaula.** The hill is 1.5 miles inland and 994 feet high. A sharply defined, low, black cone is about 5 miles inland and on the E side of the lava flow at an elevation of about 1,800 feet. A prominent fence, which extends from just E of Puu Ulaula to the shore 8 miles W of Puu Kapukapu, marks the W edge of Hawaii Volcanoes National Park.

(182) **Pahala,** 3 miles inland, is 42 miles SW of Cape Kumukahi and 21 miles NE of Ka Lae. A tall mill stack is prominent.

(183) The country between the Great Crack and Punaluu is covered with sugarcane to an elevation of about 2,000 feet; thence the slopes are wooded to within about 6,000 feet of the summit of Mauna Loa. Here and there, bare lava flows cut up the canefields. Cane in the Kau District extends as far W as Waiohinu.

(184) **Chart 19322.–Punaluu,** 17 miles NE from Ka Lae, was formerly the shipping point for Pahala, but the landing is no longer used. Small boats find some protection in depths of 6 to 11 feet close to the E shore of the small bight which forms **Punaluu Harbor.** The landing at the head of the bight is marked by the ruins of a warehouse. Resort cottages with distinctive native roofs can be seen NW of the landing; a prominent church, with a steeple, is 0.3 mile S.

(185) The SW part of the bight is foul. A rock, awash at half tide, is 260 yards SSE of the landing; another, with 8 feet of water over it, is 40 yards farther offshore in the same direction. The entrance is between these rocks and the shore to the N. A rock, with 3 feet of water over it, is 0.2 mile E of the entrance and 80 yards offshore. The NE trades tend to haul more offshore in the vicinity of Punaluu Harbor, but in rough weather breakers extend completely across the entrance and passage is impossible.

(186) **Chart 19320.–**The church and houses of **Hilea,** 1.7 miles W of Punaluu and 1.5 miles inland, can be seen from seaward. Back of the landing at Punaluu, and up to an elevation of about 3,500 feet, the slopes are broken; above this they appear regular and gradual to the summit of Mauna Loa. The upper slopes of Mauna Loa can only be seen from several miles offshore.

(187) **Puu Enuhe,** 3 miles NW of Punaluu, is the seaward end of **Enuhe Ridge.** The butte is a conspicuous flat-topped cone with an elevation of 2,327 feet. **Kaiholena, Pakua,** and **Makanau** are promontories on **Kaiholena Ridge,** which extends 3 miles NW from the village of Hilea. **Ninole Gulch** lies between the two ridges, making the region extremely rugged, with the buttes standing out boldly. The buttes are prominent from either the SW or NE.

(188) **Kaumaikeohu Peak,** about 5 miles N of Punaluu, is a prominent cone, 3,430 feet high, on the SE boundary of the Kau Forest Reserve.

(189) Between Punaluu Harbor and Honuapo Bay, the shore is composed of masses of black lava rock which project out into deep water. About 1 and 3 miles SW of Punaluu are two conspic-

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uous lava flows which reach the shore. Some of the slopes back of Honuapo Bay are covered with cane.

(190) **Chart 19322.–Honuapo Bay** is a slight coastal indentation 13 miles NE of Ka Lae. Most prominent from offshore is the 236-foot cliff 0.5 mile SW of the bay; the upper half of the cliff shows black against the light-brown background of the hills, and the lower half is a grass-covered slide. The Honuapo pier is in ruins. The bay offers good anchorage in about 20 fathoms for deep-draft vessels. The bay is exposed to the trades and offers little protection for small craft.

(191) **Chart 19320.–Naalehu,** 11 miles NE of Ka Lae and 2 miles inland, is on the S side of the base of **Puu Hoomaha,** which is 2,109 feet high. The country between Naalehu and Ka Lae is a grassy plain on which cattle range.

(192) **Maniania Pali** begins at **Kimo Point,** 11 miles NE of Ka Lae, and ends at **Waikapuna Bay,** 9 miles from Ka Lae; the black coastal cliff is 100 to 200 feet high and has a band of yellow clay on top. From Waikapuna Bay to Kamilo Point, the coast is low and rocky.

(193) **Kamilo Point,** 6 miles NE of Ka Lae, is a low, dark, lava mass on which is a black lava monument with a square base. A reef over which the sea generally breaks extends about 0.3 mile from the point.

(194) **Kaalualu Bay,** 1 mile W of Kamilo Point, affords good shelter for small craft during NE trades, but is exposed during kona weather. Anchorage can be found in depths of about 10 fathoms 200 yards due W of the point on the E side of the entrance. The submerged coral reefs between the anchorage and the NE part of the bay should be avoided, especially during periods of heavy swells.

(195) Between Kaalualu Bay and Ka Lae, the grassy plain is occasionally broken by bare lava. About 2.5 miles SW of Kaalualu Bay, the low coastline is broken by a grayish cinder cone.

(196) **Kaulana Bay,** 0.9 mile NE of Ka Lae, is a small bay that offers excellent protection from the trades. It is best approached from SW to avoid the submerged rocks extending offshore from a lava flow spit that makes up the E shore of the bay. A boat ramp, used by local fishermen, is on the N shore of the bay.

(197) **Ka Lae (South Cape)** is the S extremity of Hawaii Island. **Ka Lae Light** (18°54.7'N., 155°40.9'W.), 60 feet above the water, is shown from a 32-foot white pole with a black and white diamond-shaped daymark on the outer end of the cape. The SE side of the point is low; the bluff on the W side rises gently from the point to a height of 335 feet, 2 miles to the N. The bluff then leaves the shore and trends inland for several miles, increasing in height and forming the **Pali o Mamalu,** a remarkable cliff when seen from the W. Shoal water extends 0.6 mile S of the point; all vessels should keep 1 mile off to avoid possible dangers. The shore current setting NE against the trade wind frequently produces a rough sea on the E side of the cape. Offshore the current sets SW.

(198) From Ka Lae to Upolu Point, a distance of about 95 miles, the coast has a general N trend and is mostly bold. The largest reef extends about 0.6 mile from shore in Kawaihae Bay; few of the others off the numerous capes and points make out more than 0.3 mile. All dangers can be avoided by staying at least 1 mile offshore.

(199) **Honokohau Small-Boat Harbor** and **Kawaihae** are the only sheltered harbors along the W coast of Hawaii; all others are smooth during regular NE trades, but are exposed during kona weather. The trade winds draw around Ka Lae and hold N offshore for about 3 miles, generally causing a rough sea from Ka Lae to Kauna Point. At Kauna Point, the complexion of the sea changes abruptly, the sea being considerably smoother to the N.

(200) Storms from the SW to NW are most frequent in January and February. Some protection for small craft may be found in Keauhou, Honokohau, and Kawaihae Bays, but anchorage space is limited. Boats sometimes seek shelter along the SE side of the island during these storms.

(201) Gasoline and a limited supply of water are available at Keauhou, Kailua Kona, and Kawaihae along the W coast. Supplies are mostly obtained from the stores on the main highway inland from the coast.

(202) The section of the W coast between Ka Lae and Kawaihae Bay, 79 miles N, is known as the **Kona Coast.** The country along this coast is broken up by numerous lava flows, varying in length from a few hundred yards to 30 miles, that have broken out from Mauna Loa and Hualalai. Between these flows are areas that are heavily wooded and covered with vegetation above an elevation of 1,500 feet, and there are large areas planted in coffee. Many of the lava flows reach the coast and terminate in bluffs, some fairly high and others only a few feet above the water. Scattered trees and bushes can be seen between many of the flows.

(203) From Pali o Mamalu to Hanamalo Point, about 16 miles NW, are lowlands several miles wide, which rise gradually to the mountains. The country is extremely desolate, with its grayish-black slopes of bare lava. A particularly black flow lies at the base of the lighter colored cliffs of Pali o Mamalu.

(204) At an elevation of 2,000 feet the kona region is known for its cool and bracing climate and plentiful rain. Little variation in weather is experienced; there is generally a land and sea breeze, except during kona winds. This condition, however, does not apply between Kawaihae Bay and Upolu Point, since the region is affected by the winds which draw across the island.

(205) **Waiahukini,** a small fishing village at the base of **Pali o Kulani,** is marked by a patch of white sand. **Kailikii Shoal** extends about 0.5 mile offshore to the W and N of the landing.

(206) **Puu Hou,** a black, well-defined cone 273 feet high, is close to the beach 1.6 miles NW of Waiahukini.

(207) **Pohue Bay,** 9 miles NW of Ka Lae, has a sand beach at its head where landings can be made.

(208) **Na Puu a Pele** are cones near the beach 12 miles NW of Ka Lae. The cones are prominent landmarks, and at the summit of the highest is a black stone cairn.

(209) **Kauna Point,** 13.5 miles NW of Ka Lae, is low, flat, and somewhat grassy, with a small hummock of graying lava 0.5 mile inland. The concrete base of a former light, nearly flush with the ground, is visible on the point. A 160-foot tower(19°03'01.2"N., 155°52'32.4"W.) is conspicuous just NNW of the point.

(210) **Kamoi Point,** 16.3 miles NW of Ka Lae, is a low jumble of lava rock. A small bight, S of the point, has a sand beach at its NE extremity where small boats can land. A small shack and a skeleton tower at the head of the bight are conspicuous from seaward.

(211) **Kanewaa Point** is 18.5 miles NW of Ka Lae.

(212) **Okoe** is at the head of **Okoe Bay,** a cove immediately S of Hanamalo Point. The cove indents the shore more than any other in the vicinity and has a little more sand on the beach. Anchorage can be found in depths of 7 to 15 fathoms. Larger vessels can an-

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chor in 20 fathoms by entering the bay from due W and dropping anchor with Milolii Point Light bearing **022°.**

(213) **Hanamalo Point,** 21 miles NW of Ka Lae, is a low mass of lava with no prominent features. Unless close inshore, the point is difficult to distinguish from other points in the vicinity. S of Hanamalo Point, an inshore current sets S around Ka Lae and thence NE along the shore to the vicinity of Keauhou Point.

(214) **Milolii Point Light** (19°11.2'N., 155°54.5'W.), 44 feet above the water, is shown from a 20-foot white steel pole with a black and white diamond-shaped daymark.

(215) **Milolii,** a village 2 miles N of Hanamalo Point, has a concrete boat landing. The landing has a depth of 7 feet alongside. The current off the landing has a prevailing N set which sometimes reaches a velocity of 2 knots. A dangerous reef extends about 400 yards offshore at the S end of the village.

(216) An abandoned schoolhouse, visible only from the NW, is in the ironwood grove 250 yards S of the Milolii landing. Between the school and the landing is a grove of coconut trees, back of which are the 15 or 20 houses of the village. Otherwise, the countryside is a barren mass of lava. There is no protected anchorage off the landing. Storms occur most frequently in January and February.

(217) The lava flow of 1926 from the slopes of **Puu o Keokeo** entirely destroyed the village of **Hoopuloa,** 1 mile N of Milolii. The same flow nearly engulfed Milolii.

(218) **Papa Bay,** 3 miles N of Milolii, is a coastal indentation to the S of a prominent black lava flow of 1919. The ruins of an ancient Hawaiian civilization are at the N end of the bay.

(219) Three lava flows of 1950 are prominent 4.3, 7.7, and 9.3 miles N of Milolii Point Light. These flows emanating from the SW rift zone of Mauna Loa extend into the sea, forming precipitous cliffs.

(220) **Auau Point,** 8.6 miles N of Hanamalo Point, is the crescent-shaped rim of an old crater that has had its seaward face blown out.

(221) **Lepeamoa Rock,** 11 miles N of Hanamalo Point, is close offshore from the island. The rock, 95 feet high, is the crescent-shaped rim of an old crater that has had its seaward face blown out. About 1.5 miles inland from the rock is the 1,766-foot peak of **Haleili.** Small villages of a few houses each are scattered along the coast, 1 or 2 miles apart, between Milolii and Lepeamoa Rock. The highway, which is 2 miles inland at Milolli, draws nearer the coast until at Lepeamoa Rock it is only 0.5 mile inland.

(222) **Kauhako Bay,** 34 miles NW of Ka Lae, is a small cove which has at its head a pali, or cliff, about 0.5 mile long and 120 feet high. **Hookena** is a small village at the foot of the N end of the pali. A prominent landmark is a stone church, with steeple, at the N end of the village. A large grove of coconut and shade trees is near the village. Anchorage can be found in depths of 15 fathoms, sandy bottom, about 300 yards off Hookena. There is a landing near the N end of the sand beach.

(223) The bluffs along the coast N of Hookena lose their height. The slope up to the interior is not so steep as to the S, and the country is covered with brush and coffee plantations.

(224) **Loa Point,** about 35.5 miles NW of Ka Lae, is flat and low, and green to within 40 yards of the water, then rocky.

(225) Between Loa Point and Hookena is the settlement of **Kealia,** which is at the N end of a long white sand and coral rubble beach. The villages along this section of the coast usually have a few houses on the beach, but most of the houses are on the highway 1 or 2 miles inland.

(226) **Chart 19332.–Honaunau Bay,** 37 miles NW of Ka Lae, indents the coast about 500 yards and is about 500 yards in width. The bay lies between two flat lava points. **Puuhonua Point,** on the S, is lower and smaller and is marked by the 12-foot-high stone walls of the **City of Refuge** and by a grove of tall coconut trees. The City of Refuge is of historic interest and is now maintained as a National Historical Park of about 182 acres. In former times, criminals or refugees reaching the place were safe until such a time as the king of the land took action. Vessels anchor in depths of 4 to 8 fathoms 150 yards from the S shore. Small boats can easily land on the shingle beach on the SE side of the bay during normal weather.

(227) **Palemano Point,** on the S side of the entrance to Kealakekua Bay, is low and flat, with scattered coconut trees and temple ruins near its outer end. The buildings of a resort camp on the point are prominent. A mass of bare rocks extends 125 yards off the N side of the point. About 0.4 mile N of the point, an old lava flow reaches the shore.

(228) **Kealakekua Bay,** 40 miles NW of Ka Lae, is marked on its N side by a light on Cook Point. The bay is about 2 miles wide between Palemano Point and Keawekaheka Point, and indents the coast about 1 mile. The shore is low, except on the NE side where a precipitous cliff between 400 and 600 feet high extends about 0.5 mile. A narrow reef fringes the shore between the S end of the cliff and Palemano Point. The bay is free of obstructions, affords good anchorage in all but strong SW winds, and is by far the best anchorage along this coast. In choosing an anchorage it is well to remember that in the daytime a sea breeze will prevail, shifting to a land breeze at night. The bottom is of coral and sand and is only fair holding ground.

(229) **Kaawaloa Cove** is the N part of Kealakekua Bay and lies between the high cliff and Cook Point. It was here that Captain James Cook was killed by the natives in 1779. **Cooks Monument** is a concrete shaft, 25 feet high, near the shore of the inner side of Cook Point. A concrete landing, with a depth of about 6 feet alongside, affords a means for visitors to reach the monument. Kaawaloa Cove is within the boundary of Kealakekua Bay Marine Life Conservation District and Underwater Park. State regulations forbid anchoring, except in an emergency, and overnight mooring at other than designated locations within the park boundaries. A copy of the regulations can be obtained from the office of the harbormaster at Hilo.

(230) The village of **Napoopoo** consists of a few houses scattered among the coconut trees just S of the cliff. Water and provisions are scarce. The landing, which has a depth of about 4 feet alongside, is in the middle of the village. A church spire is fairly prominent from offshore.

(231) **Keawekaheka Point,** on the N side of the entrance to Kealakekua Bay, is a low, bare, lava point. An extensive lava flow reaches from the point to the high cliff at the head of the bay.

(232) **Chart 19327.–Puu Ohau,** 1.5 miles N of Keawekaheka Point, is a green cone, 231 feet high, near the beach. The cone has a blowhole in the middle, and its seaward side is blown out, forming a red cliff.

(233) **Keikiwaha Point,** 2 miles N of Keawekaheka Point, is low, black, and jagged, with coconut trees on it. About 2 miles in-

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land from the point, and on the highway, are a stack, a church, and the buildings of **Kainaliu.**

(234) From Napoopoo to Kailua Kona is the most thickly settled section of the coast; cultivated fields of coffee extend both ways from the highway that parallels the shore 1 to 2 miles inland.

(235) **Kaukalaelae Point,** 4.4 miles N of Keawekaheka Point, is low and flat. The white hotel on the point is one of the most prominent landmarks along this coast.

(236) **Keauhou Bay,** 45 miles NW of Ka Lae, indents the coast 0.3 mile and is 300 yards wide between entrance points. The bay is between two lava flows at the foot of a gentle slope and, though small, is one of the best protected along the Kona coast. **Keauhou Bay Light** (19°33.7'N., 155°57.7'W.), 35 feet above the water, is shown from a 30-foot pole on shore at the head of the bay. A three-color directional light is shown 10 feet below on the same structure; the fixed white sector of the beam marks the centerline of the entrance channel on course **066°.** The channel is also marked by an unlighted range, the rear marker of which is on the same structure as the lights. The **Keauhou** schoolhouse on the highway 1.5 miles inland is fairly prominent from offshore. The bottom is extremely irregular and has many coral heads with depths of 5 to 6 feet over them. A reef extends 100 yards off the N entrance point. By maintaining a lookout for coral heads, boats of 4-foot draft can enter the bay for anchorage. Breakers frequently extend across the mouth of the bay. A 3-ton hoist is on the pier; a launching ramp, fuel, moorings, and a limited amount of water are available. A marine railway can handle craft up to 45 feet.

(237) **Kahaluu** is a small village about 1 mile N of Keauhou.

(238) **Hualalai,** in the central W part of the island, is a conical peak 8,269 feet high, covered with vegetation to its summit and prominent from any point of approach. Its W slopes terminate in a bare lava plain about 4 miles wide. The plain forms a low beach consisting of sand in some places and lava rocks in others.

(239) **Chart 19331.–Kailua Bay,** 50 miles NW of Ka Lae, is a dent in the coast at the S end of the flat plain which extends N to Kawaihae Bay.

(240) **Kailua,** on the N side of the bay, formerly a barge terminal, is now used by cruise and charter boats. Large ships anchor offshore and ships' tenders are used for transportation to shore. **Kailua Light** (19°38.5'N., 156°00.0'W.), 32 feet above the water, is shown from a white pyramidal concrete tower on **Kukailimoku Point,** which is on the NW side of the bay entrance. Also prominent is the church spire E of Kailua pier and the radio tower NW of the pier.

(241) No breakwater protects this small exposed harbor. Access is good, and no channel is required to reach open water. The turning basin E of the pier is 12 to 20 feet deep and about 500 feet square. The approach to the pier is marked by a **023°** directional light. The W side of the pier has a surfaced boat-launching ramp. Gasoline, water, and marine supplies are available in limited quantities. A harbormaster is at Kailua and can be reached at 808-329-4215.

(242) **Chart 19327.**–The coast between Kailua Bay and Kawaihae Bay is a black, jagged mass of lava. The numerous capes and indentations are caused by the lava flows over the level country. Between Keahole and Upolu Points, the trade winds draw over the mountains, at times causing a very strong offshore wind. Vessels anchoring in this vicinity should be prepared to use both anchors, as the prevailing N current prevents laying to the wind.

(243) **Kaiwi Point,** about 2 miles NW of Kailua, is low and black, with some small patches of white sand. Shoal water extends about 0.3 mile offshore on the S side of the point, but on the W side the 100-fathom curve is only 0.3 mile offshore.

(244) **Honokohau Small-Boat Harbor,** at the head of **Honokohau Bay,** about 1 mile N of Kaiwi Point, is entered through a marked dredged channel that leads to two basins in the harbor. In 1983, the controlling depths were 13 feet from the bay to the W basin, thence 13 to 15 feet in the W basin, except for lesser depths along the E side, thence 7 feet in the channel along the N side of the harbor, with 6 feet in the E basin. Two boat ramps, a haul-out ramp, and moorings are available in the harbor. A wharfinger is available on weekdays from 0630 to 1730 and can assist in arranging delivery of petroleum products by tank truck.

(245) **Keahole Point,** 57 miles NW of Ka Lae, is the W extremity of Hawaii Island. **Keahole Point Light** (19°43.7'N., 156°03.6'W.), 43 feet above the water, is shown from a 33-foot white pyramidal concrete tower. An aerobeacon atop the 65-foot control tower, 1.2 miles ENE of Keahole Point Light, is more prominent at night than Keahole Point Light. The point is low and well defined, and consists of black lava with some small vegetation. White patches of sand may be seen between the fingers of the lava. A N current sets past Keahole Point. Frequently there are small tide rips near the point, and 2 miles to the N the rips are violent when the NE trade winds are strong. A berth of 0.5 mile clears the point in deep water. Mariners should not anchor within 1 mile offshore or 500 yards N and 1000 yards S of Keahole Point because of submerged pipelines.

(246) **Puu Waawaa** (see chart 19320), 13 miles E of Keahole Point, is prominent and can often be seen when Hualalai is hidden by the clouds. The mountain, 3,971 feet high, is dome-shaped, with deep gorges on its side, and rises about 1,000 feet above the slope on which it stands.

(247) Between **Makolea Point** and **Kawili Point,** 3 and 4 miles N of Keahole Point, shoal water extends about 0.7 mile offshore. The sand and coral bottom is plainly visible. A current sets NE along this coast, and there are tide rips off Makolea Point. Offshore, beyond the 2,000-fathom curve, the current has been observed to set E toward the coast. When a heavy swell is running, breakers extend about 0.5 mile offshore. Strangers should give these points a berth of 1.5 miles. The village of **Mahaiula** is at the head of the unimportant bay between the two points. Between Keahole and Mano Points are several small bays that are rarely used.

(248) **Kuili,** 5 miles N of Keahole Point and 0.3 mile inland, is a brown crater 342 feet high. The hill marks the seaward end of a series of cones on the ridge extending from the NW slope of Hualalai. An extensive shoal extends about 0.5 mile offshore about 2 miles N of Kuili and between the villages of **Kukio** and **Kaupulehu.**

(249) **Mano Point,** 9 miles NE of Keahole Point, is a poorly defined, rounded, flat mass of lava.

(250) **Kiholo Bay,** 11 miles NE of Keahole Point, indents the coast 0.5 mile and is 1 mile wide. The head of the bay is foul, but local vessels have anchored close to the black lava shore on the S side. A SW current, with an average velocity of about 0.5 knot, has been observed in Kiholo Bay. The village of **Kiholo** consists of a few houses in a coconut grove at the head of the bay.

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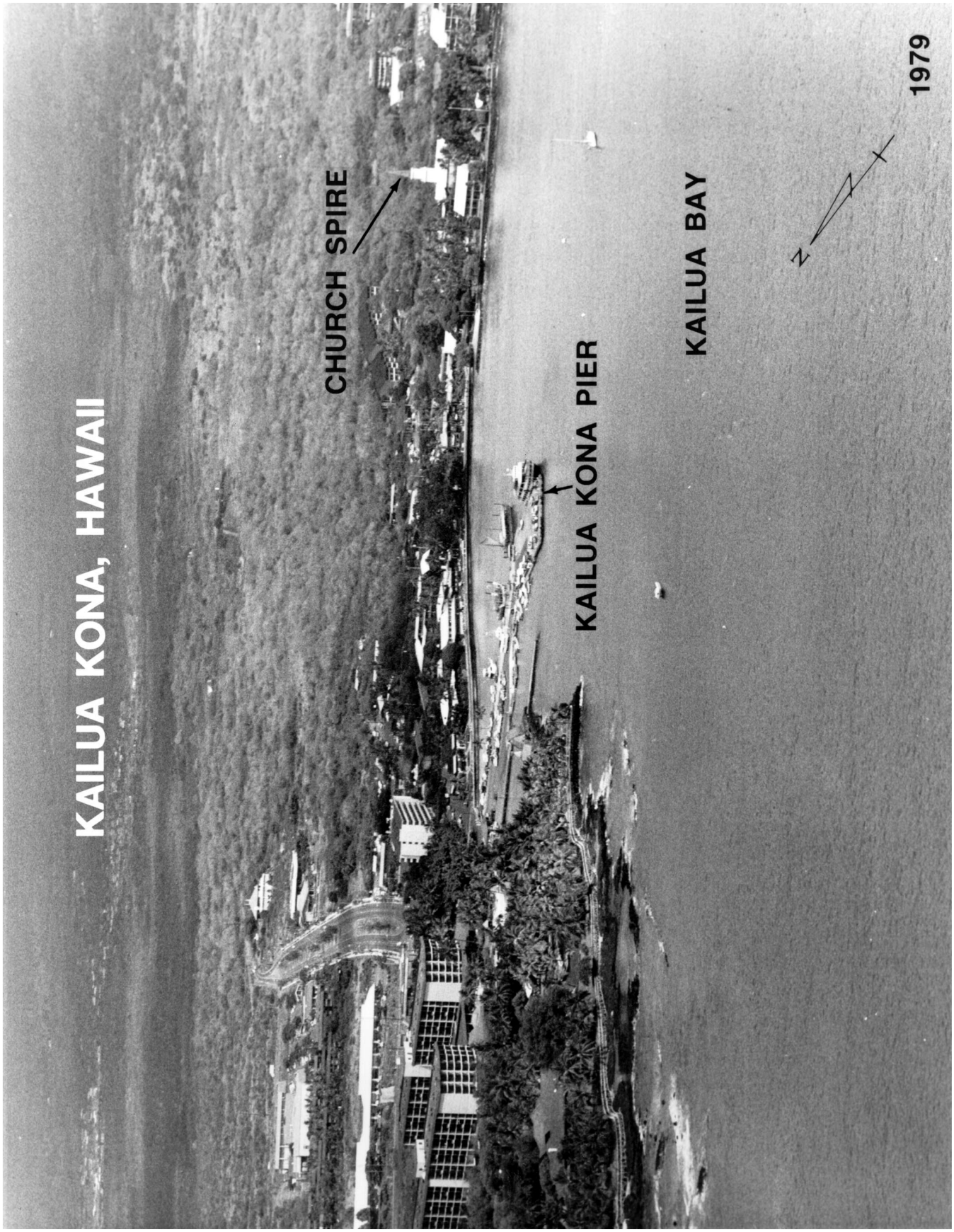
KAILUA KONA, HAWAII
CHURCH SPIRE
KAILUA KONA PIER
KAILUA BAY
N
1979

(251) **Puu Anahulu** (see chart 19320), 4 miles E of Kiholo, is a prominent yellowish cone, 1,523 feet high, with lava flows on three sides.

(252) **Kapalaoa** is a village on the S side of a small bight 3.5 miles NE of Kiholo. The bight is foul and can only be used by small boats with local knowledge.

(253) A mooring float marking a former Ocean Thermal Energy Conversion Site is about 12 miles WNW of Mano Point.

(254) **Charts 19330, 19327.–Puako Bay** is a small indentation in the coast 20 miles NE of Keahole Point. There is no protection for large vessels, and very little is available for small craft. The bay is open to W and NW winds and is foul with coral heads and reefs. The shores are mostly black, smooth lava extending into the water on a gentle slope, with many detached rocks of the same material. A small landing is at **Puako,** on the SE side of the bay, and many houses are along the S shore.

(255) Small boats can approach the landing on a course of 137° until within 250 yards of it, where the channel is marked by private buoys; a private light is on shore near the landing. A reef off **Waima Point,** 1 mile SW of Puako, is easily recognized from a safe distance offshore. Anchorage can be found about 0.8 mile NW of Puako in depths of 12 to 15 fathoms, sand and coral bottom.

(256) A large hotel and golf course can be seen at **Kaunaoa Beach,** 2.7 miles NE of Waima Point. A cluster of three tanks, about 0.6 mile S of the hotel, is also prominent.

(257) The coast, which has a NE trend to Puako, turns N for 3 miles, then gradually recurves to the NW, forming **Kawaihae Bay.** The black lava flows are no longer characteristic, and the back country, with its extensive slopes, is some of the best grazing land in the State.

(258) **Kawaihae,** 3.5 miles N of Puako, is a commercial deep-water harbor in the N part of Kawaihae Bay. The harbor is protected by stone revetment and fill on the S and by a breakwater on the W; the entrance is from NW.

(259) **Prominent features.–Kawaihae Light** (20°02.5'N., 155°49.9'W.) 59 feet above the water, is shown from a 36-foot white pyramidal concrete tower on the NW side of Kawaihae. Deep and heavily wooded **Honokoa Gulch** is NW of the harbor, and **Puukohola Heiau** is a square of dark rocks on a 50-foot knoll SE of the breakwater. **Puu Kamalii,** 1 mile NE of Kawaihae, is 690 feet high and fairly conspicuous.

(260) **COLREGS Demarcation Lines.**–The lines established for Kawaihae Harbor are described in **80.1470**, chapter 2.

(261) **Channels.–**Federal project depths are 40 feet for the entrance channel and 35 feet for the main basin behind the breakwater. (See Notice to Mariners and latest edition of the chart for controlling depths.) A lighted **120°** entrance range and lighted and unlighted buoys mark the channel. The N end of the breakwater is marked by a light. A small-boat basin, just N of the main basin, had a controlling depth of 12 feet in December 1989. The breakwater on the W side of the small-boat basin is marked by a light at the S end.

(262) **Anchorages.–**Good anchorage, except in kona weather, may be found in depths of 8 to 15 fathoms between Honokoa Gulch and the outer end of the entrance channel.

(263) **Dangers.–**Reefs that bare in places extend as much as 0.5 mile from the outer side of the breakwater and from the shore to the S.

(264) **Tides and currents.–**The mean range of tide is 1.3 feet and the diurnal range of tide is 2.0 feet at Kawaihae. The strong N current felt off Keahole Point and Makolea Point passes offshore at Kawaihae, where there is practically no current.

(265) **Weather, Kawaihae and vicinity.–**This subject has been discussed on previous pages, but vessels maneuvering in Kawaihae Harbor are again warned to be on the alert for sudden strong offshore gusts caused by the trade winds drawing over the mountains.

(266) **Pilotage, Kawaihae.–**Pilotage is compulsory for all foreign vessels and for U.S. vessels under register in the foreign trade; it is optional for U.S. vessels in the coastwise trade with a Federal licensed pilot on board.

(267) The pilot boat, NININI, is yellow and 22 feet long with the word "PILOT" written in black letters on the hull. The boat displays the standard pilot lights at night and the International Code flag "H" by day. The pilot boarding station is 1 mile seaward of the NW end of the breakwater on the entrance channel rangeline. The pilots monitor and work VHF-FM channel 12. Mariners are requested to give at least 24 hours advance notice of arrival with gross tonnage, length, and draft of vessel; telephone (808-537-4169). Additionally, vessels are requested to rig the pilot ladder 2 feet above the water on the lee side and maintain a speed of not more than 5 knots.

(268) **Towage.–**Tug service must be arranged for in advance; there are no tugs available in the harbor.

(269) **Quarantine, customs, immigration, and agricultural quarantine.–**(See chapter 3, Vessel Arrival Inspections, and appendix for addresses.)

(270) **Quarantine** is enforced in accordance with regulations of the U.S. Public Health Service. (See Public Health Service, chapter 1.)

(271) **Harbor regulations.–**These are established by the Harbors Division of the Hawaii Department of Transportation and are enforced by the **harbormaster.**

(272) **Wharves.–**The State-owned waterfront facilities are on the NE side of the harbor basin. General cargo is usually handled by ships' tackle, and cargo to and from barges by forklift trucks. For a complete description of the port facilities refer to Port Series No. 50, published and sold by the U.S. Army Corps of Engineers. (See appendix for address.)

(273) Kawaihae Pier 1: Just inside harbor basin; 410-foot face, 20 to 24 feet reported alongside; deck height, 8 feet; 8,700 square feet covered storage; 20 refrigerated container positions; receipt and shipment of general and containerized cargo by barge; receipt of bulk cement and lumber; operated by State of Hawaii, Department of Transportation, Harbors Division; and others.

(274) Kawaihae Pier 2: 200 yards SE of barge wharf; 1,152-foot face with 38-foot ends; 35 feet reported alongside; deck height, 8 feet; 12,000 square feet covered storage; pipelines extending from wharf to 5 steel storage tanks in rear with 41,000 barrel capacity; receipt and shipment of general cargo and automobiles; shipment of aggregate; receipt of petroleum products; operated by State of Hawaii, Department of Transportation, Harbors Division; and others.

(275) A 100-foot-wide concrete ramp with mooring dolphins, used exclusively for handling military cargo to and from U.S. Government-owned landing craft, is at the SW end of the harbor.

(276) **Supplies.–**Water and limited amounts of fuel oil and diesel oil are available.

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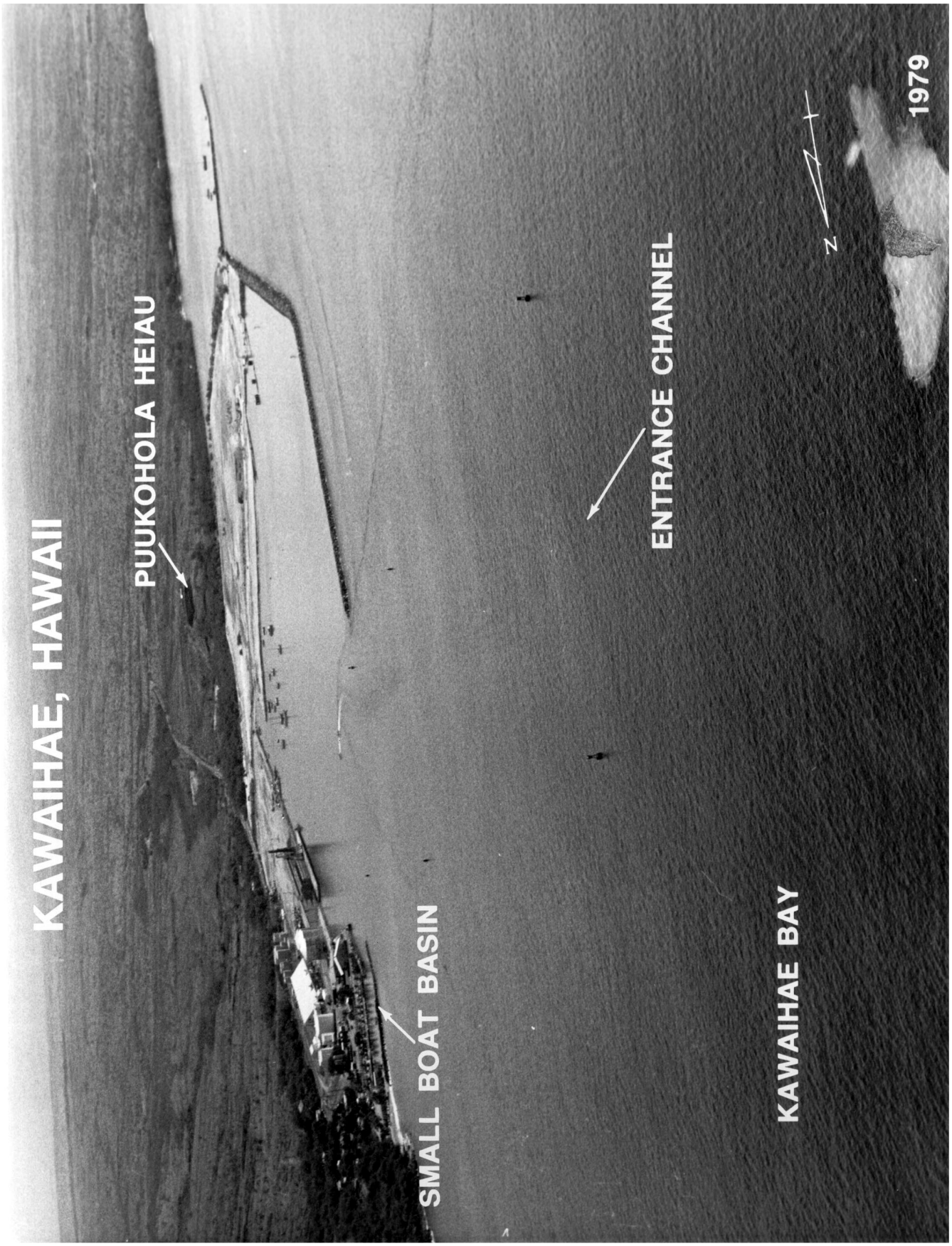
KAWAIHAE, HAWAII
PUUKOHOLA HEIAU
SMALL BOAT BASIN
ENTRANCE CHANNEL
KAWAIHAE BAY
N
1979

(277) **Communications.–**Kawaihae has interisland barge and air service and is a port of call for transpacific vessels.

