Supplies.—Plentiful quantities of staple and fresh provisions are obtainable. Deck and engineers supplies are available. Water is available alongside but should be boiled before drinking. Milk should be pasturized. Fuel and diesel oils are available at the wharf.

Communication.—Mazatlan has airline communication with Mexico City and Los Angeles. There is regular fortnightly steamship communication with other Pacific ports of Mexico, the United States and Central America. There is a ferry service with La Paz.

The Southern Pacific Railroad of Mexico runs from Mazatlan through Sonora to Nogales, Arizona. The schedule is so arranged that there will be a train north every day except Saturday, and south every day except Sunday.

The city is connected with the Mexican national telegraph system and thence with those of the United States and Central America. At Mazatlan there is a Government-owned radio station that handles commercial messages.

Climate.—Very warm, sometimes oppressive, weather prevails during the rainy season, from June to September, but the heat is tempered by frequent rains and by a refreshing night wind. The climate is more healthful than that of the coast farther south.

Meteorological table.—See appendix II.

Deratization.—See sec. 1-19.

Sanitation and health.—Sanitary regulations are enforced fairly well. The principal diseases against which special precautions should be taken are dysentery and other intestinal disorders; drinking water and milk should always be boiled, particularly during the summer months.

Hospitals.—In the city there are three hospitals, two of which, the Civil Hospital (with a capacity of 150 beds) and the Charity Hospital (with a capacity of 10 beds), will accept seamen.

5-131 COAST (*H. O. Chart 0621*).—From Mazatlan to the Chamatla River, a distance of 32½ miles, the coast is low and sandy, with a growth of bushes and stunted trees. The depths along this coast increase gradually from the shore to 10 or 12 fathoms at a distance of 2 miles, and there are no outlying dangers.

The Barron River empties into the gulf about 10 miles southeastward of Mazatlan; in the dry season it is navigable only by small boats and canoes.

Metate Peak, a conspicuous mountain about 3,000 feet high, is situated 15 miles north-northeastward of the mouth of the Barron River. It is the northernmost peak of a range of mountains that lies 8 to 10 miles inland.

A narrow lagoon that parallels the coast about 1 mile inland extends from the Barron to the Chamatla Rivers, a distance of about 22 miles. The mountain range mentioned above also extends along nearly parallel with the coast line at a few miles behind the lagoon. Cabeza de Caballo, a remarkable peak 1,979 feet high, lies nearly midway between the Barron and Chamatla Rivers and about 8 miles from the coast.

5-132 Chamatla River (Rio del Rosario) (*22°48′ N., 106°02′ W., H. O. Chart 0622*), like the Barron, is navigable only by small boats and canoes during the dry season. A breaking shoal with less than 3 fathoms over it extends ¾ mile off from the mouth of the river. On either side of the river, at a short distance from its mouth are the Chamatla Hills, which are 500 to 900 feet high.

Anchorage can be taken off the mouth of the Chamatla River in depths of 6 or 7 fathoms at about 2 miles from the shore; a 3,738-foot peak, the northernmost and highest mountain of a range which rises 18 to 20 miles from the coast, bears 058°, distant 21 miles, from this anchorage. The tidal rise in this vicinity is about 4½ feet.

The coast southward of the Chamatla River is of the same character as that northward of it, and, as far as Boca Tecapan, 23 miles to the southeastward, it has about the same general trend. A deserted Indian village lies close to the beach about 5 miles southeastward of the mouth of the Chamatla, where the hills approach the coast; about 5 miles farther there is an American settlement.

Boca Tecapan is the outlet of two quite extensive lagoons, into the northern of which the Bayona River empties. A bar, the outer edge of which is nearly 2 miles offshore, extends 1¼ miles on each side of the entrance; the sea breaks over it even in moderate weather. Leading into the estero are two channels, separated from each other by a shoal. In the northern channel there is a depth

of 2 fathoms, and in the southern 2½ fathoms at high water; there is said to be a depth of 4 fathoms over these bars during southeasterly winds. The best time to enter is early in the morning, before the sea breeze springs up.

Palmito, a small Indian village, lies nearly opposite the southern channel leading into the estero.

5–133 Anchorage.—The anchorage off Boca Tecapan is about ¾ mile off the outer edge of the bar with the middle and highest peak of the Sierra de Bayona, 2,588 feet high, bearing 072°, distant 14 miles. Spring tides rise about 7 feet in this vicinitv.

The Bayona River, which empties into the lagoon at about 9 miles northward of Boca Tecapan, forms the boundry line between the States of Sinaloa and Nayarit.

5–134 The coast beyond Boca Tecapan trends southward, sweeping slightly to the eastward between the lagoon entrance and a low, slightly projecting point 28 miles from it. For 27 miles of this distance the coast is closely paralleled by the southern of the two lagoons mentioned above; the strip of sand beach between it and the sea varies in width from ¼ mile near the northern to 2¼ miles near the southern limit of the lagoon.

The country for many miles inland is low and level; several hills 900 to 1,600 feet high, situated 15 to 20 miles from the coast, are the only ones seen throughout the entire distance. A few Indian huts and some patches of green bushes and trees are scattered along the coast.

Camichin Estero, 17 miles south-southeastward of the low, slightly projecting point just mentioned, is the outlet of an extensive lagoon which extends northward. Off the entrance is a bar over which the sea breaks. On the western shore of the lagoon, just above the entrance, is a small settlement. The usual anchorage is about 1 mile off the mouth of the estero, in a depth of 5 or 6 fathoms.

Isabel Island *(21°52′ N., 105°54′ W., H. O. Chart 622)* lies 17 miles from the nearest part of the mainland, its highest peak bearing 286° from the bar off Camichin Estero, 22 miles distant. It is about 1½ miles long, ½ mile wide, and 280 feet high. On the eastern and southeastern sides of the island are sand beaches where boats may land in fair weather. The depths between Isabel Island and the coast are regular, decreasing from 20 fathoms near the island to 6 or 7 fathoms at 3½ miles from the coast. The island has been reported to be charted 1¾ miles northeastward of its true position.

Near the island are several detached rocks, the most prominent of which are two whitish pinnacle rocks, one 90 feet and the other 40 feet high, which lie near the northern end of the island.

A light is shown from Isabel Island.

5–135 Coast.—Southward of Camichin Estero the coast continues low and sandy. Between the mouth of the estero and San Blas, which is 18½ miles to the southeastward, are the mouths of several lagoons and rivers.

Boca Tintexo (Asodero Estero), situated 7½ miles south-southeastward of the entrance to Camichin Estero, has a shoal of small extent off its entrance. The anchorage is in a depth of 5 or 6 fathoms at about ½ mile from the beach.

5–136 Rio Grande de Santiago (Lerma River), which rises near Mexico City and drains the larger part of the State of Jalisco, empties into the sea at about 4 miles southeastward of Boca Tintexo.

A dangerous shoal, over which the sea breaks heavily, extends nearly 4 miles off the mouth of the river.

At about 3 miles southeastward of the mouth of the Rio Grande de Santiago is the outlet of a lagoon which is fed by a branch of that river.

Piedra Blanca del Mar, a small, white rock 145 feet high, lies 5¼ miles west-southwestward of the mouth of the Rio Grande de Santiago. There is a safe passage between the rock and the shoal off the mouth of the river; there are depths of 8 to 9 fathoms near the rock.

This rock is a good guide for making the port of San Blas, which lies about 12 miles to the eastward.

5–137 Tide rip.—A heavy tide rip was reported at a position 18½ miles 273° from San Blas Lighthouse; although an 18-fathom sounding was obtained in the vicinity, there is probably less water near the position of the tide rip.

5–138 LAS TRES MARIAS ISLANDS, lying 50 to 63 miles off the coast northward of San Blas and at their nearest point about 60 miles northwestward of Cape Corrientes, extends 39 miles in a general northwesterly and southeasterly direction. These islands are of volcanic origin; their western sides are high, inaccessible, barren cliffs, while the eastern sides are generally low and sandy, with some vegetation.

5–139 Caution.—Las Tres Marias Islands have been reported to be charted 3 miles westward of their true position, and a recent report places the 1,320-foot peak of Cleopha Island in latitude 21°19′ N., longitude 106°18′W., approxmately 3 miles northward of its present charted position. Navigators should, therefore, exercise great caution in this vicinity until the islands are definitely located.

The depths increase very rapidly from the shores of these islands; a sounding of no bottom at 100 fathoms was found at 2 miles off them. Sailing vessels must guard against calms, eddy winds, and southerly currents when navigating the channel between these islands.

5-140 Cleopha (Maria Cleofas), (21°16′N., 106°16′W., H.O. Chart 622), the southernmost of Las Tres Marias Islands, is nearly circular in form, with a diameter of about 3 miles. The highest peak has an altitude of 1,320 feet. A pinnaole rock, 100 feet high, lies 1,600 yards off the southeast point, and a white rock, 225 feet high, lies 1/2 mile off the western extremity of the island. A constantly breaking reef extends eastward for 2 1/2 miles from the northeastern extremity and thence southward for about 2 miles. Numerous detached rocks lie a short distance off the bold, bluff points of the island. The southeastern extremity is a yellowish bluff, surmounted by a steep hill 250 feet high. A heavy surf beats against all sides of the island.

A light is located on the southeastern side of the island.

A perfectly sheltered lagoon with a depth of 4½ fathoms at the entrance lies on the eastern side of the island. A 300-foot vessel might enter, but, inasmuch as there is no room for such a vessel to swing, it would be necessary to moor bow and stern. There is a fresh-water spring about 70 yards south of the lagoon.

5–141 Magdalena Island, lying northwestward of Cleopha, from which it is separated by a channel about 8½ miles wide and free of dangers, is 8 miles long, east and west, with a maximum width of 4½ miles; its highest peak rises to an elevation of 1,500 feet.

The eastern extremity of the island is a yellowish bluff 225 feet high. Immediately southwestward of this bluff there is a small bight which has depths of 11 fathoms, rock. A fishing vessel reported (1943) that good anchorage, sheltered from northwesterly winds and free of ground swell, could be obtained on the southeastern side of this island. Fresh water is available 1½ miles inland from the beach on this side of the island. A constantly breaking reef over which there is a depth of less than 3 feet extends 3 miles southeastward from the rocky bluff at the eastern end of Magdalena Island. A small lagoon lies a short distance westward of the low, gravelly northeastern extremity of the island. The shore of the north side of the island is a fine sandy beach, the land sloping gradually toward the interior; shoal water extends off about ½ mile along the middle portion of this side of the island. Off all the salient points of the islands are outlying rocks at distance of ¼ to ½ mile from the shore.

The soil of the island is sandy, but there is considerable vegetation, consisting principally of lignumvitæ, citrus fruits, cactus, and almost impenetrable thickets of small, thorny trees and brush.

5–142 Maria Madre Island, separated from Magdalena by a clear channel 4 miles wide, is the largest of the group. In 1950 a continuous line of breakers was observed extending across the eastern end of this channel. It is nearly 12 miles long and 3 to 6 miles wide. The highest peak,

near the center of the island, is 2,020 feet high, but the peak that lies about midway of the southwestern side of the island is the most prominent.

The southern extremity of the island is a bold, rocky headland 125 feet high, with several detached rocks lying off it. Eastward of this headland there is a sand beach where boats may land in fair weather providing they take up anchorage in front of the island prison where the beach is well guarded. The anchorage, which is untenable during northerly winds, should be as close to the beach as possible as the water deepens rapidly beyond.

A dangerous reef extends nearly 1 mile toward San Juanito Island from the northwestern extremity of Maria Madre. A detached rock 5 feet high lies about 2 miles southward of the northwest point and ¼ mile from the west side of the island; there is also a sunken rock between it and the shore.

On the southeast side there is a small settlement of about 20 people who collect salt from a nearby lagoon. Vessels load the salt at a mole near the settlement.

5–143 Maria Madre Island Light is shown from a red and white horizontally banded square stone tower, 39 feet high, with a house at its base, on Balleto Point, on the eastern side of the island.

Lights are shown on the northern and southern ends of the mole near the settlement.

A signal station is located at Maria Madre Island Lighthouse.

5–144 San Juanito, the northernmost and smallest of Las Tres Marias Islands, lies 2 miles northwestward of Maria Madre. This island has a length of 2½ miles, a maximum width of 1¼ miles, and a height of about 150 feet, at its northern end, whence it slopes gradually to the southward.

A light is located on the northern extremity of San Juanito Island.

A reef extends 1 mile toward Maria Madre from the southern end of the island; this reef, together with the one, extending off from the northwestern extremity of the latter island, makes the channel between them extremely dangerous.

5–145 PORT SAN BLAS (*21°32′ N., 105° 19′ W., H. O. Chart 0938*).—The harbor of San Blas consists of a small creek with very shoal water throughout its greater part. The harbor is practically closed by a drying sand bar which has formed across the mouth of the creek. In a small area inside the bar there are depths of 2 to 3 fathoms. The western shore of the creek is a narrow peninsula, on the southern part of which there are some hills, 106 feet high, with the ruins of fortifications on them. Foul ground extends along the western side of the peninsula for a distance of ¼ mile offshore.

5-146 Light.—Castillo de la Entrada Light is shown on Vigia Hill, at the southern end of the peninsula mentioned above. The structure consists of a small masonry tower at the corner of the keeper's dwelling. A signal station is located at the light.

5-147 Piedra Blanca de Tierra is a small, white rock 55 feet high, with two smaller rocks nearby, one to the northeastward and the other to the southwestward. It lies about 1,300 yards southwestward of Castillo de la Entrada Lighthouse; the channel inshore of the rock has depths of 3 to 5 fathoms.

5–148 Landmark.—Mount San Juan, 7,550 feet high, is an excellent landmark for making the port of San Blas. It may be seen from a great distance, and is seldom obscured by fogs, as the lowlands frequently are. When seen from the westward it appears to be saddle peaked, and, when bearing 107°, it is nearly in range with Piedra Blanca del Mar and Piedra Blanca de Tierra. The coast range, 1,000 to 3,000 feet high, lies between Mount San Juan and the coast.

The land southward of San Blas is high, while that to the northward is low.

The old town of San Blas lies about ¾ mile from the shore, on the landward slope of a steep hill 450 feet high and almost perpendicular on the side toward the sea. The town is now nothing but a mass of ruins that are overgrown with trees and bushes.

5–149 The roadstead of San Blas is open and exposed to the prevailing winds. The anchorage, however, is safe during the dry season, and

is less dangerous during the rainy months than that of Mazatlan. The bottom is of sand, good holding ground. The extent and configuration of the roadstead make it easy of approach, and the prevailing current often affords considerable assistance to vessels leaving. It is advisable to avoid this anchorage during the season of the "Cordonazos."

5–150 Anchorage.—There is good anchorage in 5½ or 6 fathoms of water, with Piedra Blanca de Tierra bearing 334°, distant about ½ mile. The best position nearer the town is in 4½ fathoms about ½ mile eastward of Piedra Blanca de Tierra.

Customs and health officers board vessels at the anchorage.

5–151 Landing.—The boat landing is on the left bank of a small creek inside the bar. Inasmuch as the surf constantly breaks over the bar, it is advisable for the boat officer or coxswain to make the trip on a shore-boat before attempting to take in a ship's boat. It is reported that in September, October, and November steamers are frequently unable to land passengers. A red flag hoisted at the signal station at Castillo de la Entrada, northwestward of the lighthouse, indicates that the bar is too rough to be attempted by ship's boats.

5–152 Tides.—The mean high water interval at San Blas is 9h. 08.; the spring range is 3.2 feet, the mean range 2.3 feet.

5–153 Winds.—The southerly winds begin in June and end in November; they are accompanied by much rain, do not blow steadily, are interrupted by frequent squalls that may come from any direction, and generally end with a dangerous and violent storm. As this storm, which is always from between southeastward and southwestward, most commonly occurs at about the time of the festival of St. Francis, on October 5, it has received the local name of "Cordonazo de San Francisco"; it may, however, come considerably later in the year and then, coming when the danger is no longer apprehended, does even more damage.

During the dry season the weather is constantly fine. The winds during the day normally blow from a direction between northwest and west, following the general direction of the coast, and are succeeded at night by a light land breeze or a calm.

5–154 Storm and wind signals (sec. 1–15) are shown at the signal station at Castillo de la Entrada.

5–155 Directions.—Vessels bound for San Blas from the westward pass close southward of Piedra Blanca del Mar and shape a course for Piedra Blanca de Tierre, keeping it a little on the port bow and, in passing, giving it a berth of 300 to 400 yards. Vessels desiring to anchor nearer the town pass between Piedra Blanca de Tierre and the mainland and anchor eastward of the rock.

If coming from the southward, a vessel should steer for the westernmost hill, Castillo de la Entrada, until near Piedra Blanca de Tierre, and then anchor as desired.

Inasmuch as a strong southerly current sets along the coast during the greater part of the year, sailing vessels standing in for San Blas must take care not to fall to leeward.

5–156 SAN BLAS (*21°32′ N., 105°19′ W., H. O.* Chart 0938) is situated on the low ground on the eastern bank of the creek that forms the harbor. It serves only as a landing place for goods destined for Tepic, a thriving town of 18,000 inhabitants, situated some 30 miles inland; Tepic is the capital and trade center of the territory and is widely known for its manufacture of cigars. In 1934 San Blas had an estimated population of about 2,000.

Cargo is transferred to lighters at the roadstead.

Supplies.—Provisions and water are scarce and require previous notice.

Communication.—Steamers call at San Blas occasionally, but there is no regular steamer service. San Blas is connected with the telegraph system of Mexico, and there is daily mail service to Tepic.

Health.—San Blas is very unhealthful, especially during the rainy season, when malignant fevers, malaria, and dysentery and other intestinal diseases are very prevalent. The town is infested with insects. During the season everyone who can do so leaves the town for Tepic and other inland places in order to avoid the sickness and discomfort that accompany the rains.

5-157 THE COAST southward of San Blas is mountainous, contrasting markedly with the monotonous sandy plains northward of that town. Camaron Point, about 2½ miles southeastward of San Blas, is a sharp, bluff point, with a ridge of hills terminating just behind it; off the point are some detached islets and rocks. The Estero de San Christoval, which is shoal and of no value to navigation, is situated 1 mile northward of Camaron Point.

Ensenada Matenchen.—At Camaron Point the coast turns sharply to the northeastward for about 1¾ miles and then curves around to the southward, forming an open bay called Ensenada Matenchen. Shoal water extends ½ mile off the shore of the bay, and some detached rocks lie eastward of Camaron Point. **Excellent anchorage for small craft can be taken in this bay about ½ mile offshore in depths of 9 feet. Diesel oil and gasoline are available in limited quantities. There is bus service to San Blas.**

5-158 Santa Cruz Point and the river and village of the same name are at the southern limit of Ensenada Matenchen. The high bluffs of the point have a reddish color and are very prominent. The village of Santa Cruz, owing to its groves of trees, is difficult to make out from vessels coming from the southward.

Punta los Custorios.—Between Santa Cruz Point and Punta los Custodios, 5¾ miles to the south-southeastward, there are several steep, bluff points about 30 feet high; the coast range of hills rises abruptly behind it. At the mouth of the Custodios River, just southward of the point, there is a breaking bar.

From this point a low, straight sand beach extends southward for a distance of 8 miles; the land behind it is covered with trees and bushes. A small stream, known as the Chila River, empties into the sea at the southern end of this beach.

Shoal.—A shoal with 5 feet of water over it was reported about 3 miles westward of Punto Los Custodios. The exact position of this shoal is doubtful.

Ensenada Chacala is a small cove 2¼ miles southward of the mouth of the Chila River, at the south side of a bluff point 40 feet high. Hills that attain a height of 300 feet rise abruptly from the shore of the cove.

5-159 Tecusitan Point (*21°08′ N., 105°16′ W., H. O. Chart 0622*), 2½ miles southward of Ensenada Chacala, with some detached rocks between them, is a rocky bluff point, 70 feet high.

Cerro Compostella, a prominent peak of the main range of mountains, which extends parallel with the coast, lies about 10 miles east-southeastward of Tecusitan Point. This peak, which is 4,262 feet high, is a good landmark.

5-160 Jaltemba Bay.— The coast between Tecusitan Point and Punta Raza, 6 miles to the south-southwestward, recedes somewhat, forming the open bay of Jaltemba, in which vessels may anchor and find shelter from southeasterly winds.

The shore of the bay is sandy, and the land behind it, which rises gradually, is covered with a thick growth of trees and bushes. A line of soundings run from point to point across the bay showed no bottom at 13 fathoms.

An islet of whitish color, 80 feet high, lies about 2 miles east-northeastward of Punta Raza and about ¾ mile from the shore. A black rock 20 feet high lies about ½ mile south of the islet. Vessels that come to Jaltemba Bay to load local produce anchor between the islet and the shore. A small fresh-water stream empties into the bay at a position about 1 mile eastward of Punta Raza.

Punta Raza, a reddish-colored, bluff point about 30 feet high, is closely backed by abruptly rising hills. Deep water extends close up to the point.

5-161 Coast.—The coast, trending southeastward of Punta Raza to Punta Mita, a distance of 21¼ miles, consists of a succession of bluffs alternating with sand beaches. The coast range, varying in height from 300 to 1,000 feet, rises directly from the shore throughout the entire distance. At a short distance behind the coast range there is a higher range of mountains, the most conspicuous peak of which, Cerro Vallejo, 5,036

feet high, is 10¾ miles eastward of Monterey Point and 7¾ miles from the nearest part of the coast.

Monterey Point, 8¾ miles southwestward of Punta Raza, is a ragged bluff, with some detached rocks on its northeast side. Some huts stand near the shore about 3 miles northeastward of this point.

Santa Cruzita Point 4½ miles southwestward of Monterey Point, is, like the latter, a ragged, bluff point.

