

1,886 feet high, is situated about 8 1/2 miles inland in a position about 15 miles southwestward of the entrance to the Batang Bintulu.

In 1958, the bar of the Batang Bintulu, about 1 mile north-northwestward of the river, had a least depth of 3 feet with an average rise of 5 feet. The bar is dangerous at times. Two light beacons are located on the northeast point of the river mouth. In range 126° they lead across the bar to the river entrance. The front beacon is a steel tripod with a white triangular topmark, and the rear beacon is an iron framework tower with a similar topmark. The village of Bintulu is situated on the east bank of the river just inside its entrance, Bintulu, with a population of about 4,000 in 1948, exports tropical hard woods and jelutong, the principal ingredient of chewing gum.

The main wharf at Bintulu has a length of 138 feet with a depth of 4 feet alongside. There is a small wooden wharf for government launches and a number of small jetties for commercial vessels.

A radio mast stands on the south bank of the river, about 1 1/4 miles within the entrance. A radio mast stands on the coast about the same distance northeastward of the entrance of the river.

Vessels may anchor in a depth of about 24 feet, good holding ground, with the flagstaff at Bentulu bearing about 138°, distant 3 miles. Small vessels can anchor in Telok Plan, with Tanjong Kidurong light bearing 340°, distant 3/4 mile, in 16 feet of water, mud bottom.

Signals. —Tidal signals are shown from the northeastern yardarm of the flagstaff at Bintulu.

One white ball-----Flood tide.  
One red ball-----Ebb tide.

Depth signals are shown from the southwestern yardarm of the above flagstaff.

Three white balls---8 feet over the bar.  
Two white balls---6 feet over the bar.  
One white ball---4 feet over the bar.  
No signal-----Less than 4 feet over the bar.

Landing on the coast between Batang Tau and Tanjong Kidurong is very difficult.

10-40 Tanjong Kidurong (3°16' N., 113°03' E.) is about 5 1/2 miles north-northeast-

ward of the entrance to the Batang Bintulu. This point forms the north extremity of Telok Plan, a small bay that indents the coast to a distance of about 1 1/2 miles. Mount Kidurong, a round-topped hill, is situated about 3 1/2 miles south-southeastward of Tanjong Kidurong.

Tanjong Kidurong and the coast for about 1 mile eastward and 1 1/2 miles northeastward is fringed by a drying, rocky ledge and there are some drying rocks about 200 yards offshore.

A light is shown from Tanjong Kidurong.

10-41 Off-lying shoals and dangers.—A 3 1/2-fathom patch was reported (1956), about 17 1/2 miles northeastward of the mouth of the Batang Mukah.

A shoal, with depths of from 33 to 36 feet, lies about 10 1/2 miles northeastward of the same river mouth; its limits have not been defined. Other shoal patches are in this area.

Lydie Shoal, a small coral patch with a depth of 19 fathoms, lies about 71 miles northwestward of Tanjong Kidurong and about 57 miles northward of the entrance to the Batang Mukah. A light buoy, painted yellow, is moored about 4 1/4 miles southeast of Lydie Shoal.

Parsons Shoal, with a depth of 13 fathoms, and James Shoal, with a depth of 12 fathoms, lie respectively about 13 miles eastward and 15 miles east-northeastward of Lydie Shoal. Both are composed of coral, and are of small extent. During the northeast monsoon tides may occur in the vicinity of these shoals. A light is shown about 21 1/2 miles south of Parsons Shoal.

Acis Shoals, which consist of two coral patches, are situated about 23 miles east-southeastward of Parsons Shoal. The southeastern shoal, with a least depth of 38 feet, lies about 32 miles northwestward of Tanjong Kidurong, and the northwest shoal, with a depth of 53 feet lies about 7 miles northwestward of the southeast shoal.

Marie Shoal, with a least depth of 41 feet, lies about 29 miles north-northwestward of Tanjong Kidurong. A light is shown about 6 1/2 miles south-southeast of Marie Shoal.

Ruth Shoal, three detached patches, lies between 6 to 8 miles east-northeastward of Marie Shoal. The easternmost patch has a least depth of 35 feet over it.