(278) **Chart 19327.–**Between Kawaihae and Mahukona, the country is uncultivated grazing land. Mountain slopes terminate in cliffs at the coast and are cut intermittently by ravines.

(279) **Chart 19329.–Mahukona Harbor** is a small, open bight 10 miles NW of Kawaihae and 6 miles SW of Upolu Point. The village of **Mahukona** consists of a few houses in an algaroba grove near the beach, and abandoned warehouses and oil tanks. The shore is rocky, and the slopes back of the village are partially covered with algaroba trees.

(280) **Mahukona Light** (20°10.8'N., 155°54.1'W.), 64 feet above the water, is shown from a 22-foot white pyramidal concrete tower on Kaoma Point, S of the village.

(281) **Magnetic disturbance.–**Differences of as much as 3° from normal variation have been observed in the vicinity of Kauili Point about 0.7 mile N of Mahukona.

(282) Anchorage may be selected 0.2 mile SW of Makaohule Point, in depths of 10 to 15 fathoms, sand and coral bottom. An anchorage with less wind can be found 0.3 mile NW of the point and about 400 yards off the beach.

(283) Reports indicate that the inshore current usually sets N with considerable velocity. However, during the period of current observations the average N drift was about 0.2 knot, both N and S velocities of nearly 1 knot were measured, and the tidal current averaged less than 0.2 knot at strength. During the observations, winds were light to moderate and variable in direction. Strong offshore winds, accompanied by violent gusts from varying directions, are frequently experienced during the normal NE trades. Because of these conditions, vessels should anchor with plenty of cable and have a second anchor ready to let go.

(284) The public landing is at the head of the bight and a private landing is on the N shore. Both landings are for small boats only. Provisions are available.

(285) **Chart 19327.–**The coast between Mahukona and Upolu Point is a series of low, black bluffs. Back of the bluffs, the country is marked by many cinder cones and rises gently to the Kohala Mountains. The cuts and fills of the railroad that formerly skirted the coast from Mahukona to Kohala may be seen when close inshore.

(286) **Chart 19320.–Alenuihaha Channel,** between the islands of Hawaii and Maui, is 26 miles wide in its narrowest part, between Upolu Point and Puhilele Point. The channel is free of obstructions and is deep close to the shores.

(287) Strong trade winds usually prevail, causing the channel to be very rough and a current of 1 to 2 knots to set W. Passage is very difficult for smaller vessels, especially when going E. During the calms that frequently follow, there is at times an E set of about 1 knot, and during kona winds the E set may reach a velocity of 2 or 3 knots. The channel is roughest and the W current strongest when the wind is between NNE and ENE. During periods of strong NE trades, violent tide rips may be encountered 2 miles N of Keahole Point, probably caused by the meeting of the SW offshore current with the N inshore current. When bound from Upolu Point to Alalakeiki Channel, an onshore set is sometimes felt when reaching the lee of Maui.

(288) **Chart 19340.–Maui,** 26 miles NW of Hawaii, has an area of 728 square statute miles and is second in size of the eight large islands. The island is 42 miles long in a NW-SE direction and 23 miles in greatest width. A low, flat isthmus joins the two distinct mountain masses that make up the island. The crater of **Haleakala** (house of the sun), 10,025 feet high, is near the center of the E and larger part of the island. On the NW side of the crater the land slopes gently, while on the S and E sides, it is much steeper and in some places precipitous. **Koolau Gap** on the N side, and **Kaupo Gap** on the SE side, are two large openings in the side of the crater. **Puu Kukui,** 5,788 feet high, is near the center of the W and smaller part of the island, which is cut up by rugged peaks and deep valleys and gulches.

(289) **Anchorages** are numerous on the SW side of Maui; the first requirement under ordinary conditions is shelter from the trade winds.

(290) **Currents.–**In the vicinity of Maui, currents are variable, depending to a great extent upon the velocity and direction of the wind. Usually there is a W flow in the offshore areas along the N and S coasts, which is part of the general W oceanic drift accompanying the prevailing NE trade winds. Much of the flow along the S coast appears to continue W past the S coast of Kahoolawe. Weak, variable currents are reported in Alalakeiki Channel, and there is a N flow in Auau Channel. Near the shores of the island the currents are complicated by tidal effects, wind, and counter currents.

(291) **Weather, Maui and vicinity.–**The trade winds divide at Kauiki Head, one part following the trend of the coast NW and the other part following the S coast. The winds following the NW coast divide again at the isthmus, one part drawing S and often reaching great force in the vicinity of Maalaea Bay, and the other part following the trend of the coast around the NW end of Maui and through Pailolo Channel, with the greater force on the Molokai side of the channel. That part of the trades following the trend of the S coast of Maui divides, with part continuing along the S shore of Kahoolawe and the other part drawing through Alalakeiki Channel, around the N end of Kahoolawe and W through Kealaikahiki Channel.

(292) On the S coast of Maui, a sea breeze frequently sets in about 0900 and continues until after sundown, when the land breeze springs up. Light airs or calms are generally found in the vicinity of Molokini Islet and again along the W shore of Maui between Hekili and Kekaa Points. In the vicinity of Lahaina a light onshore breeze is generally felt, while farther out in Auau Channel the NE trades are noticed.

(293) Rainfall is quite heavy on the windward side of the island and light on the lee side.

(294) **Quarantine, customs, immigration, and agricultural quarantine.–**(See chapter 3, Vessel Arrival Inspections, and appendix for addresses.)

(295) **Quarantine** is enforced in accordance with regulations of the U.S. Public Health Service. (See Public Health Service, chapter 1.)

(296) **Supplies.–**Marine supplies are available in limited quantities for small craft at Kahului, Wailuku, Lahaina, and Maalaea. Fuel and water are available at Kahului, Maalaea, and Lahaina.

(297) **Repairs.–**Some machine repairs can be made at Kahului. Minor repairs of small craft can be accomplished at Maalaea.

(298) **Communications.–**Maui has telephone communication with the other islands and with the mainland. Passenger and freight service travels over good to fair highways that extend to

most parts of the island. Kahului is a port of call for interisland and transpacific shipping. The island has regularly scheduled air service.

(299) **From Hana Bay to Cape Hanamanioa, the coast has a generally WSW trend. Between Hana Bay and Nuu Landing the coast consists of high, rough bluffs, broken up by numerous small capes and indentations. Vegetation may be seen as far as Kaupo Gap. The entire S face of Haleakala is steep and eroded, presenting a reddish-brown appearance, dotted here and there with green patches. The slopes become less steep as the shore is approached. From Nuu Landing to Cape Hanamanioa the coast is bare, with practically no sign of habitation. Dangers lie offshore in the vicinity of Alau Island, Ahole Rock, and between Pohakueaea Point and Cape Hanamanioa. Otherwise, the 10-fathom curve lies within 0.2 mile of the shore. Landings can be made during trade-wind weather in the numerous coves along the coast between Muolea Point and Nuu Landing. There are no suitable anchorages between Nuu Landing and Cape Hanamanioa.**

(300) **Chart 19341.–Hana Bay** lies between Kauiki Head and Nanualele Point at the E end of Maui. The bay is about 0.4 mile in diameter and is open to the E. **Hana** is on the S side of the bay.

(301) **Kauiki Head,** on the S side of Hana Bay entrance, is a crater 390 feet high; the outer half of the crater has eroded, leaving the inner side exposed. Because it is joined to the rest of Maui by a comparatively low neck of land, Kauiki Head has the appearance from a distance of a separate island. **Kauiki Head Light** (20°45.4'N., 155°58.7'W.), 85 feet above the water, is shown from a 14-foot white pyramidal concrete tower on an islet close to the NE side of the crater.

(302) The shores of Hana Bay are rocky except for two short beaches, one at the S end of the bay and the other on the NW side. A shoal, usually marked by breakers, extends halfway across the bay from the middle of the N shore. A small 16-foot rocky spot is 350 yards N of the light. Numerous rocks, some bare at all tides, extend for 200 yards off **Nanualele Point.** The point is low, flat lava on the N side of Hana Bay. **Twin Rocks** are two bare rocks, with deep water close-to, about 300 yards NE of the light; the inner and larger rock is 15 feet high. About 200 yards S and 300 yards SE of outer Twin Rock are **Inner Pinnacle Rock,** about 3 feet high, and **Outer Pinnacle Rock,** about 5 feet high.

(303) The entrance channel to Hana Bay is between Twin Rocks and the 16-foot shoal and is unmarked. A local rule is to avoid entering the harbor when the seas are breaking at the entrance.

(304) The bay does not afford a desirable anchorage. Small vessels sometimes anchor in the SW portion of the bay, but swinging room is limited. Anchorages in the bay are exposed to NE winds and sea, and during strong SW blows vessels are apt to drag anchor. In the absence of local knowledge, anchorage should be attempted only by small craft.

(305) **Currents.–**Just outside the bay a tidal current reaches its S strength when the tide at Honolulu is rising and its N strength when the Honolulu tide is falling. S and N velocities of about 1 knot and 1.5 knots, respectively, have been observed. Farther offshore, a strong N or NE current has been reported. Off Kauiki Head and Nanualele Point, rough seas occur when a NE wind blows against the NE current.

(306) No breakwater protects this small, exposed harbor. The turning basin is 20 to 30 feet deep and about 600 feet by 800 feet. The State-owned T-pier provides 300 feet of berthing space, but is in poor condition and no longer maintained. Vessels drop anchor NW of the pier and make a starboard landing. Small boats can be launched from the sand beach at the S end of the bay.

(307) **Chart 19340.–Puu o Kahaula,** 545 feet high, is the highest of five hills 0.7 mile inland from Hana; the stone memorial cross atop the hill is sometimes lighted at night.

(308) **Alau Island,** 1.5 miles S of Kauiki Head and 0.4 mile offshore, is 100 yards in diameter and 150 feet high, is grass covered and has a few coconut palms. Between the island and Maui is an extensive reef. Tidal currents of 0.5 knot, setting N and S, have been observed near Alau Island. Off the island is a strong NE current, and there is an eddy between the island and Kauiki Head.

(309) Two rocks with about 9 feet of water over them are close together about 0.7 mile SE of Alau Island. Under favorable conditions, these rocks appear as small, yellowish-brown spots in the water. However, they are seldom seen and do not break in moderate seas. Vessels may avoid the rocks by giving Alau Island a berth of about 1.5 miles in passing.

(310) **Iwiopele,** about 1.5 miles S of Hana Bay, is a formation similar to Kauiki Head and resembles the latter in size and appearance.

(311) **Mokae Cove,** almost 1 mile S of Iwiopele, affords a landing for small boats in NE weather. S currents with velocities up to 0.5 knot have been observed 0.5 mile from the shore in this locality.

(312) From **Makaalae Point,** 3 miles S of Kauiki Head, the coastal trend is SW. There are several villages between Mokae Cove and Wailua Cove. A church spire is prominent on the bluff at **Puuiki,** 3.5 miles SW from Kauiki Head.

(313) **Wailua Cove** is at the mouth of a valley 5.5 miles SW from Kauiki Head. Inland from the cove and halfway up the mountain is a high waterfall that is usually conspicuous from offshore. A white cross, below the waterfall, is visible. Landings may be made during normal trade-wind weather in almost any of the coves along the coast, although the swell enters all of them. **Muolea Point,** a mile E of Wailua Cove, is rounded and rocky.

(314) **Kipahulu,** 8 miles SW of Kauiki Head and 0.5 mile W of **Puhilele Point,** is a ranch settlement on the W side of deep **Kipahulu Valley;** a stack is prominent. **Ahole Rock,** about 0.3 mile off the shore below Kipahulu, is low and flat, and has a bare appearance; anchorage in the vicinity is not recommended.

(315) **Kaapahu Bay,** 1.5 miles W of Kipahulu, is a small coastal dent which sometimes can be used for small-boat anchorage in trade-wind weather; there are depths of 4 fathoms about 200 yards off the pebble beach.

(316) **Kaupo Landing,** 11 miles SW of Kauiki Head, is the best in the vicinity during trade-wind weather. Adjacent land is divided into small homesteads, and cattle raising is the principal occupation. Vessels anchor well off and E of the landing. Strong E winds make landings difficult.

(317) **Kailio Point,** 13 miles SW of Kauiki Head, is 73 feet high, narrow, and at the E end of **Mamalu Bay.** A prominent church is on the highway directly N of the point. Trade-wind anchorage may be found about 300 yards from the head of the bay in depths of 10 fathoms, sandy bottom.

(318) **Kaupo Gap** is the large opening, about 1.3 miles wide, in the SE side of Haleakala Crater. An immense old lava flow slopes gradually from the gap to the coast. The wide U-shaped gap at the top is a good landmark, day or night, for Kailio Point. The brush-covered lava flow is the dividing line between the forest

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and brush of the E part and the barren W part of the S coast. Waterfalls are numerous E of the gap.

(319) Low **Apole Point,** 15 miles SW of Kauiki Head, is composed of black, jagged rock. The point marks the seaward end of the Kaupo lava flow.

(320) **Nuu Landing** is a small bight on the W side of Apole Point. Small vessels can find anchorage in depths of about 8 fathoms.

(321) From Nuu Landing to **Pohakueaea Point,** 12 miles to the W, the coast is barren and deep water is close-to. All dangers are close to the bluffs. A few homesteads may be seen on the slopes that rise to the rim of Haleakala. The slopes are cut by gulches and are barren except for a scattering of trees about halfway up. At Pohakueaea Point, the 20-fathom curve begins to trend offshore.

(322) A pinnacle rock with depths of less than 12 feet over it is reported to exist within 0.5 mile of the shore somewhere between Pohakueaea Point and La Perouse Bay. The rock may be off Pohakueaea Point as an extension of the lava flow that forms the point. Vessels making the run along this coast in recent years have observed no indication of an offshore danger; however, they give Cape Kinau a berth of about 1 mile, as it is known that a steamer struck bottom in the vicinity of the cape, probably about 0.2 mile offshore.

(323) **Lualailua Hills,** 6 miles W of Nuu Landing and 2 miles inland, are a group of red mounds about 2,000 feet high.

(324) **Hokukano,** 1 mile SW of Lualailua Hills, is a conspicuous red cone with a lava flow reaching the sea in a high black mass.

(325) **Pimoe,** 2.4 miles W of Hokukano, is a red dome, irregular in shape, with its E side broken. The dome, 1,766 feet high, is the crater from which the large, fan-shaped lava flow in the vicinity of Pohakueaea Point had its origin.

(326) **Chart 19347.–Cape Hanamanioa,** the SW extremity of Maui, is a black lava mass. **Hanamanioa Point Light** (20°35.0'N., 156°24.7'W.), 73 feet above the water, is shown from a 21-foot pole with a black and white diamond-shaped daymark on the cape. A current is reported to set constantly NW past the cape; however, a short series of observations a mile SE of the light indicates a tidal current with a velocity of 0.8 knot at strength.

(327) **La Perouse Bay,** between Cape Hanamanioa and Cape Kinau, is about 0.7 mile wide and indents the coast about 0.5 mile. On the NW side of the bay is **Puu Kanaloa,** a low, yellowish-brown cone at the water's edge, with its seaward side blown out. The crater is surrounded by a lava flow from **Kalua Lapa,** a small, black cone about 1 mile N of the bay. A rock covered 10 feet is in the middle of the entrance to the bay. A rocky outcrop is on the NW side of the bay. Strangers are advised to exercise extreme caution in the bay.

(328) **Cape Kinau,** 1.5 miles NW of Cape Hanamanioa, is a broad, low, black, lava point and a **protected area** of a Natural Area Reserve. A rock with 4½ feet of water over it is 400 yards offshore near the N end of the cape.

(329) **Puu Olai,** about 2.5 miles N of Cape Kinau, is the most prominent landmark in this vicinity. The hill is brown in color, 367 feet high, and consists of three bare knolls, of which the southernmost is the highest.

(330) **Molokini,** 5.5 miles NW of Cape Hanamanioa, is a small crescent-shaped islet about 0.3 mile long and 156 feet high. The islet is the bare rim of a crater, the N part of which is submerged. **Molokini Island Light** (20°37.7'N., 156°29.7'W.), 182 feet above the water, is shown from a 30-foot pole with a black and white diamond-shaped daymark. A reef extends 300 yards N from the NW end of the islet; there is deep water close to the S side. Vessels pass on either side of the islet. In March 1984, unexploded ordnance was reported in the vicinity of the islet; caution is advised.

(331) **Makena Anchorage,** 1 mile N of Puu Olai, is exposed to kona weather, but affords good holding ground during the trades. Anchorage can be had in depths of 12 to 15 fathoms off **Nahuna Point,** with a fairly prominent church bearing 100°. A few houses may be seen among the trees on the rocky point at the N side of the bight, and a prominent house is at the S end of the sand beach. The strong trade winds that are felt farther N in Maalaea Bay are not pronounced at Makena. Secondary roads lead along the coast and inland from the village. Anchorage can also be found in **Ahihi Bay,** just S of Puu Olai.

(332) The country back of Makena rises gently to the mountains. The lower slopes are covered with cactus, while the slopes higher up are wooded in places. From Makena to Kihei the coast has a general N trend and is heavily developed with beach homes and hotels. The country back of the coast is like that in the vicinity of Makena.

(333) **Keawakapu** is 8 miles N of Cape Hanamanioa. An apartment building on the small point at Keawakapu is the most prominent landmark along this coast. A fish haven, 200 yards by 1,150 yards, is 0.7 mile SW of Keawakapu.

(334) **Chart 19350.–Maalaea Bay** is a large bight midway along the SW coast of Maui. The shores are low, mostly sandy, and fringed with algaroba trees. The isthmus behind the bay and the slopes on either side are cultivated in sugarcane. Several hotels and resort developments can be seen along the E side of the bay.

(335) Maalaea Bay is only a fair anchorage. Fresh winds sweep across the isthmus during the trades, and the bay is completely exposed to kona storms. The holding quality of the ground is poor. A N current has been reported in the bay. In the central and E portions the bottom is very irregular. A reef fringes the shore for a distance of 3.5 miles S of Kihei. Off Kalepolepo, where the reef is widest, a 14-foot spot is -0.5 mile offshore along the edge of the reef. Broken ground with a least depth of 3 fathoms lies about 0.7 mile WSW of the Kihei wharf. A shoal with a least depth of 7 fathoms is in the center of the bay; shoals with 3¾ and 4¾ fathoms are NE of this shoal. Strangers should pass well offshore.

(336) **Kalepolepo,** is on the E side of Maalaea Bay, 11 miles N of Cape Hanamanioa. A large old fishpond extends 0.2 mile from shore. Local vessels anchor behind the reefs in depths of 3 to 4 feet.

(337) **Kihei** is on the E side of Maalaea Bay 12 miles N of Cape Hanamanioa. A settlement is scattered among the trees and along the beach in the vicinity of the remains of a wharf.

(338) **Kealia Pond,** just NW of Kihei, is separated from the bay by a narrow sand strip over which the shore highway passes.

(339) **Maalaea** is a village on the NW shore of Maalaea Bay. A few buildings can be seen among the algaroba trees. The boat harbor at the village is about 500 yards long E to W, about 200 yards across, and is protected by breakwaters. Depths in the harbor are about 7 feet in the W basin and about 10 feet in the NE ba-

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sin, mud bottom. In 1955, the entrance channel had a controlling depth of 10 feet. The entrance channel is marked by a **339°** lighted range; private buoys and daybeacons mark the boat harbor. A shoal area, marked by a daybeacon, with depths of about 1 foot extends from the center of the harbor N to the shore. Boats going to the public moorings in the W end of the harbor should pass between this daybeacon and the breakwater. Gasoline, diesel fuel (in cans), water, ice, marine supplies, and a launching ramp are available. Boats up to 65 feet can be handled for engine repairs. The harbor office is at the head of the harbor. The harbor experiences considerable surge during all but calm weather.

(340) **Coast Guard Station Maui** is just inside the breakwaters of Maalaea Village.

(341) **Chart 19347.–McGregor Point Light** (20°46.6'N., 156°31.4'W.) 72 feet above the water, is shown from a 22-foot white tower on McGregor Point on the W side of Maalea Bay. The coast between McGregor Point and Olowalu is broken by low bluffs rising from the water's edge, behind which the country presents a barren appearance. The mountains have sharp jagged peaks and are cut by deep gorges.

(342) **Papawai Point,** 0.9 mile W of McGregor Point, is the southernmost point of W Maui. Deep water is close inshore at the point.

(343) **Olowalu** is on **Hekili Point,** 18 miles NW of Cape Hanamanioa. The deep gulch of **Olowalu Stream** appears as a gap in the mountains when abreast of the point and is an excellent night mark.

(344) **Launiupoko Point,** about 2 miles NW of Olowalu, is low and rounding. About 0.8 mile inland from the point is an 808-foot hill that has a mottled, grayish-brown appearance. Shoal water extends about 0.2 mile offshore from the point NW to Lahaina. The highway skirts the shore between these points, and automobile lights along the road are usually the only lights seen along the coast.

(345) **Chart 19348.–Lahaina** is 23 miles NW of Cape Hanamanioa. Once the whaling capital of the mid-Pacific, Lahaina is now a colorful resort town and a favorite port of call of yachtsmen and boating enthusiasts. In the vicinity of Lahaina, canefields extend along the coast and for several miles inland on the ridges that lead to high, rugged mountains. A mill stack near the center of Lahaina is very prominent. A reef, over which the sea generally breaks, extends about 350 yards offshore from Makila Point, 1 mile SE of Lahaina, to Puunoa Point, a mile NW of Lahaina. **Mala** is a small settlement on the N side of **Puunoa Point.** The concrete wharf at Mala is in poor condition and is no longer in use. A breakwater extends along the NE side of the Mala wharf. A launching ramp is between the inner end of the breakwater and a short groin that protects the ramp on its N side.

(346) **Lahaina Light** (20°52.3'N., 156°40.7'W.), 44 feet above the water, is shown from a 39-foot white pyramidal concrete tower at the inner end of the Lahaina small-boat wharf.

(347) S of Lahaina wharf is a boat basin, about 200 by 800 feet, protected by breakwaters. The approach to the basin is marked by a lighted buoy. The entrance channel is marked by private buoys and a **044°26'** lighted range. In August 1979, the controlling depth was reported to be 8 feet in the channel. Depths inside the basin range from 5 to 10 feet. Vessels entering or leaving the boat basin should exercise caution as the combined effects of the swell and the 90° turn into the basin can set vessels onto the shoal opposite the basin entrance.

(348) Limited quantities of small-craft supplies can be obtained at Lahaina; a 1-ton hoist is available on the small-boat wharf.

(349) Off Lahaina is good anchorage, and calm water will generally be found even though strong trade winds are blowing elsewhere. However, the anchorage is exposed in kona weather. Permanent mooring buoys for pleasure craft are reportedly in the area. In approaching this anchorage, vessels should keep about 1 mile offshore until the light bears 056°, then head in on this course and anchor in depths of 9 to 15 fathoms. Anchorage can be had anywhere in the bight N of Mala wharf, 0.6 mile offshore in depths of about 12 fathoms, sandy bottom.

(350) **Currents.**–The current off Lahaina usually sets N and reaches a maximum velocity of 1 or 2 knots before low water. Before high water the current is normally quite weak and may set either N or S.

(351) It is reported that the current near the wharf at Mala sets S most of the time.

(352) The coast between Mala and Kekaa Point consists of a low, sandy beach with a fringe of coconut and algaroba trees, back of which the canefields extend inland for about 2 miles. Buildings can be seen along the coast among the trees.

(353) **Puu Laina,** 1.2 miles NE of Mala, is a prominent cone 650 feet high. The lower slopes of the hill are covered with cane.

(354) **Hanakaoo Point,** 2 miles N of Mala, is rounding and not conspicuous from offshore. The 10-fathom curve is about 500 yards off this point, and the bottom slopes gradually to the sandy beach. A hotel is on the S side of the point.

(355) **Chart 19347.–Kekaa Point** (20°55.8'N., 156°42.0'W.), 26 miles NW of Cape Hanamanioa, is the westernmost extremity of Maui. The point is a dark, rocky promontory, 85 feet high, which appears detached from a distance; there are no offshore dangers. A hotel is on the point. A prominent mill stack is 0.8 mile N of the point.

(356) A northward current is reported off Kekaa Point. A tidal current of 0.5 knot, setting N and S, was observed 0.5 mile from the shore.

(357) From Kekaa Point to Lipoa Point, the coast consists of low bluffs and stretches of sand beach along which may be seen clumps of algaroba trees and several resort hotel complexes. The gently sloping country is cut by shallow gulches and is covered with cane and pineapple which extend well up the mountain slopes.

(358) **Napili Bay,** 4.5 miles N of Kekaa Point, is a small bight between two coral reefs. Anchorage can be found about 0.5 mile offshore in depths of 5 fathoms, but it is seldom used. N currents are reported off the bay. Small boats can land in Napili Bay during tradewind weather. Breakers extend 0.2 mile offshore for a distance of 1.5 miles S of the bay.

(359) **Hawea Point Light** (21°00.2'N., 156°40.0'W.), 75 feet above the water, is shown from a post with a diamond-shaped black and white daymark 5 miles N of Kekaa Point.

(360) **Honolua Bay** is the open bight on the S side of **Lipoa Point,** which is 7 miles NE of Kekaa Point. Smaller vessels can find fair anchorage in the bay, and boats can land in the cove at the NE end.

(361) In the vicinity of Lipoa Point, the bluffs along the N shore of Maui become higher and more precipitous. Also, the bluffs are cut up by more bights and headlands. The country is more rolling and is cut by deeper gulches. The mountains are steeper and greener. Near their tops the mountains are wooded in places. Patches of black rocks, awash at high water, are found close in-

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shore off several of the points in the vicinity. Vessels should give this coast a berth of at least 0.8 mile.

(362) **Kanounou Point,** about 2 miles ENE of Lipoa Point, has several bare, black rocks a short distance offshore.

(363) **Honokohau,** on the W side of Kanounou Point, consists of a few houses at the mouth of **Honokohau Stream.** There is little protection off the village.

(364) **Nakalele Point** is 3 miles ENE of Lipoa Point; the SE face of the point has waterspouts. Close off Nakalele Point are several bare, black rocks. **Nakalele Point Light** (21°01.7'N., 156°35.4'W.), 142 feet above the water, is shown from a 21-foot pile with a black and white diamond-shaped daymark.

(365) **Chart 19342.–Kahakuloa Head,** 3 miles SE of Nakalele Point, is the seaward end of one of the numerous abrupt capes in this general vicinity. **Puu Koae (Sugarloaf),** a dark bare, conical mound 634 feet high, is on Kahakuloa Head; this feature is one of the most conspicuous landmarks on the island of Maui. E and close to Puu Koae, on the same ridge, is a low and more rounded dome. **Kahakuloa** is a small village in **Kahakuloa Bay,** just W of Kahakuloa Head. A spire can be seen in the village. Kahakuloa is the last settlement on the paved road that skirts the W and N shores of Maui. Deep water is found close to the head, although there are numerous breakers and covered rocks just offshore. A rock, covered 4½ feet, in surrounding depths of 15 to 20 fathoms, is 0.4 mile off the head of the cove between Puu Koae and Mokeehia Island.

(366) **Mokeehia Island,** 1.4 miles SE of Puu Koae, is a large, bare rock 170 feet high, just off the outer end of **Hakuhee Point.** Caverns can be seen in the faces of the cliffs on both sides of the island.

(367) **Puu Olai,** 0.7 miles inland from Mokeehia Island, is 1,002 feet high.

(368) **Hulu Island,** 95 feet high and close to shore, is 2 miles S of Mokeehia Island. Several rocks are close S of the island.

(369) **Waihee Point** is 2.6 miles S of Mokeehia Island. SE of the point is extensive **Waihee Reef,** and back of the point is deep and precipitous **Waihee Valley,** which is quite prominent.

(370) **Iao Valley,** also deep and precipitous, is 6 miles S of Mokeehia Island; some of the finest scenery on Maui is found in this vicinity.

(371) **Wailuku** at the mouth of Iao Valley and 1.5 miles from the coast, is the seat of Maui County and is the largest town on the island. The town has a hospital, hotels, and numerous stores; a white multistory building in the center of the town is prominent. There is a direct highway to Kahului.

(372) **Kahului Harbor,** on the S side of **Kahului Bay** 6 miles SE of Mokeehia Island, is protected by breakwaters which extend outward from the W and E shores. On the SE side of the harbor is the commercial deepwater port of **Kahului.**

(373) **Prominent features.–Pauwela Point Light** (20°56.7'N., 156°19.3'W.), 161 feet above the water, is shown from a 40–foot white post 9 miles ENE of Kahului Harbor and is the principal mark for the approach. Other marks are an aero light at the airport E of Kahului, the breakwater lights, the lighted entrance range, the powerplant stacks E of the piers, the radio tower 0.8 mile W of the rear range, and the Wailuku spire and stack 2 miles W of the harbor.

(374) **COLREGS Demarcation Lines.**–The lines established for Kahului Harbor are described in **80.1460**, chapter 2.

(375) **Channels.**–From deep water on the N, the channel leads between the breakwaters, then turns sharply SE to the Kahului piers. A Federal project provides for an entrance channel 35 feet deep and a harbor basin of the same depth. Channel and basin are maintained at or near project depth. Navigational aids include lighted and unlighted buoys, breakwater lights, and a **177°** lighted range. A channel, marked by private buoys, leads to a launching ramp at the W end of the harbor.

(376) **Anchorages.**–Swinging room inside the breakwaters is too restricted for large vessels, which may anchor E of the sea buoy, but caution is necessary to avoid dragging by the prevailing NE trades. Small craft have plenty of anchorage room in the unimproved areas behind the breakwaters.

(377) **Dangers.–Waihee Reef,** NW of the breakwaters, and **Spartan Reef,** NE of the breakwaters, extend 0.7 mile and 1.2 miles offshore, respectively. Vessels approaching the harbor entrance range from either direction should avoid the reefs. The W part of the inner harbor is shallow.

(378) **Tides and currents.**–The diurnal range of tide is 2.3 feet at Kahului. Harbor currents are weak.

(379) **Weather.**–The prevailing winds are the NE trades.

(380) **Pilotage, Kahului.**–Pilotage is compulsory for all foreign vessels and for U.S. vessels under register in the foreign trade; it is optional for U.S. vessels in the coastwise trade with a Federal licensed pilot on board. Pilotage is available through the Honolulu Pilots Association; they can be reached at (808) 532-7233.

(381) **Towage.**–A 1,500 hp tug is available at the port.

(382) **Quarantine, customs, immigration, and agricultural quarantine.**–(See chapter 3, Vessel Arrival Inspections, and appendix for addresses.)

(383) **Quarantine** is enforced in accordance with regulations of the U.S. Public Health Service. (See Public Health Service, chapter 1.) There is a private hospital between Kahului and Wailuku.

(384) Kahului is a **customs port of entry.**

(385) **Harbor regulations.**–These are established by the Harbor Division of the Hawaii Department of Transportation. The harbormaster enforces the regulations and assigns berths and anchorages. The harbormasters' office hours are from 0745-1630 and can be contacted at 808-873-3350; 808-877-4307 (after business hours) and 808-872-8696 (emergency pager).

(386) **Wharves.**–The State-owned and operated piers are on the SE side of the harbor. General cargo is usually handled by ships' tackle, and cargo to and from barges by forklift trucks; crawler and truck cranes are available. Transit sheds with 78,000 square feet of covered storage space and 21 acres of open storage space are available at the piers. Truck lines serve the piers. For a complete description of the port facilities refer to Port Series No. 50, published and sold by the U.S. Army Corps of Engineers. (See appendix for address.)

(387) Pier 1: 1,350 feet of berthing space along the SW side; 35 feet reported alongside; deck height, 9 feet; two traveling bulk sugar loading towers with conveyors and loading spouts, loading rate 800 tons per hour; receipt and shipment of general and containerized cargo; receipt of automobiles; receipt of petroleum products, coal, lumber, and steel products; shipment of raw sugar and molasses; boarding passengers.

(388) Pier 2: 894 feet of berthing space along the NE side, 27 feet reported alongside; deck height, 9½ feet; 288 feet of berthing space along the outer end, 27 feet reported alongside; receipt and shipment of conventional and containerized cargo and automo-

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biles; receipt of lumber, bulk cement, and liquefield petroleum gases.

(389) Pier 3: extends NE from the foot of Pier 2; 500 feet of berthing space along NW side, 18 feet reported alongside; deck height, 9 feet; receipt and shipment of general and containerized cargo and automobiles; receipt of petroleum products, sand, lumber, and steel products; boarding passengers; mooring towboats.

(390) There is a surge at the piers during periods of heavy N swells; this occurs about 10 times a year. Departing vessels may have some difficulties in breasting off from Pier 1 during kona weather.

(391) **Supplies.–**Gasoline, diesel fuel, and water are available at all piers; gasoline and diesel fuel are trucked in. Bunker C fuel can be obtained in limited quantities by truck. Ice and some marine supplies are available.

(392) **Repairs.–**Kahului has no facilities for making repairs or drydocking deep-draft vessels. The nearest such facilities are in Honolulu. There are machine, electrical, and welding concerns off the waterfront for making above-the-waterline repairs to vessels.

(393) **Communications.–**Kahului has regular interisland barge service and is a port of call for transpacific vessels, but interisland passenger travel is almost entirely by air. Telephone communication is available to the other islands and to the mainland.

(394) The coast is low between Kahului Harbor and Pauwela Point. The back country is planted in sugarcane.

(395) **Paia** is 6 miles E of Kahului Harbor and 1 mile inland. An opening in Spartan Reef off Paia is sometimes used by local craft seeking anchorage behind the reef.

(396) **Maliko Bay,** 8 miles ENE of Kahului Harbor, is a narrow opening with steep, rocky sides. The bay provides fair anchorage for small craft in depths of 1½ to 5¼ fathoms, rocky bottom, when the trade winds are blowing. Rocks and foul ground, which extend from the E side of the entrance to the bay to about halfway across, form a natural breakwater. Rocks on the W side of the entrance restrict the channel to a width of about 100 yards. A reef that bares is on the SW side of the bay about 0.1 mile inside the entrance. Small craft can be launched from a boat ramp at the head of the bay.