5–162 Punta Mita (*20°46′ N., 105°33′ W., H. O. Chart 622*), a low, narrow, projecting point, is surrounded by outlying rocks and reefs which extend westward for a distance of ½ mile; outside these dangers the depths increase rapidly to 15 fathoms. A prominent hill, 454 feet high, is situated about 1½ miles northeastward of the point, and on the coast northward of the hill there is a steep, rocky bluff, 60 feet high. From this bluff the coast sweeps to the eastward for 1½ miles, forming a small bight, open to the northward; a strip of low land covered with trees and bushes extends southward from the bight to Banderas Bay.

It was reported (1962) that Punta Mita lies about 3 miles eastward of its charted position. A light is shown from Ponta Mita.

5–163 Rock.—A dangerous breaking snoal on which there is a rock awash lies 1 mile south-southwestward of Punta Mita. In the passage between the rock and the point there are 2¾ to 4 fathoms.

5–164 Anchorage.— During the season of the northwesterly winds there is excellent anchorage in depths of 5 to 7 fathoms at a position 1½ miles eastward of Punta Mita and ½ to ¾ mile offshore, with the 454-foot hill northeastward of the point bearing 340°.

5–165 Las Tres Marietas consist of a group of small islands, rocks, and shoals extending 4¼ miles in a general east-northeasterly and west-southwesterly direction. The easternmost and largest of the group lies 4¼ miles 201° from Punta Mita, on a line joining that point and Cape Corrientes. This island, rising in broken white cliffs to the top, which appears flat, is 179 feet high and less than ½ mile in extent. A smaller but similar island 132 feet high, and on which a light is shown, lies about 1 mile westward of this island; surrounding this 132-foot island, and in the channel between it and the first, are numerous detached rocks. At about 1½ miles farther westward, its center lying 6¾ miles 221° from Punta Mita, is a reef of rocks above and below water, with deep water close-to. The third island of the group is 1½ miles westward of the reef, and 8 miles 228° from Punta Mita; it is merely a white rock 40 feet high. A smaller rock, 15 feet high, the westernmost of the group, lies ½ mile westward of this white rock. There are depths of 40 fathoms close to these rocks.

The channel between Las Tres Marietas and Punta Mita is clear and safe. In using it however, care must be taken to avoid the rock awash that lies 1 mile south-southwestward of Punta Mita; this is easily done by keeping a little nearer the island than the point.

5–166 Corveteña Rock, which is of whitish color, 600 yards in length, and 25 feet high, lies 17 miles 263° from Punta Mita. It is of irrregular shape, with a very jagged top. On a clear day it can be seen from the deck of an ordinary vessel at a distance of 8 to 10 miles. There are depths of 40 fathoms close to the rocks, and 50 to 100 fathoms between it and Punta Mita.

A rock awash is said to lie ½ mile westward of Corveteña Rock.

A light is shown from Corveteña Rock.

5–167 Current.—Strong currents have been noticed in the vicinity of Corveteña Rock. Some reports have shown a southeasterly set, and further carefully checked information indicated a westerly set. These currents, which are apparently variable should be guarded against.

5–168 BANDERAS BAY is formed by a marked recession of the coast between Punta Mita and Cape Corrientes. It is 20 miles long, east and west, and has an average width of about 15 miles. The northern shore of the bay, as far as Piedra Blanca Point, 7¾ miles eastward of Punta Mita,

is, with the exception of a short strip of sand beach just eastward of the latter point, composed of broken bluffs 10 to 20 feet high. From Piedra Blanca Point to the Rio Real, which discharges at the head of the bay, the shore is a sandy beach. The southern shore, from the Rio Real to Cape Corrientes, is high and precipitous, with occasional valleys and sand beaches where small streams enter the bay; the water along this shore is very deep.

5–169 Pedredero Point, 5 miles eastward of Punta Mita, is a rocky point with a large detached rock off it. At about 2½ miles northeastward of the point there are some conspicuous hills more than 1,800 feet high.

5–170 Piedra Blanca Point *(20°44′ N., 105° 25′ W., H. O. Chart 622)*, which is surmounted by a hill 326 feet high, lies about 2¾ miles eastward of Pedredero Point. Some outlying rocks lie close off this part of the coast.

Eastward of Piedra Blanca Point there is a small bay that affords excellent anchorage during the season of northwesterly winds.

5–171 Estero de Tomates, into which the Rio Piginto discharges, is entered at a position 7¾ miles southeastward of Piedra Blanca Point. The intermediate coast, recedes considerably to the northward, is low, sandy, and covered with bushes; the soundings off it increase regularly from 3 to 5 fathoms near the shore to 15 and 20 fathoms at a mile or so off. The Rio Piginto is reported to be navigable for nearly 20 miles by vessels drawing not more than 10 feet. The depth over the bar at the entrance to the estero is 1 to 3 feet, depending upon the state of the tide. The sea breaks badly over the bar, and the channel is subject to constant change; small boats should approach with caution and not attempt to enter unless they can find smooth water. Vessels can anchor south of a white gasoline drum which is moored in a depth of 8 fathoms at about ½ mile southeastward of the mouth of the estero, but they should take every precaution and sound continually when approaching the anchorage.

Cargo is loaded from lighters at the anchorage off the estero. At the anchorage there are five 30-ton lighters and two tugs. This equipment and a repair shop where urgent minor repairs can be effected are maintained by a fruit company.

A shoal, over which the sea breaks, lies off the entrance to the estero; outside of this shoal the soundings increase very rapidly, 99 fathoms, rock, being found at ¾ mile from the mouth of the estero.

5–172 Puerto Vallarta (Vallarta Anchorage) *(H.O. Chart 938)* lies less than ½ mile northward of the mouth of the Rio Real; vessels anchor in about 20 fathoms about 300 yards from the beach on the alignment of the range beacons. There is no wharf and cargo is worked by means of open lighters, of which there are 20 of about 3 tons capacity. General cargo can be handled at the rate of about 100 tons a day. Fresh water is plentiful, but is supplied only in barrels. Delivery of Diesel oil can be arranged, also in barrels.

A pilot is available and, if called by International Code, will meet an incoming vessel at about 1 mile off the anchorage. A quarantine official boards vessels at the anchorage.

Anchorage can also be taken in depths of 7 to 8 fathoms at about ¾ mile southwestward of Peñas village, with Rocky Point, situated about 1 mile south-southwestward of the mouth of the Rio Real, bearing 157°, distant 780 yards.

Range lights are shown at Peñas village. The front is shown from a white and black horizontally banded rectangular masonry tower located on the beach, and the rear light is shown from a similar structure located about 200 yards eastward of the front light. These lights in range 097° lead to the anchorage.

5–173 Peñas village *(20°37′ N., 105°16′ W., H. O. Chart 0938)* stands on the north bank of the Rio Real. The hills behind Peñas rise abruptly to a height of more than 1,000 feet, and high mountains are plainly visible 10 or 20 miles to the eastward. A grove of palms and a lagoon called the Estero de Paran are situated about 1½ miles northward of Peñas. Ordinary fresh provisions may be obtained in large quantities from

the local stores if ordered in advance.

Los Arcos are three rocks lying near the southern shore of the bay, about 4½ miles southwestward of the mouth of the Rio Real. One of these rocks is 291 feet high and the other two are, respectively, 20 and 30 feet high.

5–174 Coast. — The coast between Los Arcos and Cape Corrientes is bold and backed by mountains 2,000 to 3,000 feet high. Soundings taken at 1 mile offshore showed no bottom at 100 fathoms. Detached rocks lie off the rocky bluff points, and at the mouths of the several fresh-water streams there are groups of Indian huts.

Yelapa is a village about 9 miles southwestward of Los Arcos on the southwestern side of Banderas Bay. Anchorage for small vessels can be taken close off the village in 15 fathoms sheltered from all but northwesterly through northeasterly winds.

Chimo Point is a rocky headland 7 miles northeastward of Cape Corrientes. A reef of rocks lies just east of the point. A white rock 40 feet high lies a short distance westward of Chimo Point, and a rock, nearly awash and marked by breakers, is reported to lie about 800 yards 297° from the point. The Chimo River enters the bay on the eastern side of this point.

5–175 Tabo Point and Bay. —Tabo Point, situated 4½ miles southwestward of Chimo Point, forms the northeastern limit of the small, open Tabo Bay. A small stream of the same name, with a few Indian huts on its banks, empties into the head of the bay. This bay is too deep to afford anchorage.

5–176 Corrales Harbor.—The so-called harbor of Corrales, the western limit of which is only ½ mile from Cape Corrientes, is separated from Tabo Bay by a high hill. It is about ½ mile in extent, but, because of the depths, affords no convenient anchorage; the depths range from 25 fathoms in the center to 4 fathoms at 30 yards from the shore. A sunken rock, on which the sea breaks during rough weather, lies about 600 yards off the entrance.

Cape Corrientes, the southern point of the entrance to Banderas Bay, is described at the beginning of chapter 6 (sec. 6-1).

6–1 CAPE CORRIENTES (*20° 24′ N., 105°43′ W., H. O. Chart 622*), which derives its name from the currents off it, is a bold headland with a flat summit, 506 feet high, behind which the land rises to a height of 2,000 feet. The cape has been reported to give good radar returns up to 19 miles. Close to the cape is a large detached rock; soundings of 145 fathoms were obtained 600 yards from it. On approaching the cape from any direction the high land behind it is first seen. The mountains are covered with woods, which in the rainy season are green and in the dry season dark brown. From the northward and westward the cape does not present a remarkable appearance, but from the southward it is bold and projecting. It may also be distinguished by a white rock patch well down on the side of the slope, and by the reddish-brown rocks at the base, whereas the points near it are grayish bluffs and rocks.

Off the cape there are no dangers which cannot be seen, and a vessel can pass it in safety within ¼ mile. A submarine ridge with 50 fathoms on it and deep water both outside and inside of it lies westward of the cape; this may account for some of the tide rips and broken water seen at times off this point.

6–2 Cape Corrientes Light is shown from a white octagonal stone-tower, 49 feet high, with a dwelling at the base, on the wooded slope at the cape.

6–3 Landing.—A heavy sea breaks on the beach, so that landing is here impracticable, but a good landing may be had in Corrales Bay (see sec. 5-176), about ½ mile northward and eastward of the cape.

6–4 Currents.—During the summer months there is a northwesterly current off Cape Corrientes; it is variable in strength, but is stronger near the land than farther out. When augmented by the tidal current setting in the same direction the rate may be nearly 2 knots, but when the tidal current is setting to the southward the effect of the northwest current will be neutralized.

6–5 Coast. — From Cape Corrientes the coast line trends south-southeastward for 6 miles, with low yellowish rock bluffs on the intervening white sand beach, and then southeastward to Ypala Point, a further distance of about 6 miles.

6–6 Ysatan Point, about 3 miles southward of Cape Corrientes, is a grayish, rocky point, with a sand beach on either side. It appears to be the farthest projecting point on almost any line of approach, and may easily be mistaken for Cape Corrientes.

6–7 Cucharitas Rocks. — At the turning point in the coast, 6 miles south-southeastward of Cape Corrientes, there is a group of low rocks on the beach called the Cucharitas, with a low reef extending in a southwesterly direction about ¼ mile from the beach. The highest rock of this reef is only about 3 feet above water, and the breakers on and around it can be seen 6 or 8 miles. If Cape Corrientes is passed close-to, Ypala Point will be shut out by these rocks.

6–8 Ypala Point, when sighted by vessels off Cape Corrientes, stands out as a moderately high and bold-faced rocky bluff of grayish color. There are several rocks above water off its western side. It lies about 6½ miles from Cucharitas Rocks, and the coast between is an unbroken white sand beach. A light is shown from Ypala Point.

6–9 Anchorage—On the southeastern side of the point, where the sand beach begins, there is a cove where small vessels can anchor in about 5 fathoms of water, sheltered from all but southerly and southeasterly winds. Care should be taken not to run too near some sunken rocks that lie about 30 yards from the beach near the west side of the cove. Larger vessels may anchor far-

ther out, in 10 fathoms, good holding ground, about ½ mile from the beach, with the white house, mentioned below, bearing 102°. The landing is bad except in the cove.

6–10 Village. — About 1½ miles eastward from the point, indicated by a low place in the coastal range of hills, is the closed mouth of a lagoon near which is a small village lying away from the beach and hidden by the trees. About 500 yards from the lagoon and 150 yards inshore stands a white adobe house among the trees; this is the only structure visible from the anchorage.

6–11 Coast.—From the cove eastward of Ypa'a Point the coast trends southward to a rocky point about 20½ miles from Cape Corrientes; the shore consists of a sand beach with a wooded background. This rocky point is low and not remarkable; a few sunken rocks lie about 200 yards off it. A high sand beach extends nearly the whole distance from this point to Black Rock Point, 23½ miles to the southeastward. About 2 miles from the rocky point is a large lagoon, the mouth of whch is closed except in the rainy season. This lagoon appears to extend to the southward and eastward into a large valley, behind which is a range of hills; near the eastern end of this range, at about 3 miles inland, there is an easily recognizable, pyramid-shaped hill about 916 feet high. About 7 miles farther is another closed lagoon, 1 mile eastward of the low sandy point that marks a slight change in the direction of the shore line. The heavy surf along this beach makes landing dangerous. A third lagoon lies 18 miles southeastward of the rocky point.

Black Rock Point, about 5 miles from the lagoon last mentioned is a low bluff under a peculiar black knob that forms the western extremity of a range of hills extending to the eastward and diverging from the coast. This knob is 655 feet high, and is easily recognized from either side, making a good landmark for the locality of Black Rock. Although Black Rock Point is whitened by bird droppings, it generally shows black when seen from seaward. At the end of the sand beach to the northwest of the point there is a stream or lagoon where boats may land.

6–12 Black Rock (*19°46' N., 105°22' W., H. O. Chart 622*), 1 mile westward of Black Rock Point, is irregular in shape, about 47 feet high, and has a low rock just outside and close to it; there are also a few sunken rocks close to the inner side. Vessels may safely pass within ¼ mile of the rock.

6–13 Coast.—On the northwest side of a point situated 3½ miles southeastward of Black Rock Point there are several huts, and to the right of them is a large lagoon. The mouth of this lagoon is not open during the dry season, but from seaward it appears like a river mouth. In front of the huts and 200 yards from the beach is a rock 3 feet high, with breaking sunken rocks near it. Off the southern side of the point is a cluster of rocks 2 or 3 feet high and there are sunken rocks all around. Vessels should give the point a berth of at least 1 mile.

From this point the beach continues in a southeasterly direction nearly 3 miles to a low, flat rocky point that extends out 400 yards from the general shore line. This point, when first made out, appears to be a small island, but on a closer approach a short and narrow strip is found to join it to the shore.

For 4 miles southeastward of this rocky point the coast consists of a sandy beach behind which is a closed lagoon, but for the next 5 miles, as far as Chamela Bay, the coast is composed of short stretches of sandy beach broken by bluffs. The first bluff is a short one and is separated by a shingle beach, ½ mile long, from the next rocky bluff point, which from the westward resembles an island and has a group of low rocks off it. The shore line then bends in, forming a shallow bight with three short sand beaches, separated from one another by two dark-red bluffs; a group of rocks lies ½ mile southward of the first of these bluffs, but it is within the bight and, therefore, clear of the track of vessels.

From Cape Corrientes to Chamela Bay the water is shoaler than along any other section of

the coast, soundings of 45 to 55 fathoms being obtained at 3 miles from the shore, and 20 fathoms at 1 mile from the sand beaches, where they exist. Vessels may anchor off any of the sand beaches, but this coast is not considered safe between June and the end of November, during which time there are usually southeast or southwest gales that bring in a heavy sea.

6–14 CHAMELA (PERULA) BAY is the first noticeable indentation of the coast southeastward of Cape Corrientes. It extends from Punta Rivas to Flat Top Point, a distance of 5 miles in a southeasterly direction, and is partly protected by a group of islands.

Punta Rivas (*19°34′ N., 105°09′ W., H. O. Chart 938*), the northwest entrance point of Chamela Bay, is the southwestern extremity of a rounded headland of reddish-brown bluffs that rise to a hill 200 feet high. Off the point, which does not stand out very clearly from the rest of the headland, there are detached rocks on which the sea continually breaks. From the southeastern part of the headland a chain of rocks, with 8 or 9 fathoms close outside of them, extends to the eastward for a distance of 600 yards.

6–15 Landmarks.—Two prominent peaks of the Gueguenton Mountains, lying behind Chamela Bay, form excellent landmarks; they are easily seen and recognized in clear weather at a great distance on either side of the bay. The nearer peak, 3,422 feet high, stands 11¼ miles east-northeastward of Punta Rivas. The other peak, 4,675 feet high, lies about 5 miles farther in the same general direction; these peaks are similar in appearance.

When the mountains are shut in by haze, smoke, or rain, vessels approaching from the eastward may use as a landmark a hill to the southeastward of Chamela in the nearest coast range, 1,265 feet high, with low and yellow bluffs just under it. For vessels coming from the westward under the same visibility conditions, Passavera Island will be the mark.

Passavera (White Cliff) and Colorado are two conspicuous islands occupying a central position between the entrance points. Passavera, the northern island, is 186 feet high, in the northern part, and is remarkable for its perpendicular white cliffs, which may be seen from a great distance. Colorado, so named from its reddish appearance, is more regular in shape than Passavera and is 164 feet high. The small islet of Novilla, from which a shoal ridge with 3½ to 4 fathoms on it extends in a northeasterly direction to the beach, lies about 350 yards southeastward of the middle of Passavera and the same distance northward of the northern extremity of Colorado Island. Novilla is 47 feet in height.

A rock that dries lies about 1/4 mile southwestward of the southern extremity of Colorado Island.

Cocina is a small, round island 110 feet high, situated ¾ mile southeastward of Colorado Island. To the southward of Cocina Island are several small islands and islets, the principal of which are San Pedro, San Augustin, Sphynx, San Andres, and Negrita, with sunken and outlying rocks around them.

6–16 Entrances.— Between Passavera Island and the easternmost rock of those extending out from the land eastward of Punta Rivas there is a passage 1 mile in width, with a least depth of 13 fathoms at 250 yards from the rock, and 11 fathoms less than ¼ mile from Passavera. Between Colorado and Cocina Islands there is also a passage ¾ mile wide, with 12 fathoms in the middle, gradually shoaling toward the shore; this channel affords access to the southeastern part of the bay.

6–17 Anchorage.—The best anchorage is in the northwest part of the bay, where, within 500 yards of the beach, there is a depth of 6 fathoms, sheltered from all but southerly winds. Inasmuch as there is anchorage anywhere within a line from Punta Perula to the north end of Passavera, vessels may choose a berth suitable to their size and draft. Small vessels anchoring in the bight are better protected against the swell which is heaviest during the period of full and change.

Vessels wishing to communicate with the village of Chamela can anchor between Colorado Island and the beach to the eastward, but this anchorage is more exposed. Small vessels anchor inside of Cocina Island, in depths of 4 to 5 fathoms at ½ mile from the village; inside of this distance the water shoals rapidly. It is unsafe for a vessel drawing more than 18 feet to attempt to pass from one end of the bay to the other inside the islands.

During the fine or dry season, from November to June, when the sea breeze from the northward and westward is regular during the day and the land breeze at night, the anchorage is perfectly safe in any part of the bay; but during the rainy season, from June until November, gales from the southeastward or southwestward are frequent and set up heavy seas throughout the bay.

6–18 Tides.—The mean high water interval at Chamela Bay is 9h. 07m.; the spring range is 2.5 feet, the mean range 2 feet.

6–19 Directions.—To enter Chamela Bay, bring the two peaks of the Gueguenton Mountains in range bearing 60° and stand in on this course until near Passavera or Colorado Island, then go either to the northward or the southward of the islands, according to the anchorage desired.

6–20 Chamela (19°32′ N., 105°06′ W., H. O. Chart 938), situated at the southeastern end of the bay, is a subport of Manzanillo. It consists of only three or four frame houses built on a small hill 50 feet high. A large white house, standing on a bluff, can be seen a long distance at sea, particularly with the sun past the meridian. A stream of fresh water flows into the bay immediately north of the village and at the base of the bluff on which stands the white house. There is very little trade and in 1939 the port was reported to be practically abandoned. Although the village is situated in an agricultural district, most of the products are shipped out by land; cargo is worked at the anchorage by means of canoes which have a capacity of about 1 ton.

6–21 Farralon Point and Anchorage.—To the southeastward of Chamela Bay the coast line for about 6 miles is a succession of low, rocky bluffs, terminating at a sand beach which curves around to the southward; the easternmost bluff shows a whitish face from seaward. Farallon Point, which is low and rocky, projects out from the shore at the southern end of this beach. A light is located on the point. The light has been reported extinguished (1964). Close off the point is a small rocky islet, which, at a distance, is conspicuous and resembles a low bluff; there is a small rock at the western end of the islet. Anchorage fairly well sheltered against southeasterly winds may be taken in a depth of 10 fathoms at about 1/4 mile offshore and 1/2 mile from Farallon Point. A clear-cut bluff, resembling a palisade, stands a few yards from the shore near the anchorage. At the southeastern end of the sand beach there is a fair landing for boats. Patches of discolored water 1 mile in area were observed (1964) about 25 miles westward of Farralon Point.

From Farallon Point (*19°24′ N., 105°03′ W., H. O. Chart 933*) the coast line trends southeastward for 11 miles to Brothers Point, the northwestern entrance point of Tenacatita Bay. Within and parallel to this stretch of coast is a lagoon.