Isabel Shoals, with a least depth of 41

feet, lies about 9 miles northward of Ruth Shoal.

Madalene Shoals, a large group of detached coral patches, extend from about 6 miles north-northeastward to 15 miles northward of the north end of Ruth Shoals. There is a least depth of 34 feet at the south end of this shoal.

Patricia Shoal, with a depth of 5 fathoms over it, lies about 22 miles northward of Tanjong Kidurong.

Wilson Shoal, with a depth of 50 feet over it, lies about  $8\frac{1}{2}$  miles northward of Patricia Shoal.

Christine Shoals, the shoalest part having a depth of 34 feet, lies about  $3\frac{1}{2}$  miles northwestward of Wilson Shoal.

Cochrane Bank, having general depths of  $8\frac{1}{2}$  to 10 fathoms, lies about 10 miles northwestward of Tanjong Payong. The bank extends for about 11 miles in a northeasterly and southwesterly direction.

Elizabeth Shoals, four attached coral patches, with a least depth of 32 feet, lies about 18 miles northwestward of Tanjong Payong.

Kennett Bank lies about 14 miles northward of Tanjong Payong and has a depth of 12 fathoms over it.

A marker beacon, consisting of a 30-foot pipe, is located about  $14\frac{1}{4}$  miles west of a point  $1\frac{1}{2}$  miles south of Tanjong Kidurong. A yellow, conical light buoy is located close east of the pipe.

A wreck, with masts showing about 3 feet above water, the position of which is approximate, lies about 38 miles northward of Tanjong Kidurong.

**10-42 COAST FROM TANJONG KIDURONG TO TANJONG BARAM.**—From Tanjong Kidurong the coast trends in a general northeasterly direction for about 67 miles to Tanjong Batu, which has conspicuous cliffs. The coast is mostly low and featureless, but is flanked by a series of gently rising ridges, which rise to 1,000 feet in places. It is extremely difficult to identify any individual summit, with the exception of

Gunong Subis. This peak is 1,355 feet high, lying about 20 miles southward of Tanjong Batu.

On Tanjong Similajau about 21 miles northeastward of Tanjong Kidurong, a beacon is erected having a white base surmounted by a diamond. The Sungei Similajau discharges close southward of Tanjong Similajau. Another white beacon, with triangle topmark, is erected on the south entrance point of Sungei Similajau. Another white beacon, with circular topmark, stands on the coast about  $3\frac{1}{2}$  miles southwestward of the same river. The above-mentioned beacons are not maintained.

A number of rivers discharge along this coast. Craft which can cross the bars of these rivers can proceed up them without much difficulty. They are extensively used by local trade. The entrances are very difficult to discern from seaward. In some instances the bar crossings are indicated by stakes or leading marks; lights may be exhibited when vessels are expected. Depths in the bay channels are constantly changing, so that entry should not be attempted without local knowledge.

Much debris is brought down these rivers after heavy rains and on the ebb currents, some of which are large logs which constitute a danger for considerable distance offshore. The river water discharges seaward as a surface layer, giving rise to discolored patches which give the impression of shallow water. Actual shoals cannot be seen until a vessel is close upon them.

There are numerous off-lying rocks and reefs along this coast; their locations can best be seen on the chart. In the area seaward of Sungei Similajau, rocks and shoals lie up to 2 miles seaward of the entrance. Ursula Shoals, about 18 miles southwestward of Tanjong Batu, are a group with a least depth of 2 fathoms, and lie about 7 miles offshore.

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KUALA SIMILAJAU is an open bight partially protected on the north by Tanjong Similajau and the coast southeastward. The Sungei Similajau discharges into the head of Kuala Similajau. The approach to the mouth of the river is made through Kuala Similajau and is encumbered by a bar of hard sand over rock, with a depth of less than 1 foot. The channel over the bar is marked by two pairs of beacons, from which lights are shown occasionally when a vessel is entering or leaving. The outer pair are in range 089 1/2°.

CAUTION.—The timber camp mentioned in the following paragraph had been discontinued in 1957, and the lighted range beacons and beacons no longer maintained.