(397) **Pauwela Point,** 9 miles ENE of Kahului Harbor, is marked by a prominent light which has already been described. An E current is reported off the point. **Pauwela** is 1 mile inland. Back of Pauwela are several hills with heavily wooded tops.

(398) **Chart 19340.–**Paralleling the NE coast of Maui is a State highway which is the main link between Kahului and Hana. From Pauwela E the road is a succession of sharp turns and steep grades as it winds from and toward the shore in crossing the numerous gulches. Sections of the highway can be seen from seaward, but it disappears as it follows the gulches inland.

(399) Between Pauwela and Nahiku, a distance of about 15 miles, the bluffs reach heights of 300 to 400 feet, then gradually lose elevation to the SE, and are low in the vicinity of Hana. The back country is generally green, and the higher slopes are heavily wooded. Because of the heavy rains, waterfalls are numerous in the many gulches that lead to the sea. Very little of this NE coast is planted in sugarcane. From Pauwela Point to Waipio Bay the land on the seaward side of the coastal highway is under pineapple cultivation, and there are many taro patches at Keanae and Nahiku. The slopes SE of Nahiku are grazing areas for cattle. There are many inshore rocks between Pauwela Point and Hana, but all such dangers can be avoided by keeping a mile offshore.

(400) **Uaoa Bay,** 3 miles E of Pauwela Point and just E of **Opana Point,** indents the coast about 0.4 mile. Fair anchorage during S winds can be had 0.3 mile offshore in depths of 12 to 16 fathoms, sandy bottom. A large detached rock off Opana Point marks the W side of the bay.

(401) **Pilale Bay,** 4 miles E of Pauwela Point, is a small opening at the mouth of a deep valley. Small boats can find fair anchorage during tradewind weather in depths of 4 to 7 fathoms a short distance off the beach.

(402) **Waipio Bay,** 6 miles E of Pauwela Point, lies between **Honokala Point** and **Huelo Point** and is open to the NE. **Huelo** is a small village along the highway 0.5 mile inland; a church steeple is fairly prominent from seaward.

(403) **Hoalua Bay,** 7 miles SE of Pauwela Point is small and too exposed for anything but emergency anchorage. Under favorable conditions landings can be made at the head of the bay.

(404) **Oopuola Cove,** 8 miles SE of Pauwela Point, is narrow and steepsided. A reef lies just N of the point on the W side of the entrance. Beach landings can be made at times, and small boats can find anchorage in depths of 3 to 6 fathoms near the center of the cove. **Puu Kukai,** 574 feet high, is 0.5 miles W of the cove.

(405) **Keopuka Rock,** 141 feet high, is 9.5 miles SE of Pauwela Point and close to shore. The rock's double-humped top is distinctive from E or W, but from directly offshore it blends into the cliffs behind it.

(406) **Honomanu Bay,** 10 miles SE of Pauwela Point, is a good landing place and a fair small-boat anchorage during the trades, although the swell is felt in the bay. Anchorage can be found in depths of 2 to 3 fathoms about 200 yards from the black shingle beach at the head of the bay. The E side of the bay is shallow. **Puu o Kohola,** 844 feet high, is 0.5 mile W of the bay.

(407) **Nuaailua Bay,** close E of Honomanu Bay and on the W side of Keanae Point, is the only suitable anchorage for moderate-size vessels along this NE coast. The bay is somewhat exposed to the NE trades, but is partly protected by Keanae Point. A 250-foot vessel can anchor in depths of 13 to 15 fathoms in the middle of the main bay; the bottom is quite even and has good holding qualities. Approach from seaward should be made on a due S course, keeping about 0.3 mile off the W shore and well clear of the 15-foot lone, black rock which is 0.3 mile off the E shore.

(408) **Keanae Point,** 11 miles SE of Pauwela Point, is a low, flat peninsula that juts out 0.3 mile from the bluff line. Landings should not be attempted on the point proper because of the covered rocks and ledges on all sides. A scattering of houses can be seen on the point.

(409) **Keanae Valley** is the largest and most prominent valley on this part of Maui. The valley leads inland 7 miles from the vicinity of Keanae Point to **Koolau Gap,** the large opening in the N rim of Haleakala Crater.

(410) **Pauwalu Point** is 1 mile SE of Keanae Point. **Mokumana Rock,** close off Pauwalu Point, is 77 feet high and flat-topped; the rock is particularly outstanding when approached from the E, but from some directions it appears to be a continuation of the point although there is a separation of some 50 yards.

(411) **Aluea Rock,** 2 miles SE of Keanae Point and about 0.2 mile offshore, is only a few feet high and has the appearance of a reef awash as the seas break over it continuously and covered

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rocks extend another 300 yards from shore. This area should be avoided by all boats.

(412) **Wailua** consists of a few houses along the shore of the small bight immediately SW of Aluea Rock. On the E side of the bight is a high wooded bluff, and the W side is low and grass-covered. The highway leading to Hana leaves the shore W of the bight and from seaward it may be seen high up on the ridges as it winds its way SE.

(413) **Nahiku,** 15 miles SE of Pauwela Point, is a small settlement on the E side of an open bight. Anchorage can be found in depths of 7 fathoms close to shore, but strangers should not attempt it because of the two covered rocks near shore. A SE current is reported off Nahiku, and the inshore current between Nahiku and Kauiki Head is said to be weak. **Kuhiwa Gulch** extends inland from the vicinity of Nahiku and is visible from seaward.

(414) **Opikoula Point** is a low, rocky bluff on the E side of the Nahiku anchorage. Similar bluffs extend 5 miles SE to Pukaulua Point, and there are no easily recognized landmarks. This reef-fringed stretch of coast is not recommended for small-boat landings.

(415) Low **Pukaulua Point** is 2.5 miles NNW of Hana Bay and Kauiki Head. **Hana Airport** is 0.5 mile NW of the point; the main runway is laid out in an E-W direction and is close to the bluffs.

(416) **Chart 19347.–Alalakeiki Channel,** between Maui and Kahoolawe, is about 6 miles wide. The channel is clear of dangers, with the exception of Molokini, which is marked by a light.

(417) Observations show that the **current** usually flows NW with a maximum velocity of 0.7 knot on the W side of the channel near Kahoolawe Island, and SSE with a maximum velocity of 0.4 knot along the E side of the channel near Maui Island. Velocities up to 1 knot have been observed in the channel.

(418) The trade winds draw through the channel, hauling around the N end of Kahoolawe. The trades blow with much force at the E entrance to the channel, but in the vicinity of Molokini it is generally calm.

(419) **Auau Channel,** between Maui and Lanai, is about 8 miles wide. With the exception of a reef about 3 miles long, which extends not more than 0.5 mile offshore N of Kikoa Point, Lanai, the channel is free from obstructions. The aerolight at Molokai airport can be seen when passing through Auau Channel.

(420) Observations in Auau Channel show that the **current** seldom floods, but that the flow is mainly in the ebb direction; ebb is E with a velocity of 1.1 knots. Beginning with maximum ebb, the current decreases to a minimum ebb or slack and then increases to a maximum ebb without a significant flow in the flood direction. Maximum velocities of 2 knots have been observed. (For predictions see the Tidal Current Tables.) During trade winds it is often calm in the channel.

(421) **Pailolo Channel,** between Maui and Molokai, is about 7.5 miles wide. The channel is clear of obstructions with the exception of Mokuhooniki and Kanaha Rock, near the E end of Molokai, and a reef about 0.8 mile wide which fringes the shore of Molokai.

(422) Observations show the **current** in the channel to set NE with a velocity of about 0.3 knot. The maximum velocity observed was 0.6 knot.

(423) In navigating this channel, the tanks on Molokai and Maui will prove useful landmarks; those on Molokai are on the SE shore, near Pukoo, and those on Maui are on its WNW side, near Kekaa Point.

(424) It is reported that the junction of Pailolo, Auau, and Kalohi Channels, locally known as **The Slot,** is subject to high winds and dangerous currents.

(425) **Chart 19347.–Kahoolawe,** 6 miles SW across Alalakeiki Channel from the SW extremity of Maui, has an area of 45 square statute miles and is the smallest of the eight major islands. Kahoolawe is about 10 miles long and 6 miles wide, and from a distance has an even, unbroken appearance. The high cliffs on the E and S sides are grayish-black; the soil of the mountain tops and the gentle slopes of the N and W sides are reddish. The island has scarcely any rainfall, and the huge clouds of red dust which trail to leeward during strong winds can be seen for many miles. **Puu Moaulaiki (Moaula),** a brown dome 1,444 feet high near the E end of the island, is the most prominent landmark.

(426) **Warning.**–Kahoolawe is under Naval jurisdiction. The island was previously used as a military target area for bombing and gunnery training. Large amounts of unexploded ordnance are present on the island and in its adjacent waters. Entry onto the island or in its adjacent waters is prohibited without the consent of Commander, Third Fleet, Pearl Harbor, Hawaii 96860. Entry regulations are contained in **32 CFR 763.1 through 763.6** (not carried in this Coast Pilot). A **danger zone** extends 2 miles from all sides of the island. (See **334.1340**, chapter 2, for limits and regulations.)

(427) From **Lae o Kuikui (Cape Kuikui),** the most N point of the island, to Kanapou Bay, the coast is rocky and the bluffs gradually increase to cliffs several hundred feet high at the bay.

(428) **Lae o ka Ule (Ule Point),** 2.8 miles SE of Lae o Kuikui, is on the N side of Kanapou Bay.

(429) **Kanapou Bay** 2 miles wide between Lae o ka Ule and **Lae o Halona (Halona Point),** offers protection in kona weather. Anchorage is available for small vessels in **Keoneuli (Beck Cove)** on the SW side of the bay. The bay should be entered on a SW course, heading for the middle of the cove, and anchorage should be made in depths of 15 to 20 fathoms off the mouth of the cove and midway between the sides. The bottom shoals rapidly from depths of 12 to 3 fathoms about 0.2 mile from the sandy beach at the head of the cove. W winds draw down the canyon at the head of the cove with considerable force.

(430) From **Lae o Kaka (Kaka Point),** the SE point of Kahoolawe, to within 1 mile of Honokanaia on the SW side, the coast consists of sheer cliffs which reach a maximum height of 800 feet at Kamohio Bay. There are no offlying dangers except Puu Koae.

(431) **Kamohio Bay** and **Waikahalulu Bay,** 3 and 6 miles W of Lae o Kaka, respectively, each indent the coast about 0.7 mile. Neither bay can be recommended as an anchorage because of the deep water close to the shores. The bays are subject to strong gusts of wind that sweep down over the high cliffs when the trades are blowing. On the W side of Kamohio Bay is **Puu Koae,** a black mass of rocks 378 feet high and about 100 yards offshore.

(432) **Kahoolawe Southwest Point Light** (20°30.1'N., 156°40.0'W.), 120 feet above the water, is shown from a 20-foot white skeleton tower near the SW end of Kahoolawe.

(433) The prevailing current along the S coast of Kahoolawe is W.

(434) **Honokanaia** is 1 mile SE of **Lae o Kealaikahiki (Kealaikahiki Point),** the westernmost point of the island. The cove is the best anchorage on the island except during W or S

weather. Anchorage can be had in depths of 10 to 12 fathoms 0.5 mile off the sand beach. The prevailing current at the anchorage is NW. The best landing is on the sand beach close to the conspicuous black rock at the head of the cove. The shore is low and has alternate stretches of sand and rocks. A stream, which is usually dry, and a clump of algaroba trees may be seen. As many as five buildings may be seen on the shore above the beach.

(435) **Kuia Shoal,** with a least depth of 1 fathom, extends 0.7 mile W from Lae o Kealaikahiki. A shoal with a least depth of 3 fathoms is about 0.5 mile SW of Kuia Shoal. Vessels should give the point a berth of at least 1.5 miles. The country slopes up evenly from Lae o Kealaikahiki to the E.

(436) The NW coast is rocky and has a line of low bluffs from which the country slopes gently up to the reddish hills in the center of the island. There are scarcely any distinguishing marks and no off-lying dangers.

(437) **Kuheeia Bay (Kuheia Bay),** 2 miles SW of Lae o Kuikui, is a very small bight where boats can land at times.

(438) **Kealaikahiki Channel,** between Kahoolawe and Lanai, is about 15 miles wide. The channel is free from obstructions. Currents in the channel are weak and variable and are influenced by the wind. A maximum velocity of 0.5 knot in a general NE direction was observed in 1962. Sailing craft should avoid this channel during trade winds, as long periods of calms sometimes occur S and W of Kahoolawe and Lanai.

(439) **Chart 19340.–Lanai,** 8 miles W across Auau Channel from Maui and the same distance S across Kalohi Channel from Molokai, has an area of 141 square statute miles and ranks sixth in size of the eight major islands. Lanai is about 15 miles long in a NW direction and about 10 miles wide near its S end, gradually narrowing toward its NW end. The highest point on Lanai is **Lanaihale,** 3,370 feet high and 3.5 miles inland from the SE side of the island. The slopes on the E side of the mountain are steep and cut by gulches; those on the W side are more gradual, terminating in a rolling plain between the 1,000- and 2,000-foot levels. There is little rainfall, and, in general, the island has a barren appearance. The central portion of the island is covered with extensive pineapple fields which, because of their position on a high plain, are not easily seen from the sea. Pineapple cultivation is the principal occupation, although some livestock is raised. **Lanai City,** the only large community, is in the center of the island.

(440) **Chart 19347.–**The coast is low, sandy, and brush-covered from **Kikoa Point,** the easternmost point of Lanai, to **Kamaiki Point,** 3.1 miles SSW. A coral reef and shoal water fringe the shore from 200 to 400 yards off the beach. Low bluffs appear to Kamaiki Point, gradually increasing in height until close to Manele Bay, where they reach a maximum of about 400 feet.

(441) **Manele Bay** is a small indentation in the S coast of Lanai, 3 miles SW of Kaimaiki Point; a lighted buoy is off the entrance, the ruins of a cattle loading ramp, resembling a fisherman's scaffolding, are on the SW point of the bay, and the wreckage of a barge is on the N shore.

(442) **Manele Small-Boat Harbor,** protected by a breakwater on the S side, is in the NW corner of the bay. A light marks the end of the breakwater. A dredged channel, marked by private buoys, leads from Manele Bay N of the breakwater thence SW to a mooring basin. In February 1997, the midchannel controlling depth was 7 feet in the dredged channel, with depths of 6 to 8 feet in the basin; general depths of 4 to 6 feet are available in the boat slips. In December 1981, a rock covered 3 feet was reported about 30 yards NW of the breakwater light in 20°44'45"N., 156°53'23"W. A fishing pier and launching ramp are at the head of the harbor.

(443) A low rock, over which the sea usually breaks, is 300 yards seaward from the entrance point on the E side of Manele Bay. Small local vessels have anchored in depths of 14 fathoms about 350 yards SW of the rock.

(444) **Puupehe Island (Puupehe Rock),** 0.5 mile SW of Manele Bay, is 110 feet high, brown on its steep sides, and flat and grass-covered on its top. It is separated from the shore by a short, low sandspit. The island is the most prominent landmark along this section of the coast. Rocks, over which the sea usually breaks, extend 300 yards E and S from Puupehe. **Hulopoe Bay,** just to the W of the island has a sandy beach at its head. Squalls are less pronounced in Hulopoe Bay than in Manele Bay.

(445) Hulopoe Bay is within the boundary of Manele-Hulopoe Marine Life Conservation District. State regulations forbid operating, mooring, or anchoring any power-driven vessel within Hulopoe Bay. A copy of the regulations can be obtained from the State of Hawaii, Dept. of Land & Natural Resources, P.O. Box 621, Honolulu, Hawaii 96809.

(446) From Manele Bay to Palaoa Point, the coast consists of low bluffs, behind which the land rises in steep slopes to the tableland above. It is reported that the currents are weak along the S coast of Lanai. A high, detached, grass-covered rock is close to the shore 1.8 miles W of Puupehe. Many small rocks are close to the shore; one, awash at times, is 400 yards offshore and about 2 miles E of Palaoa Point. No buildings can be seen along this coast.

(447) **Palaoa Point Light** (20°43.9'N., 156°57.8'W.), 91 feet above the water, is shown from a white skeleton tower on the E prong of a double point at the SW extremity of Lanai. A small bight, with a rocky shore on which small boats can usually land during trade-wind weather, is between the double points. A small black rock, about 5 feet high, is about 200 yards off the N side of the point. Another rock, about the same distance offshore but 0.3 mile N, is about 28 feet high.

(448) Beyond Palaoa Point, the coast has a NNW trend. Between the point and Kaumalapau Harbor, the sheer coastal bluffs of **Pali Kaholo** are more than 1,000 feet high in some places. The bluffs are marked by two landslides; one, very large and conspicuous, is 1.5 miles N of Palaoa Point; the other, not so large, is 2.5 miles N of the point.

(449) **Puu Ulaula,** 1,271 feet high, is 2 miles N of Palaoa Point and a mile inland from Pali Kaholo. There is an air-navigation installation on the summit.

(450) **Chart 19351.–Kaumalapau Harbor,** 3.5 miles N of Palaoa Point, is the best harbor on Lanai in all but W and kona weather. The harbor is a small bight at the mouth of the most prominent gulch in the vicinity. A shoal area, marked by unlighted buoys at the outer extremity, extends along the S and E sides of the harbor. Many local fishing craft moor to unlighted mooring buoys in the harbor.

(451) **Kaumalapau** is a commercial barge landing on the N side of the harbor.

(452) **Kaumalapau Light** (20°47.0'N., 156°59.5'W.), 68 feet above the water, is shown from a post on the S side of the harbor entrance. Oil tanks are prominent on the high ground back of the wharf. A private aerolight is about 2.3 miles E of the harbor.

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(453) A 250-foot breakwater is on the N side of Kaumalapau Harbor. A lighted buoy, marking the N side of the entrance, is about 50 yards WSW of the outer end of the breakwater. There is no entrance channel but a 600-foot opening leads to a turning basin which is 30 to 50 feet deep and about 500 feet by 800 feet. The wharf provides cargo sheds and about 400 feet of berthing space. The facilities also include two 35-ton and one 30-ton cranes, bulk-handling and storage for petroleum products.

(454) Gasoline, diesel fuel, and water can be obtained on the Kaumalapau wharf. Small craft up to 40 feet can be handled by a derrick to the deck of the wharf, and small machine repairs can be made at a nearby shop.

(455) Between Kaumalapau Harbor and Kaena Point, the coast is a series of bluffs, in some places precipitous and 300 to 400 feet high. The shore is rocky, with a few short stretches of sand. In general, the bottom is fairly steep-to, but small vessels can find anchorage with sufficient swinging room in some places. At times, when the trades are blowing, the wind sweeps down the gulches in heavy gusts which are felt for a mile or more offshore. There are no houses or trees of any size along this coast, which has a barren appearance.

(456) **Nanahoa (Five Needles),** about 2.3 miles N of Kaumalapau Harbor and near the middle of the W side of the island, are a group of detached pinnacle rocks. The outermost rock is about 300 yards offshore and 32 feet high, and the inner pinnacle is 120 feet high. The rocks are of the same material as the higher cliffs of the shore and are therefore not easily recognized from offshore.

(457) **Keanapapa Point,** 7.5 miles NW of Kaumalapau Harbor, is the westernmost point of Lanai. The point is low and rocky and is marked by a small knoll 150 yards inland from the shore. A small detached rock, 8 feet high and 150 yards offshore, is 1.9 miles SE of Keanapapa Point. The cliffs, which are 200 feet high in the vicinity of this rock, gradually diminish in height until they are only 20 or 30 feet high 0.5 mile S of Keanapapa Point.

(458) **Kaena Point,** 1 mile N of Keanapapa Point, is low and rocky and is hard to distinguish from the other points in the vicinity. The low, rounding, unlighted, NW coast of Lanai is not easily seen at night, and vessels should give it a berth of at least 1 mile, although 0.5 mile will clear all dangers. There are many small, rocky points and short, sandy indentations in this vicinity, and boats can land in the lee of the points at times.

(459) About 1.5 miles ENE of Kaena Point is a 1-mile-long stretch of sand beach, with no fringing reef, that provides easy landing for small boats. E of this beach the coral reef fringes the N and E sides of Lanai to a width of as much as 0.3 mile. In general, the beach is backed by a low, narrow strip of land that rises gently to the tableland. Vegetation consists of cactus, low brush, and a few small trees.

(460) **Chart 19347.–Pohakuloa Point,** marked by a light, 4 miles ENE of Kaena Point, is so low and rounding that it is difficult to recognize as the N extremity of Lanai. A 150-yard opening in the reef 0.4 mile E of the point affords small-boat access to the sand beach. Two wrecks on the reef that fringes the N coast are very prominent. One wreck is 0.7 mile W of Pohakuloa Point; the other wreck is 4.4 miles E of the point.

(461) **Maunalei Gulch,** 6 miles E of Pohakuloa Point, is forked and should not be confused with deep **Hauola Gulch,** 2 miles farther to the SE. A hard-surface highway leads from Lanai City to the mouth of Maunalei Gulch; a group of beach houses, probably **Kahokunui,** is 0.8 mile NW of the gulch.

(462) **Keomuku,** 10 miles SE of Pohakuloa Point, is an abandoned village in an extensive coconut grove. There is a shallow opening in the reef off the village, and boats of less than 4-foot draft find anchorage behind and S of the entrance.

(463) The NE coast of Lanai should be given a berth of at least 0.8 mile. Current information for this coast is included in discussion of Auau Channel.

(464) **Kalohi Channel,** 8 miles wide between Lanai and Molokai, is free of dangers except for the marginal reefs around the two islands.

(465) **Currents.–**Observations made in Kalohi Channel show reversing currents with average maximum velocities of 0.5 knot. The flood sets NE, and the ebb sets SW. (See Tidal Current Tables for predictions.)

(466) **Chart 19340.–Molokai,** 7.5 miles NW across Pailolo Channel from Maui and 8 miles N across Kalohi Channel from Lanai, has an area of 259 square statute miles and ranks fifth in size of the eight major islands. More or less rectangular in shape, Molokai is about 34 miles long in a W direction and about 7 miles wide. The E end is mountainous; its summit is **Kamakou,** 4,970 feet high. On the N side, the mountain slopes are very steep, in many places almost perpendicular, and numerous deep gorges with precipitous sides can be seen. On the S side, the slopes are gradual, cut by gorges, and terminate in a narrow strip of rolling land near the coast. On the W side, the land slopes gently and is cut by gulches; here and there the crater of an extinct volcano can be seen. About 10 miles from the W end of the island the plain is only a few hundred feet high and is marked here and there by prominent blowholes. The entire W end of the island is a bare table land cut by small gulches and rising gradually to **Mauna Loa,** 1,400 feet high. From seaward this part of the island presents a smooth and rolling appearance.

(467) The island's rural economy includes tourism, cattle ranching, irrigated fruit and vegetable farming, and coffee.

(468) **Anchorage.–**Depths along the S and W coasts of Molokai are such that vessels may anchor at will, having due regard for the abrupt shoaling inside the 10-fathom curve. The bottom is mostly coral and sand. The E end of the island is exposed to the NE trades, and the N coast is exposed and offers very little protection. The only traffic along the N coast is the twice-yearly supply barge that calls on Kalaupapa, a community of Hansen's Disease patients. Kamalo Harbor and the boat lagoon in Pukoo Harbor are the only harbors on the S side of the island considered safe during kona storms. Local knowledge is advised when entering Pukoo Harbor.

(469) **Currents.–**Current observations have been made at several places along the S shore of Molokai between Kamalo and Laau Point. They indicate, in general, an E flow along the shore in the vicinities of Kaunakakai and Kamalo and a W flow near Laau Point. Combined with these movements are tidal currents which usually reach an E maximum velocity about the time of low water at Honolulu and a W maximum about the time of high water. The W flow near Laau Point is reported to turn sharply N at the point, and vessels should guard against a set toward the point. Currents are said to set W along the entire N coast of Molokai and NE along the E coast. (For further current information covering waters adjacent to Molokai, see the discussions of Pailolo, Kalohi, and Kaiwi Channels.)

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(470) **Weather, Molokai.**–The trade winds divide at Cape Halawa; one part follows the N shore and another part follows the S shore. Because of the topography of the island the trade wind is frequently a little S of E along the S coast of Molokai. The wind is usually light in the early morning, but blows with considerable strength in the middle of the day. During strong trades, dust clouds appear over the W end of the island. Very heavy rainfall is found on the NE side of the island; the S and W sides have very little rainfall.

(471) **Supplies.**–Provisions and some marine supplies are available at Kaunakakai. Gasoline and diesel fuel can be delivered by truck to the Kaunakakai pier. There are no other sources of provisions on Molokai.

(472) **Communications.**–The island has telephone communication with the other islands and with the mainland. Good roads extend from Kaunakakai, on the S coast, to Molokai Airport, in the W central part of the island, and to Kamalo and other small towns. Interisland air and barge service are available.

(473) From Cape Halawa, the E part of the island, to Kamalo, a distance of about 12 miles, the coast has a general SW trend; thence to Laau Point, a distance of about 25 miles, the trend is W. A reef about 1 mile wide fringes almost the entire coast, the widest part being in the bight about 13 miles E of Laau Point. During the day the limits of the reef can generally be determined by the breakers, but, at night, vessels are cautioned to give this coast a good berth.

(474) **Chart 19347.–Cape Halawa,** the E point of Molokai, is a brown cliff about 300 feet high. Breakers extend about 300 yards off the point and a rock, which bares at times, is 250 yards offshore. During the heavy E sea, it is apt to be quite choppy off this point and vessels should give the cape a berth of about 1.5 miles.

(475) **Cape Halawa Light** (21°09'33"N., 156°42'45"W.), 280 feet above the water, is shown from a steel pole with a concrete base.

(476) **Koalii,** 1 mile W of the cape, is a hill 794 feet high. In general, the coast between Cape Halawa and Kaunakakai Harbor is low, but rises, first gently, then rapidly, to high, rugged mountains that are cut by many gulches.

(477) **Mokuhooniki,** a small, yellow, bare, rocky islet, 198 feet high and with almost perpendicular sides, is 0.9 mile offshore and 1.6 miles S of Cape Halawa. **Kanaha Rock,** 95 feet high, is about 50 yards SW of Mokuhooniki. Midway between the rocks and Molokai are depths of about 15 fathoms.

(478) **Honouliwai,** 3.5 miles SW of Cape Halawa, is a small indentation in the coast and offers small boats a little protection from the trades. It should be entered only with local knowledge. About 0.3 mile NE of Honouliwai is **Honoulimaloo,** a small bight in the coast. The coral reef trends farther offshore from Honouliwai SW.

(479) **Waialua,** 4.6 miles SW of Cape Halawa, consists of a few houses at the mouth of a gulch.

(480) **Pauwalu Harbor,** 5 miles SW of Cape Halawa, is a double opening in the reef. The W opening is about 200 yards wide and is usually marked by breakers on either side. Within the entrance is a small pocket with depths of about 2 fathoms, where a few local vessels find some shelter. A house and tank near the beach are partly hidden by trees. The reef extends 0.6 mile offshore, and the 10-fathom curve is about 0.7 mile offshore.

(481) About a mile SW of Pauwalu Harbor is another opening in the reef near **Kainalu.**

(482) **Chart 19353.–Pukoo Harbor,** 7.4 miles SW of Cape Halawa is a pocket in the reef some 800 yards long and 250 yards wide. A depth of 11 feet can be carried across the entrance bar at the reef line and behind the reef line for about 600 yards. A privately dredged channel continues to a three-fingered boat lagoon, called **Pukoo Lagoon,** which occupies the former location of the Pukoo Fishpond. The entrance to the lagoon is a 60-yard opening through a rock seawall. Channel depths range from 12 feet to 8 feet at the lagoon entrance; depths in the lagoon are 6 feet. The lagoon offers excellent protection to small craft in all weather. The outer harbor is smooth during the trades, although the wind sweeps across it with full force. The passage through the reef is marked on either side by breakers. During kona storms, breakers extend across the passage. Boats entering the harbor should start their approach midway between the breakers and steer for the opening in the seawall of the boat lagoon. Caution should be exercised as there are no navigation aids, and numerous coral heads and submerged rocks are on both sides of the channel; local knowledge is advised. The village of **Pukoo** consists of a few houses on the lowland near the beach in front of a steep-sided gorge that extends well back into the mountain. The reef at Pukoo extends 0.6 mile offshore.

(483) **Chart 19347.**–There are many old fishponds in the vicinity of Pukoo and along the coast for 10 miles W. About 1 mile W of Pukoo is the village of **Kaluaaha,** where two church steeples may be seen above the trees.

(484) **Kalaeloa Harbor,** 3.2 miles W of Pukoo Harbor, is the largest and best protected harbor along the coast, but its use is limited by the bar across the entrance, which is an unmarked opening in the reef. A light is on the SE point of the diamond-shaped peninsula on the NE side of the harbor.

(485) **Chart 19353.–Kamalo Harbor,** 5 miles SW of Pukoo Harbor, is the E of two pockets opening S in the reef at the most S point on Molokai. The harbor, excluding the entrance, is about 150 yards wide, and extends more than 0.5 mile into the reef. The entrance, about 90 yards wide, has a bar with a general depth of 10 feet, although it is possible to carry 19 feet into the harbor through a channel with a least width of 30 yards. A shoal covered 6 feet is 50 yards N of the entrance. A lighted buoy is off the entrance, and a buoy and a daybeacon mark the E side of the harbor. The coral reefs marking the limits of deep water within the harbor usually are easily seen by day. The village of **Kamalo** consists of a few houses at the mouth of a gulch back of the harbor. The ruins of an old wharf are at the head of the harbor.

(486) Kamalo Harbor offers good protection from W to N winds. The soft gray mud bottom has good holding quality. The harbor is used by small boats, but seldom by larger vessels. The swell is not felt within the harbor. Current observations a mile off Kamalo show velocities of about 1 knot. Water, fuel, and supplies are available in the village.

(487) **Chart 19351.–Puu Papai,** 830 feet high, is 2 miles NW of Kamalo Harbor and 0.6 mile inland. Deep **Kamalo Gulch** is 1 mile E of the hill and 2.5 miles W of the hill is **Kawela Gulch,** which extends well inland from the small village of **Kawela.**

(488) From Kamalo Harbor the coast has a W trend and the reef extends as much as 1 mile from shore.

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(489) **Chart 19353.–Kaunakakai Harbor,** 9 miles W of Kamalo Harbor and 16 miles from the W extremity of Molokai, is a commercial barge harbor in the reef off **Kaunakakai.** The harbor is about 600 feet wide by 1,500 feet long and is open to the S. In December 2000, the harbor basin had a controlling depth of 19 feet, except for shoaling to 11 feet in the E corner. In July 2002, the harbor basin had a reported depth of 24 feet. Channel markers include lighted and unlighted buoys and a **034°** lighted range.

(490) The State-owned wharf, lit by floodlights at night, provides a cargo shed and 680 feet of berthing space. Two 8-ton cranes are on the W side of the wharf. A 700-yard-long mole extends NE from wharf to shore. The mole protects small craft from the trade winds. Barges can lie at the wharf except during the two or three severe kona storms of the winter season; Kamalo Harbor offers better protection for small craft during the konas. Water is piped to the wharf; gasoline and diesel fuel can be delivered by tank truck. Some marine supplies may be obtained in Kaunakakai.

(491) A landing pier and mooring area for small craft are just off the N end of the wharf; the controlling depth is 8 feet. A channel, marked by a private buoy and daybeacons, leads to a small-boat harbor off the SE side of the wharf. With local knowledge, 10 feet can be carried into the harbor. The SE side of the channel and E side of the harbor are extremely shoal; caution is advised. The harbor is protected on its E side by a detached breakwater.

(492) The coastal reef extends more than a mile from shore on both sides of the Kaunakakai entrance. Vessels can anchor temporarily in depths of about 15 fathoms off the entrance, but there is little shelter from the NE trades or the konas.

(493) Current observations a mile off Kaunakakai indicate an E set most of the time. Maximum velocities observed were 1 knot E and 0.5 knot W. E and W maximums occur at about the times of low water and high water, respectively, at Honolulu.

(494) **Chart 19351.–**For 3 miles W from Kaunakakai the lowlands extend much farther inland than along any other section of the coast. The reef extends more than a mile from shore and is mostly covered 1 to 3 feet, but has many coral heads that bare at low water. The country between Kaunakakai and Kolo is bare and rocky and is cut by numerous small gulches. The sandy beach is fringed with algaroba trees.

(495) The aerolight of Molokai Airport and the aero obstruction lights on the surrounding hills are visible off the S shore of the island.

(496) **Chart 19353.–Kolo Harbor,** about 10 miles W of Kaunakakai, is a large pocket in the reef with a narrow entrance from S. Two private white markers on shore about 300 yards W of Kolo wharf provide a **007°** range, which marks the channel through the reef. The channel and the harbor have depths of about 8 feet; the harbor is subject to shoaling. A moderately heavy swell causes heavy surf on the entrance bar, and the combination of surf and current often creates a hazardous condition. Kolo Harbor affords anchorage with limited swinging room, but the swell is felt even though its full force is broken by the outer reefs. The harbor is not recommended for strangers. The ruins of an old wharf are at the head of the harbor.

(497) **Chart 19351.–**From Kolo Harbor W to Laau Point, the coast is low and has a narrow sand beach, broken here and there by short stretches of rocky shore. The coral reef gradually becomes narrower until it disappears at Laau Point.

(498) **Haleolono Point,** 13 miles W of Kaunakakai and 3.5 miles E of Laau Point, is a conspicuous brown bluff, 50 feet high, that extends 0.2 mile along the water's edge.

(499) **Chart 19353.–Lono Harbor,** an abandoned barge harbor at Haleolono Point, is protected by two breakwaters; the entrance channel is 12 feet deep and is marked by a **346°** private unlighted range. The 500-foot-square harbor basin is 18 feet deep. The harbor has a 260-foot wharf, and fixed moorings provide an additional 680 feet of berthing space. Local knowledge is advisable for entering.

(500) **Chart 19351.–Waieli** is a prominent, bare hill, 625 feet high, 1 mile NE of Haleolono Point.

(501) **Laau Point,** the SW extremity of Molokai, is low and rocky; the 10-fathom curve is about 0.5 mile offshore. **Laau Point Light** (21°06.0'N., 157°18.3'W.), 151 feet above the water, is shown from a 20-foot pole with a black and white diamond-shaped daymark on a bluff near the point. The prevailing current off Laau Point is N, and vessels are cautioned against a set onto the point.

(502) **Penguin Bank,** an extensive shelf, makes out from the W end of Molokai in a general WSW direction for a distance of 28 miles from Laau Point. The bank is fairly flat and consists of sand and coral at depths of 21 to 30 fathoms. Along the N, W, and S edges, the bank drops off very abruptly into depths of more than 100 fathoms.

(503) In the vicinity of Laau Point currents are strong and likely to be erratic. Usually flowing along the W part of the S coast of Molokai is a W current that turns sharply to the N as it rounds the point. A strong tide rip W and N of the point forms breakers when the wind is N. A NE set over Penguin Bank joins the N current along the W coast of Molokai. This current is not felt in the deep water W of Penguin Bank but is apparent at the edge of the bank when passing inside the 100-fathom curve. There is no apparent connection between this current and the tides, and the trade winds appear to have little effect upon it, although it appears to be stronger or weaker according to whether there is a barometric depression N or S of the islands.