6–22 Los Frailes, lying about midway between Farallon Point and Brothers Point, are two remarkable needle-shaped rocks, 75 and 120 feet high, respectively. These rocks, which stand out clearly from the land, are sometimes mistaken for a sail. The outer rock is 1 mile from the beach, with deep water close-to and no hidden dangers near it; a few low rocks lie off the southeastern side close to the base, but not in a dangerous position. Vessels may pass the outer rock within 200 yards if necessary.

The inner rock, with three or four low rocks about its base, lies about 1,400 yards from the beach; it appears sharper than the outer one and its top is whitened by the deposits of sea birds.

Between the two rocks there is a deep passage 500 yards wide and free from hidden dangers, but the passage between the inner rock and the shore is unsafe.

From Los Frailes to Brothers Point, 5 miles to the southeastward, the coast is a sand beach, broken by two rock bluffs. A lagoon opens to the sea on the east side of the second bluff.

6-23 Tenacatita Bay is a large indentation lying between Brothers Point and Navidad Head. The water is deep throughout the bay, shoaling gradually from 35 fathoms at the entrance to 10 fathoms at ¼ mile from its head.

6-24 Brothers Point (*19°17′ N., 104°53′ W., H. O. Chart 936*) is a large bluff headland, 185 feet high, backed by 2 hills. The point is connected to the mainland by a sandy isthmus and, when seen from the westward, has the appearance of an island. Off Brothers Point, and in the vicinity of Squall Point, the next point to the eastward, there are many low, detached rocks, interspersed with sunken reefs and rocks awash. Vessels should not approach either of these points within ½ mile.

Birds Island, about ¼ mile southwestward of Brothers Point, is a square perpendicular rock 152 feet high; it is reddish-brown in color and has a white top. A lower sharp rock off the south side of the island appears as a part of it.

6-25 Porpoise Rock, about 12 feet high, lies 1½ miles westward of Brothers Point, on a line from the outer Fraile to the inner slope of Navidad Head. It can easily be seen in coming from the westward and appears to lie well out from the bluffs to the westward of Tenacatita Bay. It may be passed close-to in rounding into the bay, but as there are many sunken rocks between it and the shore a vessel should on no account attempt to go inside of it.

A sunken rock with only about 2 feet of water on it lies 700 yards northeast of Porpoise Rock.

Center Rock, about 10 feet high and steep-to, lies in the northwest part of the bay, about ½ mile eastward of Squall Point.

A submerged rock with a depth of about 4 feet and a dangerous sunken wreck lie between Center Rock and the shore to the westward.

A 4-fathom shoal lies about 2/3 mile northward of Center Rock.

Detached rocks with deep water close to them lie off the entire eastern shore of the bay.

6-26 Anchorage.—During the rainy season the best anchorage is in a depth of 10 fathoms near the village of Tenacatita in the northern part of the bay, at about 1/2 mile off a long sand beach. During the dry season the preferred anchorage is in the northwestern part of the bay, within Squall Point.

6-27 Navidad Head (*19°14′ N., 104°50′ W., H. O. Chart 936*), 400 feet high, is remarkable when seen from any direction. It is a wedge-shaped, high, rocky, narrow chain of islands, projecting ¾ mile straight out from the mainland. The inner large island is separated from the mainland by a narrow, rocky passage. The outer extremity of Navidad Head is the highest part and forms the head proper; when seen from the southward it appears as a wedge.

Extending out from the head in a south-southwesterly direction are three large rocks which are additional marks for Tenacatita Bay, as well as for Navidad Bay, some 7 miles to the eastward of them. The innermost and highest of these rocks is a dark rock just under Navidad Head and is about 115 feet high; as seen from the westward there are two lower sharp rocks on its right.

White Rock.—The second rock, about 750 yards outside the head, is about 100 feet high, rather square in shape, with a pointed or rounded top. The top is dark but the middle portion, tapering to the base, is whitened by the deposits of sea birds, and is often mistaken for Piedra Blanca, which lies westward of Punta Carrizal.

The third principal rock, lying ½ mile outside Navidad Head, is dark and only 40 feet high; there are several small, low rock clusters just outside of it.

Inside the limits of Tenacatita Bay, and nearly opposite the inner end of the island ridge forming the head, lies a group of white rocks which stand out very prominently against the dark background when seen from the westward.

6–28 Sunken rocks. — At about 800 yards south-southwestward of White Rock there is a sunken rock over which the sea breaks at most times. A rock awash lies 350 yards eastward of White Rock, but is out of the way of all vessels.

6–29 Coast.—From Navidad Head to the northwest bluffs of Navidad Bay, about 6 miles to the eastward, the coast presents a broken line of rocky bluffs 50 to 100 feet high; behind the bluffs is a wooded hilly country that rises to a height of 4,000 feet. At about 4 miles eastward of the head is a bight on the west of which are several sharp-pointed rocks, the highest being about 40 feet high. This bight has two short sand beaches at its head, and a small stream empties on the southern side.

6–30 Harbor Point, the northern entrance point of Navidad Bay, is a high, white, projecting point, which, with several detached rocks, shelters the inner anchorage of Navidad Bay against southwesterly winds.

6–31 Navidad Bay, lying between Harbor Point on the north and Graham Head on the south, is about 1½ miles wide and 1,600 yards long, and has a sand beach at its head.

Due to the numerous buildings along the shores of the bay, it may easily be mistaken for Manzanillo Bay.

A small lagoon at the western end of the bay extends to within a short distance of the beach and breaks through during the rains.

Near the eastern end of the beach another lagoon opens on the bay. There are depths of 1½ fathoms at its mouth, through which a strong current runs; though the lagoon is very shallow, it is reported to be navigable by boats at all seasons.

6–32 Anchorage.—During the dry season there is good anchorage in Navidad Bay, north-northeastward of the rocks off Harbor Point, but at other times it is not recommended for sailing vessels, as they might have difficulty in getting out with the prevalent southerly winds. Sailing vessels might anchor farther out, but they would then be more exposed to the swell.

6–33 Graham Head (Cabo San Fransico) *(19°11'N., 104°43'W., H.O. Chart 936)* is 705 feet high and, like many other points along this coast, appears as an island when first sighted at a distance. Cone Rock, a reddish conical rock 280 feet high, lies close off the west side of Graham Head, but it so merges with the background that it can not readily be seen at any distance. A small, detached rock, 8 feet high, lies southwestward of the head, 750 yards from the nearest point of the beach. Outside this rock there are no known dangers. Graham Head should be given a berth of at least 1,500 yards.

A light is shown from Graham Head.

6–34 Coast. — A sand beach extends the whole distance from Graham Head to the bluffs at the west side of the entrance to Manzanillo Bay. The country just beyond it is low and partly occupied by a large lagoon, remarkable for its bilge-water stench. Boats may generally land on the beach in the fine season, and there is safe anchorage at ½ mile from the shore in 18 fathoms.

WRECK.—A dangerous sunken wreck lies about 1 mile offshore, about 4 miles west-northwestward of Piedra Blanca.

6–35 Piedra Blanca, the principal landmark for vessels westward of Manzanillo Bay, lies 1 mile southwestward of the junction of the sand beach and bluffs, and 2½ miles west-northwestward of Punta Carrizal. It is nearly circular in shape, has precipitous sides, and is about ¼ mile in diameter, but it is irregular in outline and height. The highest elevation, 260 feet, is on the south side. The deposits of sea birds give the island a very white appearance and make it readily distinguishable at a great distance. There is plenty of water close up to it on all sides, and vessels can pass between it and the group of rocks off the shore. These rocks, about 5 feet

high, lie 1,000 yards west of the bluff and only about 400 yards off the beach. The land behind the beach at this point rises to low, wooded hills, and thence to the Cerro Juluapan, on the northwest side of Manzanillo Bay.

PUNTA CARRIZAL lies about 2 1/2 miles east-southeastward of Piedra Blanca; a remarkable high rock and several other detached rocks lie close off the point.

PUNTA DE JULUAPAN lies about 2 1/2 miles eastward of Punta Carrizal. Between them are Ensenada Carrizal and Ensenada Higeras which are separated by a high point. Los Frailes (Sisters Rocks), 1/2 mile southward of Punta de Juluapan, are seven small, detached, steep-to rocks 5 to 20 feet high. These rocks may be passed close-to on either side.

A light is shown from a white square beacon located atop the largest of Los Frailes.

6-36 SANTIAGO BAY, about 2 1/2 miles in extent, lies between Punta de Juluapan and Punta de Santiago and is open to the southward. It is free from dangers at 200 yards from the shore. Anchorage may be taken in 8 and 10 fathoms of water in the western and eastern ends of the bay, respectively, at about 1/2 mile offshore.

Two 3 1/4-fathom shoals lie in the entrance to Santiago Bay about 1 1/4 and 1 3/4 miles 71°30′ from Punta de Juluapan. Another shoal of 3 fathoms lies about 200 yards southeastward of the first of the above-mentioned shoals.

PUNTA DE SANTIAGO is the southwestern extremity of a high peninsula over 1 mile in length, separating Santiago Bay from Manzanillo Bay. Pelican (Santiago) Rock, close southward of Punta de Santiago, is 72 feet high and of whitish color.

6-37 MANZANILLO BAY, between Punta de Santiago and Punta Ojo de Agua, is about 2 3/4 miles wide in a northwest and southeast direction, with depths of 6 to 26 fathoms. A stretch of beach about 300 yards wide separates the head of the bay from San Pedrito Lagoon, which is 3 miles in length but very shallow. Southward of the town of Manzanillo and the southern part of the bay is the western end of the extensive Cayutlan (Cuyutlan) Lagoon. The Rio Salagua discharges at the northern extremity of the Bay. This river is a mere creek except during the rainy season.

Several wrecks are reported to be stranded on the shore in the northwestern part of Manzanillo Bay.

6-38 LANDMARKS.—Volvano Colima (see H.O. Chart 0933), 12,745 feet high, situated 17 1/2 miles north-northeastward of Colima and 48 miles northeastward of Manzanillo, is the western extremity of the volcanic chain that traverses Mexico from east to west.

About 3 1/2 miles northward of the Volcano Colima is the extinct crater of Volcano de Safa (Pico Helado), 14,118 feet high; its summit is usually covered with snow. These two volcanoes may be seen from a great distance at sea and, when the atmosphere is clear, constitute excellent landmarks for navigators approaching Manzanillo.

Cerro Juluapan (Table Mountain), a very remarkable table-topped mountain, rises about 7 1/2 miles northwestward of Manzanillo and 2 miles northwestward of Santiago Bay. Its ends are respectively, 2,620 and 2,790 feet high, the outer or seaward end being the lower. The mountain appears as a table top when seen from the westward or the eastward.

Wreck Cone, a cone-shaped single peak, 1,524 feet high, stands about 2 3/4 miles northward of Punta Carrizal.

6-39 PUNTA DE CAMPOS (19°01′ N., 104°21′ W., H.O. Chart 0915), is a bluff headland at the southern extremity of the hilly land that extends southward from Manzanillo and forms the western shore of Cayutlan Lagoon. From the westward this hilly land appears to have a cut through the middle; this cut, called Las Ventanas, is not visible from the eastward when close in to the beach.

Punta de Campos has been reported to give good radar returns up to 27 miles.

6-40 PUNTA DE CAMPOS LIGHT is shown from a masonry tower, 36 feet high, with a white wooden house at its base, on Punta de Campos.

SAIL ROCK, so called from its appearance when seen at a distance, is 112 feet high and lies 500 yards off Punta de Campos. Several detached rocks, 5 to 10 feet high, lie off its south side, and one black rock, about 20 feet high, lies one-third of the way between it and the point. There is deep water outside of and close to Sail Rock, with no hidden dangers except those shown on the chart. A vessel can pass between the rock and the point, but it is not recommended to do so. Vessels can also pass within 1/4 mile of all the bluffs from Sail Rock to the anchorage off Manzanillo; the sunken and detached rocks are indicated on the larger scale charts.

PUNTA DE VENTANAS projects out from the steep shore at a position about 3/4 mile northward of Punta de Campos. Detached rocks extend out about 200 yards in a northwesterly direction from this point.

VIGIA GRANDE is a cone-shaped peak, 711 feet high, westward of Manzanillo and overlooking the town. From the eastward it shows as the innermost of the hills extending southward from Manzanillo. A conspicuous white cross stands atop Vigia Grande.

6-41 VIGIA CHICA, the lookout station for Manzanillo, is 221 feet high and situated close under and to the northward of Vigia Grande. This hill is situated close southward of Punta Chiquita del Viejo, off which some rocks extend a short distance. Punta Ojo de Agua lies about 1,300 yards to the southwestward.

6-42 SIGNAL STATION.—The signal station for the port of Manzanillo is located on Vigia Chica. The station will receive signals for a pilot and other communications of a similar nature, but it will not accept general messages.

6-43 MANZANILLO HARBOR, in the southern part of the bay, and eastward of Punta Chiquita del Viejo, is protected by a breakwater that extends in a general northeasterly direction for about 2,080 feet from the shore westward of the town. The controlling depth at low water in the channels of approach and entrance was 75 feet (1959).

In 1959, less than charted depths were reported to exist close eastward of Fiscal Wharf, and in 1961, depths less than charted were reported close westward of the pier.

A stranded wreck lies alongside the inner breakwater, in a position northwestward of Petroleos Mexicanos (Fuel) Pier.

A breakwater under construction (1967) extends westward for about 200 yards about 1/3 mile northeastward of Punta San Pedrito.

6-44 NAVIGATIONAL AIDS.—There is a light at the head of the breakwater and on each corner of the seaward end of the main pier.

A fixed red light has been reported (1955) on the mast of the signal station. This light can be seen before the breakwater light.

Lights are shown on the head of Petroleos Mexicanos Pier.

6-45 A MOORING BUOY lies about 150 yards 082 1/2° from Petroleos Mexicanos Pier. Mooring lines, which may be difficult to see at night, are often run from the buoy to vessels at the piers.

6-46 ANCHORAGE.—The usual anchorage, protected by the breakwater, is in 6 to 10 fathoms of water southward of a line extending in an easterly direction from the outer end of the breakwater. Anchorage is also available farther out in depths up to 15 fathoms. The holding ground is good.

6-47 WINDS.—The bay is safe in all winds excepting those from the westward and southwestward, which do not occur between November and June. Although gales are not frequent, very severe ones sweep across the bay at times; they are, however, very rare during the dry season.

6-48 STORM SIGNALS (sec. 1-15) are displayed at the signal tower on Vigia Chica, a hill immediately westward of the town.

6-49 TIDES.—The mean high water interval at Manzanillo is 9h. 07m.; the spring is 2.0 feet the mean range 1.8 feet.

6-50 CURRENTS.—During the survey the current between Manzanillo Bay and Cape Corrientes was found to be variable in force, but always setting to the northwestward along the shore; it was stronger near the land than offshore, and increased in strength as the cape was approached. At times no current would be observed, but at others there would be a current with a rate of nearly 2 knots.

6–51 Pilotage is compulsory. The pilots board vessels outside the breakwater from a small dark-hulled motor launch which displays the international pilot flag. Pilots will take vessels in at night. Customs and health officers board incoming vessels after the vessel passes the head of the breakwater. The signal for a pilot is according to the International Code.

6–52 MANZANILLO *(19°03'N., 104°20'W., H.O. Chart 0915)*, situated on the southern side of the harbor, consists of two paved streets along the water front, backed by high hills on which stand most of the residence; the dwellings are mostly of wood construction, whereas the commercial structures are of adobe and brick. Manzanillo is the most important shipping center on the west coast of Mexico. It is the port of entry for the State of Colima. The town had a population of about 20,000 (1964).

Colima, the capital and principal city of the State of Colima, lies about 35 miles east-northeastward of Manzanillo, in a rich agricultural district. It has a population of about 17,000 (1960).

Piers—Wharf.—Fiscal Wharf, a pier about 700 feet long and 180 feet wide, extends northward from the southern side of Manzanillo Harbor. It provides a berth on either side, with project depths of 28 to 32 feet alongside for about 430 feet of the outer end. Depths are maintained by dredging. It was reported (1959) that the berths had been dredged to 35 feet, although the depth was reported (1961) to be slightly less.

A 23-foot shoal lies about 45 feet off the western side of the pier about 450 feet inshore from the head. Both sides of the pier are connected with the railroad. A large modern warehouse with a 24,000-ton capacity stands on the pier. The offices of the Port Captain, Quarantine Officer, and Pilot are located here.

A wharf, about 1,020 feet in length, extends westward along the waterfront from Fiscal Wharf; it will accommodate vessels drawing from 15 to 20 feet.

Fuel Wharf (Petroelos Mexicanos Pier), a T-headed pier with a length of about 490 feet, extends eastward from the shore near the root of the breakwater. This pier, which is used for discharging tankers and for bunkering purposes, can accommodate vessels drawing 35 feet. Vessels are berthed port side to the pierhead, which is 117 feet long, and must be prepared to use a starboard bow anchor, and have available a stern line to attach to the mooring buoy located 150 yards 082½° from the pier. A continuous 3-foot surge makes advisable doubling lines one and four. All lines should be protected against chafing on the pier edge.

Seven lighters of 90 to 300 tons capacities are available. A 7-ton mobile steam crane is available.

Repairs.—A naval machine shop is available for any reasonable size repairs. Three privately-owned machine shops handle minor repairs. Diving services are available.

Supplies.—Fresh and staple provisions are plentiful. Some deck supplies are plentiful, but engineers' supplies are scarce.

Water is available by pipeline at both Fiscal Wharf and Fuel Wharf. The delivery rate is from 12 to 18 tons per hour. Although suitable for boilers and drinking, it should be boiled before drinking.

A stock of fuel oil, diesel oil, and gasoline is stored in bulk at Manzanillo. These fuels are delivered by pipeline at the Fuel Wharf, at rates of 200 to 800 barrels per hour.

Communication.—Manzanillo is in frequent steamship communication with other Pacific ports of Mexico, the United States, and Central America.

A railroad line leads from Manzanillo to Guadalajara, where it connects with the national railway system. An airline connects Manzanillo with Mexico City and intermediate points. The town is also connected with the national telegraph and telephone systems. There is a Government-owned radio station at Manzanillo, and radiotelephone service to other Mexican cities is available.

Climate.—The temperature between November and April ranges from 73° to 86° F., and between May and October from 77° to 93° F. The prevailing winds blow from a direction between west and northwest. The rainy season begins in June and ends in November, and the dry season lasts from December to May. The weather from December to March is very pleasant, and the mornings and evenings are delightfully cool.

Meteorological table.—See appendix II, Table 3.

Sanitation and health. — The sewerage system of Manzanillo is primitive, but is being improved. Sanitary regulations are fairly carefully enforced. Malaria is the principal disease to be guarded against. There is a modern hospital with a capacity of 150 beds.

Deratization.—See sec. 1–19.

6–53 Coast. — Between Punta de Campos and Black Head, about 43 miles to the southeastward, the shore line is a gray sand beach upon which the sea breaks heavily. Anchorage can be had anywhere off the beach except directly in front of the mouth of Rio Armeria, where, extending directly seaward, there is a submarine valley.

Laguna de Cayutlan, separated from the sea by a narrow strip of low land on which runs the railroad from Manzanillo, extends for 18 miles inside of and parallel with the shore line. Rio Armeria discharges about 22 miles southeastward of Punta de Campos.

A rock only 5 feet high lies about 4 miles southeastward of Rio Armeria; there are depths of 15 to 20 fathoms close to it on all sides. This rock is the only known danger between the two points.

Rio de Coahuayana empties into the sea at a position about 5½ miles north-northwestward of Black Head; its mouth is marked by a line of breakers extending out about ½ mile.

6–54 Black Head *(18°35' N., 103°43' W. H. O. Chart 0933)* juts out from the mainland in such a manner that it appears as an island when first seen from the westward or the eastward. It is a cliff 770 feet high, densely wooded from base to top, and is connected with the higher wooded hills to the eastward by a low, sandy neck of land ½ mile wide. Pelican Rock,

a small white rock 75 feet high, lies 400 yards from the northwestern side of the head. An excellent anchorage in 10 fathoms may be found ¼ to ½ mile northeastward of this rock and about ½ mile from the beach. Boats can land on the beach. Vessels can pass within ¼ mile of Black Head.

The head has been reported to give good radar returns up to 30 miles.

6–55 Coast.—From Black Head the coast trends southeastward for 12 miles to the Boca de Apisa. At about 3½ miles from Black Head the sand beach is broken by a short line of rocky bluffs; and at 2 miles northward of the river there is a line of cliffs, backed by a short range of hills, 1,440 feet high.

The Boca de Apisa is surrounded by a narrow line of breakers. The river seems to be a large stream extending back between two shore ranges. Midway between Black Head and Punta Tejupan, at about 4 miles inland, there is a remarkable table-topped mountain that extends in an east and west direction and has an almost level top; the seaward end of the mountain is 4,030 feet high and the inner end 3,718 feet high.

Beginning at about 1,500 yards southeastward of Boca de Apisa and continuing for about 2 miles, the sand beach is broken by a line of low, white rocks, 5 to 12 feet high. At about 2 miles westward of Punta Tejupan a dangerous shoal and reef makes out more than 1 mile from the shore; its position is marked at most times by the breakers. A line from Black Head to Punta Tejupan barely clears the reef, and vessels from the westward standing into an anchorage under Tejupan should be particular not to get inside of this line. Between the inshore end of the reef and Punta Tejupan there is a line of low bluffs separated from one another by small sand beaches. Depths of less than 5 fathoms extend up to 1½ miles offshore between Boca de Apisa and Punta Tejupan. Parallel with the coast and lying about 1 mile within it, a series of lagoons extends practically the whole distance between Manzanillo and Punta Tejupan.