ANCHORAGE can be taken outside the 5-fathom curve on the line of the outer range beacons, in soft mud, good holding ground. There is a timber camp about 1/2 mile upriver at which there is a jetty with 12 feet alongside.

Tanjong Lobang, which has yellow sandstone cliffs about 100 feet high, is located about 18 miles north-northeastward of Tanjong Batu. Between these two points the coast is covered with dense jungle. SHOAL WATER, with depths of less than 3 fathoms, extends from this section of the coast for a distance of about 1 1/2 miles.

BUKIT LAMBIR, a conspicuous mountain 1,522 feet high, is located about 5 miles inland in a position about 10 miles southward of Tanjong Lobang.

A SHOAL with a least depth of 2 3/4 fathoms, lies about 10 miles southwestward of Tanjong Lobang. Two PATCHES, with depths of 4 1/2 and 5 1/2 fathoms, lie respectively about 1 mile and 1 1/2 miles northeastward of this 2 3/4-fathom shoal. A foul patch lies 2 miles southwestward of the 2 3/4-fathom shoal.

Another shoal, with a least depth of 7 feet, lies about 4 miles west-southwestward of Tanjong Lobang. Almost 1 1/2 miles north-by-westward of this shoal is a 6-fathom patch.

A 1 1/2-fathom patch lies about 2 1/2 miles southwestward of Tanjong Lobang.

A light is shown from Tanjong Lobang.

A 373-foot and a 467-foot radio tower are located 1/2 mile and 3/5 mile, respectively, eastward of Tanjong Lobang.

10-43 SUNGEI MIRI AND APPROACHES.—Between Tanjong Lobang and Tanjong Baram,

which is located about 14 miles northward, the coast recedes about 2 miles forming a bight. The entrance of the Sungei Miri is located near the south end of this bight in a position about 1 1/2 miles northeastward of Tanjong Lobang. A range of coastal hills extends in a north-northeasterly direction from Tanjong Lobang for about 4 miles. Northward of these hills the land is low and densely wooded, except for certain areas that have been cleared. The most conspicuous objects along this section of the coast are a tree standing on high ground about 1 mile east-northeastward of Tanjong Lobang light structure, the oil tanks at Miri and those at Lutong, which is situated about 5 1/2 miles northward of Miri, and a radio tower located about 5 1/4 miles north-northeastward of Tanjong Lobang. At night the lights of the petroleum plants at Miri and Lutong are very conspicuous.

A dangerous wreck is located in the approaches to Sungei Miri about 1 1/4 miles north-northeastward of Tanjong Lobang.

A dangerous wreck is located about 2 3/4 miles westward of the light structure at Lutong.

SHOAL WATER, with depths of less than 3 fathoms, extends from this section of the coast for a distance of about 1 1/4 miles. A shoal, with depths of less than 1 fathom, extends about 3 miles westward and northward from Tanjong Baram. A spit, which dries 1 foot, and on which the sea usually breaks, lies on this shoal, and extends in a northwesterly direction from the north entrance point of the Batang Baram (see sec. 10-52) for a distance of about 2 miles.

The course of the Sungei Miri for a distance of about 5 1/2 miles from its mouth is almost parallel to the coast. Its entrance is blocked by a bar, which is subject to frequent shifting, and which has a least depth of 1 foot (1960), with an average tide rise of 4 to 5 feet. The best time to cross the bar is at high water. There is usually no swell in the approaches to the river during the southwest monsoon, but there is always a surf on the bar. Small craft, with a draft of less than 6 feet, can proceed upstream for a distance of about 14 miles. Beyond this point the river has not been surveyed. A bridge crosses the river in a position about 6 miles from its entrance. Only small craft without a mast or funnel can pass under this bridge.

(8030) BORNEO—Northwest coast—Lutong—Oil well—Information.—Two conductor pipes, 23 feet high, 3 feet in diameter, and 8 feet apart, exist in  $4^{\circ}30'06''$  N.,  $113^{\circ}54'27''$  E. A *Fl. 4 sec. 10 M.* light will be exhibited from one of the pipes pending construction of a permanent structure.

(N.M. 11, 12, Kuching, 1966.)