(504) Between Laau Point and Ilio Point, a distance of about 8 miles, the W coast of Molokai is bare, low, and rolling, and cut up by a few small gulches. The beach is marked by low bluffs and short stretches of sand, back of which the land rises gently.

(505) **Ilio Point,** 8 miles from Laau Point, is the NW extremity of Molokai. Breakers have been observed about 0.3 mile off Ilio Point during heavy weather. A 293-foot hill is 0.8 mile inland. During the trades, small craft can find fair anchorage 1.5 miles S of the point.

(506) The N coast of Molokai is mostly bold, but deep-draft vessels should not stand close to the shore. This N coast has no harbor or anchorage that affords shelter in all winds. Kalaupapa is the only port of call for local vessels.

(507) **Mokio Point,** 3 miles E of Ilio Point, is a low, rocky bluff with a detached rock just offshore.

(508) Five miles E of Ilio Point is **Hauakea Pali,** a low cliff that extends inland at right angles to the beach. The seaward end resembles a large, white sandbank and is the most conspicuous landmark in the vicinity. The cliff is the W boundary of the low plain that extends across the island.

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(509) E of Hauakea Pali the coastal bluffs gradually rise to precipitous cliffs which are 2,000 to 3,000 feet high in some places.

(510) **Kalaupapa Peninsula,** 16 miles E of Ilio Point, is a low point of land that juts out 2 miles from the face of a high cliff. **Molokai Light** (21°12.6'N., 156°58.1'W.), 213 feet above the water, is shown from a 138-foot white octagonal pyramidal tower on the outer part of the peninsula. There is deep water close to the peninsula except for the marginal reef just N of Kalaupapa.

(511) **Kalaupapa** on the W side of Kalaupapa Peninsula is the commercial barge harbor for the community of Hansen's Disease patients which occupies the peninsula. Special permit is required to land unless on State business. This open harbor has a small breakwater on the N side. The State landing provides 56 feet of berthing space and has depths of 2 to 4 feet alongside. Access is good, and no channel is needed to reach open water. Anchorage can be found in depths of 12 fathoms 0.2 mile off the landing.

(512) **Chart 19347.–**The country between Kalaupapa Peninsula and Cape Halawa has a very irregular and jagged appearance and is more or less covered with vegetation. The coastal cliffs are broken by headlands, bights, and deep gulches. There are no landing places other than the few debris piles in front of the cliffs and the few level spots in the mouths of the gulches.

(513) **Kalawao,** on the SE side of Kalaupapa Peninsula is a part of the community of Hansen's Disease patients.

(514) **Mokapu Island,** 360 feet high, is 3 miles SE of Molokai Light and 0.7 mile offshore. The island is the outermost of two; **Okala Island,** 370 feet high, is close to shore.

(515) **Pahu Point,** 5 miles SE of Molokai Light, is a bold, pyramidal headland 1,022 feet high. The point is the seaward end of a sharp ridge that extends inland along the W side of a deep gulch. **Mokolea Rock,** over which the sea always breaks, is 0.6 mile NE of the point.

(516) **Umilehi Point,** 1 mile E of Pahu Point, is particularly conspicuous and appears to be a small crater with the entire seaward side blown out. **Mokohola Island,** 20 feet high, is a dark rock 0.3 mile off Umilehi Point.

(517) The E half of Molokai's N coast is noted for its rugged scenery and high waterfalls. **Papalaua Falls,** 10 miles E of Kalaupapa Peninsula and 5 miles W of Cape Halawa, start from an elevation of about 2,000 feet at the head of a deep gulch and have a 500-foot drop in one place.

(518) **Halawa Bay** is between **Lamaloa Head,** an 837-foot cliff, and Cape Halawa, the E extremity of Molokai. The bay, which is about 1.5 miles wide between Lamaloa Head and Cape Halawa extends about 0.7 mile inland, affords no shelter from the trades, but indifferent anchorage can be found in depths of 5 fathoms about 0.3 mile from the head. The shores of the bay are mostly backed by high cliffs; there are two black rocks close to the S shore.

(519) **Halawa** consists of a few houses at the mouth of a deep gulch on the SW side of Halawa Bay. The gulch penetrates W, and a waterfall is visible 1 mile from the mouth. A triangular cliff, 300 feet high, is conspicuous about 0.5 mile E of Halawa.

(520) **Chart 19340.–Kaiwi Channel,** between Molokai and Oahu, is about 22 miles wide and is clear of obstructions. A general N drift is reported over Penguin Bank and in the vicinity of Laau Point; elsewhere in the channel the currents appear variable, depending mainly upon the direction and velocity of the wind. The trade winds that follow the N and S shores of Molokai draw across Kaiwi Channel toward Makapuu Point.

(521) **Chart 19357.–Oahu,** 22 miles WNW across Kaiwi Channel from Molokai, has an area of 604 square statute miles and is third largest of the eight major islands. Oahu measures 39 nautical miles SE-NW between Makapuu and Kaena Points and 26 miles S-N between Barbers and Kahuku Points. The island has two prominent mountain ranges, and its skyline is rough and jagged.

(522) **Koolau Range** parallels the NE coast for nearly its entire length. The part of the range between Makapuu Point and Kaneohe Bay has on its seaward side a sheer, rocky cliff, or pali, nearly 2,000 feet high in some places. NW of Kaneohe Bay, the cliffs give way to steep, rugged slopes. From offshore, the NW half of the range appears as a long ridge, sloping gradually downward, and ending in low bluffs near Kahuku Point. The crest of the ridge and about half the seaward slope are wooded; the lower part of the slope is grass-covered. The entire range has a very jagged appearance and is cut up on its inland side by deep gorges and valleys. The greatest elevation in Koolau Range is at **Puu Konahuanui,** 3,150 feet high and 5 miles back of Honolulu; the peak is on the E side of Nuuanu Valley and overlooks the famous **Nuuanu Pali** at the head of the valley. Two miles closer to Honolulu is **Tantalus,** a rounded peak, 2,013 feet high, with a heavily wooded summit. On the seaward side of Koolau Range the land is mostly low and rolling; it is cut by a few sharp hills, and is under cultivation.

(523) **Waianae Mountains** parallel the SW coast for nearly the entire distance between Kaena and Barbers Points. Several spurs extending from the range toward the shore form short valleys. The range has numerous high peaks; **Kaala,** 4,046 feet high, is the highest.

(524) Between the two mountain ranges is an extensive plain which extends from Pearl Harbor on the S to Haleiwa on the N; the plain rises to an elevation of about 1,000 feet at Wahiawa. There are low, flat, coastal plains between Honolulu and Barbers Point, in the vicinity of Waianae, Haleiwa, and Kahuku Point, and between Kaneohe Bay and Waimanalo.

(525) Prominent headlands on Oahu are Makapuu Head, Koko Head, Diamond Head, Kaena Point, Kahuku Point, Kualoa Point, and Mokapu Peninsula. The entire coast of the island is fringed with coral reefs 0.5 to 1 mile in width, except along parts of the W shore between Barbers Point and Kaena Point. From Kaena Point to Kahuku Point, the reefs are not so continuous as along other parts of the island.

(526) **Harbors and ports.–**The largest harbors on Oahu are Kaneohe Bay and Pearl Harbor; the latter is a prohibited area. Small-craft harbors include Maunalua Bay, Honolulu's Ala Wai Boat Harbor and Kewalo Basin, Waianae Harbor, and Waialua Bay. The NE coast is exposed to the trade winds during most of the year, and the only small-craft shelter available is in Kaneohe Bay.

(527) **Currents.–**The currents around Oahu depend largely upon the winds and are variable in velocity and direction. The general tendency is a W or N flow along the coast. Tidal currents and eddies are noticeable in some places.

(528) **Weather, Oahu.–**Thanks largely to the marked marine influence and the persistent trade winds, the climate of Oahu is unusually pleasant for the tropics. Records at the International Airport at Honolulu, on the leeward side of the island, show a

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lowest temperature of 52°F (11.1°C) and a highest of 95°F (35°C). August is the warmest month with an average temperature of 81.3°F (27.4°C). January and February are the coolest with an average temperature of 73.0°F (22.8°C). Each month, May through November, has recorded maximum temperatures in excess of 90°F (32.2°C) while each month from November through May has recorded minimum temperatures of 60°F (15.6°C) or lower. Throughout the year, the average daily range in temperature is about 14°F (8°C).

(529) In some parts of the Koolau Range the annual rainfall is as much as 300 inches (7620 mm). The driest region is the southwest where rainfall drops to below 20 inches (508 mm) a year. At the International Airport, the average annual precipitation is only about 22 inches (559 mm) ranging from about 3.5 inches (89 mm) in December to about one-third of an inch (9.7 mm) in June.

(530) **Supplies and repairs.**–All kinds of supplies are available at Honolulu, and medium-size vessels can be handled for repairs.

(531) **Communications.**–Oahu has a good network of hard-surfaced highways. Air and sea transportation is available from Honolulu to the other islands and to the mainland.

(532) Honolulu is the only port in the Hawaiian Islands that maintains a commercial radio communication watch.

(533) **Chart 19358.–Makapuu Head,** the E extremity of Oahu, is a bold, barren, rocky headland 647 feet high. **Makapuu Point Light** (21°18.6'N., 157°38.9'W.), 420 feet above the water, is shown from a 46-foot white cylindrical concrete tower on the head.

(534) The seaward side of Makapuu Head is a dark cliff; the inland side slopes rapidly to the valley which separates it from the Koolau Range. The headland is the landfall for vessels inbound to Honolulu from the mainland.

(535) There is deep water close to the outer end of the headland, but shallower water is found along the N and E sides. Deep-draft vessels should give Makapuu Head a berth of about 1 mile and/or stay in depths greater than 20 fathoms.

(536) The **restricted area** of the Makai Undersea Test Range extends NW and NE from Makapuu Point. (See **334.1410,** chapter 2, for limits and regulations.)

(537) **Koko Crater,** 2.6 miles SW of Makapuu Head and 0.5 mile from the beach, is a sharp, brown cone 1,204 feet high. The coast between Makapuu Head and Koko Crater is low sand, rock, and shingle; from Koko Crater to Koko Head the coast is rocky, precipitous, and somewhat irregular.

(538) **Hanauma Bay,** 3.5 miles SW of Makapuu Head, is 0.3 mile wide and extends 0.5 mile inland. The waters off the entrance are very choppy during S and E winds. Across the head of the bay is a sand beach that is fringed by 150 yards of coral reefs. The bay is a nature preserve and is a popular snorkeling and scuba diving site. State regulations do not permit boats to enter the bay.

(539) **Koko Head,** 4 miles SW of Makapuu Head, is a bold promontory 640 feet high; the seaward side is precipitous, the top is flat, and it slopes off rapidly on the inland side. The headland is developed on its lower W slopes with residential homes, but its general appearance is mostly brown and barren. There is deep water close to Koko Head. Strong W currents have been reported offshore.

(540) **Maunalua Bay** is an open bight that extends W from Koko Head to Diamond Head; coral reefs fringe most of the shore. On the W side of Koko Head, a channel, marked by a light and private daybeacons, leads through the reef to a private marina in Kuapa Pond and to a public launching ramp behind the reef. The channel has a least depth of 5 feet, except at the entrance where it shoals to a depth of 3 feet on the E side near Daybeacon 2. Behind the Koko Head reefs is one of the few anchorages that offer small-craft shelter in all weather except kona storms. Although depths are 13 feet, only small craft familiar with the area should venture behind the reefs. Tidal currents in Maunalua Bay flood W and ebb E; slack waters occur at about the times of high and low waters at Honolulu.

(541) **Caution.**–Vessels approaching Honolulu from the E at night should not mistake the lights between Koko Head and Diamond Head for the lights of Waikiki Beach. Commercial and residential development of the coast along Maunalua Bay has resulted in an increase of background lighting. Vessels have mistaken Makapuu Point Light for Diamond Head Light and run aground on the reef W of Koko Head.

(542) **Wailupe,** 2.7 miles W of Koko Head, is a residential area with a seawall and private piers. A channel, reported dredged to 12 feet, leads through the reefs to Wailupe. Several pipes mark the W side of the entrance channel.

(543) **Diamond Head,** 9 miles WSW of Makapuu Head, is an extinct volcano 761 feet high. The steep slopes and the top of the crater are bare and brown; the base is brush covered. **Diamond Head Light** (21°15.3'N., 157°48.6'W.), 147 feet above the water, is shown from a 55-foot white concrete tower near the beach. A lighted buoy is moored in 150 feet of water 0.6 mile off the light. Currents setting in various directions with velocities up to 1 knot were noted about 3 miles SW of Diamond Head.

(544) **Chart 19369.**–The low coast between Diamond Head and Honolulu Harbor is thickly developed, and palm trees are numerous. Along this stretch is world-famous **Waikiki Beach** with its big hotels, surfboarding, outrigger canoe races, and sunbathers. The Waikiki Shore Water Restricted Zone is an area extending about 0.4 mile offshore along Waikiki Beach. Boating is prohibited in this area, except by permit issued by the Harbors Division, Hawaii Department of Transportation.

(545) A **special anchorage** is in **Kapua Entrance,** about 0.9 mile S of Waikiki Beach. (See **110.1 and 110.128d(d)**, chapter 2, for limits and regulations.)

(546) **Ala Wai Boat Harbor** is 2.5 miles NW of Diamond Head Light. A dredged channel leads from Mamala Bay through the reefs to the basins inside the harbor. In 1967, the channel was dredged to 22 feet. Depths inside the harbor are 8 to 20 feet. The entrance to the channel is marked by lighted buoys and private daybeacons. Private daybeacons and a **013°30'** lighted range mark the channel.

(547) During the trades, the winds within the harbor are distorted by the nearby tall buildings. Vessels maneuvering in the harbor under sail should beware of sudden changes in the direction and velocity of the wind. The harbor can be entered in all weather except during kona storms.

(548) It was reported in 1975, that many unmarked vessels anchor in the harbor, and entry at night could be dangerous.

(549) The harbor is one of the most popular places for small-boat activity on Oahu, and yacht clubs in the harbor are the host for the famed transpacific yacht race. The harbor attendant controls the berthing and mooring facilities.

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(550) Marine supplies and complete repair facilities are available in the harbor including a sailmaker, radio repairs, and a marine railway that can handle craft up to 45 feet.

(551) **Kewalo Basin,** 3.5 miles NW of Diamond Head Light, is used exclusively by cruise boats, and charter and commercial fishing vessels. A dredged channel leads from Mamala Bay through the reefs to the basin. The channel has a controlling depth of 19 feet. Depths in the basin are from 18 to 22 feet for the most part with shallow depths of less than 4 feet along the edges of the entrance channel. The channel is marked by lighted and unlighted buoys and a **034°45'** lighted range.

(552) At times when kona winds create high swells, the channel becomes extremely hazardous. There is usually a strong rip current crossing the channel at this time.

(553) On the NW side of the basin is a shipyard; the marine railway at the shipyard can handle vessels up to 125 feet long. A harbor agent controls the basin facilities

(554) **Charts 19367, 19369, 19362.–Honolulu Harbor** is 5 miles NW of Diamond Head and midway along the S coast of Oahu; the harbor is protected from all winds and is usually free of surge. **Honolulu** is the capital and the principal deepwater port of the State of Hawaii.

(555) **Prominent features.–Honolulu Harbor Entrance Light** (21°17.7'N., 157°52.1'W.), 95 feet above the water, is shown from a white post on the SE point of the entrance channel. The flashing green light can be easily identified against the background of Honolulu lights.

(556) **Sand Island,** which borders the seaward side of Honolulu Harbor, is Government-owned and has been built up mostly from harbor dredging. The Coast Guard base is on the NE side of the island.

(557) **Aloha Tower,** a 193-foot cream-colored, square clock tower on Pier 10, is one of the most conspicuous objects in the harbor. The tall, square, twin white office buildings 300 yards E of Aloha Tower are prominent and provide an excellent reference to ships approaching the harbor by day. **Punchbowl Hill,** 500 feet high and flat topped, is 1 mile inland from Aloha Tower. The horizontal blue lights of the Ala Moana Tower restaurant (21°17.8'N., 157°50.7'W.), 1.5 miles E of Honolulu Harbor entrance, are easily distinguished at night and provide an excellent navigation aid.

(558) **Caution.–**Vessels approaching the harbor from the W at night should not mistake the lights between Pearl Harbor and Honolulu for the lights of Honolulu, or the lighted buoys off Kalihi Channel for the lighted buoys off the main entrance. Vessels have mistaken these lights and gone aground off Keehi Lagoon. From the E the lights N of Diamond Head should not be confused with those of Honolulu, or the lighted aids of Kewalo Basin with those of Honolulu Harbor. Also from the E, vessels should not mistake the lights between Koko Head and Diamond Head for the lights of Waikiki Beach. Commercial and residential development of the coast along Maunalua Bay has resulted in an increase of background lighting. Vessels have mistaken Makapuu Point Light for Diamond Head Light and run aground on the reef W of Koko Head.

(559) **COLREGS Demarcation Lines.**–The lines established for Mamala Bay are described in **80.1420,** chapter 2.

(560) **Channels.–**A Federal project provides for a 45-foot Honolulu Entrance Channel from **Mamala Bay**, thence 40 feet in the main harbor basin. The project also provides for a 23-foot channel leading from seaward in Mamala Bay through Kalihi Channel on the W side of Sand Island to Kapalama Basin. The connecting channel between main harbor basin and Kapalama Basin has a 40-foot project depth with 40 feet in the Kapalama Basin. (See Notice to Mariners and the latest editions of charts for controlling depths.)

(561) **Honolulu Entrance Channel** is marked by lights, buoys, and a **028°** lighted range. The rear light and marker of the range is sometimes obscured when large ships are moored at Berth 8. **Kalihi Channel** is marked by lights, buoys, and a **007°** lighted range.

(562) The John H. Slattery (Sand Island) highway bridge over the harbor end of Kalihi Channel has fixed spans with a clearance of 14 feet.

(563) **Anchorages.**–Except during strong kona winds and within at least 600 yards on either side of an underwater sewer outfall line that extends from a point on Sand Island in

(564) 21°18'13.7"N., 157°53'14.0"W., thence to

(565) 21°17'00.6"N., 157°54'06.0"W., thence to

(566) 21°16'56.0"N., 157°54'31.0"W., and thence to

(567) 21°16'59.2"N., 157°54'43.1"W., is in depths from about 20 to 30 fathoms, sand and coral bottom, in Mamala Bay between the seaward ends of the two deepwater channels. Mariners are advised not to use this anchorage or to leave the anchorage during periods of large S swell. Use of the anchorages in this area is controlled by the Honolulu harbormaster, and any vessel that wishes to use an assigned anchorage is required to obtain permission from the harbormaster's office. Vessels entering the area anchorages are required to seek traffic clearance from Aloha Tower traffic control on VHF-FM channel 12; call sign, WHX-528. Vessels are also required to advise Aloha Tower of their departure time from the anchorages. All vessels must monitor VHF-FM channels 16 and 12 while they are in the anchorages. Anchorage is not practical in the harbor basins because of the limited swinging room. (See **110.1 and 110.235**, chapter 2, for locations, limits, and regulations.)

(568) **Tides.**–The mean range of tide is 1.3 feet, and the diurnal range of tide is 2.0 feet at Honolulu. Daily predictions for Honolulu are given in the Tide Tables.

(569) **Currents.–**It is reported that a tidal current floods W and ebbs E along the coast between Makapuu Point and Honolulu. In the vicinity of Honolulu, an E counterflow along the edge of the reef is reported to accompany the W flood. Strong W currents have been reported off Honolulu. Currents setting toward all four quadrants and having velocities up to 1 knot have been noted about 3 miles SW of Diamond Head.

(570) **Tsunami (seismic sea waves).–**The size of a predicted tsunami cannot be estimated in advance. Most of them felt in Honolulu Harbor have been relatively small; the largest of record was 10 feet high, in 1960. However, it is prudent to anticipate that even greater ones may strike.

(571) Honolulu Harbor authorities require all ships to vacate the harbor prior to the estimated time of arrival of a sea wave if possible. If a long engine-warmup is necessary, it should be started at the first alert so the vessel may be ready to proceed in time.

(572) Telephone notification will be given by the Captain of the Port to vessel agents who must, in turn, notify their respective ships. Messengers will be used to the extent available to supplement the telephone warnings.

(573) When ready to depart, each ship should obtain clearance from the harbormaster. The Aloha Tower, traffic control, can be

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contacted on VHF-FM channel 12, call sign WHX-528. The traffic controller will assign each vessel a departure time in accordance with harbor regulations, depending on vessel size, type, location in the harbor, and vessel type priority. Once a vessel has checked in with Aloha Tower traffic control, they are required to monitor VHF-FM channel 12 at all times.

(574) The **harbormaster** will assign the departure time in accordance with assigned priorities and in consideration of the time each vessel becomes ready to move. The assigned priorities for vessels ready to depart are: Government vessels, passenger vessels, tankers, vessels with explosive cargo, and freighters.

(575) Vessels unable to move in time should take adequate precautions against damage during the tsunami due to the expected rise and fall of the water.

(576) (See discussions of tsunamis at beginning of this chapter and in chapter 1.)

(577) **Weather, Honolulu and vicinity.**–The climate of Hawaii is unusually pleasant for the tropics. Its outstanding features are (1) the persistence of the trade winds, where not disrupted by high mountains; (2) the remarkable variability in rainfall over short distances; (3) the sunniness of the leeward lowlands, in contrast to the persistent cloudiness over nearby mountain crests; (4) the equable temperature from day to day and season to season; and (5) the infrequency of severe storms.

(578) The prevailing wind throughout the year is the NE trade wind, although its average frequency varies from more than 90 percent during the summer to only 50 percent in January.

(579) Annual rainfall in the Honolulu area averages less than 30 inches along the coast (22 inches at the airport, 24 inches in the downtown area (559 mm and 610 mm, respectively)), but increases inland at about 30 inches (762 mm) a mile. The mean annual number of days with precipitation totals 220. The wettest year on record, 1965, saw nearly 43 inches (1092 mm) while the driest year, 1983, saw only five inches (127 mm) of precipitation. In March 1958, over 15 inches (381 mm) of precipitation fell in one 24-hour period. Parts of the Koolau Range average 300 inches (7620 mm) or more a year. This heavy mountain rainfall sustains extensive irrigation of cane fields and the water supply for Honolulu. East (windward) of the Koolaus, coastal areas receive 30 to 50 inches (762 to 1270 mm) annually; cane and pineapple fields in central Oahu get about 35 to 40 inches (889 to 1016 mm). Oahu is driest along the coast west of the Waianaes where rainfall drops to about 20 inches (508 mm) a year. However, variations from month to month and year to year are considerable; more so during the cooler season, when occasional major storms provide much of the rain, than in the summer, when rain occurs primarily as showers that form within the moist trade winds as they override the mountains. Thus, March rainfall at Honolulu Airport has ranged from more than 20 inches (508 mm) to as little as 0.001 of an inch (0.03 mm, in effect, a trace). In the mean, about a third of the airport's annual total occurs during its two wettest months, December and January. Trade-wind rainfall is more frequent at night. Daytime showers, usually light, often occur while the sun continues to shine, a phenomenon referred to locally as "liquid sunshine."

(580) Average water temperatures at Waikiki Beach vary from 75°F (23.9°C) in the morning to 77°F (25°C) in the afternoon during March, and from 77°F (25°C) in the morning to 82°F (27.8°C) in the afternoon during August.

(581) Because of the persistence and moderate humidity of the NE trade winds, even the warmest months are usually comfortable. But when the trades diminish or give way to S winds, a situation known locally as "kona weather" ("kona storms" when stormy), the humidity may become oppressively high.

(582) Weather severe enough to interfere with shipping or travel is uncommon. Intense rains of the October to April "winter" season sometimes causes serious, but local, flash flooding. Thunderstorms are infrequent and usually mild, as compared with those of the midwestern United States. Hail seldom occurs, and when it does it is small and rarely damaging to crops. At great intervals a small tornado or a waterspout moving onshore may do some slight damage. Four hurricanes have struck Hawaii since 1950, but several times that many, and a number of less intense tropical cyclones, most of them drifting W from their breeding grounds off the Mexican coast, have approached near enough for their outlying winds, clouds, and rain to affect the islands.

(583) The National Weather Service office is at the airport; **barometers** may be compared there or by telephone. (See appendix for address.)

(584) (See page T–12 for **Honolulu climatological table.**)

(585) **Pilotage, Honolulu**.–Pilotage is compulsory for all foreign vessels and U.S. vessels under register in foreign trade; it is optional for U.S. vessels in coastwise trade with a Federal licensed pilot on board. The 37-foot-long pilot boat IKAIKA is yellow and gray and displays the words "HAWAII PILOTS" in large white letters on the sides of the cabin. The pilot boat also displays the International Code Flag "H" at all times and shows a white light over a red light at night. The pilot boat monitors VHF-FM channel 12 at all times, and also monitors the working frequencies, VHF-FM channels 7A, 8, and 9, of the harbor pilots.

(586) The boarding area for arriving vessels is about 1 mile seaward of the sea buoy, on the entrance channel rangeline. The pilot station is at pier 19. The pilot station monitors VHF-FM channels 12 and 16.

(587) Mariners are requested to give at least 24 hours advance notice of arrival by telephone (808-537-4169) or by calling "HONOLULU PILOTS" on VHF-FM channels 16 or 12; call sign, WXZ-456. Mariners are also requested to contact the pilot station on VHF-FM channel 12 1 hour prior to arrival to confirm a closer Estimated Time of Arrival (ETA). Additionally, mariners are requested to give gross tonnage, length, and draft of the vessel. Arriving vessels should rig the pilot ladder on the leeward side about 1 meter (about 3 feet) above the water. When pilots are boarding incoming vessels from the pilot boat, the vessel should maintain a speed of about 5 knots. Foreign and U.S. vessels under registry in foreign trade, and U.S. vessels in coastwise trade without a licensed Federal pilot on board must acquire pilot service before entering the anchorages.

(588) In addition to the above, the State of Hawaii has established **special pilotage regulations** for all **tankers, tanker barges,** and **tankerlike vessels.** In general the regulations require these vessels to have on board a Honolulu Port Pilot when entering or departing Honolulu Harbor for any reason. Exempt from this requirement are tankerlike vessels and vessels towing tanker barges when under the control and direction of a person duly licensed as a pilot by the U. S. Coast Guard for the Port of Honolulu, and tankers when departing from anchorage. A copy of the rules and regulations affecting such vessels may be obtained from the Department of Transportation of the State of Hawaii, Harbors Division, Honolulu, or at the office of the harbormaster.

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(589) All mariners are advised to monitor Honolulu harbor traffic movements on VHF-FM channel 12 at all times when approaching or transiting the waters of Mamala Bay.

(590) **Towage.**–Tugs up to 4,000 hp, including several z-drive type tractor tugs, are available in Honolulu. Salvage equipment is also available.

(591) **Quarantine, customs, immigration, and agricultural quarantine.**–(See chapter 3, Vessel Arrival Inspections, and appendix for addresses.)

(592) **Quarantine** is enforced in accordance with regulations of the U.S. Public Health Service. (See Public Health Service, chapter 1.)

(593) Honolulu is a **customs port of entry.**

(594) **Coast Guard.–Honolulu Coast Guard Base** is on the NE side of Sand Island. A Marine Safety Office maintains a **vessel documentation** office in Honolulu. (See appendix for address.)

(595) **Harbor regulations** are established by the Harbors Division, Hawaii Department of Transportation, and are enforced by the harbormaster. Prior to entry, all vessels must establish communications with Aloha Tower traffic control on VHF-FM channels 12 or 16; call sign, WHX-528. The phone number for Aloha Tower is (808) 587-2076. **Traffic control** in Honolulu is controlled by amber lights on the tower at night. The lower light, showing fixed, is 143 feet above the water; the upper flashing light is 152 feet above the water. The lights are visible 5 miles from 320° to 062°; flashing light on, incoming traffic only; fixed light on, outgoing traffic only; both lights on or no lights showing, harbor closed to all traffic. To pass visual messages, contact Pearl Harbor Navy Signal Tower, call H-1.

(596) The **speed limit** in Honolulu Harbor is 5 knots for all vessels and tows and 10 knots for motorboats, and other small craft.

(597) A flashing amber warning light, privately maintained and shown about 22 feet above the water from a pole about 70 yards SSW of Pier 38, is activated when there is a gas leak or the likelihood thereof. Anyone observing the light flashing should remain well clear and upwind, and sources of ignition should be secured.

(598) **Wharves.**–Honolulu has over 60 piers and wharves around its harbor waterfront. Only the deep-draft facilities are described. For a complete description of the port facilities refer to Port Series No. 50, published and sold by the U.S. Army Corps of Engineers. (See appendix for address.) The alongside depths for the facilities described are reported; for information on the latest depths, contact the State of Hawaii, Department of Transportation, Harbors Division or the private operators. All facilities have direct highway connections. Water is available at most piers and wharves.

(599) General cargo at the port is usually handled by ship's tackle; special handling equipment, if available, is mentioned in the description of the particular facility. Several cranes to 200 tons can be rented. Numerous warehouses and cold storage facilities adjacent to the waterfront are available.

(600) Privately owned pipelines are available for petroleum products, liquid fertilizers, and molasses.

(601) State of Hawaii, Diamond Head Terminal, Piers 1 and 2: bulkhead wharf on E side of entrance channel; 2,967 feet long, 34 to 39 feet alongside; deck height, 7 feet; about 29 acres of paved open storage; receipt and shipment of general and containerized cargo, shipment of molasses; owned and operated by the State of Hawaii, Department of Transportation, Harbors Division.

(602) State of Hawaii, Diamond Head Terminal, Piers 1 and 2: bulkhead wharf on E side of entrance channel; 2,967 feet long, 34 to 39 feet alongside; deck height, 7 feet; about 29 acres of paved open storage; receipt and shipment of general and containerized cargo; owned and operated by the State of Hawaii, Department of Transportation, Harbors Division.

(603) State of Hawaii, Pier 8: 595 feet long; 34 feet alongside; deck height, 7 feet; Aloha Tower Marketplace is at the rear in a former transit shed; owned and operated by the State of Hawaii, Department of Transportation, Harbors Division.

(604) State of Hawaii, Pier 9, 608 feet long; Piers 10 and 11, 956 feet long; 33 feet alongside; deck height, 7 feet; Aloha Tower is on the pier; boarding and disembarking passengers; owned and operated by the State of Hawaii, Department of Transportation, Harbors Division.

(605) State of Hawaii, Piers 19 and 20: 1,060 feet long; 32 to 34 feet alongside; deck height, 6 feet; about 2.5 acres of open storage; mooring company-owned towboats and barges; mooring pilot boat; operated by Sause Brothers, Inc.; owned by the State of Hawaii, Department of Transportation, Harbors Division.

(606) State of Hawaii, Pier 21: 425 feet long; 35 feet alongside; deck height, 6 feet; mooring, repairing, fueling, and dispatching company-owned floating equipment; owned by the State of Hawaii, Department of Transportation, Harbors Division; operated by Hawaiian Tug & Barge, an HEI Co.; and Smith Maritime.

(607) State of Hawaii, Piers 22-23: 890 feet long; 31 feet alongside; deck height, 6 feet; 26,000-ton grain elevator; receipt of grain; owned by Department of Transportation, Harbors Division; operated by Hawaiian Flour Mills (HFM); Hawaiian Tug & Barge, an HEI Co.; and Smith Maritime.

(608) State of Hawaii, Piers 24-25: 935 feet long; 20 to 30 feet alongside; deck height, 6 feet; receipt and shipment of conventional, containerized, and roll-on/roll-off general cargo and automobiles by barge in inter-island trade; mooring company-owned towboats, barges, and floating equipment; owned by the State of Hawaii, Department of Transportation, Harbors Division; operated by Young Brothers Ltd., an HEI Co.; and Hawaiian Tug & Barge, an HEI Co.

(609) State of Hawaii, Pier 26: 695 feet long; 23 to 30 feet alongside; deck height, 6 feet; receipt and shipment of conventional, containerized, and roll-on/roll-off general cargo and automobiles by barge in inter-island trade; owned by the State of Hawaii, Department of Transportation, Harbors Division; operated by Young Brothers Ltd.

(610) State of Hawaii, Pier 27: 885-foot-long face, 150 feet outside; 29 feet alongside face; deck height, 7 feet; receipt and shipment of conventional, containerized, and roll-on/roll-off general cargo and automobiles by barge in inter-island trade; owned by the State of Hawaii, Department of Transportation, Harbors Division; operated by Young Brothers Ltd.

(611) State of Hawaii, Piers 28 and 29: 1,290 feet long; 29 to 31 feet alongside; deck height, 7 feet; receipt and shipment of conventional, containerized, and roll-on/roll-off general cargo and automobiles by barge in inter-island trade; owned by the State of Hawaii, Department of Transportation, Harbors Division; operated by Young Brothers, Ltd.

(612) Chevron Products Co., Honolulu Pier 30: 270 feet long; 30 to 31 feet alongside; deck height, 6 to 7 feet; receipt and shipment of petroleum products; bunkering vessels; owned and operated by Chevron Products Co., Inc.

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(613) State of Hawaii, Piers 31A, 31, 32 and 33: 1,440 feet long, 34 feet alongside; deck height, 7 feet; about 5 acres of open storage; receipt and shipment of conventional general cargo in foreign and domestic trade; receipt of lumber, automobiles, caustic soda, and miscellaneous bulk commodities; bunkering vessels; owned and operated by the State of Hawaii, Department of Transportation, Harbors Division.

(614) State of Hawaii, Pier 34: 550 feet long; 34 feet alongside; deck height, 7 feet; receipt of petroleum products, shipment of bulk cement; owned by the State of Hawaii, Department of Transportation, Harbors Division; operated by Tosco Distribution Co.; Tesoro Petroleum Corp.; and Hawaiian Cement Corp.

(615) State of Hawaii, Pier 35: 705 feet long; 18 to 35 feet alongside; deck height, 7 feet; mooring company-owned vessels; owned by the State of Hawaii, Department of Transportation, Harbors Division; operated by the State of Hawaii, Department of Transportation, Harbors Division; and Smith Marine.

(616) State of Hawaii, Pier 36: 68-foot-long face, lower side 546 feet long, upper side 432 feet long; 34 feet alongside face and lower side, 6-20 feet along upper side; deck height, 7 to 7½ feet; mooring fishing vessels; mooring company-owned floating equipment; handling equipment, materials, and supplies; owned by the State of Hawaii, Department of Transportation, Harbors Division; operated by the State of Hawaii, Department of Transportation, Harbors Division and P&R Water Taxi, Ltd.

(617) State of Hawaii, Pier 39: 105-foot-long face, 32 feet alongside; lower side 1,213 feet long, 24 to 32 feet alongside; upper side 1,025 feet long, 33 feet alongside; deck height, 8 feet; about 9.5 acres open storage; receipt and shipment of conventional, containerized, and roll-on/roll-off general cargo and automobiles by barge in inter-island trade; owned by the State of Hawaii, Department of Transportation, Harbors Division; operated by Young Brothers, Ltd.

(618) State of Hawaii, Pier 40: lower and upper sides 1,005 feet long; 25 to 32 feet along lower side, 27 to 33 feet along upper side; face 250 feet long, 33 feet alongside; deck height, 8 feet; about 13 acres open storage; receipt and shipment of conventional, containerized, and roll-on/roll-off general cargo and automobiles by barge in inter-island trade; mooring company-owned floating equipment; owned by the State of Hawaii, Department of Transportation, Harbors Division; operated by Young Brothers, Ltd.