6–56 Punta Tejupan and Punta San Telmo appear as one projecting point when seen from either the westward or the eastward; from the westward Punta Tejupan apparently projects out farther than does Punta San Telmo, but from the eastward the reverse is true; when directly abreast of them there is no point visible, both appear as a series of rocky bluffs. Foul ground, on which the sea usually breaks, extends about 1½ miles westward from Punta Tejupan; three rocky islets, 20 to 60 feet high, lie on the foul ground. Vessels with local knowledge may find anchorage, with little shelter, northwestward of these islets. The islets have been reported to give good radar returns up to 10 miles.

Between Tejupan and San Telmo the shore line is of rock bluffs, with short white sand beaches adjoining each point.

6–57 Punta San Telmo Light is shown on the bluff at Punta San Telmo. It was reported (1961) that the light is located 2 miles northward of the point.

6–58 Caution.—During the daytime Puntas Tejupan and San Telmo can be passed at a distance of about 1 mile, but at night they should be given a good berth on acount of their lowness and the variable currents that set along this part of the coast.

Punta San Telmo was reported (1959) to extend 2 miles seaward of its charted position.

6–59 Coast.—For 2¾ miles from Punta San Telmo the shore line is a succession of rock bluffs and sand beaches, ending in a remarkable sugarloaf rock 75 feet high. Beyond that distance there is a white sand beach that extends 2½ miles to the low bluffs 3 miles westward of Piedra Blanca. These bluffs, increasing in height to Maruata, are separated by sand beaches.

Piedra Blanca, lying 8½ miles southeastward of Punta San Telmo and only a few yards off the south side of a bluff, is a white rock 110 feet high and about ¼ mile in circumference. Together with the white bluffs behind it on the shore, this rock forms the best landmark for Maruata Bay, which lies 1,500 yards to the eastward of the bluff. The bluffs show white to the eastward and are the first high white bluffs eastward of Punta San Telmo.

A 20-fathom bank has been reported to lie about 5 miles west-southwestward of Piedra Blanca.

6–60 Maruata Bay *(18°15′ N., 103°21′ W., H. O. Chart 0933)* is exposed to all winds except those from the northward and westward. Four small rocky islets extend eastward about 400 yards from a rocky bluff at the western end of the bay. The shore of the bay consists of a white sand beach. The islets and bluff mentioned above constitute the western limit of the bay.

The anchorage is in a depth of 7 fathoms, sand on mud, at about ⅓ mile from the beach, with the easternmost of the four islets bearing 284°. Although boats can land on the western end of the beach, it is better to pass outside of the islets and land on the short sand beach to the westward of them; at the latter place, being out of the heavy swell which sets into the bay, the water is moderately smooth. The vicinity of Maruata Bay is reputed to be extremely unhealthful.

Paps of Tejupan, about 12 miles from the coast, at the summit of a range about 5,500 feet high, are not well defined. From a vessel to the eastward or westward of them a double-nipple summit appears, the northern summit being wooded to the top, while the other is almost bare, but they are difficult to identify from some positions, as they are then overshadowed by the more lofty ranges behind them. A smooth wooded cone 2,140 feet high, about 3½ miles north-northeastward from Maruata, is conspicuous when passing this part of the coast.

6–61 Coast.—A line of high, bold bluffs, backed by wooded hills, extends eastward for 3 miles from Maruata; a low rocky reef extends ¼ mile in a southwesterly direction off a bluff near the western end of this stretch of coast. A sand and shingle beach succeeds these bluffs for 3½ miles, where it, in turn, is succeeded by a high and remarkable line of bluffs extending 6 miles to Ensenada de Pichilinquillo. This last bluff line is broken by three or four projecting points with detached outlying rocks off each. For 2½ miles westward of Pichilinquillo the bluffs, which are 50 to 120 feet high, are vertical and even overhanging, with perfectly smooth seaward sides. Near the center of these vertical bluffs a small stream flows over the face of the cliff, leaving a yellowish white deposit which is visible from a long distance seaward.

The whole country between Maruata and Lizard Point is broken, mountainous, and densely wooded, rising in successive ranges until an elevation of 9,000 feet is reached at 15 or 20 miles inland. Between the bluffs at about 5 miles westward of Pichilinquillo are two small sand beaches, where fresh water streams empty into the sea.

6–62 Ensenada de Pichilinquillo, lying westward of Lizard Point, is open to all southerly winds, yet affords good anchorage for small coasters. A white sand beach lies at the head of the inlet. At about 1,500 yards from the western side of the bay lies a rocky islet, about 234 feet high and about ½ mile in circumference, which has been reported to give good radar returns up to 10 miles. It is not easily distinguished as an island unless close in. Between this islet and the sand beaches inside of it are a great many sunken rocks, through which it would be difficult for a boat to pass; there are also two sunken rocks on a line between it and the bluff point on the west, one about midway and the other close to the point.

Large vessels can anchor in 9 or 10 fathoms, sand, on a line from the islet to Lizard Point; smaller ones can go into 5 or 6 fathoms, ¼ mile from the sand beach, and find better shelter. There are no signs of habitation anywhere near the bay.

6–63 Lizard Point *(18°11′ N., 103°07′ W., H. O. Chart 0933),* which forms the eastern side of Ensenada de Pichilinquillo, is a dark, bluff headland, 1.1 miles long on its seaward side, about 100 feet high, and covered with thick woods. From either northward or southward it appears as a low, narrow, projecting point.

There are several detached rocks close to Lizard

Point, but a vessel may pass within ¼ mile of them.

6-64 Coast.—From Lizard Point the coast extends for 25½ miles to a low, bluff, rock-faced point, which projects ½ mile beyond the general line of bluffs. There are many low, detached rocks off these bluffs, but all are so close in as to be off the track of passing vessels.

A stream with a palm grove on its west bank empties into the sea on the east side of a low, shingle point about 6¼ miles eastward of Lizard Point. Boats can land in this vicinity when no sea is running.

At about 18½ miles eastward of Lizard Point there is a remarkable peak, 1,443 feet high; it is sharp at its summit, descending in a long saddle-like slope to the outer extremity of the ridge, which terminates in a decided knob, 960 feet high. The highest peak is 1,800 yards from the shore, which is here a low bluff, 1,800 yards long. From the outer peak or knob a gentle slope descends to the shore, and the low extreme point, 7 miles to the eastward, shows as a prolongation of the slope, appearing at a distance from up or down the coast as a low point extending out from the knob. A large river, with a line of breakers across its open mouth, empties into the sea at a position between this knob and Bufadero Bluff.

6-65 Bufadero Bluff, situated about 3 miles westward of this low point, is a reddish bluff at the foot of which is a rock with a blow hole through which water spouts. The bluff, on which a light is shown, has been reported to give good radar returns up to 18 miles.

From the extreme bluff point, 3 miles eastward of Bufadero Bluff, the coast line trends eastward for 11½ miles to the end of the bluff line and the commencement of a long unbroken sand beach extending around Mangrove and Sacatula Points.

Along this coast are frequent high water breaks through which streams discharge during the rainy season. There are many detached rocks off the little bluffs, but they are close to the beach, and may be approached to within ½ mile without danger. The country behind this coast is rough and mountainous. In 1952 depths of 45 and 15 fathoms were reported about 9 and 12 miles west-southwestward of Bufadero Bluff, respectively. A depth of 27 fathoms was reported about 6 miles south-southeastward of Bufadero Bluff.

6-66 Anchorage.—Vessels may anchor anywhere off the sand beach in depths of 10 to 15 fathoms at 1,000 to 1,500 yards from the shore; the sea breaks heavily all along the beach. Calpica village is situated on this beach about 5½ miles from the end bluff, with other groups of huts to the eastward and westward of it. A lagoon lies parallel to and within this beach.

6-67 Mangrove Point *(17°55′ N., 102°12′ W., H. O. Chart0933)* is a low, round point, 20 to 30 feet high. It is covered with mangroves and palms, and, near the point, with dead trees and bush. There is nothing to mark this locality, as the country behind it is low and flat, forming the delta of the Sacatula River. Beyond Mangrove Point the coast line sweeps around to the northeastward. to Petacalo Bay.

A tower, reported (1966) to be non-existent, is charted about 5 1/2 miles west-northwestward of Mangrove Point.

Sacatula Point, 3 miles east-northeastward of Mangrove Point, is near the principal mouth of the river of the same name, and is the northeastern end of the delta. Together with Mangrove Point it forms a single round-shaped point.

6-68 The delta of the Sacatula (Zacatula) River extends from Mangrove Point to Petacalco Bay. This river, one of the longest and largest in Mexico, rises in the mountains near the City of Mexico, and discharges into the sea through three mouths, the first and largest being near Sacatula Point and the second and third, respectively, 6 and 8 miles westward of Mangrove Point. The river is known under three different names: Sacatula, near its mouth or in the delta; Balza (Balsa), from the head of the delta for some distance inland; and Mescale (Mexcala), thence to headwaters. During the rainy season an immense volume of water is discharged into the sea, discoloring the surface for some 8 or 10 miles offshore. This discoloration was observed (1960) up to 22 miles offshore.

The depths off the delta of the Sacatula are very irregular and the bottom is of shifting sand and mud; at one place, 2½ miles from shore, a sounding of 17 fathoms was obtained, while at another, less than 2 miles offshore, there was a depth of 225 fathoms. Breakers have been reported at about 2½ miles southeastward and southward of Mangrove Point.

6–69 Anchorage.—Vessels can anchor anywhere off this beach, but the deeper and safer water is westward of Mangrove Point. There is no landing in any of the mouths of the Sacatula.

Petacalco Bay.—In this bay, as well as in the area southward and eastward of it, the bottom is very uneven and lumpy. Vessels should approach the shore with great caution, as the bottom is so shifting that the soundings shown on the chart, close in, are not reliable.

There is an excellent boat landing at Canuta, on the west side of the bay.

6–71 Coast.—From Canuta the coast trends southeastward 23 miles to Punta Troncones, a low, cliffy headland, 540 feet high, rising to a peak 1,145 feet high. The beach is low, covered with coco palms, and broken in a number of places by small streams which drain the adjacent country during the rainy season. The water is deep close to the beach, and anchorage can be had only in Salada Bay. 1½ miles northwestward of Punta Troncones. From this point the coast trends southeastward 8½ miles to Isla Grande Bay.

Rio Rincon, about 7½ miles southeastward of Punta Troncones and 1 mile northward of Isla Grande Bay, is closed by a heavily breaking bar which, however, boats can cross without much danger by waiting for a time when the water is smooth. A small Indian village lies about 5 miles up the river.

6–72 Isla Grande (Ixtapa) Bay, lying between Isla Grande and the mainland to the northeastward, is sheltered on all sides except between west-southwest and west-northwest, and winds seldom blow from those directions.

Isla Grande (Ixtapa Island) (*17°40′ N., 101° 40′ W., H. O. Chart 878*), lying about 400 yards offshore, is small and of irregular shape, about 170 feet high, and thickly covered with brush and undergrowth. When seen from the offing it appears more like a headland of the coast than an island.

A sunken rock with only 5 feet of water on it lies about ½ mile 353° from the north point of Isla Grande; with a heavy swell and at low water it breaks, but at other times its position is not indicated. Vessels approaching or leaving the anchorage can easily avoid this rock by passing close to the islets off the north side of Isla Grande.

6–73 Anchorage.—Vessels may anchor anywhere in the bay inside a line drawn from the outer rock off Isla Grande to the mouth of the Rio Rincon, but the deepest water is near Isla Grande. There is apparently a free passage, with a depth of 2¾ fathoms, between Isla Grande and the mainland; all dangers show above water. The tidal rise is approximately 2 feet in this vicinity.

Isla de Apies, 1 mile southeastward of Isla Grande, is 216 feet high, heavily wooded, and connected to the mainland by a narrow sand strip about 3 feet above low water. Ixtapa Point is the outer extremity of Isla de Apies. This island forms, with Isla Grande, a bay, open to the southwestward. Anchorage can be taken in a depth of 6 fathoms in this bay, but it is not as good as that northward of Isla Grande.

San Juan de Dios Bay, to the eastward of Ixtapa Point, is encumbered by Islas Blancas and other shoal dangers.

Islas Blancas, extending out from the middle part of San Juan de Dios Bay, consist of a group of detached rocks and islets, 20 to 150 feet high. They are very conspicuous from the offing, particularly when the sun is past the meridan; with the sun shining on them they have a white appearance, but at other times they are dark brown in color. Vessels can safely pass within ¼ mile of the outer rocks.

Sacramento Rocks, a group of sunken rocks, lie about 2¾ miles southeastward of Ixtapa Point.

6–74 Coast.—Mount Ixtapa, about 1¼ miles northeastward of Ixtapa Point, is 720 feet high; it is the westernmost elevated ground in the immediate vicinity. The coast eastward of Ixtapa Point is bold and rocky, the bluffs coming down to the water. About 4 miles from Ixtapa Point is the first bluff point, 2 miles farther the second, 1 mile from the second the third bluff, and ½ mile from this still another; thence the rocky beach extends northeastward and eastward for about 2 miles, where it is succeeded by the sand beach of Petatlan Bay.

6-75 Zihuatanejo (Zijuatanejo) Bay *(17°37' N., 101°33'W., H.O. Chart 879),* lying between the second and third bluffs, 6½ miles from Istapa Point, is a small but excellent harbor, free from all dangers, and easy of access, with deep water close to the rocks on either side of the entrance. The harbor is open to winds from the southwestward, but affords anchorage anywhere inside the bay, with allowance for the draft of the vessel and for the heavy swell that sets in from the sea. In the entrance there are depths of 17 fathoms, decreasing gradually to the head of the harbor. The bottom is soft mud, good holding ground. The land all around the bay, except at the head and along part of the east shore, rises abruptly from the beach. Directly behind the harbor are two remarkable peaks. The tidal rise is approximately 2 feet in this vicinity.

Zihuatanejo village, situated at the head of the bay, is connected with Acapulco by telegraph.

A light is shown at the entrance to Zihuatanejo Bay from a tower, 33 feet high, on Punta Garrobo, on the southeastern side of the bay in a position approximately lat. 17°36'30"N., long. 101°33'15"W.

6-76 Black Rock (Solitaria), 46 feet high, lying 1 mile off the entrance to the bay, is steep-to on all sides. It is a good mark for Zihuatanejo. Between the rock and the entrance the bottom is gravel and stone.

It should be remembered that Black Rock is the mark for Zihuatanejo Bay; unless the rock is sighted there may be trouble in finding the bay, while with it close aboard one can not miss or mistake the entrance.

A light is shown on Black Rock.

6-77 Tides.—The mean high water interval at Zihuatanejo Bay is 8h. 50m.; the spring range is 2 feet, the mean range 1.7 feet.

Directions.—Vessels coming from the westward, after passing Mangrove Point, steer for Islas Blancas for about 35 miles, making good a course of about 115°; pass outside these rocks and on getting nearer, Black Rock will be easily distinguished. Vessels coming from the eastward, after passing the White Friars, steer 323° for Black Rock, which may be passed within 200 yards on either hand, there being from 5 to 10 fathoms within a boat's length of the break at its base. On nearing Black Rock from the southward the sand beach to the right and in the harbor can be seen, but the huts at the head of the bay do not show until well inside the entrance.

6-78 Morro de Petatlan, situated about 7 miles southeastward of Black Rock, is a round hill 640 feet high, ½ mile in diameter, and thickly covered with brush and straggling trees. Inasmuch as it stands on a projecting point that is connected with the mainland by a low, wooded isthmus, this hill appears as an island when seen from the eastward or westward. Punta Gorda, its western extremity, can be approached within ¼ mile, as the water is deep close-to, and all rocks and dangers show above water.

Depths of 80 to 85 fathoms have been reported about 63 miles southwestward of Morro de Petatlan.

6-79 Petatlan Bay (*H. O. Chart 879*), a roadstead situated northward of Punta Gorda, is sheltered against all winds except those blowing from a direction between southwest and northwest. There is excellent anchorage in depths of 5 to 10 fathoms, hard sand, about 1,200 yards northeastward of Punta Gorda. The depths decrease gradually toward the beach. On the north side of Morro de Petatlan there is a straight and abrupt shingle beach, succeeded at its eastern end by a sand beach that sweeps around to the northward and northwestward. There is an excellent boat landing at the junction of these beaches.

The tidal rise is approximately 2 feet in this vicinity.

Potoci (White Friars), lying between 1 and ½ miles westward of Punta Gorda, consist of a group of twelve barren islets or rocks that have been whitened by bird droppings. Four of these rocks are quite large and 150 to 200 feet high; the others are small, the westernmost being 25 feet high. These islets and rocks have been reported to give good radar returns up to 14 miles. Between the rocks and Punta Gorda there is an excellent passage with depths of 11 to 20 fathoms, the deeper water being nearer the rocks.

6-80 Coast (*H. O. Chart 933*).—From Morro de Petatlan the beach extends in an unbroken line for 17 miles to Japutica Point. This sand

beach is low and covered with bushes, palms, and coconut groves. Behind the beach the land is cultivated and rises to elevations of 2,000 to 4,700 feet in the mountain range 10 miles from the coast.

Japutica Point is low, black, and rocky, and, being the only rocky projection on this immediate coast, is easily recognized. To the northward and westward of this point the coast recedes somewhat, forming a slight inlet where vessels may anchor. About 1 mile eastward of Japutica Point there is a remarkable sand patch 300 yards back from the beach and extending up the bank 75 to 100 feet; it is bright, clear, free sand, surrounded by bushes, and a little to the eastward of it is a large coconut grove. The water is deep close to the beach, but breakers have been seen off Japutica Point during a heavy blow; no hidden dangers, however, have been found at any distance off the rocky beach.

From Japutica the sand beach continues in a gentle curve for nearly 10 miles to Morro de Papanoa, with Rio Coyuquilla discharging about midway between.

6–81 Morro de las Animas, a large white rock with several smaller rocks around it, lies about ½ mile offshore, at a position 1½ miles southeastward of Rio Coyuquilla and 3 miles northward of Punta de Papanoa. It is fan-shaped, about ¼ mile in length, and 112 feet high, the highest part being at the south point. Between Morro de las Animas and the mainland there is a clear passage with depths of 3 to 4 fathoms.

This rock, as well as Morro de Papanoa to the southward and Potoci Rocks to the northwestward, has been reported to be easily distinguishable on a clear moonlight night.

6–82 Morro de Papanoa *(17°16′ N., 101° 05′W., H.O. Chart 0879)* is a bold, rocky headland about 527 feet high, that is densely covered with brush and small trees. There are several detached rocks off its western side, but to the southward it is bold and clear, and a vessel can pass within ¼ mile of the beach. In 1965 depths of 7 to 15 fathoms were reported to exist from 8 1/2 miles southwestward to 7 miles west-northwestward of Morro de Papanoa. Punta de Papanoa is its northern extremity. The land behind Morro de Papanoa is very high and thickly wooded.

Tequepa Bay, close northward of Morro de Papanoa, affords excellent shelter from all winds except those between southwest and northwest. The preferred anchorage is about 1,300 yards north-northeastward of Punta de Papanoa, in a depth of 11 fathoms, sand. There is a good boat landing at the head of the bay. The tidal rise in this vicinity is about 2 feet.

6–83 Coast *(H. O. Chart 933).*— To the eastward of Morro de Papanoa there are three bluffs; the easternmost, 3 miles from Morro de Papanoa, stands at the northwestern end of a long sand beach which trends eastward without interruption for 70 miles to the heads of Acapulco; it is 10 to 15 feet high and crowned with a heavy undergrowth of bushes interspersed with coco and other palms. The land immediately behind the beach is low and cultivated, but farther inland it rises in successive mountain ranges until it attains a height of 12,000 feet at 28 miles inshore, beyond the Paps of Coyuca. The San Luis River, situated about 9 miles eastward of Morro de Papanoa, is merely an opening through which a lagoon discharges during the rainy season. Two small streams, the San Jeronimo and Cayuca Rivers discharge through this coast 26 and 47 miles, respectively, farther eastward.

Between Morro de Papanoa and the heads of Acapulco a vessel can approach the beach to within ⅓ mile, and anchor anywhere in depths of 10 to 15 fathoms at about ½ mile from the line of breakers, just outside of which are 6 fathoms of water. Inasmuch as there is always a very heavy surf on this beach, boat landing is almost impossible.

6–84 Paps of Coyuca (Tetas de Coyuca), 35 miles northward of the entrance to Acapulco Harbor and 26 miles from the nearest coast, are two remarkable conical summits, about 1 mile apart. The southeastern summit is 10,474 feet high and rises about 1,200 feet above the mountain proper; the northwestern summit is 120 feet higher. This mountain and the high ranges near it are generally covered with clouds, particularly during the rainy season; they are clearest early in the morning.

A remarkably high range of mountains, some of which have elevations of over 12,000 feet, is situated northward and westward of the Paps of Coyuca, 30 miles inland.

6-85 ACAPULCO HARBOR (H.O. Chart 872), is considered the finest on the west coast of Mexico. All around the harbor are high mountains which afford considerable shelter and may be seen from great distances seaward. The harbor has a width of about 1 1/4 miles at the entrance, increasing to more than 3 miles inside; the general depths range from 5 to 25 fathoms, sand over clay, good holding ground.

6-86 LANDMARKS.—Corcovado Peak, which rises to a height of 4,038 feet at a position 27 miles northeastward of the harbor, and the Paps of Coyuca, which are mentioned above, are good marks when not obscured.

The heads of Acapulco are the only rocky projections to break the long sand beach that extends from Morro de Papanoa, on the west, to Acamama Point, on the east, a total distance of about 135 miles. To vessels approaching the harbor from the southward or southwestward, the yellowish cliffs of Diamante Point serve to mark the entrance; these cliffs, as well as Roqueta Island, can be seen from a great distance.

Acapulco Harbor has been reported to give good radar returns up to 17 miles.