(N.M. 52/66.)

H.O. Charts 3042, 5501, 5502.

H.O. Pub. 71, 1951, page 218.

(7074) EAST INDIES—Borneo—Lutong—Oil structure.—An oil structure showing a *Fl. R. 4 sec. 42 ft. 5M.* light exists about 3.45 miles  $287^{\circ}20'$  from Lutong Light ( $4^{\circ}28.5'$  N.,  $113^{\circ}59.8'$  E. approx.).

(N.M. 45/66.)

(N.M. 38 (1698), London, 1966.)

H.O. Chart 3042.

H.O. Pub. 71, 1951, page 218.

10-44 Beacons.—The range beacons that mark the channel across the bar are located southward of the river entrance. These beacons are lighted; as the bar is subject to change, the range is moved accordingly.

10-45 Anchorage.—Vessels can anchor, in depths of about 7 fathoms, 5 miles northward of Sungei Miri. Vessels approaching Miri in thick weather should anchor in depths of 10 to 12 fathoms rather than remain underway. A vessel discharging cargo should anchor in 5 fathoms about 3 miles northward of the river entrance.

10-46 Tides.—Tidal heights above datum soundings at Miri are: M.H.H.W. 5.3 feet; M.L.L.W. 1.7 feet, and at Lutong, M.M.H.W. 5.0 feet; M.L.L.W. 1.6 feet.

10-47 Tidal currents.—Within 5 miles of the coast the tidal currents are generally weak. The velocity of the current rarely exceeds 1/2 knot, although velocities up to 2 1/2 knots are reported to occur.

10-48 Pilots.—Qualified pilots are available at Miri. Pilots and customs officials board vessels at the anchorage, from a white motor launch. They will not take vessels in at night.

It is reported (1963) that pilots for Lutong board on the 10 fathom curve, about midway between Miri and Lutong.

Note.—The prohibited anchorage and passage areas are mentioned in section 10-51 especially in the vicinity of the Lutong oil berths.

10-49 Directions.—Vessels approaching from the westward should steer for the oil tanks at Miri bearing 115° and anchor as directed above. In thick weather they should keep in a depth greater than 12 fathoms until Tanjong Lobang is sighted. The anchorage can usually be made at night as the white-painted oil tanks are conspicuous. Vessels approaching from the northward should give Tanjong Baram a berth of a least 6 miles. After passing this point the foregoing directions should be followed.

10-50 MIRI (4° 23' N., 113° 58' E.), a government station, and one of the principal

ports of Sarawak, is situated on the southern bank of the Sungei Miri near its entrance. The government buildings and quarters are located westward of the town about midway between the river entrance and Tanjong Lobang. The European sections are situated on the western part of the southern bank of the river, and also on the narrow neck of land that comprises the north bank of the river. In 1960 the population of Miri was about 13,350.

Wharves.—The principal wharves are Customs Wharf with a length of 90 feet and a least depth alongside of 3 feet (1960), and Immigration Wharf with a length of 30 feet and a depth of 7 feet. Both of these wharves are located within the Sungu Miri. A pier, 650 yards long with a depth of 6 feet at its head, extends west-northwestward from a position about 2 1/4 miles northeastward of Tanjong Lobang. Lighters are available for working cargo at the anchorage.

Repairs.—There are two slipways, which are located eastward of Main Wharf. One is capable of hauling up vessels of about 250 tons, and the other is capable of hauling up lighters. A diver and diving equipment are available. The oil company maintains a wharf, slipways and repair facilities mainly for use of their own vessels. However, emergency repairs can usually be made to commercial vessels.

Supplies.—Fuel oil and small quantities of diesel oil can be supplied by lighter to vessels at the anchorage. No provisions or stores are available. Water can be obtained alongside the slipway jetty.

Communications.—There is regular steamer communication with Singapore and with the other ports of Sarawak and British North Borneo. There is a local telephone system.

Hospital.—The Miri General Hospital, situated on the northern bank of the river, is divided into two sections, one for the Europeans, and the other for Asiatics.