(619) State of Hawaii, Pier 51A: 556 foot face; 39 feet alongside; deck height, 8 feet; receipt and shipment of containerized general cargo in foreign and domestic trade; receipt of petroleum products; owned by the State of Hawaii, Department of Transportation, Harbors Division; operated by Sea-Land Service, Inc. and Airport Group International, Inc.

(620) State of Hawaii, Piers 51B and 51C: 1,346-foot face; 39 feet alongside; deck height, 8 feet; two 37½-ton cranes; receipt and shipment of containerized and roll-on/roll-off general cargo in foreign and domestic trade; receipt and shipment of molasses; owned by the State of Hawaii, Department of Transportation, Harbors Division; operated by Matson Terminals, Inc.

(621) Piers 52A, 52B, and 53: total length, 3,000 feet; 40 feet alongside; deck height, 8 feet; seven cranes to 45 tons; receipt and shipment of containerized and roll-on/roll-off general cargo and automobiles in inter-island trade; receipt and shipment of molasses; owned by the State of Hawaii, Department of Transportation, Harbors Division; operated by Matson Terminals, Inc. and Alexander & Baldwin, Inc.

(622) **Supplies**.–Bunker oils, diesel fuels, and water are piped to most of the piers; gasoline is available at the fuel piers. Marine supplies are available in quantity.

(623) **Repairs.–**Honolulu has two floating drydocks. The largest has a lifting capacity of 2,800 tons, length of 345½ feet over the keel blocks, width of 58 feet between wing walls and a maximum width of 84 feet, and a depth of 19 feet over the blocks. A large marine railway is available in the port; lifting capacity 1,400 tons, maximum length 222 feet, maximum width of 63 feet, and maximum depth of 10 feet. The service of a 200-ton mobile crane is available. Machine work can be obtained; a 84-inch lathe with a 44-foot bed is available for this purpose. In an emergency large commercial vessels have been handled at the Pearl Harbor Naval Shipyard.

(624) **Communications.–**Honolulu is a major port of call for transpacific vessels, and there is commercial barge service to and from the other islands. Air service, passenger and freight, includes scheduled flights to the other islands, to the mainland, and to W and SW Pacific areas.

(625) **Chart 19369.–Keehi Lagoon,** 6 miles NW of Diamond Head is triangular in shape and is fronted by coral reefs. The cuts through the lagoon are former seaplane landing areas. Kalihi Channel, previously mentioned, cuts through the SE part of the lagoon. A privately dredged channel branches NW from Kalihi Channel to a small-boat harbor and a barge harbor and turning basin on the E side of the landing areas. In 1974, the reported controlling depths were 12 feet in the channel to the turning basin and 15 feet in the basin. The barge channel is marked by a private **334°** lighted range.

(626) A **special anchorage** is in Keehi Lagoon on the W side of the barge channel. (See **110.1 and 110.128d(c)**, chapter 2, for limits and regulations.)

(627) Submerged pipelines, centered about 160 yards NE from the N corner of the special anchorage, extend from the SE to the NW side of Keehi Lagoon; mariners should avoid anchoring in the pipeline area.

(628) **Honolulu International Airport,** on the N shore of Keehi Lagoon, is the largest commercial airport in the State. The aerolight on the control tower is prominent from seaward.

(629) **Charts 19357, 19369, 19366**.–A low, flat plain, 3 to 5 miles wide, borders the sandy shore between Keehi Lagoon and Barbers Point. The area includes Pearl Harbor and several airfields. W of Pearl Harbor, most of the area is developed with residential communities.

(630) **Pearl Harbor,** 9.5 miles WNW of Diamond Head, is a **Defensive Sea Area** established by Executive Order No. 8143 of May 26, 1939. The order says in part:

(631) "The area of water in Pearl Harbor, Island of Oahu, Territory of Hawaii, lying between extreme high-water mark and the sea, and in and about the entrance channel to said harbor, within an area bounded by the extreme high-water mark, a line bearing S from the SW corner of the Puuloa Naval Reservation, a line bearing S from Ahua Point, and a line bearing W from a point 3 miles due S from Ahua Point, has been established as a defensive sea area for purposes of national defense, and no persons (other than persons on public vessels of the United States) are permitted to enter this defensive sea area, and no vessels or other craft (other than public vessels of the United States) are permitted to navigate in this area, except by authority of the Secretary of the Navy."

(632) Permission to enter Pearl Harbor must be obtained in advance from Commander, Naval Base, Pearl Harbor, Hawaii 96860.

(633) **Pilotage, Pearl Harbor**–All vessels, except commissioned ships of the U.S. Navy and U.S. Coast Guard, are required to take a pilot when entering or departing Pearl Harbor. Pilots board about 1.3 miles SE of the entrance buoys. All vessels destined for Pearl Harbor must pass through Approach Point PAPA HOTEL (21°16’17"N., 157°56’33"W.). This point, about 2 miles SE of the entrance buoys, is not marked by any navigational aid.

(634) It is requested that ships guard Pearl Harbor Control frequency VHF-FM channel 69, 1 hour before entrance, and continuously thereafter unless guard for this circuitry is arranged after arrival. The voice call of Pearl Harbor Port Control is “Pearl Harbor Control;” ships use own ship’s name as voice call. Pearl Harbor Control also guards the Bridge-to-Bridge frequency VHF-FM channel 13.

(635) **General description.**–There are many prominent features in and around Pearl Harbor. (See chart.) The fan-shaped harbor has an entrance width of 400 yards and a greatest inland extent of 5 miles. The 45-foot entrance channel is marked by lighted and unlighted buoys and by a lighted range. The main basin is divided by two peninsulas and an island into four smaller basins known as **West Loch, Middle Loch, East Loch,** and **Southeast Loch.** Tidal currents are generally weak, but the ebb sometimes exceeds 0.5 knot. A dangerous W set may be experienced in the vicinity of the entrance to Pearl Harbor Channel.

(636) **Special anchorages** are on the E side of the Pearl Harbor Entrance Channel near Kumumau Point; on the W side of the channel in the lagoon S of Iroquois Point; and in Aiea Bay on the E side of East Loch. (See **110.1 and 110.128d (e) through (h),** chapter 2, for limits and regulations.)

(637) **Chart 19362**.–**Barbers Point,** 17 miles W of Diamond Head, is the SW extremity of Oahu. The low land back of the rounding point extends 3 miles N to the foothills of the Waianae Mountains; the hill slopes are steep and partly brush covered but the bare soil that shows in places gives them a reddish appearance.

(638) **Barbers Point Light** (21°17.8'N., 158°06.4'W.), 85 feet above the water, is shown from a 71-foot white cylindrical concrete tower. A reef extends 0.6 mile off the light.

(639) Five miles NE of Barbers Point and 2 miles inland are the prominent chimneys of a sugar mill at **Ewa.** An industrial park is on the point. Tanks are about 0.8 mile N of the light and stacks are close N.

(640) In April 1996, Captain of the Port Honolulu amended federal **pilotage waters** in the vicinity of the offshore pipeline terminal off Barbers Point. The area was expanded to be identical to that designated in May 1995 for vessels engaged in foreign commerce and is defined by the following points:

(641) 21°17'47"N., 158°06'23"W.; thence to

(642) 21°14'49"N., 158°06'23"W.; thence to

(643) 21°14'49"N., 158°03'10"W.; thence to

(644) 21°15'26"N., 158°00'57"W.; thence to

(645) 21°18'18"N., 158°01'49"W.; thence along the shoreline to the point of beginning.

(646) All foreign trade vessels, U.S. vessels under registry, and U.S. vessels engaged in coastwise trade operating within this area must be under the direction and control of a first class pilot.

(647) Two naval **danger zones** and a **restricted area** have been established between Barbers Point and the entrance to Pearl Harbor. (See **334.1360, 334.1370, and 334.1400**, chapter 2, for limits and regulations.)

(648) A **253°22'–073°22' measured nautical mile** has been established 2.5 miles E of Barbers Point. The front markers are white triangles, with horizontal orange band, on 55-foot posts; the rear markers are white triangles, with vertical orange band, on 70-foot posts.

(649) Two offshore oil tanker mooring terminals and their submarine pipelines are located within the **anchorage and non anchorage areas** that have been established off Barbers Point. (See **110.1 and 110.236**, chapter 2, for limits and regulations.) All vessels, except for vessels with official business at the tanker terminals, should stay well S of these areas in order to avoid the unlit mooring buoys located there.

(650) **Currents.**–There is a general W current along the coast between Honolulu and Barbers Point. Velocities up to 0.8 knot, setting W, have been measured off the point, and greater velocities have been reported.

(651) **Chart 19357**.–The coast has a general NW trend between Barbers Point and Kaena Point, a distance of about 20 miles, and consists of alternating ledges of rock and stretches of white sand. Spurs of the Waianae Mountains extend to most of the points. Between the spurs and ridges are heavily wooded valleys that contrast with the rocky and bare mountains. A highway follows the coast from just N of Barbers Point to Kaena Point.

(652) Much of the shoreline is fringed with rocks and reefs, but they are mostly close to the shore. The 3-fathom curve is within 0.5 mile of the shore, and the 10-fathom curve is within 1 mile. Vessels can avoid all outlying dangers by giving the coast a berth of 1 to 1.5 miles. Other than Pokai Bay, there are no harbors or anchorages along the W coast that afford shelter in all winds.

(653) **Barbers Point Harbor** is about 2 miles NW of Barbers Point. A dredged channel leads NE to a basin in the harbor. In March-April 1999, the dredged channel had a controlling depth of 37 feet, except for lesser depths along the edges, thence 36 to 38 feet in the basin with lesser depths along the edges. The channel is marked by a lighted buoy, lights, and a **045°** lighted range. The basin has a 1,600-foot dock with a 30-acre paved backup area and 120 acres for cargo handling and storage. A ship repair company has an 18,000-ton drydock capable of handling vessels to over 600 feet long and 94 feet wide. A state licensed pilot is required to enter the harbor. Vessels entering the harbor during the winter months should be aware of large swells coming from the N.

(654) A marina harbor entrance, marked by lights, is in the NW portion of the basin. Gasoline, diesel fuel, 267 slips, electricity, water, pump-out, and a public boat ramp are available at the marina.

(655) A flashing amber warning light, privately maintained and shown from a pole about 22 feet high on the S side of the harbor, is activated when there is a gas leak or the likelihood thereof. Anyone observing the light flashing should remain well clear and upwind, and sources of ignition should be secured.

(656) Barbers Point is a **customs port of entry.**

(657) **Kahe Point,** 3.5 miles N of Barbers Point, is the seaward end of a mountain spur. A large power plant is prominent on the point. The largest stack is 475 feet high with a strobe light on top. Two short boulder groins extending from the shore protect the in-

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take of the plant's cooling system. The outfall is about 250 yards offshore with 9 feet of water over it.

(658) **Nanakuli,** 5.5 miles N of Barbers Point, is a homestead area near the shore.

(659) **Puu o Hulu,** about 7 miles NW of Barbers Point, is a narrow rocky, barren ridge, 1.5 miles long. A large water tank is on the saddle of the S slope. The ridge is on **Maili Point,** the S of the two important projecting points of this coast, and is the most conspicuous landmark in this vicinity. The W end of the ridge is close to the shore and has an elevation of 856 feet; it is precipitous on its seaward side.

(660) **Chart 19361**.–**Lualuaei Homestead** tracts are N and NE of Puu o Hulu. Two 1,500-foot radio towers are prominent in the valley. **Puu Mailiilii,** about 2 miles N of Puu o Hulu, is a narrow, rocky ridge, 723 feet high, near the shore and approximately at right angles with it.

(661) Low **Kaneilio Point,** 10 miles NW of Barbers Point, projects 0.2 mile from the general coastline. A fish haven consisting of old auto bodies is 1 mile S of the point. Two wrecks covered 6¼ fathoms are about 1.6 miles S of the point. Between Puu o Hulu and Kaneilio Point the light-colored buildings of a limekiln 0.3 mile inland show up against a dark background. In November 1999, suspected live ordnance was reported about 2 miles SW of Kaneilio Point inside the following coordinates: 21°26'23"N., 158°12'11"W.; 21°26'23"N., 158°12'38"W.; 21°25'26"N., 158°12'38"W.; 21°25'26"N., 158°12'11"W.

(662) **Pokai Bay,** on the NW side of Kaneilio Point, is the seaward approach to **Waianae.** Shallow water extends 0.3 mile from the inner shore of the bay. The breakwater extending N from Kaneilio Point and marked at the end by a light, and the opposing boulder groin from the inner shore form a State water recreation area. Piles are about midway between the breakwater and the shore. The area E of the piles is for swimming, and the area between the piles and the breakwater is for outrigger canoes. No person shall operate, anchor or moor any other vessel in the area between the piles and the breakwater except in adverse weather conditions when emergency anchoring is permitted.

(663) **Waianae Boat Harbor,** 0.5 mile NW of Kaneilio Point, is owned and operated by the State of Hawaii. The harbor is used primarily by fishing boats. The harbor is entered from the SE between two breakwaters. The harbor is protected on the W side by a 1,690-foot-long L-shaped breakwater, marked on its seaward end by a light, and on the NE side at the entrance by a 220-foot-long stub breakwater. A **003°-183°** lighted range marks the entrance approach. In April 1996, the controlling depth was 11 feet in the entrance channel, 12 feet in the main access channel and basin with 9 feet alongside the piers. Berthing, water, and two double launching ramps are available at the harbor. Waianae harbormaster has scheduled daytime hours (0745 to 1630) Tuesdays through Saturdays; phone numbers are: 808-697-7095 (business) and 808-851-1839 or 808-696-9921 (emergency or after hours); 808-594-0849 (fax).

(664) **Local magnetic disturbance**.–Differences of 2° or more from normal variation may be expected in Pokai Bay.

(665) A deep valley extends about 4 miles inland between Puu o Hulu and Lahilahi Point and is the largest valley on this side of the Waianae Range. The broken ridge which makes down to Puu Paheehee divides the valley. **Puu Paheehee,** 652 feet high, is about 1 mile inland from Waianae.

(666) **Lahilahi Point,** 1.7 miles NW of Kaneilio Point, is a detached, steep ridge of dark rock, 234 feet high. This narrow, conspicuous point, projecting seaward about 0.2 mile, has the appearance of an islet from a distance and is known to local fishermen as **Black Rock.** An apartment building on the beach 250 yards N of the point and a hotel about 1.2 miles NNE of the point are good landmarks.

(667) **Kepuhi Point,** 13 miles NW of Barbers Point, is a few hundred yards from the seaward end of a bold, rocky, mountain spur.

(668) **Chart 19357**.–The coastal bight between Kepuhi Point and Kaena Point, 7 miles to the NW, is backed mostly by ridges of the Waianae Mountains. Midway along the bight is a sand beach in front of a small valley; small boats can make beach landings when the sea is smooth and can anchor in depths of 4 to 6 fathoms about 0.2 mile offshore.

(669) **Kaena Point,** the NW extremity of Oahu, is low and rocky and is only a few hundred yards from the foot of Kuaokala Ridge. **Kaena Point Light** (21°34.3'N., 158°15.8'W.), 931 feet above the water, is shown on top of a 25-foot building on Kuaokala Ridge. Another light is 0.9 mile W of Kaena Point Light on the lower W end of the Point. Off the end of the point are several low, jagged rocks, over which the sea washes, and breakers extend about 0.4 mile from shore. The 10-fathom curve is 0.8 mile W of the point.

(670) The **danger zone** of a firing area covers a wide sector N of Kaena Point. (See **334.1350**, chapter 2, for limits and regulations.)

(671) **Currents.**–A continuous NW current and moderate tide rips are reported off Kaena Point. Observations over a 24-hour period at a location 0.8 mile S of Kaena Point Light show a NW current averaging 0.8 knot; the greatest velocity measured was 1 knot.

(672) The N coast of Oahu trends E for 9 miles from Kaena Point to Waialua, thence NE for another 11 miles to Kahuku Point; rock ledges alternate with stretches of white sand beach. The broad valley back of Waialua spreads to the coastal plain, which narrows as it approaches Kaena and Kahuku Points; most of the valley is cultivated in sugarcane. From Kaena Point to Waialua the mountains have a rugged appearance; from Waialua to Kahuku Point the hills resemble a continuous plateau. A hard-surface highway parallels the coast.

(673) Most of the N coast is fringed with reefs as much as 0.5 mile in width, but all dangers can be avoided by staying at least 1 mile from shore. Haleiwa Small-Boat Harbor is the only harbor along the N coast.

(674) **Kuaokala Ridge,** back of Kaena Point, is high, and its seaward end breaks off rather abruptly. White domes and telemetry antennas are conspicuous along the ridge. The scattered beach houses between Kaena Point and Waialua are backed by cultivated fields that extend to the mountains.

(675) **Kaiaka Bay** is a small coastal dent 9 miles E of Kaena Point; **Kiikii Stream** and **Paukauila Stream** empty into the head of the bay. Prominent from offshore is the mill stack in **Waialua,** 0.5 mile back of the beach. A depth of 3 feet can be carried halfway into the bay by passing between the **Kaiaka Point** reefs, on the NE side, and the reef in midentrance.

(676) **Waialua Bay,** 1 mile NE of Kaiaka Bay, is a small dent at the bend in the middle of the N coast. The bay shores are low, black rock, with sand patches in the bights and fringed by large

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algaroba trees. The low land back of the beach slopes gently to a tableland with mountain ranges on either side. **Haleiwa** is at the head of Waialua Bay.

(677) **Haleiwa Small-Boat Harbor,** at the head of Waialua Bay is protected by a breakwater on the W and a mole marked by a light on the E. In March 1999, the midchannel controlling depth in the entrance channel was 9 feet. In 1979, depths of 6 to 11 feet were alongside the berths. The channel is marked by lighted and unlighted buoys and by a **129°** lighted range. Water is available at most berths, and a launching ramp is in the harbor. The harbor can be entered in all but the most violent storms, at which time good anchorage is found about 1 mile offshore in 20 to 30 fathoms.

(678) **Anahulu River** empties into the SW corner of Waialua Bay. River navigation is restricted by the fixed bridge over the mouth; the clearance is 8 feet for a channel width of 14 feet.

(679) The narrow coastal plain between Waialua and Kahuku Point is backed by a vegetation-covered tableland with steep seaward slopes that are cut by deep gorges.

(680) **Waimea Bay,** 5 miles NE of Waialua, is a small coastal dent at the mouth of the **Waimea River** gorge. The highway bridge over the river can be seen from seaward. A yellow-brown tower and scattered buildings are visible on the N side of the bay.

(681) **Wananapaoa Islet,** the outer of two ragged masses of black rock off the S point of Waimea Bay, has deep water close to its seaward sides. The submerged rocks near the point on the NE side of the bay are usually marked by breakers.

(682) Waimea Bay affords little shelter, and beach landings can be made only in very smooth weather. There is a wide beach at the head of the bay, but both sides of the entrance are fringed with rocky ledges. Indifferent anchorage is available in depths of 9 or 10 fathoms, sand bottom, 0.3 mile W of the river mouth.

(683) **Waialee** is 4 miles NE of Waimea Bay. A group of large conspicuous buildings is at the foot of a bluff a few hundred yards inland. Also prominent are two large dish antennas atop a ridge about 1.3 miles SW of Waialee, a radome on Mount Kawela about 2 miles SE, and a windmill with a strobe light about 2.0 miles ESE. Low **Kuilima Point,** 5.4 miles NE of Waimea Bay, has a resort hotel complex on the point.

(684) **Kahuku Point,** the N extremity of Oahu, is low and sandy; the dunes are partly overgrown with vegetation, and there are few scattered trees. The coast rounds gradually at Kahuku Point, and there are several small black rocks close to shore. The land rises gently from the low bluffs near the point to the mountains of Koolau Range. The 10–fathom curve draws in to within 0.4 mile of the point. The breakers afford sufficient daytime warning of coastal dangers, but the low, unmarked point is difficult to locate at night. Currents off Kahuku Point set W or NW, but are sometimes negligible; tide rips have been reported 1 mile E of the point.

(685) The coast between Kahuku Point and Makapuu Point, 30 miles to the SE, is known as **Windward Oahu** and is more productive than other parts of the island because of its greater rainfall. Paralleling this coast is the Koolau Range from which several spurs reach shore between Laie Bay and Kaneohe Bay. The shore is low and sandy with patches of black rock outcrop, particularly at the headlands and most of the points. Between the shore and Koolau Range is a narrow strip of cultivated land; this coastal area widens between Kaneohe Bay and Waimanalo and is one of the principal agricultural areas of Oahu. There are good highways along the entire coast.

(686) Nearly all of this NE coast is fringed by coral reefs with little or no water over them at low tide, and the area is exposed throughout most of the year to the sea and swell built up by the NE trades. The numerous small openings in the reefs can be navigated by local craft; wider openings lead to Kahana, Kaneohe, Kailua, and Waimanalo Bays. The 10–fathom curve is no farther than 1.6 miles from shore except in Kaneohe Bay.

(687) **Kahuku,** 3 miles SE of Kahuku Point, is marked by a mill stack which is a half mile from the beach.

(688) Low **Makahoa Point** projects 0.2 mile from the general coast 3.5 miles SE of Kahuku Point. **Kihewamoku,** an islet 24 feet high, is 0.5 mile off Makahoa Point; 0.2 mile N of the islet is a rock that covers 4 feet and sometimes breaks.

(689) Wooded **Kalanai Point,** 4 miles SE of Kahuku Point is on the N side of Laie Bay. **Mokuauia,** an island 0.2 mile long and 23 feet high, is 0.2 mile off the point; between the island and the point are depths of only 1 or 2 feet. A rock 0.2 mile seaward of the island is covered 10 feet.

(690) **Pulemoku,** a rock 30 feet high, is 0.4 mile SE of Mokuauia. A 2-foot-high rock is close to the S side of Pulemoku.

(691) **Laie Bay** has outer depths of 3 to 7 fathoms, and a narrow reef opening affords access to shelter and landing for local small craft. **Laie,** at the head of the bay, has a Mormon Temple, a large, flat-roofed building that is visible from seaward.

(692) **Laniloa** a narrow peninsula with white sandy beaches on either side and covered with homes is on the S side of Laie Bay. Off the outer end of Laniloa are two small rocky islets; **Kukuihoolua,** 30 feet high and **Mokualai,** 33 feet high.

(693) **Kaipapau Hill,** about 700 feet high, is 2 miles S of Laniloa and 0.5 mile inland; the hill has a pyramidal, grass-covered top.

(694) **Hauula** is a beach settlement 2.5 miles S of Laniloa. **Punaluu** 4 miles S of Laniloa, is a beach settlement with a prominent apartment building near the beach.

(695) **Kahana Bay,** 11 miles SE of Kahuku Point, has an entrance width of 1 mile between **Makalii Point** on the N and **Mahie Point** on the SE; inland extent is 0.6 mile. Local small craft make the narrow passage through the reef and find limited shelter behind it. A breakwater protects a launching ramp on the W side of the bay. The breakers on both sides of the bay are the only guides for entering.

(696) **Chart 19359.–Kualoa Point,** 15 miles SE of Kahuku Point, is on the NW side of the entrance to Kaneohe Bay. **Mokolii Island,** 206 feet high, is a conspicuous conical islet 0.3 mile seaward of Kualoa Point.

(697) **Kaneohe Bay** has an entrance width of 4.6 miles between Kualoa Point on the NW and Mokapu Peninsula on the SE; greatest inland extent is 3 miles. The bay has low sand and coral beaches along which are many of the old diked fishponds, some which are still in use. Islands, coral reefs, and sand shoals are numerous throughout the bay. Mokolii Island, **Kapapa Island,** about 2.8 miles SE of Kualoa Point and in the center of Kaneohe Bay, and **Kekepa Island,** mushroom-shaped and 4.4 miles SE of Kualoa Point, are easy to identify from seaward and make for a good landfall during daylight. **Moku o Loe Island (Coconut Island),** in the SW part of the bay, is the largest of the islands.

(698) The University of Hawaii operates a launch that ferries university personnel to and from the Hawaii Institute of Marine Biology on the island of Moku o Loe. The launch runs from the island to a nearby pier on the SW side of Kaneohe Bay.

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(699) **Kaneohe Bay** is a **Naval Defensive Sea Area**.established by Executive Order No. 8681 of February 14, 1941. The order says in part:

(700) "The territorial waters within Kaneohe Bay between extreme high-water mark and the sea and in and about the entrance channel within a line extending 3 miles NE from Kaoio Point, a line extending 4 miles NE from Kapaho Point, and a line joining the seaward extremities of the two above-described bearing lines, are hereby established and reserved as a naval defensive sea area for purposes of national defense, such area to be known as Kaneohe Bay Naval Defensive Sea Area; and the airspace over the said territorial waters is hereby set apart and reserved as a naval airspace reservation for purposes of national defense, such reservation to be known as Kaneohe Bay Naval Airspace Reservation.

(701) "At no time shall any person, other than persons on public vessels of the United States, enter Kaneohe Bay Naval Defensive Sea Area, nor shall any vessel or other craft, other than public vessels of the United States, be navigated into said area unless authorized by the Secretary of the Navy.

(702) "At no time shall any aircraft, other than public aircraft of the United States, be navigated into Kaneohe Bay Naval Airspace Reservation, unless authorized by the Secretary of the Navy."

(703) **Note.–**Naval control over entry into Kaneohe Bay Naval Defensive Sea Area has been suspended, except for a 500-yard **prohibited area** around the perimeter of Mokapu Peninsula where only authorized vessels may enter. Naval control may, however, be reinstated without notice at any time.

(704) **Kaneohe Marine Corps Air Station** is on Mokapu Peninsula. Mariners are advised that field operations are conducted throughout the year and divers, rafts, and aircraft may be operating in the bay. Caution should be taken when operating near the air station runway.

(705) **COLREGS Demarcation Lines.**–The lines established for Kaneohe Bay are described in **80.1430**, chapter 2.

(706) Two channels lead through the reefs to the SE end of the bay. The deeper approach from the N end of the bay is through a dredged channel entered about 2 miles E of Kualoa Point. The channel is marked by lights, buoys, daybeacons, and a **227°** and a **349°30'** lighted range with the front range tower common to both. In May 1976, the controlling depth in the channel was 25 feet. Sampan Channel (Kaneohe Passage) to the SE, is entered about 0.85 mile NW of the N extremity of Mokapu Peninsula. This channel intersects the deeper channel about 0.9 mile W of Mokapu Peninsula, and is marked by a **217°15'** lighted range, daybeacons, and lighted and unlighted buoys. In May 1976, the controlling depth was 8 feet.

(707) **Crashboat Channel,** about 0.4 mile W of Mokapu Peninsula, has been dredged by the Navy for search and rescue vessels. This channel is within the prohibited area and should not be used by pleasure craft as it may hamper aid to a needy vessel or downed pilot. The Navy monitors 2716 kHz at its search and rescue facility on the SW side of Mokapu Peninsula; telephone number (257–2941 or 257–3543).

(708) **Special anchorages** are in the SE and W parts of Kaneohe Bay. (See **110.1 and 110.128d (a) and (b)**, chapter 2, for limits and regulations.)

(709) **Dangers.**–Mariners are advised to exercise caution as the channels and other dredged areas in the bay have not been dragged or swept. Numerous coral heads are along the sides of the channels, and many of these are marked by privately maintained pipes extending 3 to 5 feet above the water.

(710) The bay is by far the best locality for the operation of small craft on Oahu. Many permits are being obtained by property owners to dredge small-boat basins and channels through the reefs. Numerous docks, including the Kaneohe Yacht Club, are in the bay. In addition, many uncharted private floats and buoys, used to mark race courses, moorings, and fish and lobster pots are throughout the bay.

(711) **A 015°–195° measured course,** 3,038 feet long, is SE of Moku o Loe Island in Kaneohe Bay. The range markers are 30–by 40–inch white daymarks with orange borders set on coral reefs about 0.4 mile off the SE shore of the bay.

(712) **Kaneohe** near the SE end of the bay is the principal community in the area. Radio towers are prominent at **Heeia,** a mile NW of Kaneohe.

(713) **Heeia Kea Small-Boat Harbor,** just N of Kealohi Point about 0.9 mile N of Heeia, is open to the public. In 1999, the controlling depth in the harbor was 6½ feet. The fuel pier has a reported depth of 12 feet alongside. Gasoline, diesel fuel, berths, water, ice, and launching ramps are available. Anchorage in the harbor is by permit only.

(714) **Chart 19357.–Mokapu Peninsula,** 20 miles SE of Kahuku Point, has a greatest elevation of 683 feet. **Pyramid Rock,** on the NW point of the peninsula, is black and has a sharp summit. **Pyramid Rock Light** (21°27.7'N., 157°45.8'W.), 101 feet above the water, is shown from a white square concrete house with black diagonal stripes. **Puu Hawaiiloa** is a 337–foot hill near the center of the peninsula. A red and white skeleton tower and a nearby aerobeacon atop the hill are the most prominent navigation aids on the peninsula.

(715) A weapons training range **danger zone** extends NNE from Mokapu Point. (See **334.1380**, chapter 2, for limits and regulations.)

(716) **Ulupau Crater,** part of an old crater rim, is a rocky headland at the NE end of Mokapu Peninsula. **Mokumanu Islands,** two islets with vertical sides 202 feet and 132 feet high, are 0.7 mile N of the headland. The passage between the islets and the peninsula has midchannel depths of 3½ to 8½ fathoms, but is not recommended for strangers. An E current is reported in the vicinity of Mokumanu Islands.

(717) The beach between Mokapu Peninsula and Makapuu Point, 10 miles to the SE, is mostly low and sandy, with black rocks showing in some places. Between the beach and the cliffs of the Koolau Range is a narrow strip of land developed with residential communities. The cliffs are characteristic of Koolau Range from behind Kaneohe Bay to rugged Makapuu Head.

(718) **Mokolea Rock,** is about 1 mile off the SE side of Mokapu Peninsula; the black rock is 20 feet high, has a submerged edge that extends 0.15 mile W, and has depths of 6 to 8 fathoms around it.

(719) **Kailua Bay,** S of Mokapu Peninsula, is an open bight which affords no shelter from the trades. The N part of the bay is free of the usual fringing reefs, and there is a sand beach at the head of the bay.

(720) **Alala Point,** on the S side of Kailua Bay, is a low bluff with a 25–foot white stone monument that resembles a lighthouse. A public launching ramp is on the W side of the point.

(721) **Popoia Island** is a small, flat, low-lying island 0.2 mile N of Alala Point.

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(722) **Mokulua Islands,** 0.7 mile from shore and midway between Mokapu Peninsula and Makapuu Head, are steep, rocky, grass covered, and locally known as **Twin Peaks**. Elevations are 206 feet for the N islet and 182 feet for the S islet. On the shore side of the islets is an extensive reef; between the reef and the shore is a small-boat passage that leads to private landings.

(723) **Chart 19358.–Wailea Point,** 5 miles NW of Makapuu Head, is the NW point of Waimanalo Bay. An inactive airfield occupies a large area S of the point.

(724) **Waimanalo Bay,** between Wailea Point and Makapuu Head, affords all-weather shelter for small craft behind the barrier reefs that parallel much of the bay's shore. A 2–mile stretch off midbay has no fringing coral reef; in its S part, the reef gets closer to shore and disappears near Makapuu Head. Depths of 10 feet can be carried into the bay except during strong trades when the entrance is closed by breakers. **Waimanalo** is on the coastal highway that skirts the head of the bay.

(725) **Manana Island,** 361 feet high, is 1 mile NNW of Makapuu Point Light. The island is part of an old crater and has a lighter shade of rock than any other in the vicinity. The sides are bluff except on the W where there is a short sloping point. The water is deep on the seaward side of Manana Island, and there are depths of 4 fathoms between the island and the mainland; the 4–fathom passage is not recommended for strangers.

(726) **Kaohikaipu Island,** 80 feet high, is a flat, black mass of rock midway between Manana Island and Makapuu Head. A double rock, 10 feet high, is 200 yards NE of Kaohikaipu, and a small black rock, barely above water, is about the same distance SW of the island. There are depths of 4 fathoms between Manana and Kaohikaipu, but passage is not recommended for strangers because reefs make off from both islands. Depths are 4 to 6 fathoms in the bight between Kaohikaipu Island and Makapuu Head; passage is not recommended.

(727) About 1.2 miles NW of Makapuu Point is a privately operated ocean research facility. An L–shaped pier, protected by a breakwater, extends 700 feet into the bay. In March 1984, the basin and the channel leading to the facility had a reported controlling depth of 16 feet. The channel and the basin are privately marked by daybeacons and a **211°46'** lighted range. A **restricted area** of the Makai Undersea Test Range extends about 2.5 miles offshore. (See **334.1410**, chapter 2, for limits and regulations.)

(728) **Chart 19380.–Kauai Channel,** NW of Oahu, is wide, deep, and clear. During the trades the current usually sets W across the channel and divides at Kauai, part following the N side of the island and the other part following the S side. Strong S or SW winds cause the current to set in the opposite direction to that produced by the trades.

(729) **Chart 19381.–Kauai,** 63 miles NW across Kauai Channel from Oahu, has an area of 555 square statute miles and is fourth largest of the eight major islands. Kauai measures 29 nautical miles E-W by 23 miles N-S and slopes from centrally located **Kawaikini,** a 5,170–foot peak. **Lihue,** the seat of Kauai County, is 2 miles inland from the east-coast port of Nawiliwili.

(730) The mountains on the W and N sides of Kauai descend in steep, jagged ridges; the gentle slopes on the E and S sides are cut by numerous gulches. The peaks are nearly always cloud covered, making them difficult to see from any great distance. Dome-shaped **Haupu,** 2,297 feet high, is prominent in the SE part of the island. The entire NW coast is backed by high bluffs; the rest of the coast is mostly low and rocky with some scattered sand beaches. A low coastal plain extends W from the town of Waimea. The few outlying dangers can be avoided by giving the coast a berth of 2 miles.

(731) **Harbors and ports.–**Nawiliwili, on the E coast, and Port Allen, on the S coast, are the only commercial harbors on Kauai and are the only places that afford shelter in almost all weather.

(732) Small craft planning to visit Kauai should carry two good holding anchors, because mooring space is scarce and there are few well-protected anchorages. Advance arrangements with the Kauai District Manager, Harbors Division of the Hawaii Department of Transportation, are advised.

(733) **Currents.–**The oceanic currents in the vicinity of Kauai generally follow the winds. The available local information relative to currents is given in the discussions of the various localities.

(734) **Weather, Kauai.–**The trade winds divide on the E side of Kauai, one part follows the N coast and one part the S coast, and unite again some distance W of the island. On the W side, between Mana Point and Makaha Point, calm or light variable airs prevail. A moderate SW wind is sometimes felt at Waimea Bay, while a strong E wind is blowing about 2 miles (4 km) offshore. Along the N and S shores the early morning trade wind is usually light until about 0900 and again decreases in strength about 1600. Occasionally kona winds, starting in the SE, displace the normal trades; this condition occurs more often during the winter.