A conspicuous gray building is located about 3/4 mile northwestward of the town. A hotel is located about 1/2 mile westward of the town and is a very prononced landmark when seen from seaward. The hotel is a three-story, diamond shaped, white building. A church with a white cross stands on the hill just northward of the town.

A conspicuous hotel stands about 2 miles east-northeastward of the town. Aluminum-colored storage tanks are located about 1/4 and 3/4 mile north-northeastward, respectively, of Sand Lorenzo Rocks. A white house is located on the shore near the rocks.

A red and white television tower, on which obstruction lights are shown, is located on the summit of a 1,474-foot hill about 2 miles northeastward of the center of Acapulco Bay.

The entire area in the vicinity of Acapulco is reported to be built up with numerous buildings on the hillsides and shores of the bay.

6-87 ROQUETA (GRIFO) ISLAND, just outside the western entrance point, is of irregular shape, nearly 1,700 yards long, east and west, and 350 feet high. A small islet, the western extremity of which is called Coyuca Point, is almost connected with the west end of Roqueta Island. A reef, partly above water, extends out for nearly 300 yards from the eastern end of Roqueta; otherwise the island is clear of any known sunken dangers. El Morro, a small islet about 50 feet high, lies immediately north of the northeast point of Roqueta.

A light is shown from Punto Lorenz, about 1/4 mile northeastward of Coyuca Point.

A rock about 5 feet high and marked by a light, with depths of 10 to 20 fathoms close-to on all sides except the west, lies about 600 yards eastward of El Morro, in a position dangerous to vessels coming from the westward: inasmuch as the sea always breaks over it, it is well marked by day. There is no passage between the rock and Roqueta; reefs extend westward from the rock and eastward from the island.

6-88 ROQUETA ISLAND LIGHT (16° 49′ N., 99° 56′ W., H.O. Chart 872) is shown on the summit of Roqueta Island, another light is shown from a tower about 650 yards north-northwestward of La Roqueta Light.

6-89 This section has been deleted.

6-90 METEROLOGICAL STATION.—There is a meterological station located in the Federal Building. No visual signals are given, but information is available.

6-91 ENTRANCES.—Boca Chica, between Roqueta Island and the mainland, is 250 yards wide in its narrowest part, with a midchannel depth of 14 fathoms. Vessels using this channel have only to keep clear of the rocks that show; there are no hidden dangers.

Boca Grande, the main entrance to the harbor, between Roqueta Island and Bruja Point, is clear of danger except for the rock eastward of El Morro; between this rock and Bruja Point there is a passage over one mile wide. A LIGHT is shown from Bruja Point.

A light is shown near Punta Guitarron, about 1 1/4 miles northeastward of Punta Bruja.

El Sueco Light is shown about 1 1/4 miles east-northeastward of Punta Guitarron.

Punta Guitarron and El Sueco Lights, in range about 081°, lead through Boca Chica Channel from its western entrance.

6-92 WRECK.—The wreck of a vessel was reported (1944) to lie sunk in Acapulco Harbor, about 2 3/4 miles east-northeastward of Roqueta Island Light.

Farallon del Obispo is a rocky islet, 102 feet high, in the northern part of the harbor, near the shore. The depth on the seaward side of this rock is 7 fathoms. It is of a light gray color with dark patches.

San Lorenzo Rocks, 1/2 mile westward of Farallon del Obispo, are a chain of rocks extending 1/4 mile from the shore, with 6 fathoms of water on the seaward side.

La Serieuse Rock, with a depth of 2 1/2 fathoms over it, lies about 1/2 mile east-northeastward of Fort San Diego, midway between the fort and San Lorenzo Rocks; it is the only hidden danger in the harbor.

Fort San Diego stands on the northwestern side of the harbor.

6-93 Santa Lucia Bay, the bight at the extreme western end of the harbor, has general depths of 6 to 13 fathoms. The entrance is between Grifo Point and the point on which stands Fort San Diego.

Las Dos Piedras are two white rocks situated, respectively, about 90 and 130 yards eastward of a point that projects out from about the middle part of the west shore of Santa Lucia Bay.

Two wrecks lie sunk in the southern cove of Santa Lucia Bay about 160 yards and 300 yards from the southeastern shore. These wrecks were reported (1966) to have been removed.

6-94 HARBOR LIGHTS.—A light is shown on Grifo Point. A light is shown on the inner rock of Las Dos Piedras. A light is shown from the southeastern corner and near the middle of the wharf at Acapulco.

6-95 ANCHORAGE. — Large vessels anchor in 14 to 18 fathoms, southeastward of Fort San Diego. The holding ground is good. Small vessels anchor in Santa Lucia Bay, eastward of Las Dos Piedras.

Vessels with quarantinable diseases aboard must anchor off Grifo Point, at the entrance to Santa Lucia Bay.

It was reported that all vessels that put into the port for over a few hours are advised to anchor in the stream rather than tie up at the wharves, because of the considerable surge that exists in the harbor, particularly during the hours of high tide. A mooring buoy lies about 200 yards southward of the southeastern corner of the wharf at Acapulco in a depth of 10 fathoms.

PROHIBITED ANCHORAGE. — Merchant vessels are prohibited from anchoring in the waters around the naval base located about 2 1/3 miles eastward of Grifo Point.

6-96 TIDES.—The mean high-water interval at Acapulco is 2h. 40m.; the spring range is 1.8 feet, the mean range 1.6 feet.

6-97 CURRENTS.—Off the heads of Acapulco, and for some distance eastward, there is an easterly current with a velocity of 1/2 to 3 knots. In leaving Acapulco on an easterly course this fact should be kept in mind; at night or in thick weather the course steered should be nothing to the eastward of 132° until well clear of the sandy point off Papacayo Lagoon.

6-98 WINDS.—The sea breeze blows quite freshly from about 11:00 a.m. until after sunset. The land breeze comes from the northward and eastward during the night, but it is always very feeble and dies down at about sunrise.

It has been reported that while a Tehuantepecer of moderate intensity was blowing, no effect was noticed at Acapulco nor along the coast between Acapulco and Point Galera. The next day, while the vessel was lying off Point Galera, a 10-knot wind was observed, while at Salina Cruz a vessel was reporting winds of 30 knots or more.

6-99 PILOTAGE.—Pilotage (sec. 1-16) is compulsory. The pilot station is at Boca Grande. Pilots board in the entrance, eastward of La Roqueta Island, from a 25-foot black hull boat displaying the pilot flag.

Boarding party officials will board about 1 mile off the pier. Vessels may enter the port day or night.

The Port Authority should be notified of arrival at least 24 hours in advance. The radio shore station for the pilot is XFA on 35 and 600 mc.

6-100 DIRECTIONS.—Vessels entering the harbor through Boca Grande can proceed through midchannel by steering for Farallon del Obispo until nearly abreast Grifo Point, when course should be changed for the anchorage. Inasmuch as there are no detached dangers off it and there is deep water close-to, vessels can pass close to Grifo Point. A vessel recommended (1946) heading directly

for Farallon del Obispo on a course of 020°. On such a course the lateral set due to the prevailing easterly current off the entrance is immediately apparent. When Dos Piedros Light opens, haul westward to the anchorage. The hotel on the 381-foot summit in line with the light is a good range for making Santa Lucia Bay.

6-101 Acapulco (16°51′ N., 99°56′ W., H.O. Chart 0872), situated on the northwest side of Santa Lucia Bay, is the distributing point and shipping center for the seaboard area of the State of Guerrero; it lies in a fertile agricultural district. The town is built on the hillside overlooking Santa Lucia Bay. Most of the houses are of adobe construction with tile roofs.

The population in 1960 was about 70,000. It is a port of entry.

WHARF—PIERS.—A wharf, fronting the town, has 1,700 feet of berthing space with depths of 24 to 28 feet in the inner berth and 28 to 38 feet (1965) in the outer berth. A warehouse with a capacity of 10,000 tons is located at the eastern end of the wharf. Vessels alongside the wharf are subject to a heavy surge which makes it necessary to lie off a few feet, starboard side to, with the port anchor out and a stern line to a buoy. A tug is available to assist vessels berthing.

The pier at the naval base has depth of 10 feet alongside. An additional naval pier is located about 1/2 mile southward of the naval station; the length overall is 300 feet with alongside depths of 12 to 30 feet.

All cargo is handled either at the wharf or at the piers.

There is an oil dock located at Yeacos, on the eastern side of the bay about 750 yards eastward of Guitarron Point. A depth of about 28 feet exists 50 yards off the head of the pier and vessels must anchor to the westward and run stern lines to the shore. The bottom is hard sand. There is a 6 inch submarine hose buoyed off the pier which is used to discharge oil to the shore.

Another dock is located about 3/4 mile north-northeastward of the fuel dock.

The fuel oil storage capacity, in 5 tanks, is about 50,000 gallons. Fuel oil and diesel oil can be obtained by tank truck from Mexico City.

REPAIRS.—Small emergency repairs can be made at the naval shipyard at Tambuco. The facilities are very limited and the service is reported to be very expensive. There is a marine railway of 2,000 tons lifting capacity at Ycacos naval shipyard.

SUPPLIES.—Moderate quantities of quality provisions are available.

Water is piped in a 2-inch overhead pipe to the western part of the wharf and, to a valve about 600 feet from the eastern end of the wharf. It is advisable to boil all drinking water.

COMMUNICATION. — Several steamship lines make frequent calls at Acapulco. The town has no railroad communication, but bus and motor car services are maintained over a highway connecting Acapulco with Mexico City, a distance of about 290 miles. Telegraph, telephone, and radio services are maintained. Regular air service is maintained with Mexico City.

CLIMATE.—The rainy season lasts from the end of June to the end of October; the annual rainfall averages about 50 inches. During December and January the temperature rarely exceeds 90°F., and this season is generally pleasant. During the latter part of the dry season, however, the heat over the land is intense. The climatic conditions of the town have been somewhat improved by cutting through the rocks to the westward and thus letting in the sea breeze.

METEOROLOGICAL TABLE.—See appendix II.

SANITATION AND HEALTH.—The town has a fair water system, but the sewerage system is very primitive. Intestinal diseases, particularly amoebic dysentery, are common and malaria is prevalent throughout the year. There is a small hospital that will accept seamen.

6-102 Diamante Point (16°48′ N., 99°53′ W., H.O. Chart 0872), situated 1 1/2 miles southeastward of Bruja Point, is the southern entrance point of Port Marques. It is the seaward end of a high promontory that is backed by low land to the eastward; this promontory, therefore, when seen from a distance of 7 or 8 miles, appears as an island. A reef extends out a short distance from the point. A light is shown on Piedra

Ahogadade, a sunken rock, at the head of the bay. A 3-fathom patch lies about 300 yards south-southeastward of Piedra Ahogadade.

An aeronautical light and a radio beacon are located about 6 1/2 miles east-southeastward of Diamante Point.

A vessel reported (1952) that it had struck a rock, with a depth of less than 6 feet, located about 750 yards south-southwestward of Diamante Point.

6-103 Port Marques, between Bruja and Diamante Points, is a little bay with depths of 5 to 20 fathoms, sticky bottom, in which there is good shelter from all except westerly winds. There is a small rock on the northern side of the bay about 200 yards from shore, and about 1/3 mile farther northwestward there is a sunken rock, which breaks; this rock also lies about 200 yards offshore. At the head of the bay there is another sunken rock from which a light is shown. These dangers can easily be avoided.

Construction of a new port facility was reported (1964) in progress in Port Marques.

Rodrigo Point is situated 1 mile southeastward of Diamante Point; a small detached rock with 13 fathoms of water along its seaward side lies 100 yards off the point.

Rocky Point, 1/2 mile east-southeastward of Rodrigo Point, is the southeasternmost point of the heads of Acapuloc. A rock 10 feet high lies about 150 yards southward of the point; another (Continued on page 159)

rock, nearly awash and marked by breakers, lies close southwestward of the 10-foot rock.

6–104. The coast beyond Rocky Point is an uninterrupted sand beach, except where lagoons break through in the rainy season, for about 55 miles to the rocky point of Acamama or the Cerro del Coacoyal.

This coast is low, sandy, and crowned with low bushes interspersed with coconut and other palms. The country inland, low and cultivated to the foothills, rises to mountain ranges 1,200 to 6,000 feet high.

Anchorage can be had off this stretch of coast in depths of 10 to 15 fathoms, good holding ground; the heavy surf, however, prevents boats from landing anywhere along this beach.

Papacayo Lagoon and River.—A low, sandy, bush-covered point, off which there are very heavy breakers, lies about 16 miles eastward of Diamante Point. The entrance of Papacayo Lagoon and River, with a bar across it, is eastward of this sandy projection. It was reported (1943) that the Papacayo River discharges into the sea 1 mile southeastward of the lagoon.

During the rainy season and for a time after its close, until the neighboring country is drained, this lagoon breaks through the beach carrying a heavy deposit which adds to this sandy point and discolors the sea for miles off the coast. This discoloration is a good mark for the entrance to Acapulco, especially if a vessel is close inshore and without observations. It was reported (1958) that there were no indications of any discoloration. The beach may, if necessity demands, be approached to within 1 mile of the sandy point westward of the lagoon entrance, although a heavy surf and breakers extend some distance offshore.

6–105 Nexpa Village, 21½ miles eastward of Papacayo Lagoon mouth, although only a small collection of huts on the beach, is the largest village along this coast. Just eastward of the village is the mouth of the Nexpa River. A high wooden cross which can be seen for several miles seaward stands a few hundred yards eastward of the village.

Cerro del Coacoyal rises gradually from the beach to a mound 626 feet high at a position about 3 miles westward of Acamama Point.

Acamama Point, at the extremity of the long sand beach stretching to Acapulco, is low and rocky, with two or three detached rocks off it to the westward. A heavy line of breakers extends in a southeasterly direction for upward of 1 mile of this point; during the survey depths of 4 to 6 fathoms were found along the outer edge of the line of breakers. The surf broke so heavily that the steam cutters could not go in to ascertain the depth and to determine whether the breakers were caused by rocks or a shoal.

A bank, with depths of 22 to 26 fathoms, has been reported (1953) to lie about 13 miles southward of Acamama Point.

6–106 Bay of Dulce. — From Acamama Point the coast sweeps around to the northeastward 4 miles, then to the southeastward for 4½ miles to the Dulce River, forming the Bay of Dulce.

The Dulce River discharges large volumes of water and mud during the rainy season, causing irregular and constantly changing depths at the entrance. The shifting bar across the mouth can be crossed by boats or lighters only at certain stages of tide and swell; the depth over the bar is about 6 feet at low water. Boats can ascend the river for a distance of 15 to 18 miles. The village of Tecoanapa stands on the south bank, near the mouth of the river.

A heavy swell that cuts off all communication with the river and village sets in from the southwestward at full and change of the moon.

The coast beyond the mouth of the Dulce River is an unbroken sand beach that trends southeastward for about 14 miles to Maldonado, at 3 miles off which lies Tartar Shoal.

6–107 MALDONADO (*16°20′ N., 98°35′ W., H. O. Chart 856*) is a fairly well-defined headland that has a length of 2 miles but projects only slightly from the general coast line. It can not be made out from the westward except when close inshore, and, as seen from vessels coming from the eastward, it ceases to appear as a point beyond the bearing 337°. El Recodo (Escondido) is the point at the northwestern extremity of Maldonado.

A sandy beach extends northwestward from the point; for a distance of more than 6 miles this beach is backed by a series of sand bluffs, 200 to 300 feet high, separated by ravines that are good landmarks during certain seasons. A small bight which affords a good boat landing is situated close northward of El Recodo.

6–108 Coast.—The coast for a distance of 2 miles eastward of El Recodo is rocky, with the exception of two small breaks where there are sandy beaches; within a distance of 1 mile of the point are several sand cliffs, about 250 feet high, which are prominent and show white from the southward. Cuacaul Peak is at the southeastern end of Maldonado. The entire country in the vicinity of the headland is thickly wooded land 300 to 400 feet high.

Maldmado Light is shown on a bluff on El Recodo.

6–109 Landmarks. — The white cliffs or bluffs which lie behind Tartar Shoal, about midway between Cuacaul Peak and El Recodo, being the only white cliffs along this coast, are the principal marks for avoiding Tartar Shoal. In passing Maldonado at a distance of 7 or 8 miles offshore, no point, bight, or hook can be distinguished, the whole coast appearing as one beach or line; but close in, within or near Tartar Shoal, the two points of Maldonado can easily be made out. It is unsafe, however, for a vessel to come in that close to this shore.

From vessels well outside of the shoals, say 6 or 8 miles, a second range of hills will show above the shore range or beach bluffs. If this back range is not visible, the weather being clear, the ship is too near the shoals for safety.

At the close of the dry season the forest fires, which everywhere prevail, produce so much smoke as frequently to oscure all the higher land as well as that near the coast. As a result of this reduced visibility a stranger would be apt to greatly overestimate his distance from the shore. With the rising sun the shadow cast beyond the line of breakers also makes the beach appear much more distant than it really is. These facts should be remembered and, as it is impossible during the smoky time to distinguish objects on the land at a distance of 5 miles, the course should be shaped so as to pass Maldonado at a distance of not less than 8 miles.

6–110 Tartar Shoal (*16°18′ N., 98°36′ W. H. O. Chart 856*), lying 3 miles southwestward of Maldonado, constitutes the greatest danger to navigation on this portion of the coast. This shoal consists of rocky patches, with 1½ to 4½ fathoms of water over them, lying within the bearings 205° and 255° and 1 3/4 to 2 1/2 miles, respectively, from El Recodo. Outside of these patches the depths are very irregular for a distance of 4 miles from El Recodo, but beyond that distance they increase gradually in a westerly direction, and much more rapidly in a southerly direction.

A series of shoals also extends northwestward from El Recodo for a distance of 2 miles; on the outer shoal, at a distance of 1.4 miles 290° from the point, is the wreck of the Pacific Mail steamer *City of San Francisco*. The shoal is gradually growing about the wreck by the action of the sea, and heavy breakers extend 1,200 yards outside the wreck on a line with it and the point.

6–111 Caution. —Vessels passing along this dangerous part of the coast should keep the lead going constantly, and should not venture within the 20-fathom curve unless they are absolutely certain of their position.

6–112 Anchorage may be had to the northward and westward of Tartar Shoal in 6 or 8 fathoms, sand, anywhere along the sand beach. If intending to land, it is better to anchor near the wreck and El Recodo.

6–113 Tides.—The mean bigh water interval at Maldonado is 1h. 16m.; spring range 2.5 feet and mean range 2.1 feet.

The tides are regular; close inshore along Maldonado the ebb sets to the southward and eastward and the flood to the northward and westward. At and near the full and change of the moon there is always a heavy swell setting in on

the beach from the southward and westward, decreasing as the moon quarters.

6-114 Currents.— The current sets southeastward at a rate of ½ to 2 knots, and is strongest on the ebb tide. At about 6 miles southwestward of El Recodo very heavy tide rips have been observed, the water curling up to the point of breaking. The U. S. S. *Tuscarora* sounded through, in, and around the rips, but the least water found was 18 fathoms.

The current between Mangrove Point and Maldonado has been reported to set to the southeastward and eastward during the winter months and to the northwestward and westward during the summer, when southeasterly winds prevail, varying in force with the strength of the wind. The greatest current is found off the heads of Acapulco, setting east-southeastward at a rate of ½ to 2 knots. This current is influenced by the wind and is more rapid on the ebb tide.

6-115 Coast (*H. O. Chart 932*).— From the bluffs of Maldonado a white sand beach extends for 49 miles to the mouth of the Rio Verde. This long sand beach, which is steep-to and surmounted by palms and low bushes, is broken by low rocky bluffs at two places.

Immediately eastward of and behind the Maldonado Bluffs is an extensive low plain, well cultivated for this part of Mexico, with a few villages on it, and near the beach there is a large lagoon. About 24 miles northeastward of Maldonado Light stands Fort Range, a remarkable castlelike mountain with a cone-shaped turret at each end of the 6-mile long ridge; the cone on the left is 3,453 feet and that on the right 3,833 feet high. For vessels coming from the eastward in clear weather this mountain makes an excellent mark for Tartar Shoal.

During the months of April, May, June, and the first part of July the atmosphere is at times so smoky and hazy that at two miles from the beach it is impossible to distinguish objects on shore.

Anchorage may be had off the beach to the eastward of the bluff in 7 to 10 fathoms; the uneven bottom is of coral and rock.

A village stands about 7 miles eastward of Maldonado Light, and 11 miles farther, near a small bluff and an outlet to a lagoon, there is another village. Five miles eastward of this bluff there are four or five rocky bluffs of whitish color, 50 to 75 feet high, with two or three small rocks to the southward and westward 1,200 yards off the beach. To the westward of these bluffs is the mouth of the Tecogame River, and the entrance of Lagoon Alatengo. The land behind the beach is heavily wooded, and, rising in a series of foothills and ranges, it finally attains a height of upward of 8,000 feet. These hills and ranges begin near the beach, running off in a northeasterly direction; to vessels proceeding inshore up or down the coast the seaward ends of these ranges, when first seen, and before they are well above the horizon, have the appearance of points and islands.

The land immediately westward of the Rio Verde rises rapidly to a height of 1,000 to 1,200 feet. Close off the beach, in the bight to the westward of the river, the water is shoal and the bottom uneven. About 5 miles westward of the Rio Verde are two or three rocky bluffs, and 1½ miles westward of these bluffs is a reef of rocks 400 yards offshore. These rocks, two or three in number, are 10 to 15 feet high, and can be seen only from vessels close in; the water is deep and free from danger close outside of these rocks.

When seen from the eastward or westward, the land at the Rio Verde appears as a low, sandy, wooded point 1 or 2 miles long, with heavy breakers off it.