Quarantine.—Any vessel arriving at Miri from a foreign port must fly the quarantine flag, which must not be hauled down until the vessel has been granted pratique. No communication with the shore is permitted, no boat or launch will be allowed alongside the vessel, and the vessel will not be allowed alongside any wharf until pratique has been granted.

10-51 LUTONG (4° 28' N., 114° 00' E.), situated about 6 miles north-northeastward of Miri, is the location of a large oil refinery. The refinery is connected by 8-inch sea pipelines to four oiling berths with a least depth of 39 feet, situated about 2 1/2 miles offshore. Vessels use their own anchors and secure their sterns to mooring buoys which are lighted at night. Qualified pilots are stationed at Miri who will moor vessels at the Lutong oil berths. These pilots will provide mooring wire, a launch, and a gang of men. There is a wharf, with a length of 103 feet, and a depth alongside of 10 feet, which is used to land stores for the refinery settlement and to load packed oil products. Anchorage and passage is prohibited in an area that extends from about 1 mile southward to 2 1/2 miles northward of Lutong, and about 2 3/4 miles

offshore, unless the vessel is in charge of a pilot.

A light is shown from a gray framework tower, 80-foot elevation, at the refinery in Lutong.

10-52 Coast.—From Lutong the coast trends in a north-northwesterly direction for about 7 miles to the mouth of the Batang Baram, of which Tanjong Baram is the north entrance point.

A light is shown on Tanjong Baram.

From Tanjong Baram a bank, with depths of less than 36 feet over it, extends about 4 miles westward and 5 1/2 miles northward.

A sandspit, with depths of less than 6 feet over it, extends about 2 3/4 miles west-northwestward from Tanjong Baram and there are several patches that dry 1 foot on it.





Tanjong Baram was reported (1958) to give a good radar return at a distance of 15 miles and was identifiable with charted features at a distance of 12 miles.

A gray iron tower was reported (1964) to be located about 6 miles northwestward of Tanjong Baram.

A dangerous wreck with mast showing is located about 4 miles north-northeastward of the light structure on Tanjong Baram.

A dangerous wreck is located about 5 miles northwestward of the same light structure.

Discolored water, in which large floating logs and nipa palm roots may be found, extends for about 4 to 8 miles from the mouth of the Batang Baram. The line of demarcation between the sea and river water is usually very conspicuous.

The bar of the Batang Baram has a depth of about 4 feet (1960), and 8 feet at high water springs. Vessels having local knowledge and drawing not more than 7 feet can enter the river during fine weather. Vessels that can cross the bar can proceed upstream for a distance of about 105 miles. Anchorage is prohibited about 1 mile within the entrance of the river in the vicinity of a pipeline and submarine cable crossing.

At a position about 26 miles upstream from its entrance there is a canal that connects this river with the Batang Belait, situated about 2 miles eastward. A wharf with a length of 90 feet and a depth of 9 feet is located on the south side of the river.

10-53 MARUDI, a government station and the principal town of the district, is situated about 59 miles upstream from the mouth of the Batang Baram. The population in 1944 was about 2,200. There is steamer communication with Kuching and other ports in Sarawak. There is a radio station and a hospital at Marudi.

A wharf with a length of 72 feet with a depth of 20 feet alongside is located at Marudi.

10-54 OUTLYING SHOALS AND DANGERS.—SOUTH LUCONIA SHOALS, consisting of a number of coral reefs, are situated about 85 miles west-northwestward of Tanjong Baram. They are steep-to, break in places, and can usually be seen from aloft.

Herald Reef, the southernmost of the South Luconia Shoals, is a small coral reef about 1/2 mile in diameter. It is situated about 86 miles west-northwestward of Tanjong Baram. There are depths of about 2 1/2

fathoms on the reef, and depths of about 30 fathoms in its center. This reef is steep-to, and there is very little surface indication of its presence.

A danger area (position doubtful) lies about 17 miles south-by-eastward of Herald Reef.

Luconia Breakers, which dry, and on which the sea breaks heavily, lie about 3 1/4 miles northeastward of Herald Reef.