(735) The E and N, or windward, sides of the island are noted for their heavy rainfall, which reaches a maximum yearly average of more than 400 inches (10160 mm) on 5,080-foot-high (1550 m) **Waialeale**. The lower slopes have much less rain, and along the S side the fall seldom exceeds 20 inches. The winter, from December to March, produces the strongest winds, which sometimes reach gale force and are accompanied by more rain than is usual at other times of the year. Precipitation averages over 42 inches (1067 mm) at the Lihue airport and has ranged from 74.4 inches (1890 mm) in 1982 to 16.4 inches (417 mm) the very next year. Precipitation falls, on average, 275 days each year. December is the wettest month and June, the driest.

(736) The National Weather Service office located at the Lihue Airport has an average annual temperature of 75.6°F (24.2°C). The average maximum is 81.1°F (27.3°C) while the average minimum is 69.7°F (20.9°C). Annual extremes are 90°F (32.2°C) recorded in August 1981, September 1993 and 1995, and October 1957, and 50°F (10°C) recorded in January 1969. August is the warmest month with an average temperature of 79.3°F (26.3°C) while January and February each have an average temperature of 71.6°F (22°C).

(737) (See page T–13 for **Lihue climatological table**.)

(738) **Supplies and repairs.–**Food supplies are obtainable at the various towns on the island, particularly at Lihue, the county seat. Marine supplies are limited to small-craft requirements and occasionally must be ordered from Honolulu. Fuel and water are available at Nawiliwili and Port Allen; limited bunker C oil is available at Port Allen. The island has no repair facilities for medium or large vessels, but minor repairs can be made at Nawiliwili and Port Allen.

(739) **Communications.–**Port Allen and Nawiliwili are ports for a few interisland barges and transpacific vessels. Interisland passenger traffic is by air. Telephone communication is available

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to the other islands and to the mainland. A good highway skirts the island except on the NW side.

(740) **Chart 19383.–Nawiliwili Bay,** on the SE side of Kauai, has an entrance width of 0.8 mile between Carter and Ninini Points and an inland extent of about 1 mile. **Nawiliwili,** on the N side of the bay, is one of the two commercial deepwater ports on Kauai and is protected by a breakwater, marked at the end by a light, extending NE from Carter Point, and by a jetty in the inner harbor. SE winds produce some surge, but the harbor is otherwise secure.

(741) **Prominent features.–**The shore consists of rocky bluffs, except at the mouth of Huleia Stream and in the vicinity of Nawiliwili. The jagged, mountainous coast extending SW from the bay is in marked contrast with the lowlands of Huleia Stream, on the SW side of the bay, and affords a means of fixing the entrance from well offshore. A water tank on the wharf and a large white bulk sugar warehouse on the hill overlooking the wharf are conspicuous.

(742) A flashing amber warning light, privately maintained and shown about 4 feet above the roof on the SW corner of the shed (largest shed on the N piers) on Pier 2, is activated when there is a gas leak or the likelihood thereof. Anyone observing the light flashing should remain well clear and upwind, and sources of ignition should be secured.

(743) **Ninini Point,** on the N side of the entrance, is low, flat, and rocky, and is backed by land planted in cane. A rocky ledge with a depth of 12 feet at the outer end extends about 100 yards S of the point. **Nawiliwili Harbor Light** (21°57.3'N., 159°20.2'W.), 112 feet above the water, is shown from an 80-foot buff-colored cylindrical concrete tower on the point. The loom of the light is frequently seen by vessels 40 miles away.

(744) **Kukii Point,** 0.7 mile W of Ninini Point and the N entrance point of the inner harbor, is a high bluff with a low, rocky shelf at the base. There is a light on the point.

(745) **Carter Point,** on the S side of the entrance to Nawiliwili Bay, is rocky and rises rapidly to **Kalanipuu;** the hill is marked by an aviation obstruction light 799 feet high. The mountain spur that extends inland rises to Haupu, the most prominent feature of SE Kauai.

(746) **Kawai Point,** 0.5 mile S of Carter Point, is a bold rocky headland, 525 feet high, very irregular and jagged in appearance.

(747) **COLREGS Demarcation Lines.–**The lines established for Nawiliwili Harbor are described in **80.1450,** chapter 2.

(748) **Channels.–**A Federal project provides for an entrance channel 40 feet deep to a harbor basin 35 feet deep; the entrance channel is marked by a lighted range, lights, and buoys. In April 1999, the controlling depth was 26 feet (40 feet at midchannel) in the entrance channel with lesser depths along the edges, thence depths of 35 feet were available in the basin except for lesser depths along the edges.

(749) **Anchorage** in the vicinity of Nawiliwili Bay, outside the breakwater, is not recommended. Commercial vessels are not allowed to anchor within the harbor basin, except by permission from the harbormaster. Swinging room is limited. An anchorage area for small boats is within the mouth of **Huleia Stream,**adjacent to the small boat harbor basin.

(750) A **special anchorage** is N of the Nawiliwili Small-Boat Harbor. (See **110.1 and 110.128c**, chapter 2, for limits and regulations.)

(751) **Caution when entering.–**Generally, the current offshore of Ninini Point is from north to south. However, deep-draft vessels have reported a northerly set as they get closer to the point, while on the range line. The transit of the entrance into Nawiliwili Harbor is difficult for large vessels in all but calm weather. The turn around the outer breakwater, then immediately turning in the opposite direction around the inner jetty, is made difficult by the combined effects of the winds and seas. Vessels must contend with large quartering swells and brisk tradewinds on the stern, while approaching the outer breakwater. While turning around the inner jetty into the main basin, the fresh tradewinds generally are on the beam. Local pilots require an assist tug to escort all medium to large size vessels inbound and outbound from Nawiliwili. Vessels berthing at pier 3 are advised to consider laying out an anchor to assist in undocking during moderate to heavy tradewinds weather conditions.

(752) **Tide.–**The mean range of tide is 1.2 feet and the diurnal range of tide is 1.9 feet at Nawiliwili.

(753) **Pilotage, Nawiliwili.–**Pilotage is compulsory for all foreign vessels and for U.S. vessels under register in the foreign trade; it is optional for coastwise vessels who have on board a pilot licensed by the Federal government.

(754) The pilot boat, IWA, is a yellow 35-foot catamaran with the word PILOT in black letters on the side of the cabin. The boat displays the International Code flag "H". Harbor regulations require that vessels may only transit the entrance from sunrise to sunset. Vessels may shift from pier to pier within the basin at night. The pilot boarding ground is 1 mile ESE of Nawiliwili Harbor Light, on the rangeline. The pilots monitor and work on VHF-FM channel 12. Mariners are requested to give at least 24 hours advance notice of arrival with overall length, gross tonnage, and draft of vessel; telephone 808-537-4169. Vessels are requested to rig a ladder no more than one meter on the lee side and to maintain a "dead slow ahead" speed, between 5 and 10 knots. The boarding area is generally very rough, open sea conditions. Vessel masters are advised that boarding a pilot in these conditions may take some time. They should not allow their vessel to stand in towards shore W of Ninini Point until a local pilot is on the bridge.

(755) **Towage**.–An 85-foot, 2,700 hp tug is based in Nawiliwili and services both Nawiliwili and Port Allen. Local pilots request the use of this tug for nearly all vessels transiting Nawiliwili Harbor.

(756) **Quarantine, customs, immigration, and agricultural quarantine.–**(See chapter 3, Vessel Arrival Inspections, and appendix for addresses.)

(757) **Quarantine** is enforced in accordance with regulations of the U.S. Public Health Service. (See Public Health Service, chapter 1.) A private hospital is at Lihue.

(758) Nawiliwili is a **customs port of entry.**

(759) **Harbor regulations** are established by the Harbors Division of the Hawaii Department of Transportation and enforced by the harbormaster.

(760) The **speed limit** in the harbor is 5 m.p.h.

(761) **Wharves.–**The State Wharf, in the N part of the harbor, provides 1,140 feet of berthing space with depths of 20 to 33 feet alongside, from W to E, in October 1992, and a deck height of 8 feet. Pier 1, the E 438-foot section of the wharf, is used principally for the receipt and shipment of general and containerized cargo by barge in the interisland trade, and for the receipt of lumber, bulk cement, and petroleum products. Pier 2, the W 702-foot

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section of the wharf, is used for the receipt and shipment of general and containerized cargo by deep-draft vessels in the foreign and domestic trade; the receipt of liquefied petroleum gas and petroleum products; and for the shipment of bulk raw sugar and molasses. Two transit sheds and an annex shed with a total of 62,000 square feet of storage space are available for cargo in transit.

(762) General cargo at the wharf is usually handled to and from vessels by ships' tackle and to and from barges by forklift trucks. Crawler and truck cranes can be obtained locally; no floating cranes or derricks for making heavy lifts are available at the port.

(763) **Supplies.–**Gasoline, kerosene, fuel oil, and diesel fuel are available by tank truck, and water is piped to the pier. Some provisions and supplies are available at Lihue. Marine supplies are limited to items for small craft.

(764) **Repairs.–**There are no facilities available at Nawiliwili for making major repairs or for drydocking large, deep-draft vessels. Several machine, electrical, and welding concerns off the waterfront in Nawiliwili and in Honolulu are available for making above-waterline repairs to vessels berthed at the port.

(765) **Nawiliwili Small-Boat Harbor** is on the SW side of Nawiliwili Harbor. The entrance to the small-boat harbor is marked by an articulated light, and the jetties that protect the harbor are each marked by a light at their seaward ends. Private daybeacons mark the channel inside the harbor. A launching ramp is on the N side of the harbor. In April 1999, the controlling depth was 9 feet to and in the basin, thence 8 feet in the remainder of the channel.

(766) **Chart 19381.–Kawelikoa Point,** 4 miles SW of Nawiliwili Bay, is a dark, rocky headland 691 feet high. The point is at the seaward end of a ridge which extends N to a 2,297-foot-high peak of Haupu.

(767) From about 1.5 miles SW of Kawelikoa Point to Hanapepe Bay, the coast is a series of low bluffs and beaches; the back country is mostly under cultivation, and the cane fields extend well up the slopes in some places.

(768) **Makahuena Point,** 7 miles SW of Nawiliwili Bay, is the S extremity of Kauai. The low, flat point has a rocky shore with bluffs 20 to 50 feet in height. The land near the point is sandy and rolling, and there are short stretches of sand beach both NE and W of the point. A hotel is prominent on the W side of the point. **Makahuena Point Light** (21°52.1'N., 159°26.6'W.), 80 feet above the water, is shown from a 20-foot pole with a black and white diamond-shaped daymark on the point. The bottom slopes gradually to a depth of 7 fathoms about 0.5 mile off the point. Several reefs extend about 300 yards offshore between the point and Koloa Landing.

(769) There is a conspicuous mill stack at **Koloa,** 2 miles inland from Makahuena Point. The stack is visible all along this coast except for the short distance where it is hidden by **Paa Cones,** which are on a long, low ridge that extends inland from the point.

(770) **Koloa Landing,** 1.5 miles W of Makahuena Point, has a landing slip for small, flat-bottom boats and outrigger canoes. The landing slip is treacherous, and only persons familiar with the landing should attempt to land a small boat. Anchorage is available in depths of 12 fathoms, rocky bottom, about 400 yards S of the landing. A road leads inland to Koloa.

(771) **Kuhio Park** is 0.5 mile W of Koloa Landing and on the shore road. There are several beach houses between the landing and the park.

(772) **Kukuiula Bay,** 3 miles W of Makahuena Point, has an entrance width of 150 yards and an inland extent of 300 yards; considerable protection is afforded small craft except in S winds. A wreck (21°52.9'N., 159°29.6'W.), covered 25 feet, is about 0.3 mile S of the breakwater. **Kukuiula** is a settlement at the head of the bay. About 500 yards W of Kukuiula is the **Spouting Horn,** a seawater spout which is active even in smooth weather.

(773) **Lawai Bay,** 3.5 miles W of Makahuena Point, has an entrance width of 300 yards and an inland extent of 0.2 mile; fair protection is afforded small craft except in S winds. The side shores of the bay are low and rocky, but there is a wide sand beach at the head. A grass-topped rock, 70 feet high, stands at the upper edge of the sand on the W side of the bay.

(774) **Makaokahai Point,** 4.6 miles W of Makahuena Point, is easily recognized because of the several hills extending N from it. One particularly prominent hill, 0.5 mile inland, is 436 feet high and well rounded, has canefields on the lower slopes, and is evenly capped with trees. The first low hills on the point are the walls of a water-filled crater.

(775) **Ioleau,** 1.1 miles N of Makaokahai Point, is a flat-topped 625-foot hill. A Vortac station on the hill is a good landmark.

(776) **Kalanipuao Rock,** with 2 feet of water over it, is about 0.3 mile SE of Makaokahai Point and is marked by a buoy. Vessels should not attempt to pass N of the buoy.

(777) **Koheo Point,** 1.4 miles W of Makaokahai Point, is level and covered with vegetation. A radio tower is on the W side of the point.

(778) **Chart 19382.–Wahiawa Bay,** 2.8 miles W of Makaokahai Point and 1 mile E of Port Allen, is 170 yards wide at the entrance and indents the coast about 0.2 mile. Excellent protection is afforded small craft in all but S winds. Boats anchor in depths of 5 to 10 feet, sandy bottom. The sides of the bay are rocky. The seas usually break over the shoal 100 yards off **Weli Point** on the SE side of the bay.

(779) **Hanapepe Bay,** midway along the S coast of Kauai, is the approach to **Port Allen.** The bay is about 0.6 mile wide and about 0.4 mile long, and is protected from the SE by a breakwater marked near the end by a light. The shores are low, rocky bluffs except at the head of the bay, where there is a sandy beach.

(780) **Local magnetic disturbance.–**Differences of as much as 2 ¼° from normal variation have been observed at Hanapepe Bay.

(781) **Prominent features.–**The E side of the bay has several oil tanks and warehouses. A light is on low, flat, and rocky **Puolo Point** on the W side of the bay. A landing strip, used by tour helicopters and occasionally small planes, is back of the point.

(782) **COLREGS Demarcation Lines.–**The lines established for Port Allen Harbor are described in **80.1440**, chapter 2.

(783) **Channels.–**A Federal project provides for 35-foot depths in the entrance channel and bay channel. Hanapepe Bay is marked by lighted and unlighted buoys. In October 1992, the controlling depth was 34 feet near the center of the harbor with lesser depths near the edges of the project and severe shoaling that extends about 400 feet into the harbor at the NE corner.

(784) **Dangers.–**A reef extends about 200 yards from the shore E of the inner end of the breakwater. In heavy weather breakers extend 350 yards offshore on the NW side of the bay and 50 to 150 yards off the SE side of Puolo Point. In January 1984, a 19-foot shoal was reported about 0.5 mile E of Hanapepe Light in about 21°53.7'N., 159°35.9'W.

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(785) **Anchorage.–**There is little shelter for vessels intending to anchor off Port Allen. In order for a vessel to get in the lee of the bluffs, located on the E shore, the vessel would be positioned dangerously close to shallow water near the breakwater. Fresh tradewinds generally make this area a poor anchorage. The harbor is congested with small commercial charter boats. There is little swinging room within the basin. Port Allen is known for surge conditions. At times, the surge is severe enough to discourage commercial vessels from mooring at the S face of the main pier.

(786) **Tides and currents.–**The diurnal range of tide is 1.7 feet at Port Allen. The prevailing current off Puolo Point is W.

(787) **Pilotage, Port Allen.–**Pilotage is compulsory for all foreign vessels and U.S. vessels under register in the foreign trade; it is optional for coastwise vessels who have on board a pilot licensed by the Federal government. The pilot boat, IWA, is a yellow 35-foot catamaran with the word PILOT in black letters on the side of the cabin. The boat displays the International Code flag "H" by day and the white and red signal lights at night. The pilot boarding ground is 0.75 mile S of the outer end of the breakwater. The pilots monitor and use VHF-FM channel 12. Mariners are advised to give at least 24 hours advance notice of arrival with overall length, gross tonnage, and draft of vessel; telephone 808-537-4169. Vessels are requested to rig a ladder no more than one meter on the lee side and to maintain a "dead slow ahead" speed, between 5 and 10 knots.

(788) **Towage.–**An 85-foot, 2,700 hp tug based at Nawiliwili Harbor services vessels entering or leaving Port Allen.

(789) **Quarantine, customs, immigration, and agricultural quarantine.–**(See chapter 3, Vessel Arrival Inspections, and appendix for addresses.)

(790) **Quarantine** is enforced in accordance with regulations of the U.S. Public Health Service. (See Public Health Service, chapter 1.) A private hospital is at Waimea.

(791) Port Allen is a **customs port of entry.**

(792) **Harbor regulations** are established by the Hawaii Department of Transportation, Harbors Division and enforced by the **harbormaster.**

(793) The **speed limit** in the harbor is 5 m.p.h.

(794) **Wharves.–**The State pier in the E part of the harbor provides 600 feet of berthing space along both the N and S sides, and 124 feet along the W face. In April 1999, depths to 25 feet were available along the N side, 33 feet on the S side and 28 feet on the W face; deck height, 11 feet. A transit shed with 24,000 square feet of covered storage space, and open storage are available. Pipelines are on the wharf, and bulk handling and storage facilities for molasses, liquid fertilizer, and petroleum products are in the port. General cargo, and barge and tanker traffic are handled at the pier.

(795) Vessels are advised to drop an anchor when approaching the pier. This assists in maneuvering to a berth as well as getting away in an emergency. During and after strong winds some surge is experienced at the pier. This condition may require small and medium craft to cast off and sometimes interferes with the cargo handling of large vessels.

(796) **Supplies.–**Gasoline, fuel oil, and diesel fuel are available by tank truck, and water is piped to the wharf. Provisions are available in the principal towns on the island. Marine supplies are limited to small-craft items.

(797) **Repairs.–**Facilities for minor repairs to vessels are available.

(798) **Port Allen Small Boat Harbor** is N of the State pier on the E side of the bay. The harbor has 3 launching ramps, 38 berths, 6 mooring buoys, and a small pier.

(799) **Communications.–**Port Allen has highway and telephone communication with other parts of the island and radiotelephone and air communication with the other islands of the group. The town is a port of call for interisland barge and transpacific vessels.

(800) **Chart 19386.–Kaumakani** is 2 miles NW of Puolo Point and a half mile inland. A mill stack is prominent.

(801) **Robinson Landing,** 1 mile NW of Kaumakani, is a small-boat harbor with a dredged entrance that accommodates drafts of 2 to 4 feet. A stone wall has been built around the harbor edges, and a marine railway is available for handling small craft. This is a private landing and cannot be used without the owner's permission.

(802) **Hoanuanu Bay,** 2 miles NW of Kaumakani, has depths of 2 to 3 fathoms and affords good protection from trade winds for small craft. The E side of the bay is rocky; the NW side is a sand beach.

(803) A breaking area extends 0.5 mile off **Poo Point,** which is on the NW side of Hoanuanu Bay. A buoy is moored in 44 feet 0.9 mile off the point.

(804) **Waimea Bay,** an open bight 3 miles NW of Kaumakani, is the approach to **Waimea,** which is the place where Captain James Cook, R.N., made his first (January 1778) landing in the islands.

(805) A **naval anchorage** is off Waimea Bay. (See **110.1 and 110.237,** chapter 2, for limits and regulations.) Good anchorage, for other vessels, can be found in and off Waimea Bay during ordinary weather in depths of 3 to 20 fathoms, sand bottom. Small boats usually shift anchorage to Hoanuanu Bay for better protection when the trades are strong. Depths of 5 to 18 feet extend 0.3 mile from the shore of Waimea Bay. The Waimea pier, 0.3 mile NW of the Waimea River, is a former inter-island steamer landing that is used as a state recreational pier, primarily for fishing. The town has a hospital.

(806) **Waimea River,** which empties into Waimea Bay along the E side of Waimea, is navigable only for pulling boats because of the bar across the mouth; the river descends from the mountains through the deepest gorge on this part of Kauai. The ruins of a Russian fort are on the E side of the river's mouth; the fort was built in 1815 and abandoned in 1817.

(807) Between Waimea River and **Oomano Point,** 2.3 miles to the W, a reef extends 0.4 mile from shore and breaks in heavy weather. **Kikiaola Boat Harbor,** 1.6 miles W of the river, is entered over the reef and is protected by breakwaters marked by privately maintained lights. The harbor has a launching ramp and loading piers; the entrance is marked by a privately maintained lighted range. The controlling depth is about 6 feet over the reef. In August 1982, shoaling to less than 5 feet was reported in the basin. Caution should be exercised when entering or leaving the harbor due to the combined effects of the breakers and the 90° turn in the basin.

(808) **Chart 19381.–**A low plain, about 2 miles wide, extends W from Waimea River around Kokole Point and N to Barking Sands beyond Nohili Point. The shore side of the plain has a growth of algaroba trees, behind which are occasional sand dunes.

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(809) **Kekaha** is a plantation settlement on the NW side of Oomano Point and 2.5 miles from Waimea River. A mill stack is prominent.

(810) **Kokole Point,** 5 miles WNW of Waimea River, is low, rounding, and wooded. **Kokole Light** (21°58.7'N., 159°45.4'W.), 58 feet above the water, is shown from a three-legged tower with a black and white diamond-shaped daymark on the point. The transmitting antenna of Radio Station **WWVH** (National Bureau of Standards) is about 0.7 mile NW of Kokole Light.

(811) **Mana Point,** about 3.5 miles N of Kokole Point, is the W extremity of the island. Along the water's edge is a strip of sand that extends 2 miles on either side of the point, but the sea breaks on a lava ledge at the edge of the sand, making the beaching of boats dangerous except when the sea is smooth.

(812) Current observations taken during a 24-hour period 0.5 mile off Mana Point show a tidal current of 0.8 knot velocity at strength setting S and N along the coast. The S maximum occurs about 3 hours after low water at Honolulu, and the N maximum 3 hours after high water. Similar observations taken near the coast about 3.8 miles NNE of Nohili Point show a tidal current with velocities generally less than 0.5 knot.

(813) Discolored water, caused by the drainage canals and the undertow from the beach, is often noted as far as 2 miles off Mana and Kokole Points. The village of **Mana,** 1 mile inland from Mana Point, is marked by several large bushy trees and tall coconut palm trees. An aviation control tower at Bonham auxiliary navy landing field 1 mile SW of Mana is prominent.

(814) A **safety zone** extends northward from Mana Point to Polihale. (See **165.1406,** chapter 2, for limits and regulations.)

(815) A **danger zone** is between Mana Point and Nohili Point. (See **334.1390**, chapter 2, for limits and regulations.)

(816) **Nohili Point,** about 6 miles N of Kokole Point, is marked by **Nohili Dune,** 100 feet high, and the highest and southernmost of a chain of sand dunes extending along the coast for 2.5 miles to the NE. The dunes are known as **Barking Sands**. A road continues to Polihale. A light is on the point.

(817) A narrow sand shoal, with depths of 7 to 10 fathoms, extends from Nohili Point to **Alapii Point,** 7.5 miles to the NE. The shoal, which appears to be a succession of E-W sand ridges, is 1 to 2 miles from shore. A depth of 3 fathoms is 0.5 mile W of Alapii Point; from there to Kailiu Point, 7 miles farther to the NE, the 15-fathom curve is at an average distance of 1 mile from shore. A private aerolight is about 2.5 miles SW of Alapii Point, and a conspicuous radar dome antenna is on top of a high ridge about 3 miles ESE of Alapii Point.

(818) From Barking Sands NE to Kailiu Point, the coast is rocky and precipitous. The section between Alapii and Kailiu Points consists of a series of cliffs known as **Na Pali (Napali).** These cliffs are 2,000 feet high in some places, and are cut up by numerous streams which form small waterfalls. The S part of this section is practically bare, but the N part is wooded.

(819) **Kalalau Valley,** 2.5 miles NE of Alapii Point, is the broadest and deepest valley along the NW coast and is easily distinguished from seaward.

(820) **Kailiu Point,** on the N coast of Kauai, is the seaward end of a jagged ridge that ends abruptly in a sharp peak 1,200 feet high. There is a narrow strip of lowland at the point.

(821) **Chart 19385.–Haena Point,** 1.2 miles E of Kailiu Point, is low and rounding. A reef, which bares at low water, extends 0.3 mile NW from the point. The **Haena Caves,** which cannot be seen from seaward, are 0.2 mile inland under the bold face of the mountains; the caves are near the W end of the highway that skirts the N shore of Kauai.

(822) **Wainiha Bay,** 1.3 miles E of Haena Point, has an entrance width of 0.5 miles between the extensive **Kepuhi Point** reef on the W and **Kolokolo Point** on the E; inland extent is 0.4 mile. The bay is an open bight that affords little protection except in kona weather. **Wainiha River** empties into the head of the bay from the most W of the deep valleys along the N coast of Kauai.

(823) **Lumahai River,** which is unnavigable, empties into the sea on the E side of Kolokolo Point; E of the river mouth is a sandy beach with a few rocky patches.

(824) **Makahoa Point,** 2 miles ESE of Haena Point, is black and rocky. A half mile inland is Puu Ka Manu, a 714-foot hill.

(825) **Hanalei Bay** has an entrance width of a mile between Makahoa Point on the W and the extensive Puu Poa Point reef on the NE; inland extent is nearly a mile. Breaking coral reefs fringe the shores on both sides of the entrance. Seas break across the entire entrance during N or NW gales. During the winter and spring, the entire bay is subject to high surf, but when the sea is calm good protection is afforded from the trades. Midbay anchorage is in depths of 6 fathoms, sandy bottom.

(826) Along the sandy beach at the head of Hanalei Bay are clumps of ironwood and coconut trees and the houses of **Hanalei.** The highway is close to the shore. Three miles inland the mountains attain heights of more than 4,000 feet.

(827) **Hanalei River,** which empties into the E side of the bay, is navigable for shallow-draft boats for a distance of 2 or 3 miles. A privately dredged channel, marked by private daybeacons, passes close to the reef on the NE side of the bay and leads to the river mouth. At high water, a depth of 4½ feet can be carried over the bar at the mouth and about 4 feet to the bridge 1.8 miles above the mouth. A launching ramp is on the S side of the river, 0.1 mile above the mouth. A clump of ironwood trees is prominent on the N side of the river's mouth.

(828) Overhead power and telephone cables with a clearance of 27 feet cross Hanalei River at its mouth.

(829) A 300-foot long concrete pier, used as a shore recreation site for swimming and fishing, is on the E side of the bay and 200 yards S of the Hanalei River. A prominent large resort complex is on the bluff on the N side of the river near the entrance.

(830) **Waioli Stream** and **Waipa Stream.** which empty into the head of Hanalei Bay, are not navigable.

(831) **Puu Poa Point,** on the E side of Hanalei Bay, is a bluff about 50 feet high, back of which a green ridge extends inland.

(832) From offshore the N side of Kauai presents a very irregular and jagged skyline, with ridges extending in all directions. In the NW part of the island these ridges often end abruptly at the sea. The mountains are heavily wooded. The coast between Hanalei and Kalihiwai Bays is a series of more or less wooded bluffs cut up by gulches back of which a rolling plain extends to the mountains. Between the shore and the highway, l mile inland, is a resort community with homes, condominiums, and golf courses.

(833) **Kalihiwai Bay,** , 4.5 miles E of Hanalei Bay, is about 0.5 mile wide and is a popular surfing site. **Kapukaamoi Point,** a red precipitous bluff about 150 feet high, is on the E side of the entrance. Several houses are scattered along the sand beach at the head of the bay, which is backed by a wooded gulch. Indifferent anchorage, with poor holding ground, can be found in depths of 5 fathoms in the center of the bay, but a heavy swell sets in during

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N winds. A rock awash is 150 yards N of Kapukaamoi Point. A reef, 0.2 mile wide and bare at low water, fringes the shore for 2.5 miles W from Kalihiwai Bay, and vessels should stay at least 0.8 mile offshore. A shore road, with beach houses along it, extends W from the bay for 1.5 miles.

(834) **Kilauea Point,** the N extremity of Kauai Island, is a grass-covered bluff about 165 feet high. **Kilauea Point Light** (22°13.9'N., 159°24.1'W.), 174 feet above the water, is shown from a white concrete pole. **Mokuaeae Island,** 200 yards off Kilauea Point, is a black, flat, grass-topped rock about 200 yards in diameter and 92 feet high. The island is the most prominent feature in the vicinity to coasting vessels.

(835) **Kilauea,** 1.3 miles inland from Kilauea Point, is the site of a sugarmill, but is not easily seen when close to the shore. The sugar of the district is trucked to Nawiliwili for shipment.

(836) Between Kilauea Point and Mokolea Point the coast is bluff, rising gradually from each point to an elevation of about 570 feet midway between them.

(837) **Makapili Rock,** 0.8 mile SE of Kilauea Point, is 156 feet high, black, and prominent. The rock is on the outer end of a narrow neck of land that juts out 200 yards from the general coastline.

(838) **Mokolea Point,** 1.2 miles SE of Kilauea Point, is narrow and 140 feet high, and projects out 0.3 mile from the general coastline. The point is on the NW side of Kilauea Bay and has two old buildings near its outer end. An abandoned rock quarry is on the E side of the point.

(839) **Kilauea Bay** has an entrance width of 0.5 mile and an inland extent of 0.5 mile. The bay is subject to high surf, especially in the winter and spring. The bay is open to the trades, but offers some protection in W weather. A narrow coral reef fringes the shore, and **Kilauea Stream** empties into the head of the bay. Anchorage can be found in depths of 6 fathoms, rocky bottom, near the center of the bay.

(840) Low **Kepuhi Point** is 2 miles E of Mokolea Point. The low coast between the two points is fringed with a narrow coral reef.

(841) **Chart 19381.–Moloaa Bay** (22°12'N., 159°20'W.), 4.5 miles SE of Kilauea Point, has an entrance width of 0.3 mile and extends the same distance inland to the mouth of a gulch. Little protection is afforded from the heavy swell that sets into the bay during the trades, but anchorage is possible during S winds in depths of 3 to 6 fathoms in midbay. There are a few houses along the sand beach at the head of the bay, and rice is grown in the gulch. The interior between Moloaa and Anahola Bays is used for pineapple cultivation and for grazing.

(842) **Papaa Bay,** 6 miles SE of Kilauea Point, is a small bight that is wide open to the trades. The central part of the bay is foul, and there is a rock awash 300 yards from shore. A coral reef fringes the S shore.

(843) **Anahola Bay,** 7.5 miles SE of Kilauea Point, is a small bight exposed to the trades. **Kahala Point,** a low bluff with a grove of ironwood trees near the outer end is on the SE side of the bay. **Kahala Point Light** (22°08.8'N., 159°17.7'W.), 42 feet above the water, is shown from a 20-foot steel pole with a black and white diamond-shaped daymark on the point. A water tank 1 mile W of the light is prominent. Discolored water frequently extends for a considerable distance off **Kuaehu Point** on the NW side of the bay. A reef extends about 0.3 mile from Kuaehu Point. Because of the numerous reefs, strangers should not attempt to enter the bay. In moderately smooth weather small vessels can find anchorage well inside the bay in depths of 4 to 6 fathoms, mud bottom.

(844) **Puu Konanae,** 1.3 miles inland from Anahola Bay, is a tall, dark spire, with green slopes, that stands out more prominently than any other land feature on this part of the island.

(845) Between Kahala Point and Kealia are low coastal bluffs and a rocky shore with some patches of sand.

(846) **Kealia,** 3 miles S of Kahala Point, is a plantation village. A short breakwater, extending SE from the shore, affords some protection from N weather for shallow-draft boats. The breakwater is not kept in repair, and portions have been carried away by the sea. Vessels should not approach the village without local knowledge. About 0.7 mile S of Kealia, a flat building on a low hill is prominent from offshore.

(847) **Kapaa,** 4.5 miles S of Kahala Point, is scattered along the beach. A reef, which is 0.3 mile wide in some places, extends alongshore from N of Kapaa to Hanamaulu Bay. An opening in the reef at Kapaa is usually marked by breakers on either side. Small craft find anchorage in depths of about 2 fathoms behind the reef and about 150 yards off the N side of the village.

(848) **Wailua** is a settlement at the mouth of **Wailua River,** which empties into small **Lehuawehe Bay** 6.5 miles S of Kahala Point. The river, which is spanned by a bridge at its mouth, is navigable for small boats for several miles, once a shifting bar at the mouth is passed. Only very shallow draft vessels can cross the bar even at high tide, and only during calm weather. A public marina is 0.3 mile above the mouth. Vessels may find unprotected anchorage off Wailua in depths of 10 to 15 fathoms, rocky bottom, but like the whole NE coast of the island, anchorage is not safe when the trade winds are blowing. **Waipouli** is a village 1 mile NE along the highway from Wailua.

(849) **Nonou,** 1.3 miles NW of Wailua and 1,241 feet high, is the northernmost and highest of the low mountains near the coast.

(850) **Kalepa Ridge** is 1 mile inland and parallels the coast from Wailua to Hanamaulu Bay. The S end of the ridge, which is about 700 feet high, is marked by several buildings high on the seaward face of the bluff. The buildings can be seen for many miles offshore and are a good leading mark for Hanamaulu Bay.

(851) **Chart 19384.–Hanamaulu Bay,** 10 miles S of Kahala Point and 2.6 miles N of Nawiliwili, is about 0.3 mile wide and indents the coast about 0.5 mile. **Ahukini Landing** is on the point on the S side of the entrance. Only the outer third of the bay has deep water; the sand and coral bottom slopes gradually from the 18-foot curve to the beach at the head of the bay. The shores of the bay are low, rocky bluffs, about 40 feet high, except for the white sand beach at the head. A fringe of trees on the bluffs forms a windbreak for the extensive cane fields on either side of the bay. **Hanamaulu Stream,** which empties into the head of the bay, is not navigable.

(852) The 20-foot concrete tower of an abandoned lighthouse is on the outer end of the 300-foot stone breakwater that projects from the S point of Hanamaulu Bay entrance; the pilings and ruins of a small wooden pier are at the inner end of the breakwater. The bay is no longer used by large vessels. Only the concrete piling remains of the former wharf at Ahukini Landing, and most of the port installations are in ruins. A heavy outside swell causes a heavy surge in the harbor.

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(853) **Chart 19381.**–From Hanamaulu Bay to Nawiliwili the coast is a series of low bluffs with occasional stretches of sand beach; there are no off-lying dangers. Sugarcane is grown extensively on the land back of the beach. An aerolight at Lihue Airport is 0.7 mile S of Hanamaulu Bay.

(854) **Chart 19380.–Kaulakahi Channel,** between Kauai and Niihau, is about 15 miles wide and clear of obstructions. Off Mana Point the trade wind following the S coast of Kauai meets the air current that has followed around the N side. The trades blow directly across the lowlands of Niihau, but part is deflected S and around the SE point of the island.

(855) **Currents.**–Little is known of the current in Kaulakahi Channel, but presumably it is variable depending mainly upon the velocity and direction of the wind. There appears to be a general NW flow along the SW coast of Kauai. It is reported that a current sometimes sets S along the E coast of Niihau at the same time that the current is setting NW along the Kauai coast. There are noticeable tidal currents near the W extremity of Kauai.

(856) **Niihau,** 15 miles W across Kaulakahi Channel from Kauai, is seventh in size and westernmost of the eight major islands. Niihau has an area of 72 square statute miles, a NE-SW length of 16 nautical miles, and an average width of 3.5 miles. Near the middle of the island is a high tableland with occasional rises or cones, the highest of which is 1,281-foot **Paniau.** The N and E ends of the tableland are precipitous and vary in height from 600 to 1,000 feet; the S and W slopes are gradual. An unpaved road follows the W coast of Niihau for most of its length. The island lies in the rain shadow of Kauai and is a semi-arid island with no streams.