Rio Verde, the largest river on this part of the coast, enters the sea about 49 miles eastward of Maldonado. It has its source beyond Oaxaca, and, like the Sacatula, deposits an immense amount of débris at its mouth. It is supposed that the low land at its mouth is gradually extending out into the sea, and that the river causes the shoal water to the westward, as well as the holes and deep pits outside. During and after the rains

the water is discolored for a long distance offshore. The mouth of the river is closed by a shallow bar on which, for a distance of 1,500 yards from the beach, the sea breaks heavily; the breakers extend in a horseshoe shape from beach to beach, with deep water close to the outer curl. Several rocks are reported to lie directly in the line of breakers, and it is therefore impossible to enter the river with even a boat or canoe. San Juan Beach extends from the mouth of the Rio Verde to Punta Galera.

6–116 CHACAHUA BAY, between Punta Galera and Morro Hermoso to the eastward, is 6 miles wide and, in the western part, extends northward 1 mile within the points. The shore of the bay rises to a ridge which is covered with a dense undergrowth and stunted trees.

6–117 Tututepec, with a population of about 2,200, is situated about 9½ miles inland, on a spur of foothills about 900 feet above the sea. It can be seen well from the offing when the sun shines upon it; the church shows as a white spot on the hillside. Between Tututepec and the coast is an extensive plain that is plentifully watered by clear running streams.

The brown and barren hills northward of Punta Galera and Tututepec have a spotted appearas seen from the offing. The other hills in this vicinity are thickly wooded.

6–118 Punta Galera (Little Morro) *(15° 58′ N., 97°41′ W., H. O. Chart* 932) is a bold, barren, isolated, rocky bluff or headland of a grayish color, with several detached rocks off its eastern end; it is connected with the mainland by a low, narrow strip of land. When first seen from the westward or the eastward it appears as an island well out from the coast line; from the westward, inshore, Morro Hermoso appears to the northward of it.

Punta Galera Light is shown on the eastern extremity of the point. The point has been reported to give good radar returns up to 15 miles.

A sunken reef with a depth of 6 feet over it lies 600 yards southeastward of Punta Galera; with a heavy swell the sea occasionally breaks on this reef.

Several rocks, 10 to 15 feet above water, lie 1,100 yards eastward of Punta Galera; this reef, on which the sea breaks heavily, extends east and west about 100 yards. Deep water surrounds these rocks and there is a passage between them and Punta Palera, but, owing to the sunken reef southeastward of the point, the passage can not be considered a safe one.

6–119 Anchorage.—There is good anchorage anywhere in the bay in depths of 6 to 10 fathoms, but the best anchorage is between the reef of rocks above water and the sand beach to the northward.

6–120 Chacahua Lagoon.—To the northward of Punta Galera is the outlet to the Chacahua Lagoon, across which is a sand bar. The bar has a depth of 4 feet over it during the rainy season, but at other times it dries all the way across; the surf breaks heavily upon it. When the bar is open a boat can enter the lagoon by watching for a smooth time.

The lagoon extends from Punta Galera to the base of Morro Hermoso and some distance inland; its water is fresh but highly impregnated with sulphur. The lagoon has depths of 12 to 15 feet during the rainy season, but this depth is reduced to about 4 feet during the dry season. Native sulphur in small particles crops out on the surface of the hill just behind Punta Galera.

6–121 Morro Hermoso, a rounded bluff or headland 837 feet high, looks like an island when seen from the eastward or the westward. The southern face is quite steep, reddish colored, and barren, but the inshore side is covered with heavy undergrowth and thick timber halfway to the top; the line between the wooded and the barren part is well marked. The eastern end of the headland is only about 300 feet high, and is very abrupt on the sea face. The southeastern point of the headland is called Punta Encomiedo.

Inasmuch as all known rocks and other dangers show above water and are close to the rocky shore, a vessel can pass within 1 mile of the point.

The Rio Grande empties into the sea at a position about 4 miles eastward of Punta Encomiedo. Like all the other rivers in this vicinity, the Rio Grande is closed except during the rainy season. The water is shoal off the mouth of the river and between it and Morro Hermoso.

6–122 Coast.—A low, flat, rocky bluff, only about 30 feet high, the first break in the sand beach eastward of Morro Hermoso, is situated about 6½ miles eastward of Punta Encomiedo. A sunken rock, with only 9 feet of water on it, lies 135° from this bluff, ½ mile from the beach; the sea occasionally breaks on this rock.

Piedra Blanca (Alcatraz).—About 10 miles eastward of Punta Encomiedo there is a sharp, rocky, black bluff about 95 feet high. Piedra Blanca, a small rocky islet, of whitish color, about 200 yards long in an east and west direction, lies about 1 mile eastward of this bluff; two detached rocks showing above water lie eastward of Piedra Blanca. The islet is about ¼ mile off the beach, with 2 to 6 fathoms inside of it, but, inasmuch as a reef extends from the islet toward the sharp black bluff to the westward, the passage is not safe. Outside of Piedra Blanca the water is deep close-to.

6–123 Coast. — From Piedra Blanca the coast curves gradually to the eastward for 16 miles, to the bluffs on the western side of Escondido Bay. Two conspicuous points resembling pierheads, are situated about 3 miles eastward of Piedra Blanca.

About 6 miles eastward of Piedra Blanca is the mouth of the Manialtepec River. A few huts stand on the beach eastward of the mouth of the river, and a small village is located a mile or so inland.

Escondido Bluffs (*15°51′ N. 97°06′ W., H.* O. Chart 932), 50 to 100 feet high, are perpendicular rocky formations that are of grayish color on their seaward sides; their tops are flat and covered with low bushes and trees. These bluffs are the only ones of any size between Morro Hermoso and those westward of White Rock, near Port Angeles. The extreme western bluff is a low, flat point of a very red color. A bright yellow spot about midway of the Escondido Bluffs can be seen a long way to the westward.

Escondido Bluffs Light is shown on the coast about ½ mile eastward of Escondido Bluffs.

6–124 Escondido Bay, between the bluffs on the northwest and Escondido Point on the southeast, is open to southerly and westerly winds, but is an excellent anchorage with good holding ground. The eastern part of the bay is bounded by rocky bluffs, with some detached rocks close off the southern point of the bay.

Escondido Bay has been reported to give good radar returns up to 26 miles.

Cerro de la Ocote, 2,161 feet high, lies about 4 miles northeastward of the head of the bay. This mountain and the Escondido Bluffs are the best marks for the bay.

The anchorage is in depths of 10 to 13 fathoms with Piedra de la Marina, the rocks in the northeastern part of the bay, bearing 020°. Vessels should approach the anchorage on this bearing, sounding constantly. The rise and fall of the tide is about 6 feet. There is good landing at the head of the bay.

A rocky shoal, with a depth of 21 feet, lies about 300 yards westward of the southern rocks of Piedras de la Marina. A vessel drawing 26 feet reported (1937) striking an obstruction about 100 yards southwestward of the shoal. The position of the obstruction is approximate.

Vessels proceeding to Escomdido should call at Puerto Angel first to obtain clearance.

Punta Sicatela.—From Escondido Point the coast trends southeastward for 2 miles to Punta Sicatela, a low sandy point covered with mangroves. The water is shoal off this point, and breakers extend some distance seaward.

6–125 Sicatela River, which discharges immediately westward of the point, is a comparatively large stream, but, like nearly all the rivers along this coast, its mouth is closed with a sand bar that is impassable even by boats.

At ahout 9 miles eastward of the river the sand

beach is again broken by low rocks and flat bluffs extending into the sea.

Point of Rocks, about 11½ miles eastward of Punta Sicatela, is a low, sandy point covered with mangroves, with several small detached rocks off it; the water is shoal and the bottom rocky, and heavy breakers extend some distance out from the shore. For upward of 5 miles along here there are several rocks and bluffs on the beach, with very foul bottom off them.

6–126 Coast.—At 15½ miles eastward of Point of Rocks there is a large, bold, rocky bluff that projects slightly from the general line of the coast. It is 255 high and is covered with brush and dense foliage, except on the sea face, which is of bare brown and yellowish rocks. Off its base are two detached rocks 20 to 50 feet high. This bluff is at the extreme eastern end of the sand beach commencing at Morro Hermoso, and is the westernmost of a series of high, rocky bluffs lying westward of Port Angeles. At ½ mile eastward of the end of the beach there is a smooth, round, brown-colored hill which, as seen from the westward, projects and appears as a bare point. A low rocky point, off which there are several detached rocks, projects out about ½ mile from the coast line at a position 1 mile southeastward of the large bluff described above.

From the end of the sand beach to Port Angeles, a distance of 5¼ miles, the coast is a continuous series of rocky bluffs, rising abruptly from the beach to a height of 100 to 500 feet. Several small rocks with deep water outside lie close off these bluffs.

In 1951 a bank with depths from 13 to 27 fathoms was reported southwestward of Port Angeles. The bank was about 25 miles long and paralleled the shore at a distance of 10 miles.

Depths of 11 to 13 fathoms have been reported to lie about 14 miles south-southwestward of Port Angeles.

White Rock, 2¼ miles westward of Port Angeles and ⅓ mile offshore, is a round, rocky islet of whitish color, 106 feet high and nearly ½ mile in circumference. Black Rock, ¼ mile westward of White Rock, is a small detached rock, black in color, 40 feet high, and not more than 50 feet across. Another small rock is situated about 600 yards offshore, near Black Rock.

6–127 Caution.—The coast recedes a little behind these rocks, forming a shallow bay, but, inasmuch as it is full of sunken rocks, vessels should not enter the bay, nor go within 1 mile of the rocky bluffs to the westward of White Rock. There is, however, sufficiently deep water to enable vessels to pass within 200 yards of the seaward side of White Rock and of the bluffs between it and Port Angeles.

6–128 PORT ANGELES (PUERTO ANGEL) *(15°39′ N., 96°31′ W., H. O. Chart 875)*, which is entered at a position 2¼ miles eastward of White Rock, is a roughly rectangular bight about 400 yards wide and 850 yards long.

The head of the port is marked by a white sand beach about 500 feet long, which is the first sand beach seen after reaching the bluffs eastward of White Rock; to the eastward of the sand beach and out of sight from the entrance, are three or four buildings. The western entrance point is a sharp, rocky islet, 100 feet high, which is barely separated from the mainland. At 450 yards eastward of the eastern entrance point there is a bold, round, abrupt bluff 290 feet high, covered with trees, with a low detached rock off it.

All the bluffs in the vicinity of Port Angeles are covered with trees and a dense undergrowth; their seaward sides are bare, abrupt, and gray, but their bases, where the sea washes against them, are dark or almost black.

A large native style hut is located in front of the charted lagoon and may be easily seen with a glass at a distance of 5 miles.

During the closing of Salina Cruz, Port Angeles resumed its former position as the shipping point for the western part of the State of Oaxaca; it is the port of entry for the city of Oaxaca, the capital of the state. A good road leads from Port Angeles to Oaxaca. The port is connected with the national telegraph system.

The tidal range in the port is approximately 6 feet.

6–129 Port Angeles Light is shown from a white, octagonal stone tower, 43 feet high, with

a white rectangular house, on Point Izuca, ½ mile westward of Port Angeles.

6–130 Anchorage.—The port is very small, with depths of 4 to 7 fathoms, but affords good shelter and an excellent anchorage for schooners and small craft during the dry season, which lasts from the end of October to the beginning of June. Large vessels can anchor within the line from the outer southwest rock to the southeast bluff, in 10 fathoms of water with 45 fathoms of chain out; this will permit the vessel to swing clear of the rocks on either side. At times a heavy swell sets into the bay.

Sailing vessels should avoid this port during the rainy season because at that time southerly winds are frequent, and such winds not only render the anchorage unsafe but also make it very difficult for sailing vessels to get out of the port.

A large landing platform is located on the eastern shore of the bay. Supplies may be obtained in limited amounts. Two lights are available.

6–131 Directions.—To find the entrance it is advisable to pass near White Rock and then steam close inshore to the eastward. A vessel may encounter a strong current either with or against it on this course.

The anchorage may be approached by bringing Port Angeles Lighthouse in range with the 100-foot islet on the west side of the entrance and proceeding in on that range line. When Bufaderos Point is in range with the rocky spit in the northeastern part of the port, anchor in a depth of 13 fathoms. In proceeding in on the range line it will be noted that no open water will be visible between the mainland and the comparatively barren, grayish-colored, 100-foot islet mentioned above.

6–132 Coast (*H. O. Chart 932*).—From Port Angeles the coast trends northeastward for nearly 4 miles, and then takes a general easterly direction for 11½ miles to the entrance to Sacrificios Harbor. There are several rocky bluffs on this stretch of coast, with strips of sand beach between. At 10 and 13 miles, respectively, from Port Angeles there are two reefs of detached rocks, some of them above water and 10 to 20 feet high; these reefs extended 400 yards off the beach, but as they are visible and the water is deep outside of them, they can be approached, if necessary, to within 1 mile.

The heavily wooded land behind the bluffs between Port Angeles and Sacrificios Harbor is low and flat as compared with that to the eastward or the westward.

6–133 Soundings. — The deepest water along any part of the coast between Mangrove Point and Salina Cruz is found off Port Angeles and Sacrificios Harbor.

6–134 Currents.—Along the coast from Tartar Shoal to Salina Cruz the currents are exceedingly irregular in direction and force as well as in duration; they sometimes set to the eastward with a velocity of ½ to 2⅓ knots, and within 12 hours change and set as strongly in the opposite direction.

6–135 Sacrificios Harbor (*15°41′ N., 96°15′ W., H. O. Chart 875*) is very small and adapted only to small vessels. The harbor is sheltered from easterly winds by Sacrificios Island, about ¼ mile in length, and surrounded by outlying rocks. Rocks on which the sea breaks heavily extend out a considerable distance from the shore of the bay. The depths in the harbor are regular, decreasing from 8 fathoms at the entrance to 4 fathoms at the head. The passage between the island and the mainland has a depth of 4 fathoms, but its use is not recommended.

6–136 Rocks.—A sunken rock with a depth of only 11 feet over it at low water lies in the approach to the harbor 650 yards southward of the western end of Sacrificios Island. There are depths of 6½ fathoms close to the rock on all sides.

6–137 Tides.—The mean high water interval at Sacrificios Harbor is 1h. 38m.; spring range 3.2 feet and mean range 2.7 feet.

6–138 Directions.—To enter the harbor, bring the western point of Sacrificios Island in range with a peaked hill, 270 feet high, bearing

018 3/4° and stand in on this course until a cliffy point at the head of the bay bears 007 1/2°, then steer for it on that bearing.

Vessels coming from the eastward can keep well to the southward and westward of the outermost sunken rock by approaching with the western entrance point of the harbor bearing not less than 277° until on the entrance mark.

6-139 The Gulf of Tehuantepec (H.o. Chart 932) is the large bay that lies between Port Angeles and Suchiate Bar, about 250 miles to the east-southeastward. The head of the gulf, at San Francisco Bar, lies only about 120 miles southward of the southern shore of the Gulf of Mexico.

From Sacrificios Harbor the coast trends northeastward to Cerro Morro; it is of a bluff and rocky character, with intermediate sand beaches and deep water close up to the bold bluffs, while the mountains are rugged and stand not far back from the coast. At Cerro Morro the coast changes and becomes a whitish-gray sand beach which sweeps around to the eastward and southeastward in a curve of large radius, unbroken by a single rock, with a gently shelving bottom and moderate depths far from the coast. The mountains to the eastward, appearing somewhat as tablelands, sweep away inland to a maximum distance of about 25 miles, leaving a large low area, partly occupied by an extensive lagoon and its numerous branches or divisions, with a few scattered hills or mounds, ranging from 236 to 2,280 feet in height, the highest standing farthest to the eastward. This low area is sparsely wooded, and parts of it are under cultivation, while large numbers of cattle graze in the open country.

The mountain chain forming the backbone of the continent, here confined to the narrow limits of the isthmus, becomes lower, affording in one place a pass through which a survey for an interoceanic ship canal has been made. The Tehuantepec Railroad and a telegraph line cross the isthmus here from Salina Cruz to Coatzacoalcos.

Beyond this low land the mountains gradually begin to rise and spread out, approaching the coast line again, until at Soconusco Bluff a detached cluster of hills forms a prominent landmark very near the beach. Farther to the eastward the mountain chain extends nearly parallel with the shore line, and between it and the shore there lies a low wooded belt, filled with many lagoons.

6-140 Anchorage may be had in depths of 7 to 15 fathoms, sand, almost anywhere along this stretch of beach. There is no protection against winds from any southerly direction, but the northers blow offshore and vessels can readily put to sea.

A heavy surf is almost constantly breaking on this beach, and landing is an extremely hazardous undertaking. At times, however, the surf subsides and a landing may be made at any point.

6-141 Currents. -The currents are very difficult, but there is no doubt that the currents fluctuate with the shifting winds which prevail here. The navigation of sailing vessels is often very difficult and tedious, owing to the embarrassment of calms and varying drifts. Cape Corrientes, which is subject to the varying currents that give it the name, is probably the northern limit of these shifting currents, and between that point and Cocos Island, around which the currents are variable, it may be considered that the general set will be between southeast and east-southeast in the winter months, and between northwest and west-northwest the rest of the year; but, as before stated, nothing very definite can be laid down. The current appears to have a breadth of nearly 360 miles, and there is a countercurrent close inshore.

6-142 Inshore currents in the Gulf of Tehuantepec.—The currents are especially subject to the influence of the winds in the Gulf of Tehuantepec during the season of northers. During northers the current sets strongly to the northward and eastward along the shore on the western side of the gulf, and to the northward and westward inshore on the east side of the gulf; at other times the current sets in the opposite direction. This confusion of currents may be accounted for

in this way: The fury of the norther blows the water out of the gulf to the southward and, as the waters lower at the head, there is a rush along each shore to the northward to supply or fill the vacancy. When the norther moderates or ceases to blow, the water that was banked up, as it were, flows back up the gulf, and the extra amount rushes out along each shore to the southward. As this fact has been observed as far west as Rio Verde, and eastward as far as Champerico, coasting vessels keep a close check on the currents.

Off Sacrificios during a heavy norther the current has been observed to set to the northward and eastward with a rate of as much as 2 knots, and, when the wind was blowing from the opposite direction, to set to the southward and westward with a velocity of 0.6 knot.

The strongest current which has been reported in the gulf was off the rock awash that lies 3 miles westward of Punta Chipequa, where a drift of 2.3 knots was observed.

There is believed to be a general, but by no means invariable, set to the eastward and southeastward along the coast between Manzanillo and Sacrificios during the winter months, and to the westward and northwestward in summer, when the southeasterly winds prevail.

In the Gulf of Tehuantepec, on a line between Acapulco and Montuosa Island, off the coast of Panama, the current generally sets to the westnorthwestward, but nearer the coast of Guatemala the current probably sets to the eastward or southeastward.

6–143 Caution.—Because of the erratic currents that may be encountered near the Gulf of Tehuantepec, mariners are warned to exercise special care when navigating in that vicinity.

6–144 Crossing the Gulf of Tehuantepec. It is inadvisable for southbound vessels to keep close along the shore of the Gulf of Tehuantepec during the season of the northers. It is better, after passing Sacrificios, to steer directly across the gulf on a course of about 082°: then, in case a norther sets in, keep the ship off and run with the wind and sea one or two points abaft the beam; the wind will veer to the northward and westward, enabling the ship to come up gradually to the course, and as the coast of Guatemala is approached the wind will veer more and more to the westward until it dies out. Should a norther be blowing at the time of passing Sacrificios, go up at least as far as Estrete Island, keeping 1 to 2 miles offshore.

When northward bound in a steamer, hug the Guatemala coast and follow close around the gulf shore; the wind then is constantly hauling ahead, and although it will be frequently found that after passing Soconusco Bluff in a norther the wind will temporarily die out, it will be pretty sure to freshen up again, and it is better to continue to hug the coast, giving Tonala Bar a wide berth. From Champerico to Acapulco the coast should also be hugged to avoid the strong current, sometimes over 2 knots, setting to the eastward.

6–145 Coast.—The coast between Sacrificios Harbor and Cacaluta Island, about 4½ miles to the northeastward, is a succession of bold bluffs about 100 feet high, with detached rocks close off each bluff. The tops of the bluffs are covered with dense undergrowth and bushes. From the island the coast trends northeastward for about 2¼ miles to Punta **Bufadero.**

Cacaluta Island, about ⅓ mile in diameter and 220 feet high, lies 400 yards from the shore. Behind and on each side of the island is a white sand beach. From the offing, abreast of Cacaluta, the island and the first bluff eastward of it appear as two bluff headlands, and both might easily be taken for islands. The Tayuta River empties into the sea close northwestward of the island. To the eastward of Cacaluta Island there is an anchorage in 7 fathoms of water and a good boat landing.

Punta Bufadero (*15°44′ N., 96°08′ W., H. O. Chart 932*), ½ mile southwestward of Port Guatulco, is a good mark for distinguishing the harbor. In one of the rocks close inshore and level with the water, there is a cave, called the Bufadero, with a small aperture in the roof, and every

swell that enters the cave forces the water violently through the hole. At night or in foggy weather, when it is calm or the wind is from the shore, the sound, like the blowing of a whale, can be heard at some distance.

6–146 Port Guatulco is separated from Santa Cruz Bay to the eastward by a small peninsula 150 feet high, jutting out 800 yards from the mainland and terminating in Punta Rosas. The inner part of the harbor of Guatulco affords to small vessels the best anchorage between Acapulco and Salina Cruz; the other anchorages are open to the southwesterly winds, which often blow on this coast. There are no known dangers in any part of the harbor, and the soundings are gradual, the depths decreasing from 20 fathoms off the entrance to 5 and 3 fathoms very near the beach. The bay is bounded by a smooth shore, very good for landing. A small fresh-water brook empties into the port during the rainy season.