(857) The population of Niihau was 230 in 1990. One family owns the entire island and operates it as a cattle ranch. There are no scheduled communications with the island.

(858) **Lehua,** about 0.6 mile off the N end of Niihau, is a small rocky, crescent-shaped island, with the crescent open to the N. The E and W points are low, rising gradually to an elevation of about 700 feet near the center of the island. On the W point is a natural arch. **Lehua Rock Light** (22°01.1'N., 160°05.9'W.), 704 feet above the water, is shown from a 10-foot post on the summit of Lehua.

(859) **Lehua Channel,** between Niihau and Lehua, is restricted on its S side by rocks that show above water and extend about halfway across it. A depth of 9 fathoms can be carried through the channel by staying within about 350 yards of the Lehua shore. In heavy NW weather the swell almost breaks in the passage, and, as little is to be gained by using the channel, vessels should pass N of Lehua Island. The current through the channel varies with the tide and sets in both directions with a velocity of about 1.5 knots.

(860) To the E of Lehua Channel vessels should give the N coast of Niihau a berth of 0.5 mile; to the W the clearance should be about 1 mile.

(861) **Puu Kole (Puukole Point),** on the N end of Niihau, is low, as is **Kikepa Point,** 1 mile to the E. Between these points and the high bluff on the N side of the tableland, the land is low and grass covered, with a few low hills. From a distance this lowland is not visible and Lehua appears to be about 3.5 miles from Niihau.

(862) **Kaunuopou Point**, 1.8 miles SE of Kikepa Point, is the easternmost point of Niihau. **Kaunuopou Rocks**, over which the sea breaks, are 300 yards off the point. Another rock, about 0.4 mile off the S side of the point, usually breaks and should be given a good berth by vessels approaching Kii.

(863) **Kii (Kii Landing)**, a small bight about 0.7 mile W of Kaunuopou Point, is only slightly protected from the trade winds. The landing is usable in ordinary weather, but not in S weather. The landing is built on beach boulders and has depths of only 2 or 3 feet alongside. Anchorage can be had in depths of about 8 fathoms, coral bottom, about 0.6 mile off the landing.

(864) About 1.3 miles S of Kii, a reef with about 1 fathom of water over it and usually breaking, extends 0.5 mile offshore. The 10-fathom curve is about 1 mile offshore. From the vicinity of the reef to Pueo Point the coastline consists of cliffs reaching a height of 1,000 feet.

(865) **Pueo Point**, 5 miles S of Kaunuopou Point, is a prominent brown, precipitous bluff about 800 feet high. SW from the point for a distance of about 4.5 miles the coastline consists of bluffs that gradually diminish in height toward the lowlands of the S half of the island. The bluffs are broken by small bights, most of which have short sand or pebble beaches where boats could land during smooth weather. Beyond the bluffs to Kawaihoa, a distance of about 6 miles, the coast consists of a series of low bluffs about 15 feet high, with stretches of sand beach, a few sand dunes, and scattered trees. Between Pueo Point and Kawaihoa are no known outlying dangers; the few isolated rocks are very close to the shore.

(866) The lowland of the S part of the island is broken by two hills, one on Kawaihoa and the other, **Kawaewae**, a gently rounded hill 315 feet high, which is 4 miles N of the cape and 1.3 miles inland from the W coast.

(867) **Kawaihoa (Kawaihoa Point)**, the southernmost point of Niihau, is formed by a hill 548 feet high, the seaward face of which is steep. From a distance the hill has the appearance of an island and can easily be mistaken for Kaula. Deep water is close to the point. About 2 miles S of the point there is a prevailing W current which reaches a velocity of about 1.5 knots.

(868) Beyond Kawaihoa the coast gradually curves NW and N and is low and rocky with occasional short sand beaches. At **Leahi (Leahi Point),** 1.7 miles W of Kawaihoa, the 10-fathom curve is 0.6 mile offshore. A road skirts the W shore.

(869) The coast between **Kamalino**, a former village 4 miles NW of Kawaihoa and Puu Kole, is practically one low, continuous beach, with an occasional group of rocks. Near the beach are numerous sand dunes covered with sparse vegetation. In the vicinity of Kamalino, weak currents have been reported setting N and S along the coast.

(870) **Nonopapa Landing**, 5.5 miles NW of Kawaihoa, is the principal landing on the island. Local vessels call occasionally for the island's cattle. The landing is used only from May to September, as there is often a heavy N swell during the winter. The landing is marked by a shed and derrick on a short concrete retaining wall at the N end of a long sand beach. **Kaeo**, a cone 1,018 feet high and near the center of the tableland, shows on the skyline from the anchorage.

(871) Anchorage is available in depths of 8 fathoms, coral and sand bottom, about 660 yards off the derrick, with the landing shed and Kaeo in range and bearing 070°. Kawaewae is 1.5 miles 135° from the anchorage. The landing is somewhat protected by a small reef extending about 75 yards SW from the end of the retaining wall. Small boats approaching the landing head S of it until the reef is rounded. **Puuwai,** the principal village of the island, is about 2.5 miles NE of the landing.

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(872) **Kuakamoku Rock,** 1.6 miles N of Nonopapa Landing, is a large, single rock about 4 feet above water and near the center of a reef some 200 yards in diameter and 500 yards offshore. The reef should be given a berth of 0.5 mile, and only small craft should attempt the passage between the reef and the shore. Other reefs extend about 0.5 mile offshore 0.5 mile S, and 3 miles NE of Kuakamoku Rock.

(873) **Kaununui (Kaununui Point)**, 4.5 miles NE of Kuakamoku Rock, is marked by a group of rocks a few feet high and close to the shore. A coral reef with depths of 6¼ fathoms over it is 1.5 miles off the point. It is reported that the reef breaks in heavy weather. The passage inside the reef is not recommended except for small boats.

(874) **Keawanui Bay**, is no more than a slight curve in the shoreline that extends NE from Kaununui for 3 miles. The bay has a sand and coral bottom and a sandy shore. A rock with 2 feet of water over it is in the S part of the bay, 0.8 mile N of Kaununui and 0.5 mile offshore.

(875) From the N side of the bay to Puu Kole the coast is foul for a distance of about a mile offshore. Vessels should give this section of the coast a berth of at least 1 mile. About 2 miles W of Puu Kole and 0.9 mile offshore is a reef with reported depths of 12 feet over it. A mile S of this reef and 0.8 mile offshore is a rock with 5 feet of water over it.

(876) **Kaula**, 19 miles SW of Niihau, is a small, bare, rocky islet, 550 feet high. Vessels have anchored close to both the S and E sides of Kaula in depths of about 20 fathoms, but as the islet is only 0.7 mile long, little protection is afforded. A rock with a least depth of 5 fathoms is 3.8 miles 300° from the highest point on Kaula. A bank with depths of 30 to 40 fathoms extends 5 miles NW from the islet.

(877) The **danger zone** of an aerial bombing and strafing target is centered on Kaula. (See **334.1340**, chapter 2, for limits and regulations.)

(878) **Chart 540.–Outer Islands.** The small rocky islands, reefs, and atolls WNW from Niihau form a well-defined chain in the Hawaiian Archipelago. Between Niihau and Gardner Pinnacles, 480 miles distant, are several widely separated high barren rocks; continuing W are the coral reefs and atolls.

(879) The Hawaiian Archipelago from longitude 161°W. to 176°W. is part of the **Hawaiian Islands National Wildlife Refuge,** and under the jurisdiction of the U.S. Fish and Wildlife Service, Department of Interior. The islands and atolls in the refuge include Nihoa, Necker Island, French Frigate Shoals, Gardner Pinnacles, Maro Reef, Laysan Island, Lisianski Island, Pearl and Hermes Reef, and all intervening reefs and shoals, which are also part of the so-called Leeward Islands.

(880) The refuge was established in 1909 in order to preserve wildlife including very rare forms, found in the area. All fish and wildlife are protected. Federal laws governing wildlife and national wildlife refuges are in force. Sharks are abundant throughout the refuge. Entry to the refuge is **prohibited** except by permit issued by the Refuge Manager, Hawaiian/Pacific Islands National Wildlife Refuge Complex, U.S. Fish and Wildlife Service, 300 Ala Moana Boulevard, P.O. Box 50167, Honolulu, Hawaii 96850. Entry upon Tern Island of French Frigate Shoals and Green Island, Kure Atoll, must be also by approval Commander, 14th U.S. Coast Guard District, Honolulu. The restrictions apply to all civilian and military agencies, as well as individuals. Because of the extreme fragilities of the refuge islands ecosystems general public use is not permitted. Entry to the entire refuge is restricted to scientists on previously U.S. Fish and Wildlife approved research projects.

(881) **Areas to be Avoided-Hawaiian Islands.**–The International Maritime Organization (IMO) has adopted certain areas to be avoided in the region of the Hawaiian Islands National Wildlife Refuge. To avoid the risk of pollution due to an accident in these areas, all vessels of more than 1,000 gross tons carrying cargoes of oil or hazardous materials should avoid the areas within a circle having a radius of 50 miles centered upon the following geographical positions:

(882) Pearl and Hermes Reef (27°50'N., 175°50'W.);

(883) Lisianski Island (26°00'N., 173°55'W.);

(884) Laysan Island (25°45'N., 171°45'W.);

(885) Maro Reef (25°25'N., 170°35'W.);

(886) Gardner Pinnacles (25°00'N., 168°00'W.);

(887) French Frigate Shoals (23°45'N., 166°15'W.);

(888) Necker Island (23°35'N., 164°40'W.);

(889) Nihoa (23°05'N., 161°55'W.).

(890) **Atolls**.–An atoll may comprise one or more low coral islands situated on a strip or ring of coral surrounding a central lagoon. Many of these atolls have openings in the coral ring that permit passage of small boats, and sometimes large vessels, to anchorage in the enclosed lagoon.

(891) **Reefs.–**Successful navigation through or among coral reefs often depends on the eye. They are always more plainly to be seen from the masthead than from the deck or bridge. The best observing conditions are with the sun high and behind the observer, and with the sea slightly ruffled; reefs are extremely difficult to distinguish if the sea is glassy calm.

(892) Reefs with about 3 feet of water over them appear light brownish in color; those with a fathom or more appear light green, deepening to dark green and finally deep blue. Under favorable circumstances, a reef with depths of 3 or 4 fathoms over it can be seen from aloft for a considerable distance; in greater depths, the reef can only be seen when nearly over it. Polaroid glasses have been found of great help in navigating among reefs.

(893) **Vigias.–**A vigia is an indication on a chart that a dangerous rock or shoal is thought to be near the spot indicated. Doubtful navigation and strong currents account for a large proportion of the vigias that encumber or have encumbered the charts of the Pacific Ocean. Phosphorescence, seaweed scum, and shoals of fish often resemble reefs and breakers so closely as to deceive the most experienced. Many vigias have been disproved by extensive investigation, but many others are still on the charts and remain a source of annoyance to the navigator.

(894) **Chart 19016.–Nihoa** (23°03' N., 161°55' W.), a barren, rocky, and uninhabited island, is about 120 miles NW of Niihau. The island was discovered by Captain Douglas of the British vessel IPHIGENIA on April 13, 1790. The low, stone walls of ancient Polynesian ceremonial sites still remain on the island. The island is inhabited by a number of species of sea birds and two extremely rare land birds.

(895) Nihoa is about 0.8 mile long and 0.2 mile wide. The E, N, and W sides are high and precipitous; the S side is much lower and its slopes are more gradual. **Millers Peak,** 910 feet high and the highest point on the island, is near the NW end. **Tanager Peak**, 874 feet high, is near the NE end. The SE and SW sides of the island terminate at points on either side of **Adams Bay.** In the bay are three small bights; the westernmost has a sand beach, and

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the shores of the other two are rocky ledges. There is deep water, close to all sides of the island.

(896) The safest anchorages are between the 15-and 20–fathom curves W and SW of the island, but the holding ground is poor. The middle cove of Adams Bay probably affords the best landing, but the surge is considerable and great care must be taken in landing anywhere on the island. During heavy NW weather landing is very dangerous. A steep trail leads from the middle cove to the top of the bluff. At the foot of the bluff is a seepage of water that is not suitable for drinking purposes except in emergencies.

(897) **Currents.–**The prevailing current sets W in the vicinity of Nihoa. Current observations taken about 0.2 mile W of the island show a nontidal flow of about 0.2 knot setting WSW combined with a tidal current of nearly 0.5 knot at strength setting N and S. The N strength of the tidal current occurs about 6 hours after the local transit of the moon and the S strength at about the time of local transit. The velocity measured was nearly 2 knots and set S.

(898) **Local magnetic disturbance.–**Differences from normal variation of as much as 33° have been observed on Nihoa.

(899) Nihoa is near the SW end of a bank which is about 18 miles long in a NE-SW direction 10 miles wide and has depths of 14 to 36 fathoms, except for a reported depth of 6½ fathoms at the westernmost extremity. Another bank, the center of which is about 18 miles WSW from Nihoa, is about 14 miles long in an E-W direction, 9 miles wide, and has depths of 15 to 25 fathoms, except for an 11-fathom depth about 2 miles SE of its center, and a 14-fathom depth about 6 miles SSE of its center, reported in 1968. A bank about 54 miles SE of Nihoa has a least depth of 32 fathoms except for a reported depth of 19 fathoms at its S end; the positions of the reported depths are approximate and caution is advised. The two banks 57 and 70 miles W of Nihoa have least depths of 29 and 33 fathoms, respectively. The edges of the bank slope steeply to much greater depths. A 9-fathom shoal is about 5 miles NW of the E bank.

(900) **Necker Island** (23°34'N., 164°42'W.) is 158 miles W from Nihoa. It was discovered by La Perouse on November 1, 1786, and was annexed to Hawaii in 1895. The island, which might well be called a rock, is uninhabited, but, like Nihoa, shows unmistakable evidence of ancient habitation. It is the home of countless sea birds.

(901) About 0.7 mile long and less than 0.2 mile wide, Necker Island is made up entirely of lava. There are four peaks or hills, one near each end and two between. The highest, **Summit Hill**, 277 feet high, is near the middle of the island. **Annexation Hill**, 249 feet high, at the W end of the island, is separated from the other hills by a low saddle and, when seen from a distance appears detached. There is a sparse growth of low brush on the upper slopes of the hills.

(902) **Northwest Cape,** a rocky spur extending N from the W end of the island, is joined to the rest of the island by a low isthmus over which the seas break in rough weather. On the W side of the cape is **West Cove,** and on the E side is **Shark Bay**. Off the E end of the island are several low, detached rocks. A depth of 5 fathoms has been reported 0.5 mile S of Necker Island where general depths are 10 to 12 fathoms.

(903) Vessels can anchor in depths of about 12 fathoms 0.5 mile S of the SW point of the island, but the island is so small that it affords little protection. West Cove and Shark Bay are the landing places, and are usually very hazardous and there are times when it is impossible to land anywhere on the island. During heavy NW weather landing at West Cove is very dangerous. Shark Bay, open to the NE trades, is usually filled with breakers. Small seepages of unpalatable water have been found on the island.

(904) **Tide.–**The rise and fall of the tide is about 1 foot.

(905) **Currents.–**The prevailing current sets W, but countercurrents may be expected close to the island. Four days of current observations taken 0.2 mile WNW of the W end of Necker Island show a W nontidal flow of about 0.5 knot, combined with a tidal current of about 0.8 knot at strength. E trade winds prevailed during the observations.

(906) **Weather, Necker Island.–**September is reported to be the calmest month of the year; strong N and NE winds prevail during the other months.

(907) **Local magnetic disturbance.–**Differences from the normal variation of as much as 22° have been observed on Necker Island.

(908) Necker Island is near the N end of a bank about 40 miles long in a NW-SE direction. The bank is about 15 miles wide and has depths of 8 to 23 fathoms except for a reported 5-fathom depth 0.5 mile S of Necker Island and a 5-fathom depth reported in 1968 about 5 miles N of Necker Island. The sand and coral bottom is plainly visible. A 10-fathom shoal has been reported about 19 miles NE of Necker Island.

(909) **Charts 19401, 19402.–French Frigate Shoals,** about 85 miles W from Necker Island, is a crescent-shaped atoll about 17 miles long in a NNW direction. It was discovered by La Perouse on November 6, 1786, the day after leaving Necker Island, and like that island, was annexed to Hawaii in 1895. The atoll consists of a coral reef with a number of small, bare, sand islets on it, and is flanked by a volcanic rock and numerous coral heads and reefs. It is home to many sea birds, seals, turtles and other fish and wildlife all protected by Federal Law.

(910) La Perouse Pinnacle and Tern Island are the best landmarks. The other islands are of little assistance in navigation due to their constantly changing size and shape and low elevations. Shark Island has been observed to be particularly unreliable in this regard.

(911) The crescent reef is double, and the outer and inner arcs bound a lagoon that is 1 to 6 miles wide. At its midpoint the windward reef lies about 8 miles from a line joining the tips of the crescent; the leeward reef is about 5 miles from this line. The windward reef is nearly continuous and can be plainly seen in the daytime for a considerable distance by vessels approaching from the N, E or SE. The sea practically always breaks over the reef, and during the few times it is not breaking, the green shoal water inside the reef is seen in ample time to avoid danger. The bottom slopes uniformly from the reef to the 100-fathom curve 1 to 2 miles off, and there are no known dangers from N through E to S of the windward reef.

(912) The leeward or inner reef, however, is broken in many places and in normal weather is seldom marked by breakers. The lagoon between the reefs is very foul with numerous coral heads, some just under the surface of the water.

(913) A bank with depths of 8 to 20 fathoms extends about 8 miles W from the midpoint of the inner reef, where it then drops off rapidly to great depths.

(914) **La Perouse Pinnacle** (23°46'N., 166°16'W.), a volcanic rock about 60 yards long, 20 yards wide, and 122 feet high, lies about midway between the tips of the crescent and W of the leeward arc of the reef. The rock is so steep and rugged that is almost

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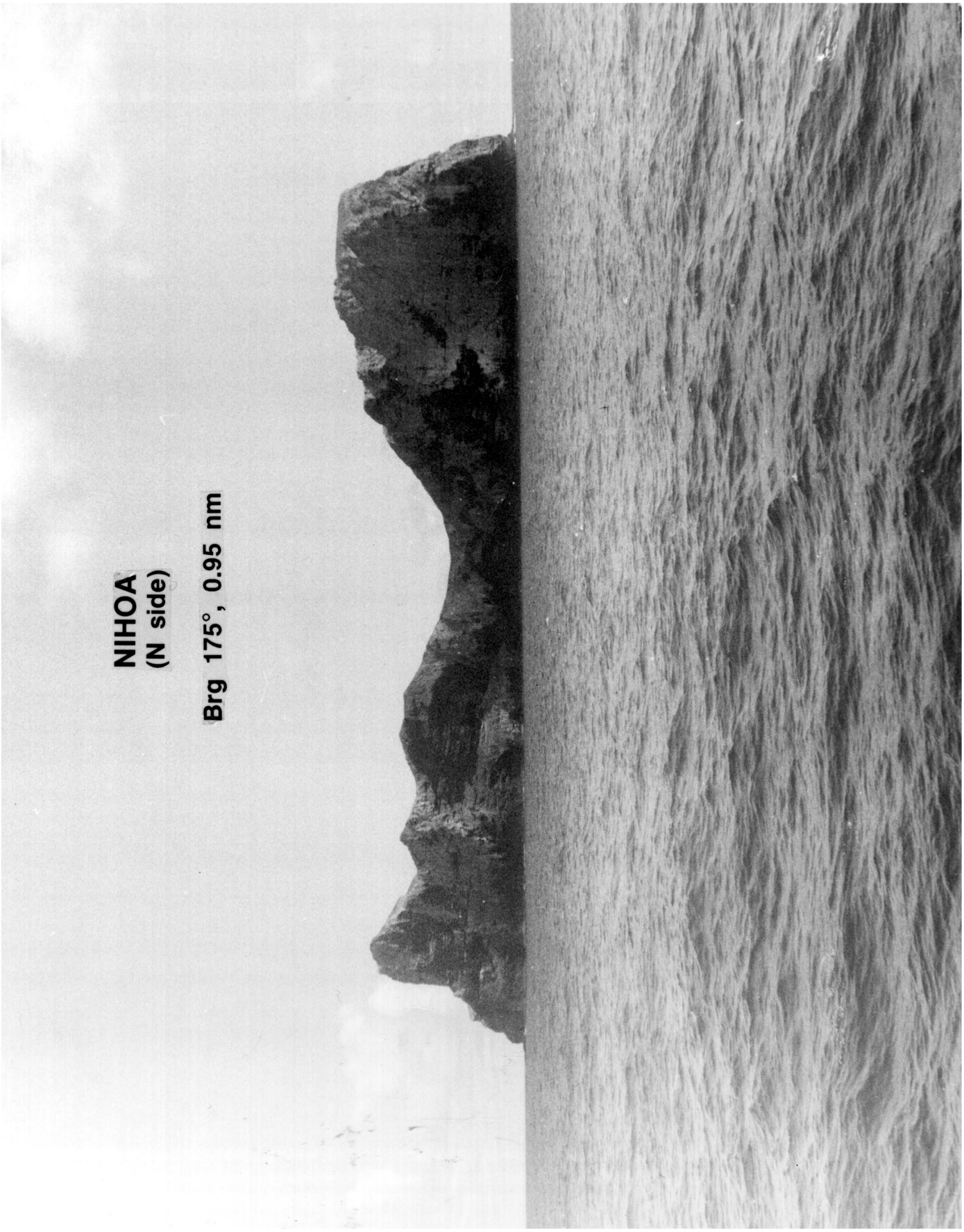
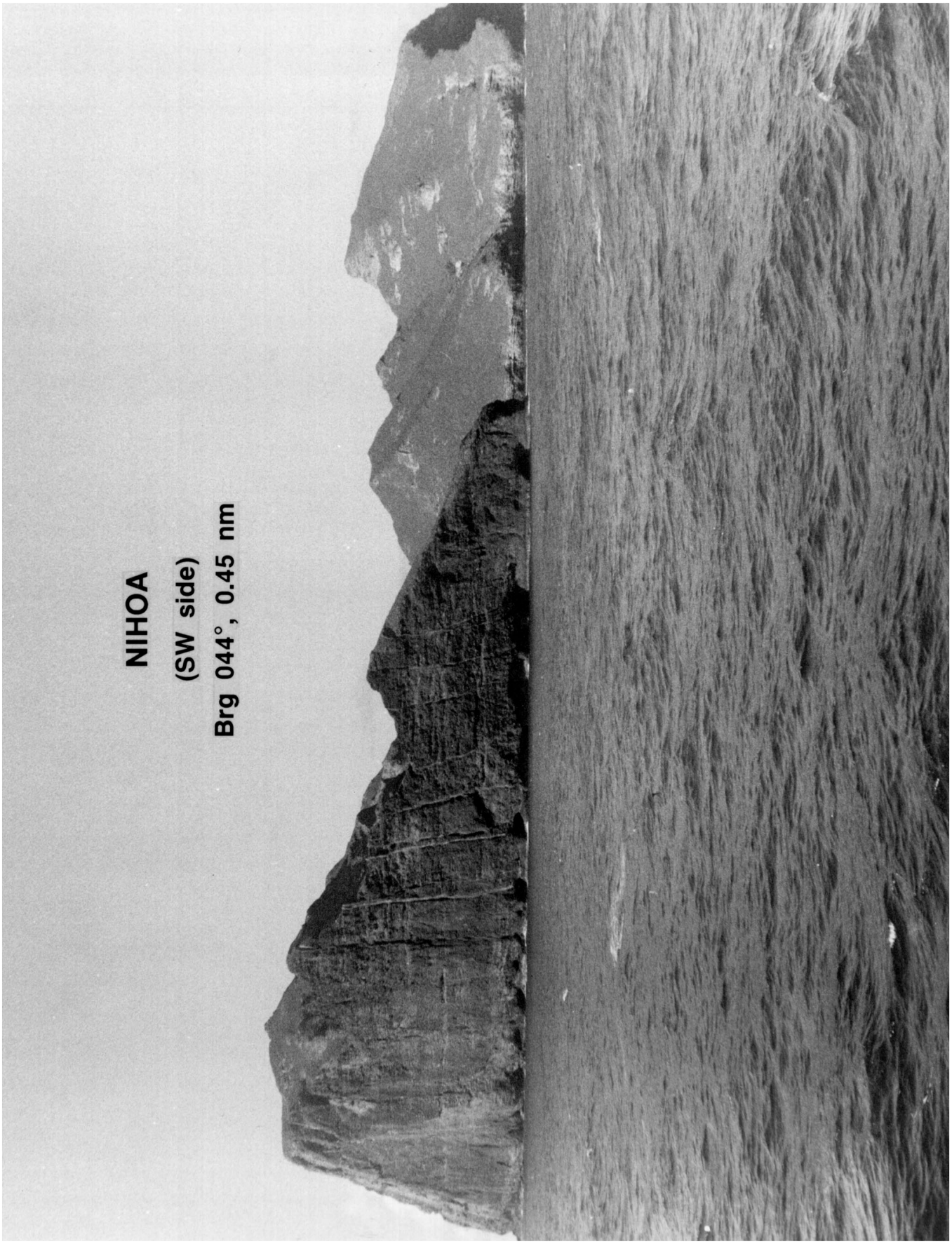
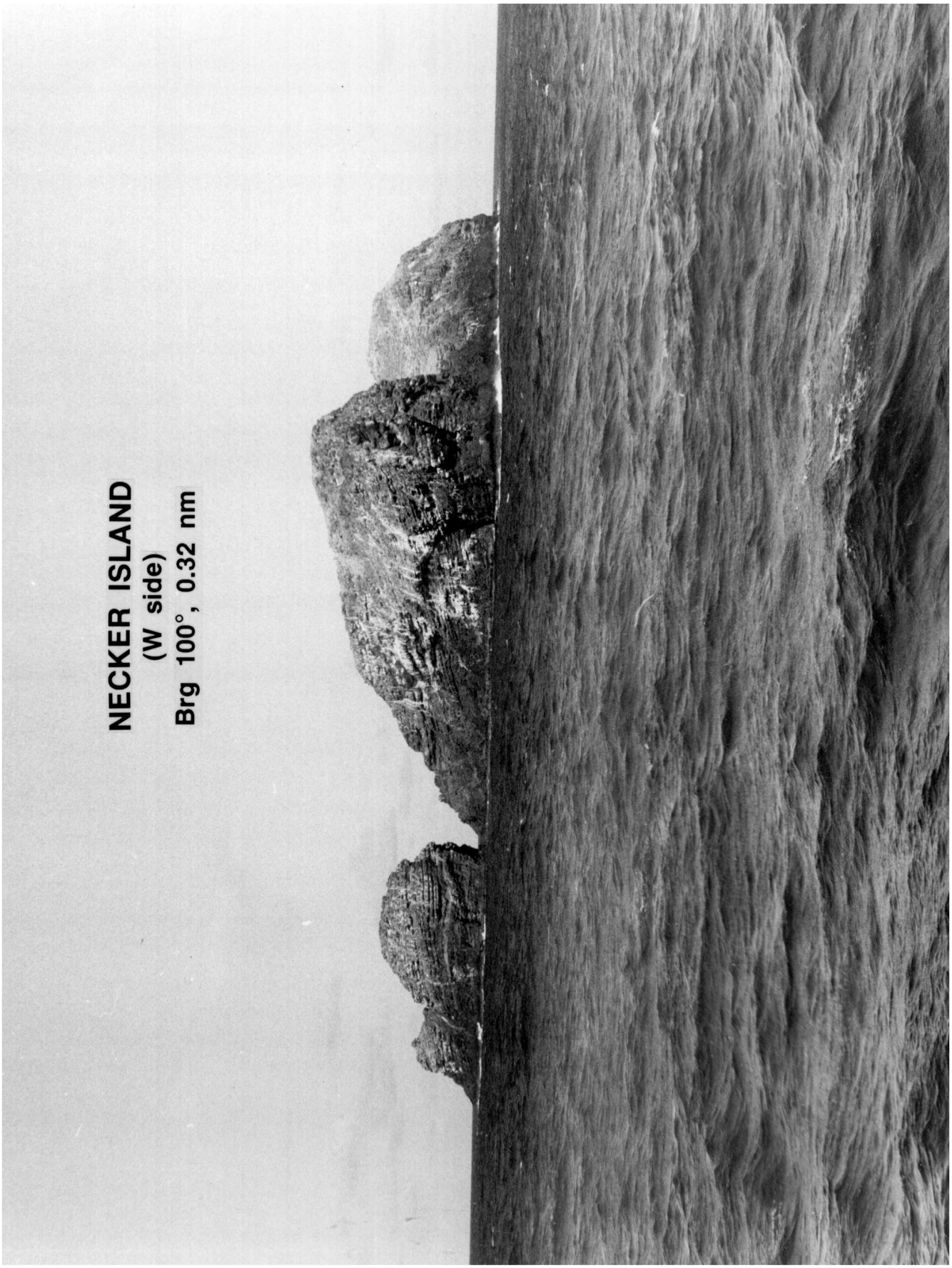

NIHOA
(N side)
Brg 175°, 0.95 nm


NIHOA
(SW side)
Brg 044°, 0.45 nm


NECKER ISLAND
(W side)
Brg 100°, 0.32 nm

inaccessible. From a distance its guano-coated outline resembles a brig under sail. A small detached lava rock about 9 feet high lies off the W side of the pinnacle. The points of the crescent reef, as indicated by the ends of the line of breakers, bear about 170° and 310° from La Perouse Pinnacle. La Perouse Pinnacle is reported to be the first object sighted, generally, when approaching the atoll, and that it is usually picked up on radar at 12 to 15 miles.

(915) **Shark Island,** the northwesternmost of the sand islets, lies 6 miles NW of La Perouse Pinnacle. A coral reef fringes the island. **Tern Island,** about 2 miles ENE of Shark Island, is marked by two 40-foot towers, low concrete buildings, a wooden telegraph pole, and four large trees. The island and buildings are visible at 8 and 5 miles, respectively. There are no facilities on the island.

(916) **East Island**, 3 miles ENE of La Perouse Pinnacle, is a low sand bar 600 yards long in a NW direction and about 100 yards across. Reefs that are awash most of the time extend a mile W and 0.2 mile S from the island; the S reef seldom breaks. A coral head that sometimes breaks is 0.6 mile S of East Island. NE and E of the island are numerous coral heads and reefs.

(917) Extreme caution must be exercised when navigating in the vicinity of these islets because of the numerous coral heads.

(918) **Channels.**–The principal approach to Tern Island is through a natural channel that leads to a lagoon and anchorage SE of the island. Entry into the lagoon is through an opening in the reef indicated by the 3¼-fathom sounding in 23°51'09"N., 166°16'27"W., on chart 19402. Mariners are advised that attempting entry into the lagoon requires extensive local knowledge, good sea and weather conditions, and the sound judgment to recognize when conditions allow committing the vessel to a course through the reef opening.

(919) **Anchorages.**–The best holding ground SW of French Frigate Shoals is in depths of 13 to 15 fathoms, sand bottom; in lesser depths the bottom is mostly coral. There are no all-weather anchorages for large vessels, but the conformation of the reef is such that some protection can be found from choppy seas and ground swell. Small vessels can find good protection from most weather behind the shoals and coral heads.

(920) **Routes.**–Vessels approaching French Frigate Shoals from the N, E, or SE in the daytime should have no difficulty in picking out the outer reef from a considerable distance off. La Perouse Pinnacle, plainly visible from outside the reefs in clear weather, is reported to make a good radar target at 19 miles. From the S, the reef is not so easily seen. The sea may not break over the shoals, and although the bottom is plainly visible close in, the shoals might not be detected from a short distance. The 100-fathom curve is only about 0.5 mile from the shoals.

(921) **Currents.**–A prevailing current sets W in the vicinity of French Frigate Shoals, but variable currents have been noted. A SW current of 2 knots has been measured. A 1-day series of half-hourly current observations taken 0.7 mile W of the S end of the shoal during a period of small wind velocity shows practically no current.

(922) **Weather, French Frigate Shoals and vicinity.**–The NE trades prevail throughout the year, but W blows can be expected during the winter. The average wind velocity is 12 knots, with monthly averages of about 16 knots in December to 9.5 knots in August. Gales have been experienced in July and September. Occasional heavy showers of short duration cut visibility to about 2 miles (4 km).

(923) **Chart 19019.–Brooks Banks** and **St. Rogatien Bank** are a group of five coral banks between French Frigate Shoals and Gardner Pinnacles. The banks extend 50 miles in a NW direction, have depths of 11 to 59 fathoms, and are separated by channels several miles wide and more than 100 fathoms deep. The largest of these banks lies 60 miles 305° from La Perouse Pinnacle, is about 12 miles in diameter, and has depths of 12 to 56 fathoms. The southeasternmost bank, the smallest in the group, is 27 miles 297° from La Perouse Pinnacle, is about 2 miles in diameter, and has depths of 28 fathoms. The northwesternmost bank is 75 miles 311° from La Perouse Pinnacle, is about 6 miles long and 4 miles wide, and has depths of 30 to 43 fathoms.

(924) Unprotected anchorage can be had on the shoaler areas, but the holding ground is only fair. The sand and coral bottom is plainly visible. There are no known dangers.

(925) **Currents.**–The oceanic flow is variable, but usually sets W. Sixty half-hourly current observations indicate a NW nontidal current of about 0.5 knot, combined with a tidal current of 0.8 knot at strength. The tidalcurrent is somewhat rotary, turning clockwise. The largest velocity observed was nearly 1.5 knots setting W.

(926) **Chart 19421.–Gardner Pinnacles** (25°00'N., 168°00'W.) are 120 miles NW of La Perouse Pinnacle. They were discovered by Captain Allen of the whaler MARO in June 1820. The pinnacles are solid, volcanic, rocky islets; the larger pinnacle is 190 feet high and about 200 yards in diameter, and the smaller about 100 yards from the NW side of the larger. The rocks are barren of vegetation and are covered with guano, giving them a snow-capped appearance. The only off-lying dangers are a small rock just off the NW side of the larger pinnacle and two 20-foot patches, one of which is about 100 yards S of the larger pinnacle and the other just N of the smaller pinnacle. From an E approach, the pinnacles are reported visible at a distance of 20 miles.

(927) Anchorage can be had anywhere on the bank which surrounds the pinnacles, but there is no protection; in general, the holding ground is poor. In comparatively smooth weather, landings can be made just N of the bight on the W side of the larger pinnacle. Because of its exposed position, most times the surf breaks high up its sides and landings are extremely hazardous and generally impossible. Some sea birds nest on its higher elevations.

(928) **Currents.**–Current observations taken at a number of locations in the vicinity of Gardner Pinnacles show a WNW oceanic drift of about 0.2 knot combined with a rotary tidal current, turning clockwise, of 0.2 knot at strength. Velocities of about 2 knots setting WSW were measured during E winds.

(929) Gardner Pinnacles lie near the NE side of a bank about 50 miles long, in a N-S direction, and about 20 miles wide near the N end. The bank has depths of 10 to 25 fathoms, and the sand and coral bottom is plainly visible.