Piedra Blanca. A rocky reef extends 600 yards in a general easterly direction from a position 400 yards southeastward of Punta Rosas. Piedra Blanca, the western and largest rock, which is 90 feet high and about 500 yards in circumference, is surrounded by several rocks, the smallest of which is barely above water. There is a passage between this reef and Punta Rosas, but it is considered unsafe, as another reef extends some distance from the point toward Piedra Blanca.

6–147 Santa Cruz Bay is much larger and more open than Port Guatulco, and affords anchorage in any part in depths of 5 to 10 fathoms, with shelter from all winds except those from the southward and eastward. A rock is charted about 1,300 yards northeastward of Piedro Blanca. As both bays are open, no directions are needed other than to keep off the visible rocks and anchor with room to swing. The rise and fall of tide is approximately 6 feet.

6–148 Landmarks.—The best mark for the harbors of Guatulco and Santa Cruz is the Cerro de Zadan, a hell-shaped mountain, 5,677 feet high, 13½ miles northward of Piedra Blanca. The mountain is of reddish-brown color, owing to the absence of any brush or undergrowth, although it may possibly be green during the rainy season. On its northern side a ridge connects it with the higher range of the Cordilleras. For vessels near the coast the best marks are Punta Bufadero and Piedra Blanca. These harbors are so difficult to distinguish that vessels are said to have spent more than a fortnight in finding them.

To vessels about 5 miles off Punta Bufadero, the extreme western point of land has a rocky, broken appearance, and is not so high as the land adjoining. When 6 miles out, another cape farther westward can be seen; its extreme point is rather low, but rises gradually inland to an elevation of 1,200 feet.

Cerro de Leon, 10 miles northwestward of Cerro de Zadan, is 10,300 feet high, the highest peak along this part of the coast. The land back is covered with stunted trees and brushwood, but over the foothills, a few miles from the coast, the land is well cultivated.

6–149 Tangola Tangola Bay *(15° 46′ N., 96°06′W.)*, which is separated from Santa Cruz Bay by a square-shaped peninsula about 1,600 yards wide at the outer end, has a width of 1,200 yards at the entrance between Tangola Tangola Island and the western entrance point. The bay contains several small rocky islets, hut with due precaution there is no danger in entering. The bay affords anchorage in depths of 5 to 10 fathoms, sand and shell, good holding ground. Off the western entrance point there is a reef of rocks, but the water is deep close to the outer rock, which is awash. There is usually a very heavy swell setting in from the southward.

Tangola Tangola Island is separated from the mainland by a passage with a width of 200 yards and depths of 3 fathoms, but, the channel is so narrow in places that it is considered unsafe. The island is remarkable in appearance and is easily recognized; it is about 800 yards long, northeast and southwest, 600 yards wide, and 200 feet high, and its top is covered with heavy

undergrowth and bushes. The outer part of the island is a cliff of brownish stone. From the westward the island appears to be part of the mainland.

A sunken rock lies within 100 yards of the beach at a position close southeastward of the second bluff eastward of Tangola Tangola Island.

Capulita River, which discharges into the sea 3 miles northeastward of Tangola Tangola Island, is a small stream with an impassable bar across its mouth.

6–150 Coast (*H. O. Chart 932*).—From Tangola Tangola Island the coast trends in a northeasterly direction for 19 miles to Morro Ayuca, the southern entrance point of an open bay. Along this stretch of coast there are over 20 headlands 100 to 200 feet high, projecting but little beyond the general line of the coast. Most of them have a steep cliff facing the sea, and are separated by fine, sandy beaches, off which anchorage may be taken in depths of 8 to 10 fathoms, sand, at about 1 mile from the shore. The land behind rises in irregular-shaped hills toward the Cordilleras, which are three or four ranges of foothills, then to the high back range, up to 10,000 feet high.

6–151 Morro Ayuca (Ayuta) (*15° 52′ N.*, 95°47′ W.) is 270 feet high, terminating in Punta Ayuca, a bold, cliffy point 100 feet high. It is surrounded by a steep-to reef which extends around to the northward.

Immediately westward of Morro Ayuca there is a large lagoon, into which empties the small Ayuca River. During the rainy season the lagoon breaks through the beach close westward of Morro Ayuca.

6–152 Morro Ayuca Light is shown from a square, white, concrete tower, 43 feet high, with a dwelling attached.

6–153 Ayuca Bay is open to all winds from the eastward and the southward, yet it is a safe anchorage at all seasons. Vessels can anchor anywhere in it, with due regard to the draft of the vessel and the locality of Ranger Rock. The best anchorage, however, is in the western part of the bay in 7 fathoms of water.

Ranger Rock, with 1½ fathoms over it, lies about 1.6 miles northeastward of Morro Ayuca Light.

Estrete Island, 12 miles from Morro Ayuca, is a barren, rocky, white islet, composed of two rocks of about equal size and two or three outlying reefs. There is a passage between the island and the mainland, with deep water all around and close to the rocks.

6–154 Coast.—Between Morro Ayuca and Punta Chipequa, a distance of 25 miles, there are several bluff headlands separated by fine sand beaches. These bluffs, which are gray and almost perpendicular to the water's edge, project but little from the general coast line and afford no shelter.

Behind the beach the hills are barren and brown in the dry season, but during the rainy season their appearance is more pleasing. About 20 miles from Morro Ayuca and 8 miles from Estrete Island there is a remarkable dome-shaped bluff, covered with a dense undergrowth of stunted trees and bushes. At the base of this bluff, close to the beach, are 2 detached cone-shaped rocks, 20 to 30 feet high.

A rock awash lies ½ to ¾ mile from this dome bluff. At high water the sea seldom breaks on it, and it can not be seen, but at low tide the sea breaks at each swell and the rock is visible. Depths of 7 to 12 fathoms are found close up to the rock.

The currents in this vicinity are very irregular and at times very strong.

6–155 Bay of Bamba. — From the dome bluff, just mentioned, to Punta Chipequa the shore recedes to the northward, forming the Bay of Bamba. Inasmuch as there are two sunken rocks in its western part at 1,000 to 1,500 yards from the sand beach, this bay should be entered only in case of absolute necessity.

6–156 Punta Chipequa (*16°01′ N., 95°22′ W., H. O. Chart 876*) is a very remarkable headland, being an immense growing sand dune. It

projects nearly 1 mile from the line of the coast and forms a kind of double headland. From the westward it appears as a bold, dark cliff, surmounted by a belt of sand over its top or back, and is an excellent landmark. The outer end is rounded and brown and within it both sides are covered with sand from the top to the beach; the whole headland is quite bare of vegetation, except for a few stunted bushes which crop out through the sand on the eastern slope. This is the first sand dune seen by vessels coming from the westward, but there are two or three smaller ones between it and Salina Cruz.

Just behind Punta Chipequa there is a very remarkable knifelike ridge ½ mile long in a northwesterly and southeasterly direction, and 1,478 feet high; it slopes gradually to the westward, but is almost perpendicular on the eastern side one-third of the way down from the top.

A reef consisting of four or five detached rocks 10 to 15 feet high and covering an area about 40 yards in diameter lies 1,500 yards offshore at a position northeastward of Punta Chipequa. Shoal water extends westward from the rocks about 600 yards; between the reef and the shore there is a narrow channel with about 4 fathoms of water, but it is unsafe for use; outside and close to the rocks the water is deep.

Detached rocks and rocky reefs extend off all the points from Sacrificios to Salina Cruz, and it is not prudent to go within ½ mile of any of them.

6–157 Chipequa Bay, between Punta Chipequa and Punta de Guela-gichi, is about 5 miles wide and extends in 1 to 2 miles. The bottom inside the bay is sandy and the depths are regular, ranging from 2 fathoms close in to the beach to 20 fathoms at the outer limit of the bay. The beach is clean, hard, white sand, and behind it is a level plain, heavily timbered, extending to the foothills. Near the beach is a lagoon.

6–158 Anchorage.—There is good holding ground in all parts of the bay, hut the best anchorage is in the western part, between the reef of rocks and the sand beach to the northward.

Although Chipequa Bay is open to all winds from the northeastward to the southward, it is considered in all seasons the best anchorage between Acapulco and La Union. At the full and change of the moon a heavy swell sets in and increases the surf on the beach, but boats can be landed at all times.

Punta de Guela-gichi is a hold bluff, 535 feet high, nearly 500 yards wide, and covered with stunted pine trees.

6–159 Coast. — Between Punta Chipequa and Cerro Morro are Chipequa, Coneja, Salina Marques, and Salina Cruz Bays, all affording anchorage. While off each bluff along this stretch of coast there are detached rocks showing above water, the whole coast can be safely approached to within 1 mile. Between the bluffs there are stretches of sand beach on which the surf hreaks heavily. On Punta de Conejo and Morro de Salina Marques there are sand dunes, which, however, are less extensive than that on Punta Chipequa.

Conejo Bay, between Punta de Conejo and Morro de Salina Marques is a small indentation of the coast about 2 miles wide and open to easterly and southerly winds. The soundings are regular all over the bay and the holding ground is good, but on account of the heavy surf rolling in on the steep beach there is no boat landing.

Hermoso Cone, a solitary conical peak, 305 feet high, stands north of the bay, at 600 yards from the beach.

Salina Marques Bay, between Morro de Salina Marques and Morro de Salinas, is a little larger than Conejo Bay and lies in the same general direction. The bottom is of hard sand, and the soundings are regular. The bay affords no landing for boats. Behind the sand beach there is a large lagoon which discharges into the sea during the rainy season. This bay and Conejo Bay are used but little, owing to their close proximity to Chipequa and Salina Cruz Bays.

6–160 SALINA CRUZ BAY, formed by a slight indentation of the coast between Morro de

Salinas and Cerro Morro, is exposed to all southerly winds, which are always light, and to a heavy swell from the southeastward, which is general from May to October. The northers also blow with great fury from November to March, two or more anchors being necessary on such occasions.

MORRO DE SALINAS (16° 10′ N., 95° 12′ W., H.O. Chart 0876) is a round, rocky projection from which several clusters of rocks above and below water extend 250 yards; just outside of them the water is deep. The morro is 241 feet high, with an almost perpendicular cliff to the eastward.

6-161 SALINA CRUZ LIGHT is shown on Morro de Salinas.

6-162 LANDMARKS.—The best landmarks for approaching Salina Cruz are the Peaks Shadani and Tecuani. Peak Shadani (House Rock), situated 3 1/2 miles northwestward of the port, rises to a peak 1,070 feet high; on its summit is a remarkable, square, flat rock 60 feet high and 150 feet square, resembling a house. Peak Tecuani, 1 3/4 miles westward of Peak Shadani and 5 miles from the port, is a remarkable whale-backed mountain, 2,214 feet high.

Five tall tanks, painted aluminum, are located close northwestward of the light on Morro de Salinas. Reported visible at 15 miles, they form a conspicuous landmark.

6-163 PUERTO SALINA CRUZ (16° 10′ N., 95° 12′ W., H.O. Chart 2424) is an artificial port located in the northwestern part of the bay. The outer harbor, formed by two breakwaters, is approached via a dredged channel. The channel is about 400 feet wide between the heads of the breakwaters. Constant dredging is necessary to prevent the entrance channel from silting up.

The inner harbor is separated from the outer harbor by two moles.

The entrance channel was reported (1966) to have depths of 25 to 35 feet; in 1959 there was a depth of 30 feet in the inner harbor operating area. It was reported in 1957 that vessels of up to 22,000 tons displacement could be accommodated.

CAUTION.—Because of material changes in depths, due to silting and dredging, Puerto Salina Cruz is considered a difficult harbor to enter; consequently, entry must be undertaken with local knowledge. Strong gales frequently occur here, and there is a dangerous swell at the entrance.

A spoil ground, with a radius of about 600 yards and having a depth of 4 fathoms, lies about 3/4 mile east-southeastward of the breakwater entrance.

LIGHTS.—A light is shown on the head of the eastern breakwater, and another is shown on the head of the western breakwater.

Range lights are shown from the top of a hill close northward of the inner harbor. In range 345° they lead through the entrance into the outer harbor.

The inner harbor, a basin in the northern part of the harbor, is sheltered on its southern side by two moles, between the ends of which there is a narrow entrance channel, 97 1/2 feet wide. General charted depths in the inner harbor may change materially due to silting.

6-164 ANCHORAGE.—Vessels anchor in Ventosa Bay, the next inlet northeastward of Salina Cruz Bay. Vessels of large draft can approach to within 1/2 mile of the shore of this bay. Vessels also anchor inside the breakwaters at Salina Cruz.

6-165 TIDES.—The mean high-water interval at Salina Cruz is 2h. 50m.; the spring range is 4 feet, the mean range 3.4 feet.

6-166 Pilotage is compulsory, but it is best to notify the port authorities by radio well in advance of the expected time of arrival. The pilot will board incoming vessels about 1/2 mile southward of the breakwater entrance. They will not take vessels in at night.

Customs and health officers board vessels at the anchorage in the outer harbor.

6-167 Salina Cruz, which has a population of 15, 000 (1964), is situated northeastward of the port. The town derives its importance principally from being the southern terminus of the railroad that goes through Tehuantepec and thence across the isthmus to Coatzacoalos.

The area around Salina Cruz is healthful during the dry season, but fevers, particularly malaria, are prevalent during the rainy season.

WHARVES.—Vessels berth along the northern sides of the two moles that shelter the inner harbor. Depths of 22 to 30 feet were reported (1967) in the berths adjacent to the entrance. A draft of 22 feet can be accommodated alongside in the harbor but greater drafts have been taken in at high water. There are three warehouses on each mole.

A concrete wharf 1,400 feet in length is located at the northwestern part of the inner harbor. In 1966 vessels were berthing at the western end of this wharf where the harbor has been dredged for ocean-going ships.

The northeastern part of the harbor is shoal and used by fishing and other small vessels.

TUGS.—Three tugs are available. A tug used to assist vessels into the inner harbor and swinging to the berths.

REPAIRS.—There is a drydock and a machine shop at the port. Major repairs can be undertaken. The drydock is 664 feet long, 79 1/2 feet wide, and in 1959 had a depth of 35 1/2 feet on the sill at M.H.W.S. The drydock has two 10-ton railway cranes. Vessels up to 18,000 tons can be accommodated; length is limited by a turning circle 600 feet in diameter. This is the only graving dock between San Diego and the Panama Canal.

SUPPLIES.—Engineers' supplies are usually not available. Fresh provisions are available. Water, which must be treated for drinking, is available from pipelines on the wharves. Fuel oil and diesel oil are always available at Berths 4,5, and 6. Also, fuel oil may be delivered by a tug.

COMMUNICATIONS. — Regular steamship service is maintained by a U.S. shipping company. The town is served by the railroad that crosses the Isthmus of Tehuantepec. It is connected with the national telegraph system, and is in telephonic communication with Mexico City. A government-owned radio station is maintained at Salina Cruz.

An airfield is located a short distance northeastward of the town.

HOSPITAL.—Civil Hospital, which is small, will admit seamen.

METEOROLOGICAL TABLE.—See appendix II.

6-168 Tehuantepec, with a population of about 12,000, lies about 9 miles northward of Salina Cruz, on the Tehuantepec River, about 10 miles above its mouth. A good road, as well as the railroad, connects Salina Cruz and Tehuantepec.

DERATIZATION.—See section 1-19.

6-169 Cerro Morro (Ventosa Point), 3 miles eastward of Morro de Salinas, is a bold, rocky headland jutting out from the mainland. Off the point are many outlying rocks 50 to 150 feet high, with deep water close-to. The point can not be mistaken, as it is the last of the high land on the western part of the Gulf of Tehuantepec. An old tower on Cerro Morro is an excellent mark when approaching from the eastward.

A detached shoal, with a depth of 4 1/2 fathoms over it, lies about 200 yards offshore, in a position about 1 mile southwestward of Cerro Morro.

Ventosa Bay, situated northeastward of Cerro Morro, is about 2 miles in extent. The soundings in the western part are irregular, and, on account of the great amount of sediment brought down by the Tehuantepec River during the rainy season, this part of the bay is fast filling up. Heavy breakers extend about 1 mile outside the bar at the mouth of the river; the bar dries during the dry season. Landing here is difficult even in the best of weather.

6-170 COAST.—From Cerro Morro the beach trends eastward for 23 miles to San Francisco Bar. About 9 3/4 miles from Cerro Morro there is a high-water break or closed mouth of a lagoon, and 3/4 mile farther a second break; both connect with the same lagoon.

6-171 San Mateo Village lies midway between these breaks and about 3/4 mile back

from (continued on page 173)

the beach. The whitewashed or painted dome of the church can be seen at some distance seaward, and forms an excellent landmark when the mountains are obscured. The country in this vicinity is low and sparsely wooded and is cut by branches of a lagoon that extends inland.

There are two other high-water breaks, distant 13 and 20½ miles, respectively, from Cerro Morro.

Santa Maria, 17½ miles from Cerro Morro stands about 1,500 yards back from the beach. This village also has a whitewashed cathedral which, rising from a group of scattered palmetto trees, forms a good mark. This tower is an open cupola, while that at San Mateo is a dome.

6–172 San Francisco Bar (Bocca Barra) *(16°13′ N., 94°46′ W., H. O. Chart 932)* is formed at the open mouth of a series of large lagoons that here connect with the sea. Since the growth of trees and bushes ends at some distance on either side of the opening, the mouth, when seen from a few miles at sea, seems broad, but it is only 600 yards wide. Heavy breakers extend out ¼ to ½ mile from the mouth, and ordinarily there is not even a channel for boats, but in 1942 the entrance was reported to have a depth of 20 feet. The mouth may be identified by a white sandbank about 20 feet high that stands on a low sand spit about ½ mile to the westward.

This series of lagoons consists of broad and open bodies of water that extend inland more than 13 miles and are fed by numerous small streams. There is not more than 21 feet of water in any part of the lagoons.

The village of San Francisco stands about 2 miles northeastward of the mouth, and there are several other small villages on the shores of the lagoons.

6–173 Coast.—From San Francisco Bar to Tonala Bar, a distance of 48 miles, the shore line sweeps around in a gentle curve as an unbroken sand beach upon which a heavy surf usually breaks, making landing extremely difficult, but occasionally the surf is light and a landing can be made at any place. Between these two bars the country is low and wooded. A lagoon extends parallel with the coast at a short distance behind the beach.

La Chichi Light is shown on the shore about 16 miles eastward of San Francisco Bar.

6–174 Tonala Bar, in its narrowest place, is about 1,750 yards wide, and on the eastern side a growth of trees seems to come down close to the water's edge. There is a channel with about 12 feet of water at spring tides, and, while vessels of light draft may cross at certain stages of tide and sea, it is unsafe for a small boat to attempt to enter the lagoon at this position. The bar is continually shifting. The breakers on the bar extend out 1,000 to 1,500 yards from the beach in a rounded outline, and the surf breaks across the full length of the bar. A few huts are situated about 4 miles westward of the bar, on the neck of land that separates the lagoon from the sea.

Anchorage may be taken in a depth of 11 fathoms at a position ½ mile outside the middle of the breakers. The nearest and best boat landing is on the beach at the eastern side of the mouth, clear of the breakers.

6–175 Coast.—From Tonala Bar to Soconusco Bluff the coast has a general southeasterly trend for a distance of 18 miles.

6–176 Landmarks.— In clear weather the high peak of Tres Picos, the lighthouse and dwelling at La Puerta, and the hills at Soconusco Bluff are conspicuous.

Tres Picos, which, when seen from a distance, appears as a cone towering above the adjacent mountains, rises to an elevation of 7,946 feet at a position 19 miles northeastward of La Puerta. From Tonala Bar it is seen divided into three points,, the middle one being the sharpest and highest, and the other two about alike in shape and size. The mountain is easily seen in clear weather for a distance of 90 miles.

6–177 La Puerta (Puerta Arista), 8 miles eastward of Tonala Bar, was formerly the place of embarkation and port of entry for the town of Tonala, which lies about 9 miles to the northeastward and with which it is connected by a wagon road, but there are now no facilities for

handling cargo. In approaching from the westward the lighthouse is the best mark. The beach is rather steep, and all along the coast there is a dangerous surf with one line of breakers through which it is dangerous to attempt a landing.

6–178 La Puerta Light (*15°57′ N., 93°50′ W., H. O. Chart 932*) is shown from a gray, masonry tower with a small white house adjacent; when seen from the westward or southwestward in full daylight the bright roof of this house is very conspicuous.

6–179 The anchorage is in a depth of 10 fathoms directly off three or four houses with red-tiled roofs, visible on the beach. During the bad season, between June and October, heavy squalls, accompanied by thunder and lightning of the severest character and yet lasting only a few hours, occur at frequent intervals, generally coming from the southwestward; but a ship with good ground tackle would not drag, if riding to an ample scope of cable, say 75 to 90 fathoms. The early part of the day is usually calm, and the coast current causes a ship to lie broadside to the swell.

6–180 Tides.—The mean high water interval at La Puerta is 2h. 00m.; spring range 4.7 feet and mean range 4 feet.

6–180 San Marcos Bar is 4½ miles eastward of La Puerta, at the narrow entrance to a lagoon. The breakers on the bar extend out a little more than ¼ mile from the beach, but they are not very heavy. Sharks are numerous and may be seen in the edge of the breakers here and at all the bars along this coast.

Soconusco Bluff, 6 miles eastward of San Marcos Bar, is not actually a bluff but rather a group of hills or mounds upward of 2,000 feet high.

San Bernardo Mountain rises to an elevation of 3,035 feet at a position behind Soconusco Bluff and 5 miles inland. The mountains and hills in the vicinity are wooded and green in the rainy season, and light brown in the dry season; standing so near the shore they seem to abut upon it, forming the best landmark in all seasons for this part of the coast. At this position the high mountain range approaches nearest to the coast; several peaks of this range rise to elevations of 6,000 to 7,000 feet within 15 miles of the shore.