(930) **Chart 19019.–Raita Bank** (25°32'N., 169°28'W.), is about 85 miles 291° from Gardner Pinnacles. It was discovered in 1921 by the French schooner RAITA. The bank is about 20 miles long in a NNE direction and has a maximum width of about 10 miles. Depths range from 9 to 20 fathoms, and the sand and coral bottom is plainly visible under ordinary weather conditions. At the 20-fathom curve, the bottom drops off rapidly to great depths. In heavy weather, the swells seem to lump up slightly over the shoaler areas, but there are no known dangers.

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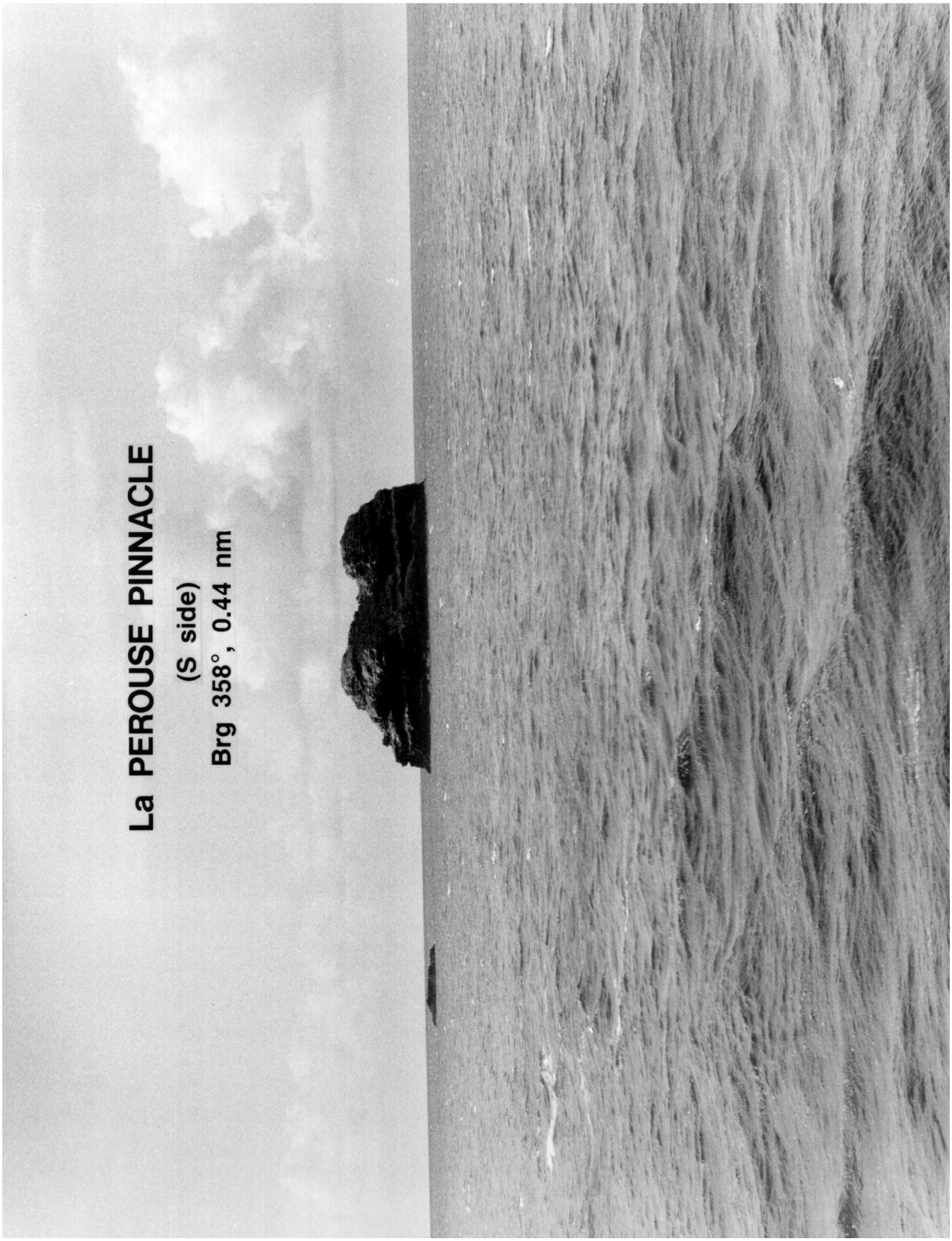
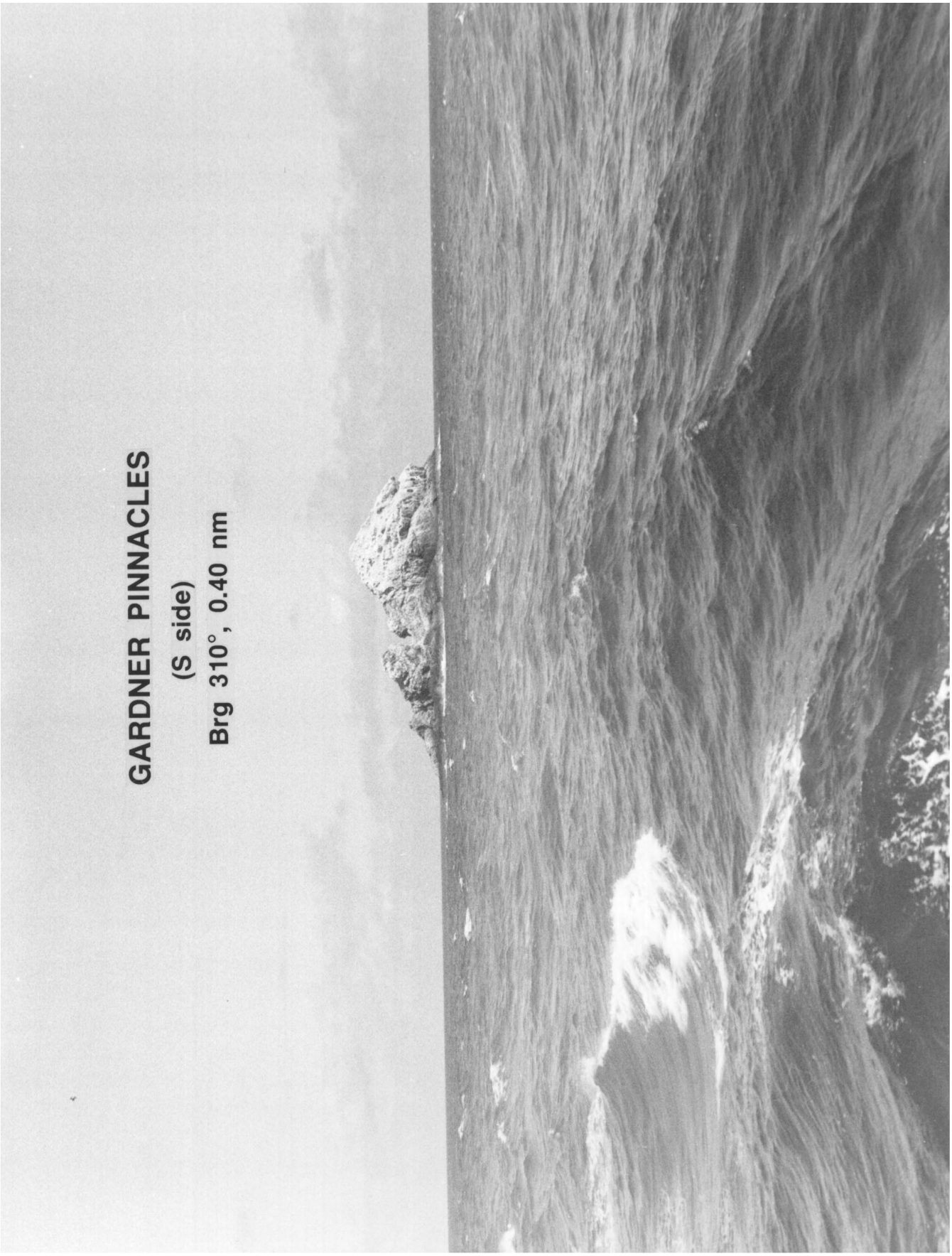

La PEROUSE PINNACLE
(S side)
Brg 358°, 0.44 nm


GARDNER PINNACLES
(S side)
Brg 310°, 0.40 nm

Large schools of ulua fish and sharks have been observed on the bank. Anchorage can be had on the bank in the open sea with fair holding ground.

(931) **Currents.**–Variable currents are reported in the vicinity of Raita Bank. Observations in the vicinity indicate a rotary tidal current turning clockwise.

(932) **Chart 19441.–Maro Reef** (25°25'N., 170°35'W.), is about 60 miles W of Raita Bank. It was discovered by Captain Allen of the whaler MARO in June 1820. The large, oval-shaped, coral bank is about 31 miles long in a NW direction and about 18 miles wide. The center of the bank is a large area of reefs awash. This broken area, about 12 miles long in a NW direction and 5 miles wide, is extremely foul, with many coral heads awash and channels of deep water between. Only one very small rock, about 2 feet high and on the N side of the reef, shows above high water. Outside the broken portion of the reef, which is practically always marked by breakers, is the wide shelf of the bank with depths of 12 to 20 fathoms.

(933) Breakers, or the light blue-green color of the area within the broken portions of the reef, give the first warning of the proximity of danger. All maneuvering in the vicinity of the broken area must be done with extreme caution and with the sea and light such that shoal spots can be seen and avoided. Ordinarily, spots with less than 6 fathoms of water are plainly visible.

(934) There are no known dangers more than 2 miles from the general outline of broken portions of Maro Reef, thus leaving a navigable shelf with depths of 12 to 20 fathoms on all sides but the NE where depths of 7 to 10 fathoms are found.

(935) Vessels may anchor in the shelter of the broken portion of the reef on any side; the closer to the reef the more caution is necessary to avoid the isolated coral heads, which can usually be seen only in favorable sunlight. Good shelter from the NE trades can be had on the W side between two long arms of the reef which project, one to the NW and one to the SW, from the main reef area. Care must be taken to avoid the 5¾–fathom spot off the middle of the entrance and the 4¼-fathom spot well inside. In August 1977, numerous uncharted coral heads were reported in the approach to this anchorage. In August 1978, the NOAA Ship TOWNSEND CROMWELL reported position discrepancies inside the anchorage. Because of the recent reports of position discrepancies and uncharted obstructions, extreme caution should be exercised while in the general vicinity or approaching the reef. Vessels entering should keep within 0.5 mile of the SW arm of the reef. However, unless the navigator is familiar with the area, he should remain as far as he can from the broken area on all sides and still obtain the desired shelter.

(936) **Currents.**–In the vicinity of Maro Reef the prevailing current sets W, but variable currents have been noted. Over the bank a rotary tidal current, turning clockwise, has been reported.

(937) **Charts 19442, 19019.–Laysan Island** (25°46'N., 171°44'W.) is a low sand island about 65 miles WNW of Maro Reef. The island is 1.6 miles long in a N-S direction, about 1 mile wide, and 35 feet in elevation at its highest point near the N end. In the center of the island is an extremely hypersaline, foul-smelling lake about 0.9 mile long. The island, mostly soft white sand, is partly covered with low vines and grass, and walking over it is tiring because of innumerable sea-bird nesting holes. The island is marked by an ironwood tree behind a wooden refuge warning sign on the W side of the island, and by a grove of coconut palms on the N edge of the lake. The wreck of a steel fishing boat is on the S shore of the island in 25°45.4'N., 171°44.4'W., but does not present a good radar target. Water can be obtained by digging shallow wells. The island is uninhabited and is seldom visited. As with other islands in the Leeward Islands, an entry permit is required. It is home to countless sea birds. Millions of flies make a visit there unpleasant most of the year.

(938) A coral reef, a few hundred yards wide, fringes the island. About 0.3 mile off the NW shore is a small, sharp rock, about 3 feet high. Coral heads, covered with 4 to 7 fathoms of water, are numerous in the area within 1 mile of the island. The sand and coral bottom can usually be seen in depths less than 10 fathoms, and often in greater depths. When approaching closer than 1 mile, a sharp lookout must be maintained to detect the coral heads.

(939) Vessels can anchor in depths of 8 to 15 fathoms 1 to 1.5 miles off the island on all sides, depending upon which side affords the best protection. During the trades, anchorage can be had 0.5 to 1 mile off the W side in depths of 8 to 15 fathoms, fair holding ground. In 1976, the Coast Guard Cutter MALLOW found good anchorage in 45 feet of water, sand and coral bottom, in 25°46'22"N., 171°45'15"W., with the ironwood tree bearing 084°, 1,390 yards. However, the anchor chain is subject to fouling on the coral heads because of the rotary currents. Small craft drawing not over 12 feet can lie at anchor inside the reef and off the ironwood tree on the W side of the island, but this anchorage affords no protection from W winds. In February-March 1978, the NOAA Ship TOWNSEND CROMWELL found anchorage with good holding ground, sand and coral bottom, and fair protection from strong W and NW winds accompanied by heavy seas and swell in 25°46.3'N., 171°43.0'W. and 25°45.8'N., 171°43.5'W. Surf of 10 to 15 feet was observed breaking on the W side of the island, and a 3- to 5-foot surf was observed on the reefs on the E and NE side.

(940) During NE and SE weather, the best landing can be made off the ironwood tree on the W side of the island on a sloping sandy beach. A poor landing can be made near the NE end of the island during light W winds. Caution is advised when attempting a landing on this side of the island. Clear sand beaches are almost nonexistent, and approaches to the beach must be made between breakers on the outer reef and the shore. Summer is the best for landing, as the NE trades prevail during this period.

(941) **Currents.**–A current velocity of about 1 knot and a rotary tidal current, turning clockwise, have been reported. The current is believed to depend to a great extent upon the wind. In 1976, the Coast Guard Cutter MALLOW observed the current to round the S side of the island in a clockwise direction on the flood; and to round the N tip of the island in a counterclockwise direction on the ebb.

(942) Laysan Island is just SE of the center of a circular bank 14 miles in diameter, with depths of 9 to 23 fathoms, beyond which the water deepens rapidly.

(943) **Northampton Seamounts,** unsurveyed seamounts with a least known depth of 15 fathoms, are about 35 miles SW of Laysan Island.

(944) **Charts 19442, 19022.–Lisianski Island** (26°04'N., 173°58'W.) is a small, low, sandy island, about 120 miles W of Laysan Island. Captain Lisianski, of the Russian ship NEVA, discovered the island on October 15, 1805, when his ship grounded

on the reef and was nearly wrecked. The island is about 1.2 miles long in a NNW direction, 0.5 mile wide, and 20 feet in elevation at its highest point on the NE side. The shores are white sand except for two stretches of rock ledge at the waterline on the E side of the island. Behind the sand beach, the island is overgrown with vines and bushes. One coconut palm tree in the NE part of the island is prominent from N. In 1976, a small boat was reported wrecked on the NE end of the island and two groves of palm trees were observed near the middle of the island. Brackish water may be obtained by digging shallow wells. Large numbers of sea birds nest on the island, and, as at Laysan, large numbers of flies make a stay there unpleasant. The island is uninhabited and seldom visited. Visits should be made during the summer, when the NE trades prevail, but small-boat landings have been made on the E side of the island at other times, although this is very risky.

(945) A reef circles around to the SW from off the N side of the island. It is marked near its offshore end by a coral ledge that bares at times and over which the seas break. The S end of this ledge is 1.7 miles 260° from the N end of the island. About 0.5 mile SW of this point is another ledge which is marked by a breaker in most weather. Midway between these ledges or breakers is a passage leading to the lagoon between the island and the reef. The passage has an uneven bottom with depths of 11 to 22 feet. About 350 yards SW of the N ledge is a small shoal with a depth of 3 feet over it. These shoal spots are easily seen and avoided by small boats making the passage into the lagoon, but vessels should not enter without local knowledge. Once inside, anchorage can be had in depths of 3 to 6 fathoms, taking care to avoid the scattered coral heads with only a few feet of water over them. Landing can be made on the W side and S end of the island in all but SW and W weather.

(946) **Neva Shoal,** with innumerable coral ledges, extends about 8 miles SE from Lisianski Island. This reef, which is about 4 miles wide, has its W extremity about 4 miles SSW of the island. The S end of the reef is usually marked by breakers, and many of the ledges break in almost all weather. The shoal has areas of deeper water between the ledges, and small boats can maneuver but with difficulty over many parts of the reef. It must be avoided entirely by larger vessels.

(947) In addition to Neva Shoal, there are many coral heads with depths of 3 to 6 fathoms over them within 3 miles of all sides of the island. A small coral ledge, with an islet on it and nearly always marked by breakers, is 2.7 miles 254° from the S end of the island. Between this ledge and the island are depths as great as 8 fathoms and a scattering of coral heads, some of which are nearly awash. The lagoon could be entered between this ledge and the ledge marking the S side of the previously described opening 1 mile N. A rock covered 14 feet, about 1.5 miles NNE of the island, is marked by breakers only during heavy weather. Under favorable conditions dangerous coral heads can be seen for several hundred yards.

(948) **Anchorage** can be had in trade-wind weather about 3 miles W of the island in depths of 11 to 15 fathoms, sand and coral bottom, with the N end of the island bearing 080°. During SW weather, vessels can find anchorage 3 to 4 miles E of the N end of the island in depths of 8 to 15 fathoms. Small boats can anchor in the lagoon, as described previously.

(949) Vessels may approach to within 3 miles of Lisianski Island from the N on courses between 270° and 090°. The island and Neva Shoal should be given a wide berth when passing S of them, as the island is seldom seen from the S limits of the shoal. Vessels approaching from the SW should keep about 5 miles W of the meridian of the island until the island bears 090°, and then approach the anchorage.

(950) **Currents.–**One-half day of current observations taken 3 miles W of Lisianski Island indicate a rotary tidal current, turning clockwise, of 0.8 knot velocity at strength. A prevailing NW current is reported in the vicinity of the island.

(951) Lisianski Island and Neva Shoal lie just SE of the center of a bank about 25 miles long in a NW direction and about 15 miles wide. Outside the reefs, general depths on the bank are 9 to 47 fathoms.

(952) **Pioneer Bank** (26°02'N., 173°26'W.) is about 30 miles E of Lisianski Island. The bank is about 8 miles in diameter, and soundings of 18 fathoms have been obtained near its center. No breakers or dangers were observed during a preliminary survey, but, as the least depth may not have been obtained, vessels should avoid the area.

(953) An unsurveyed bank with least known depths of 30 fathoms is reported to be about 36 miles NW of Lisianski Island.

(954) **Chart 19461.–Pearl and Hermes Atoll,** about 145 miles NW of Lisianski Island, is an extensive oval-shaped atoll about 40 miles in circumference, 17 miles long in a NE direction, and 9 miles wide. The reef was discovered on April 26, 1822, by the British whalers PEARL and HERMES, which were wrecked on the same night within 10 miles of each other. Within the outer reef is a lagoon in which are numerous coral reefs with deep water between. The remains of a wreck stranded on the E side of the reef are still visible, but over the years most have been beaten down by breakers. There are no known dangers outside the heavy breakers on the outer reef.

(955) Within the outer fringing reef are several small islets, most of which are on the S side; the exception is **North Island.** There are also several sandbanks that are awash at high water. **Southeast Island** (27°47'N.,175°49'W.) is the largest of the group; five other named islands are scattered along a 7-mile stretch to W. The islands are uninhabited and are vegetated with low plants and shrubs. Large numbers of sea birds nest on the islands.

(956) The 6-mile opening on the NW side of the outer reef has depths of 1 to 6 feet between the numerous coral heads, and is hazardous to negotiate with a small boat. The small-boat channel between Southeast Island and **Bird Island,** next islet to the W, has a least depth of 4 feet; the channel between Bird Island and **Sand Island** has 19 feet. Lagoon entrance or navigation are definitely not for the amateur.

(957) **Anchorage** can be had off the W entrance to the lagoon in depths of 8 to 12 fathoms, or on the E side of the reef. Vessels have anchored midway between the S entrances and about 0.6 mile off Bird Island in depths of 25 fathoms.

(958) **Currents.–**The current appears to set N between Lisianski Island and Pearl and Hermes Atoll.

(959) **Chart 19022.–Salmon Bank** is about 60 miles SW from Southeast Island on Pearl and Hermes Atoll. The least known depth on the bank is 30 fathoms.

(960) **Gambia Shoal,** position doubtful, is about 50 miles WNW of Southeast Island on Pearl and Hermes Atoll. The shoal has a depth of 14 fathoms, and the bottom can be plainly seen. About 25 miles N of the charted position of Gambia Shoal is **Ladd Seamount,** a bank with a least known depth of 35 fathoms.

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(961) **Charts 19480, 19481, 19482.–Midway Islands,** 1,150 miles WNW of Honolulu, were discovered in 1859 by Captain N. C. Brooks, an American shipmaster on the Hawaiian vessel GAMBIA; possession was taken on behalf of the United States on September 30, 1867, by Captain William Reynolds of the U.S.S. LACKAWANNA. The circular atoll is 6 miles in diameter and encloses two islands. The coral reef does not completely enclose the lagoon; there is a natural opening on the W side, and another opening has been dredged on the S side. The reef rises abruptly from deep water and there are no off-lying rocks or shoals; breakers mark all seaward sides of the reef. The enclosed islands average 12 feet high with a maximum height of 45 feet. Numerous birds, especially albatross, nest on the islands and are sometimes a hazard to landing or departing airplanes.

(962) The Midway Islands, not part of the State of Hawaii, are under the administration of the Department of the Interior **Midway Atoll National Wildlife Refuge** established by Executive Order No. 13022 of October 31, 1996. Copies of the Executive Order directing the **Management** and **General Public Use** of the National Wildlife Refuge System can be obtained from Refuge Manager, Hawaiian/Pacific Islands National Wildlife Refuge Complex, U.S. Fish and Wildlife Service, 300 Ala Moana Boulevard, P.O. Box 50167, Honolulu, HI 96850.

(963) Requests for emergency entry of vessels in distress should be made by any means possible to the Joint Rescue Coordination Center (JRCC), Honolulu, Hawaii (808-541-2500). JRCC will then obtain entry approval or denial from the USFWS Refuge Manager and provide a response to the requester.

(964) Non-emergency entry requests must be approved in advance by contacting the USFWS Refuge Manager. Additionally, the Midway harbormaster can be reached by VHF-FM radio channel 16.

(965) **Eastern Island,** at the SE end of the atoll, is triangular in shape, about 1.2 miles long, and 6 to 12 feet high.

(966) **Sand Island,** on the S side of the atoll, is about 2 miles long in a SW direction and is composed of white coral sand. Prominent from offshore are the towers, tanks, and radio masts of the naval installations and a group of trees on the N side of the island. An aerolight is on top of the tallest tank in the N central part of the island.

(967) **Welles Harbor** is the area inside the gap in the barrier reef on the W side of the atoll. The harbor was formerly used to a considerable extent as an anchorage by ships calling at Midway, but since the dredging of the ship channel and harbor between Sand and Eastern Islands, Welles Harbor is little used. Navigation in this area should not be attempted.

(968) **Channels.–**Marked dredged channels through the S reef lead to deepwater basins on the E and NE sides of Sand Island,and to a small-craft basin on the W side of Eastern Island. The entrance channel is marked by a lighted buoy and a **395.5°** lighted range. (**Consult the United States Fish and Wildlife Service for latest controlling depths in channels and alongside piers.**)

(969) **Anchorages.–**The established anchorage area is NE of Sand Island. Outside anchorage is available in depths of 15 to 25 fathoms E of the main channel sea buoy; this anchorage is fair during NE winds, but should not be attempted during winds from other quadrants. Anchorage S of Sand Island is prohibited to avoid possible fouling of the San Francisco-Honolulu-Midway-Guam-Manila cable.

(970) **Routes.–**Vessels approaching Midway Islands are reminded that entry into the Midway Atoll National Wildlife Refuge is prohibited without prior approval. In approaching from any direction, vessels will remain 3 miles off until S of the entrance. Then vessels should steer a course to pass through a position (28°09'25"N., 177°21'15"W.) about 2 miles S of Midway Channel Entrance Lighted Buoy 1, then steer a N course heading directly between Sand and Eastern Islands until the channel is made out, then steer on the range. Due to the prevailing E winds and W set of current, caution must be exercised in entering. Drift and leeway should be anticipated, and sufficient speed should be maintained at all times to control the vessel. (See discussion of currents in the channel.)

(971) **Radar Navigation.–**Radar and visual contact have been frequently made with the radio towers on Sand Island at distances in excess of 20 miles.

(972) The best radar returns are the SE edge of Sand Island, the stranded wreck on E edge of the entrance channel, the radio towers on Sand Island, an unlighted platform on the N side of the atoll, and the W tip of Eastern Island.

(973) **Tides.–**The mean range of tide is 0.8 feet and the diurnal range of tide is 1.2 feet at Midway Islands. The generally calm waters inside the reef are occasionally subjected to strong surge, and they can be extremely agitated by winter gales.

(974) **Currents.–**The current off the main entrance channel usually sets W with a velocity of about 2 knots. Within the channels, the current changes direction with velocities of 2 to 8 knots, depending on the weather; extreme caution is necessary to avoid being carried outside the channel limits. It is reported that during heavy gales Welles Harbor is full of strong currents caused by the sea forced over the reefs.

(975) **Weather, Midway Islands and vicinity.–**During the summer the winds are generally variable and light, either from NE, SE, or SW until about the middle of July, when fresh to strong NE trades set in, continuing through July and August. SW winds are always accompanied with a low barometer, rain, and squalls. Rain also comes occasionally with NE and SE winds and a high barometer. NW winds following SW storms generally indicate clearing weather.

(976) During the winter from October to April, gales frequently occur, working around from SE through SW to NW. Occasionally a few days of fine weather will prevail, but a rough W sea is always present.

(977) The average temperature at Midway is 73°F (22.8°C). The average maximum is 76°F (24.4°C) while the average minimum is 68°F (20°C). The record high is 92°F (33.3°C) recorded in September 1979, July and August 1984, and August 1987. The record low is 49°F (9.4°C) recorded in January 1980. On average, only one day each year is 90°F (32.2°C) or warmer and 137 days each year are 80°F (26.7°C) or warmer.

(978) Precipitation is moderate at Midway and averages 41.3 inches (1050 mm) each year. June is the driest month and January the wettest. On average, six thunderstorms each year effect Midway.

(979) **Pilotage, Midway Islands.—**Pilotage regulations are currently under development for Midway. Vessels required by law to have a licensed master should consult the Captain of the Port, Honolulu (808-522-8264 ext. 352) to determine specific pilotage requirements. Pilots are not required for public vessels of the United States.

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(980) **Harbor facilities.**–Two deepwater piers are on the NE side, and one smaller pier is in the inner harbor on the E side of Sand Island; a small-craft pier is on the W side of Eastern Island.

(981) Provisions, jet fuel (JP–5), and water are not available for commercial use, except in case of emergency. Limited emergency repairs can be made to vessels, but there are no drydocking facilities. Tugs are available; there is a 20-ton mobile crane for use in emergencies.

(982) **Chart 19480.–Nero Seamount** is about 30 miles WSW from Midway Islands. Nero Seamount, formerly Pogy Bank, extends about 8.5 miles in an E-W direction, about 7 miles in a N-S direction, and has a least depth of 37 fathoms.

(983) **Chart 19483.–Kure Atoll** (28°25'N., 178°20'W.) is 50 miles WNW of Midway Islands, which it closely resembles both in formation and appearance. Kure Atoll is 4.5 miles in diameter, and a nearly continuous coral reef encloses a lagoon in which reefs and coral heads alternate with deep water. A mile-wide break in the SW side of the barrier reef provides an entrance of sorts to the lagoon.

(984) Good anchorage in 15 fathoms may be found on the NW side of the atoll.

(985) Entry upon Kure Atoll must be approved by the State of Hawaii, Department of Land and Natural Resources and Commander, 14th Coast Guard District, Honolulu, HI. These restrictions apply to all civilian and military agencies as well as individuals.

(986) **Green Island,** on the SE side of the atoll, has a highest elevation of 20 feet and is covered with scaevola brush.

(987) The island is a wildlife refuge and entry upon the island must be by approval of the State of Hawaii Department of Land and Natural Resources. This restriction applies to civilian and military agencies as well as individuals. The Coast Guard has reported that Green Island presents a good radar target at 22 miles and the reef line presents a good target at 7.5 miles. Another good radar target, reported by NOAA Ship TOWNSEND CROMWELL, is a large wreck in about 28°27.0'N., 178°18.9'W., on the NE side of the atoll. W of Green Island are small sand islets, the largest of which is 8- to 10-foot-high **Sand Island.** These islands continually shift and change with weather and sea action.

(988) The best anchorage is on the W side, at the SW corner of the atoll with depth of 8 to 15 fathoms, rocky bottom. Boats may then be taken to a concrete pier with 3 to 5 feet alongside, located at about the midpoint of the lagoon side of Green Island. Vessels also anchor about 0.3 to 0.5 mile SSW of the S tip of Green Island in depths up to 15 fathoms. Landings can be made in good weather through a break in the reef to a sand beach at the SW tip of Green Island; depths to the landing are 5 to 6 feet between small coral heads and ledges.

(989) A bank with depths of 20 to 30 fathoms surrounds Kure Atoll. No dangers have been observed outside the reef; however, the reef is inadequately surveyed. From the appearance of the islands, it may be assumed that they are sometimes visited by severe storms, the sand being thrown into numerous cones and pyramids.

(990) **Currents.**–A set to the S has been observed between Kure Atoll and Midway Islands. In the vicinity of Kure Atoll a continuous E current of about 2 knots during W weather has been reported.

(991) **Weather** for Kure Atoll is similar to that for the Midway Islands.

(992) **Chart 19022.**–In 1923, breakers were reported observed about 180 miles S of Kure Atoll in about 25°23'N., 178°04'W., by the American vessel ETHAN ALLEN. The master reported that the swell appeared to mount up and occasionally break as though over a shoal extending for about 2 or 3 miles in an E-W direction.

(993) **Charts 83633, 83637.–Johnston Atoll** (16°45'N., 169°31'W.) is about 780 miles WSW of the island of Hawaii. Johnston Atoll consists of four islets that lie on a reef about 9 miles long in a NE-SW direction. Johnston Island, the largest island, lies about 2 miles inside the SW end of the reef. **Sand Island** and **Hikina Island** lie about 1 and 2 miles NE of Johnston Island, respectively; **Akau Island** is about 1.5 miles N of Sand Island.

(994) Johnston Atoll is a possession of the United States; it is administered by the Department of Defense and under management of Field Command, Defense Special Weapons Agency (FCDSWA). Additionally, Johnston Atoll is designated as a National Wildlife Refuge and is administrated as such by the Department of the Interior, United States Fish and Wildlife Service. The atoll is closed to the general public and unauthorized vessels without prior clearance shall not be navigated with 3 miles of the atoll's perimeter.

(995) **Prominent features**.–The Joint Operations Building, with its aviation beacon, stands on the NE end of the island. The Johnston Atoll Chemical Agent Disposal System stands on the SW portion of the island. Both buildings are prominent. Sand Island has several buildings which show as separate radar targets. The outline of the island does not show until within 10 miles of the island.

(996) **Channels**.–The main entrance channel is entered S of Johnston Island and leads to the harbor. The harbor consists of a turning basin within the lagoon about midway between Johnston and Sand Islands. The entrance channel is marked by lighted and unlighted buoys, daybeacons, and a **000°** lighted range. In 1964, the entrance channel was dredged to a depth of 35 feet. The turning basin and harbor area have a depth of 35 feet. The berthing area alongside the main pier has a depth of 29.8 feet. Maximum draft for vessels entering the harbor under normal conditions is 28 feet. The largest vessel to enter was 656 feet long. Vessels bound for Johnston Island ship channel should approach the channel from the S, passing through position 16°41'N., 169°31'W. and then proceed to the pilot boarding position. Ships should not enter at night or when cross channel winds exceed 25 knots.

(997) **Anchorage**.–Vessels drawing more than 28 feet should anchor in the channel approach area S of the channel entrance. Anchorage is prohibited within the area of an arc extending 1.5 miles S and SE from Johnston Atoll Channel Entrance Lighted Buoy 2. Anchorage is prohibited in an area situated near the center of the turning basin.

(998) **Dangers.**–A barrier reef surrounds Johnston Island, and extends in an arc from about 2 miles W to about 7 miles NE of the island. Depths outside the reef drop off to 600 feet about 0.4 mile off. With heavy breakers on the reef, a 2 to 3-foot surge exists inside the lagoon. From the NE, via S to SW is a foul area with a very irregular bottom. The 600-foot curve lies 4 miles S of the center of Johnston Island; however, there are 34-foot shoals lying

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as close as 0.3 mile inside the curve and depths shallower than 10 fathoms can be found as far as 10 miles E and 6 miles SE of the Johnston Island.

(999) **Regulations**.–Johnston Atoll is a Naval Defensive Sea Area and Airspace Reservation, and is closed to the public. Non-government vessels without prior clearance shall not be navigated within 3 miles of the atoll's perimeter. The administration of Johnston Atoll is under the jurisdiction of the Defense Special Weapons Agency, Commander, Johnston Atoll, APO AP 96558. Authorities at Johnston Atoll must receive ship visit requests a minimum of 5 days in advance, with the following information:

(1000) 1. Purpose and authority of visit.

(1001) 2. Name and type of vessel.

(1002) 3. Vessel itinerary.

(1003) 4. Crew and passenger manifest

(1004) The following regulations are in effect for all non-public vessels calling on Johnston Atoll:

(1005) 1. Entrance to the harbor is not authorized at night.

(1006) 2. Ships are required to night steam or anchor 3 miles S of Johnston Atoll to wait for daylight.

(1007) 3. Observe carefully, rules and regulations prescribed by the Commander for navigation in harbors and anchorages of Johnston Atoll, and have on board an officer familiar with these waters while underway in these areas.

(1008) 4. All persons on board shall be U.S. citizens.

(1009) 5. No photographs will be taken from the vessel. All cameras will be kept in the custody of the master so long as the vessel is in waters contiguous to Johnston Atoll.

(1010) 6. While anchored, the vessel will maintain steam up and be prepared to get underway.

(1011) 7. Dogs, cats, and other animals shall be confined on board.

(1012) 8. Plants and fruits will not be imported without specific authority of the Commander of Johnston Atoll.

(1013) 9. No garbage or ashes will be dumped overboard within 3 miles of Johnston Atoll. Ships will normally dump garbage before entering the channel. During the stay in port, garbage and trash removal will be arranged. Rat guards will be placed promptly on all lines, chains, hawsers, etc., used to make fast.

(1014) 10. No oil or oily bilges may be pumped while in the harbor.

(1015) Communications with the atoll are under military supervision. Ships are requested to contact Johnston Atoll when within 100 miles of the atoll. The atoll can be contacted on VHF-FM channel 16 and on VHF 121.5 MHz and UHF 243.0 MHz; these frequencies are guarded 24 hours. Radio contact can also be established on other pre-coordinated marine frequencies.

(1016) **Tides**–Johnston Atoll was recently added as a National Ocean Service tidal reference station. The mean range of tide is 1.9 feet, with maximum water level of 2.81 feet above MHHW and minimum water level -1.74 feet below MLLW. Currents in the entrance channel and inside the lagoon are highly variable and dependent upon observed wind speed and wave heights.

(1017) **Weather**.–Winds average 10 to 15 knots in summer and 15 to 25 knots in winter. They are from the E to NE about 90 percent of the time. The occasional Hawaiian Island storms are characterized by stormy S or SW winds and heavy rains. Brief showers occur frequently, but protracted bad weather is rare. Visibility is good, usually over 12 miles.

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