6–182 Coast.—From Soconusco bluff to Sacapulco Bar the coast has a general southeast trend for 57 miles. Between this stretch of coast and the mountains is a belt of low wooded country with occasional mounds or hills rising from it. One of these hills, with a long ridge top 1,100 feet high, stands 5 miles from the shore at a position 12 miles eastward of Soconusco Bluff.

6–183 Sacapulco Bar lies at the opening of a narrow lagoon which seems to extend all along behind the bench both westward and eastward. The opening is about 250 yards wide, but breakers extend off it for about ¼ mile; there is not enough water on the bar for ships' boats.

6–184 Coast. —From Sacapulco Bar to Soconusco Bar the beach trends southeastward for 43 miles. A lagoon extends along behind the beach for the whole distance. At 12 1/2 miles eastward of Sacapulco Bar there is a small village, and a second village stands 14 miles farther eastward.

6–185 Soconusco Bar is similar to that of Sacapulco. The opening to the narrow lagoon is about 400 yards wide, with breakers extending off ¼ mile and making it almost impossible for a boat to enter. No habitations are visible here.

6–186 Tides.—The mean high water interval at Soconusco Bar is 2h. 50m.; the spring range is 8 feet, the mean range 6.3 feet

Tacana Volcano, 14,000 feet high, in sight from Soconusco Bar, is on the boundary line between Mexico and Guatemala, about 32 miles northeastward of Puerto de San Benito.

6–187 San Simon Bar lies 19½ miles southeastward of Soconusco Bar. The opening at the bar is about 250 yards wide, and breakers extend off 250 yards. There is 9 fathoms of water at 2¼ miles off the beach at this bar.

6-188 Puerto Madero (Puerto de San Benito) *(14° 42' N., 92° 27' W., H. O. Chart 0932)* is 19 miles southeastward of San Simon Bar. The forest which borders the intervening beach is sprinkled with palmetto trees. The anchorage is in 6 fathoms at about 1½ miles from shore, but vessels may anchor within ½ mile of the shore, mooring with a stern anchor; they should however, be prepared to weigh anchor immediately in case the necessity should arise. There are no berthing facilities at the port.

6—189 A light is shown at Puerto Madero.

An avaition light is shown about 15 miles northeastward at the town of Tapachula.

An aeronautical radiobeacon transmits from the light structure at Tapachula.

6-190 Puerto Madero consists of a few scattered houses and is a local beach resort. Puerto Madero has telegraphic communication with the interior, and is connected with Tapachula by a road which is almost impassable during the rainy season.

Tapachula, with a population of about 12,000 lies about 15 miles inland from Puerto Madero, in a rich agricultural area in which there are many coffee plantations and stock ranches. It is served hy a railroad.

6-191 Coast.—From Puerto Madero the coast line trends southeastward to the mouth of the Ocos River, a distance of 19 miles. At 5½ miles from Puerto Madero a lagoon comes close to the beach, separated from the sea by only a narrow strip of land. The lagoon has doubtless had an opening here, and the bar is called Cuayacan Bar. At 3 miles from Cuayacan Bar is a similar narrow place between sea and lagoon called Suchiate Bar, and at 7 miles from the latter, 3½ miles westward of Ocos River is another narrow place called Ayutla Bar. All of these closed lagoon mouths are reported to be open during the rainy season.

Rio Suchiate, which discharges into the lagoon, 9 miles southeastward of Puerto Madero, forms part of the boundary line between Mexico and Guatemala.

6—192 Off-lying Bank—Danger.—An off-lying bank with depths ranging from 5½ to 24 fathoms, the limits of which are not well defined although it is reported to be approximately 14 miles in diameter, lies with its center about 47 miles west-southwestward of Puerto Madero, in approximately 14°55' N., 93°11'W. Depths of 6 to 11 fathoms have been reported in the vicinity of this bank.

CHAPTER 7

THE COASTS OF GUATEMALA, EL SALVADOR, AND HONDURAS, INCLUDING THE GULF OF FONSECA

7–1 Ocos *(14°31′ N., 92°12′ W., H. O. Chart0931).*—The village of Ocos, consisting only of four wooden buildings in bad repair is situated on the western side of the entrance of the Ocos River. The remains of an iron pier, now completely surrounded by dry land, are visible from seaward. The place is said to be very unhealthful at all seasons.

Vessels with cargo to be landed usually anchor in a depth of about 5 fathoms during the day and shift to a position 1 to 2 miles offshore at night. The only way that passengers and cargo can be landed is by means of a surf boat.

7–2 This section has been deleted.

7–3 Caution.—Inasmuch as the coast is liable to frequent changes caused by earthquakes, vessels should approach Ocos with caution.

7–4 Coast.—From the Ocos River the coast trends in a southeasterly direction in almost a straight line to Champerico, distant 20 miles. The water is shallow, but at 1 mile from shore there are fairly uniform depths of 7 to 8 fathoms, deepening very gradually seaward; along this coast there are no obstructions to navigation. This coast, typical of the entire coast between Salina Cruz and Acajutla, is a continuous sand beach lined with trees and undergrowth.

7–5 THE ROADSTEAD OF CHAMPERICO *(14°18′ N., 91°56′ W.,H.O. Chart 1366).* Champerico is a port of entry for the western part of Guatemala, and is located on a straight coast with an entirely open roadstead. The warehouses and buildings on shore can be seen a long distance. A red-roofed house and a clump of 3 coconut palms, located about ½ mile northwestward and about 1 mile southeastward of the pier at Champerico, respectively, are conspicuous. A conspicuous wreck lies stranded on the coast about 1 mile eastward of the pier. A signal station is located on a building in the town. International Morse Code is used at all times.

It was reported (1962) that a shed on the pier gave good radar returns up to 24 miles between the bearings of 335° and 030°, but the returns from the coast itself were very weak.

7–6 Lights.—A light is shown from a water tank situated 300 yards northeastward of the root of the pier at Champerico. A light is shown on each seaward corner of the pier during cargo operations.

An obstruction light is shown on a tower about 400 yards eastward of the head of the pier.

Buoys.—Mooring buoys for lighters are located about ½ mile south-southwestward of the pier. A buoy is located close south-southeastward of the head of the pier.

7–7 Anchorage can be taken in a depth of 6½ fathoms, sand and mud, about ¾ mile south-southwestward of the pier. Vessels should not anchor in an area about 250 yards southward of the pier as this is the usual anchorage of port floating equipment. The swell here is heavier than at any other place on the coast. At times it is difficult to land or to take in cargo unless the vessel is sprung around, head to sea; boats should not attempt to land unless the water is smooth. A local regulation requires that three (3) long blasts of the ship's whistle be given when the anchor is down.

Caution.—It is advisable to anchor further seaward during extreme surf conditions in the spring and fall and, during the rainy season when "Chubascos" (sec. 1-28) occur without warning. Vessels have dragged anchor at such times.

7–8 Tides.—The mean high water interval at Champerico is 2h. 08m.; the spring range is 6.1 feet, the mean range 5 feet. At full and change of the moon heavy rollers sometimes set in from the southward during a complete calm and break in 4 fathoms of water. In such a case it is best to anchor farther out, in 7 fathoms or more.

7-9 Currents.—During the dry season the current in this vicinity generally sets to the east-southeastward at a rate of 1 knot, and more at spring tides. Sometimes, however, it will set east-southeastward for three or four days, and then set west-northwestward for the same length of time. From June to August, a west-northwesterly current of over ½ knot, predominates.

7-10 Champerico, with a population of about 4,300, has several substantial buildings and warehouses.

Berths.—The pier, which is about 750 feet long with a depth of 15 feet at the seaward end, is available only to lighters and small craft. Vessels work cargo at the anchorage. Iron ladders for use in landing from boats are available. The pier is served by rail and is equipped with five cranes of 8 to 25 tons capacity.

The port has two tugs and five 40-ton lighters.

Supplies.—Staple and fresh provisions are available in limited quantities. Fuel and fresh water are not available.

Communication.—The town has telephone, telegraph, and radio facilities. It has daily train service to Retulhulen. Several steamship lines call at Champerico monthly.

Medical.—Champerico has poor sanitary conditions.

7-11 San Luis *(14°12′ N., 91°46′ W., H. O.* Chart 0931), is located at the mouth of the Rio Samala about 12 miles from Champerico. During the fine season, from October to May, vessels may anchor here without risk, but at other times of the year the anchorage should be avoided as dangerous. This port is connected by road with Mazatenango, Quezaltenango, and Retalhuleu. There is a radio station at Quezaltenango.

7-12 Reef.— A breaking reef 6 miles in length lies along the coast, 2 miles offshore, abreast the mouth of Rio Samala. Shoal water abreast the reef is reported to be extending seaward to the 10-fathom curve, or about 3½ miles southwestward of the river entrance, and depths of 7 to 9 fathoms are found at about 8½ miles southwestward of the entrance. Vessels should, therefore, give the entrance to Rio Samala a berth of at least 4 miles.

Rock.—A dangerous sunken rock lies in a position approximately 5 miles southward of San Luis.

7-13 Sesecapa, 10 miles from San Luis, at the mouths of the Rio Sacua and Rio Naguala, is another embarcadero where vessels load with sugar and coffee.

Tecojata lies between the mouths of the Rio Madre Vieja and the Rio Coyolate. Inasmuch as the bottom is of shifting sand, which necessitates the raising of the anchor every day, the anchorage off Tecojate is inferior to that of the other roadsteads of Guatemala.

7-14 San Jeronimo village, at the mouth of the Rio Guacalata, 6 miles from Tecojate and 26 miles westward of San José, consists merely of a number of huts with one large house where sugar is stored for shipment. Vessels load here with sugar, coffee, and other produce, bringing lighters for the purpose from Champerico or San José, where they must enter and clear.

There is good anchorage off the village in the fine season in 6 to 8 fathoms, with Volcano Agua bearing about 044°. Being an open roadstead, it is quite exposed and should be avoided in bad weather.

7-15 Landmarks.—Volcano Agua and Volcano Fuego are excellent landmarks for this part of the coast and for making San José de Guatemala. Volcano Agua rises in a perfect cone to the height of 12,309 feet and is apparently connected on the western side with Volcano Fuego by a ridge of considerable altitude. Volcano Fuego, 12,989 feet high, has at its summit two peaks of similar appearance and nearly equal size. It was reported (1944) that when Agua and Fuego Volcanoes are obscured by haze, Square Rock (14°19′N., 90°51′W., H.O. Chart 0931) makes an excellent landmark for vessels approaching San Jose. A village about 12 miles westward of San Jose has been reported a useful landmark. Some conspicuous oil tanks are located near the coast about 2 miles westward of the pier. Two water towers are located near the root of the pier and near the coast about 250 yards westward of the pier, respectively.

7-16 THE ROADSTEAD OF SAN JOSÉ *(13°55′ N., 90°50′ W., H.O. Chart 1366).*—San José, the chief seaport of Guatemala on the Pacific coast, is only an open roadstead and derives its importance from its connection by railroad with the city of Guatemala, 72 miles distant by rail. None of the houses of the town are con-

spicuous from the sea, except a large white storehouse and a galvanized-iron storehouse at the outer end of the pier; in fine weather these buildings may be clearly distinguished at a distance of 12 miles when viewed from a height of 30 feet above the sea. Six conspicuous oil tanks, painted aluminum, stand near the coast about 2 miles westward of San Jose light. Volcano Agua and Volcano Fuego, which have been described above, are excellent marks for making the anchorage. Additional landmarks in San Jose have been reported to be the railway station at the shore end of the pier, the customhouse, and an office building. These structures are two-storied affairs, jutting noticeably from the shore line. The coast line is low, and low land extends back 15 to 20 miles from the coast. An iron pier extending out at right angles from the beach provides means for landing and for unloading lighters, but not for berthing larger vessels.

Smoke from the burning of fields and brush makes the port difficult to locate in the early morning between February and April; at that time, likewise, the smoke almost invariably conceals Volcano Agua and Volcano Fuego. In hazy weather, however, the town may be located by the break in the thick green vegetation.

The town is lighted by electricity; on the beach there is a row of lights extending westward and eastward from the pier, which forms a dark spot in the middle of the row. The lights of the town, however, are too undependable to be relied upon as guides at night.

Floating equipment, usually consisting of nine lighters, three tugs, and a passenger launch, is anchored in a position about 300 yards southeastward of the head of the pier. The tugs and launch are anchored at the west side of the lighters and show three lights at night. The Government keeps a gasoline launch anchored 300 yards west of the pier; this launch also shows a light at night.

Lights.—San José Light is shown near the shore close north-northeastward of the pier. A light is shown at the head of the pier. An aeronautical radiobeacon, from which 3 obstruction lights are shown, is located about 5 1/2 miles east-northeastward of San Jose Light. A signal station in the town communicates via International Morse Code.

Mooring buoys are located off each side of the pier, and about 1/2 mile southeastward of the head of the pier.

7-18 Anchorage.—The anchorage is in a depth of 8 to 9 fathoms, sand, in a position about 600 yards southwestward of the head of the pier. Whistle blasts must be given after the anchor is down. Positions closer in should be avoided, particularly when entering the roadstead at night, because of barges, loaded and unlighted, normally anchored off the pier. There is occasional congestion in the port during the harvest season, November through April.

Caution.—Anchorage further seaward is advisable during extreme surf conditions in the spring and fall and during the rainy season when "Chubascos" (secs. 1–28 and 7–20) occur without warning. Vessels have dragged anchor at such times.

Anchorage is prohibited eastward of the lighter anchorage because of an underwater cable line.

Foul ground consisting of anchors and chain lies about 1/3 mile southward of the head of the iron pier.

An 8-fathom patch is reported to lie approximately 1 mile south-southwestward of the head of the pier.

A stranded wreck, well beached, lies about 2 miles eastward of the root of the pier.

7-19 Tides—Currents.—The mean high water interval at San José is 2h. 12m.; the spring range is 6.1 feet, the mean range 5 feet.

During the dry season the current in this vicinity generally sets east-southeastward with a rate of 1 knot or more at springs; frequently, however, it alternates between that direction and west-northwestward, setting in each direction for three or four days at a time.

7-20 Winds and weather. — As on other parts of the Central American coast, the winds at San José generally blow from a direction between south-southeastward and westward between 10 a. m. and 9 p. m.; a short interval of calm follows, and is succeeded by light winds from northward to northwestward. Southerly and south-southeasterly winds, accompanied by heavy squalls and frequent rains, prevail from July to October.

"Chubascos" (see sec. 1-28) are frequent at night from the middle of May until October. These heavy squalls always blow from the east and last about 45 minutes and are accompanied by heavy rain.

7-21 Directions.—The Agua and Fuego volcanoes are excellent marks for making San José, but if they are not visible, as is generally the case from 10 a. m. until sunset, the land must be followed at a distance of about 2 miles until the pier and the white storehouse are seen. In approaching San José roadstead careful consideration must be given to the currents.

7-22 SAN JOSE DE GUATEMALA *(13°55'N., 90°50'W., H.O. Chart 1366)*, the chief Guatemalan port of entry on the Pacific, consists principally of about 200 shacks grouped on either side of the narrow-gage railroad that leads directly into the interior from the pier. The port and customs offices are located near the railroad station, at the root of the pier. The town has a municipal lighting system. The transshipment of goods comprises the main economic activity of the town, although there is some work in connection with the nearby salt works and banana plantations. In 1965 it was reported that the population was about 5,000.

The pier, extending out 920 feet from the shore, has depths of approximately 30 feet at its outer end, but it is used only by lighters and small craft. The pier is equipped with four stationary winches one of which is used for the handling of oil hose. A crane of 20-ton capacity is available. Lighters are available. The maximum size package which can be handled is 32 feet in length, and a maximum lift of 20 tons. There are three small tugs used for lighterage towing.

A small tank farm is located near the beach about 1 1/2 miles westward of the pier. Tankers at times proceed to the anchorage abreast the tank farm to discharge through one of three submarine pipelines. Mooring buoys are located at the seaward end of the pipelines.

Three low-powered tugs and nine 35-ton lighters are available.

General cargo is worked by means of lighters. Oil tankers secure stern to the mooring buoys and discharge their cargo into the pier line by floating hose. T-2 tankers with a maximum draft of 30½ feet were permitted at this terminal and abreast the tank farm in 1954.

During rough weather passengers are transferred between boats or lighters and the pier by means of a type of boatswain's chair which is operated by a winch.

Supplies.—Stable and fresh provisions in season can be obtained on three days notice. Crude oil is available and minor repairs can be made. Fresh water is not available.

Communication.—Regular steamship service is maintained between San Jose and other ports of Central America, Mexico, the United States, and Europe.

There is railroad service to Guatemala City twice a day. Telegraph and telephone facilities are available. A radio station is open to public correspondence.

Sanitation and health.—Sanitary conditions of San Jose are poor, and the town is situated in a low, swampy, mosquito-infested area. Dysentery and Malaria, therefore, are prevalent in San Jose and the surrounding country. The nearest hospitals are at Guatemala City.

7-23 Istapa (Iztapa) *(H.O. Chart 0931)*, situated at the mouth of the Rio Michatoya about 6 miles eastward of San Jose, is of little importance, and is said to be unhealthful.

The anchorage is in depths of 11 to 13 fathoms, mud and sand, at about ½ mile offshore. Vessels going to Istapa must enter and clear at San José.

The coast between Istapa and Acajutla, 56 miles to the east-southeastward consists of a beach of grayish sand, backed by a well-wooded shore interrupted in a few places by unimportant rivers. The largest of these rivers are the Esclavos and La Paz, the latter forming part of the boundary line between Guatemala and El Salvador. The entrances of the rivers are generally indicated by the white trunks of mangrove trees. A small village, which may be useful as a landmark, is located near the coast about 1½ miles east-southeastward of the mouth of the Esclavos River. The surf is very heavy upon all this coast, especially after a few days of strong southerly winds.

The general soundings off the coast seem to indicate great regularity in the bottom, which apparently consists of muddy sand; a depth of 5½ fathoms was, however, reported in 1926 to lie about 12 miles south-southwestward of the mouth of Rio La Paz.

7-24 **Current.**—The usual direction of the current appears to be eastward, following the coast, with a velocity of ½ knot.

7-25 THE ROADSTEAD OF ACAJUTLA (*13°35′ N., 89°50′ W., H. O. Chart 1366*).—Acajutla, a port in western El Salvador, is the port for Sonsonate, about 11 miles northeastward in the interior. The roadstead is mearly an open bay only partially sheltered by the reef off Remedios Point, and is quite exposed to all winds from the westward; since these winds occasionally send in a heavy sea, it is not considered a desirable anchorage during local "winter season" (May-September rainy season) when the sea or squally weather or both may limit entry somewhat. The old government pier which is used by boats and lighters extends from shore just north of the town. This pier is not available for deep-draft vessels.

Caution.—Vessels berthing at the new government pier (Cepa Pier), located about 1½ miles southward of the town, have reported that due to the large sea surge their mooring lines and wires have parted.

Barges, loaded and unlighted, are often anchored as far as ½ mile off the old pier. Caution in entering is advised, particularly at night.

Several unlit steel piles, extending about 6 feet above the water, stand on the 6-fathom curve 1/2 mile offshore about 2/3 mile northward of the new government pier. These piles are reported to be used for mooring lighters.

A shoal with a least depth of 9 feet lies about 800 yards southward of the head of the new pier and shoaling has also been reported on the seaward side of the pier.

7-26 Lights.—Acajutla Light is shown on the shore about 1 mile southward of the town. A light is shown on the head of the new government pier.

7-27 **Landmarks.**—Volcano Isalco, situated northeastward of Acajutla at about 18 miles from the coast, is 6,328 feet high, and, although there are other peaks behind, is fairly easy to recognize when not obscured by clouds, which however is usually the case in the rainy season.

The volcano has been reported (1964) dormant. Three villages located 11½, 17, and 28 miles west-northwestward of Acajulta, respectively, are useful landmarks. A windmill and a cement factory, standing about 800 yards and 1 1/4 miles southward of Acajutla, respectively, are conspicuous. The lights of the cement factory are reported to be visible about 20 miles. Two white lights mark a 250-foot chimney close southward of the factory and a grain silo, from the top of which an obstruction light is shown, is located near the root of the new government pier.

The town of Acajutla is difficult to make out until within 5 miles. It is advisable to approach with Volcano Isalco bearing 045°; this course will lead in until the port is made. If the volcano be obscured, the large shed on the outer end of the old pier, which is visible from a distance of 5 or 6 miles, may be used as an approach mark.

7-28 Anchorage.—The best anchorage is in depths of 10 to 11 fathoms about 1 1/2 miles off the end of the old pier; in winter, however, vessels should anchor farther out.

Ship's boats should be hoisted at night during the rainy season.

Mooring Buoy — Buoys.—A mooring buoy is located about ½ mile west-southwestward of the head of the old pier. Two spherical buoys, painted red, mark the end of a pipe line extending about ½ mile southwestward from the head of the old pier in depths of about 6 fathoms. A buoy, painted white, is moored close southward of the seaward end of the pipe line. The 3 pipe line buoys are for private use only. There are no other anchorage restrictions.

A submarine pipeline extends about ½ mile offshore from a position about ¾ mile southward of the root of the new government pier. Mooring buoys are located at the outer end of the pipeline and form a berth which can accommodate a vessel up to 700 feet in length with a maximum draft of 40 feet.

Tides.—The mean high water interval at Acajutla is 2h. 18m.; the spring range is 6.4 feet, the mean range 5.2 feet.

Pilotage.—Pilotage is compulsory. Pilots will board vessels close off the new government pier from a pilot launch. A tug is available to assist in berthing.