Stigant Reef (5° 02' N., 112° 29' E.), located about 9 miles west-northwestward of Herald Reef, is horseshoe-shaped, and has general depths of 2 1/2 to 6 fathoms. A patch, with a depth of about 2 1/2 fathoms, lies near the northwest extremity of Stigant Reef.

Richmond Reef, with a least known depth of about 2 1/2 fathoms near its center, is situated about 2 1/2 miles northeastward of Luconia Breakers. It consists of a ridge that extends in a north-northeasterly and south-southwesterly direction for a distance of about 2 miles.

Comus Shoal, with a least depth of 4 1/2 fathoms, lies about 13 miles eastward of the northern part of South Luconia Shoals.

Connell Reef, with a least depth of 4 1/2 fathoms, lies about 6 1/2 miles northwestward of Richmond Reef.

The area within the various reefs that comprise South Luconia Shoals has not been examined, and there may be other reefs in this vicinity.

10-55 North Luconia Shoals.—This group of shoals and coral reefs lie between 92 and 120 miles northwestward of Tanjong Baram and from 14 to 50 miles northward of South Luconia Shoals. They were partly examined in 1866, and again in 1935, and no safe passages were found between them. The channel between South and North Luconia Shoals and the area westward of North Luconia Shoals have not been examined.

Hayes Reef (5° 22' N., 112° 36' E.), the southernmost of the North Luconia Shoals, is a small steep-to drying reef. It breaks heavily in all kinds of weather. A shoal head lies about 2 2/3 miles eastward of Hayes Reef.

Seahorse Breakers, with depths of 2 to 6 fathoms, are steep-to on their eastern side. They are situated about 10 miles north-northwestward of Hayes Reef. A small drying patch, on which the sea breaks heavily, is situated about 2 miles west- (continued on page 220)

ward of Seahorse Breakers, and a detached coral reef lies close southward.

Tripp Reef, with a least known depth of 2 fathoms, lies about 8 miles northwestward of Hayes Reef.

Moody Reef, with a depth of 5 fathoms over it, lies about 20 miles northwestward of Hayes Reef. Two dangerous reefs lie between Tripp and Moody Reefs, and a 6 3/4-fathom patch, with a small reef close westward of it, lies about 3 miles northeastward of Moody Reef.

Hardie Reef, with depths of from 4 to 5 1/2 fathoms, extends between 15 and 19 miles north-northeastward from Moody Reef. From the south end of Hardie Reef another reef extends about 8 miles southward and has a depth of 5 1/4 fathoms over its south extremity. About 10 miles east-northeastward of Moody Reef lies an unexamined dangerous reef.

Buck Reef, with a least known depth of 2 3/4 fathoms, lies about 15 miles northeastward of Moody Reef.

Aitken Reef, with a depth of 5 1/4 fathoms over it, lies about 4 miles northward of Buck Reef.

Friendship Shoal, the northernmost of the North Luconia Shoals, has a least known depth of 5 1/4 fathoms, but there may be depths less than that. The position of this shoal is approximately 26 miles northward of Seahorse Breakers.

**10-56 DANGERS NORTHEASTWARD OF NORTH LUCONIA SHOALS.**—Louisa Reef (6° 20' N., 113° 14' E.), a steep-to coral reef about 3 feet high, is situated about 46 miles east-northeastward of Friendship Shoal and about 113 miles north-northwestward of Tanjong Baram.

Royal Charlotte Reef, which is nearly rectangular in shape, is situated about 42 miles north-northeastward of Louisa Reef. Several boulders, 2 to 4 feet high, lie near its southeastern side, and some rocks awash lie on its northeast side. An area in which sunken dangers exist extends about 8 miles north-northeastward from this reef. Breakers have been observed (1962) over this reef.

Swallow Reef, situated about 27 miles north-northeastward of Royal Charlotte Reef, consists of a shallow basin surrounded by a narrow belt of coral. Several rocks, 5 to 10 feet high, lie near its eastern end, and there

are also several above-water rocks near its southeast side. A wreck lies stranded (1959) near the west end of the reef. The rocks at the extreme east end of the reef are plainly visible. The entire reef is marked by breakers. Swallow Reef has been reported (1958) to be a good radar target at a distance of 9 miles.

Aradasier Bank, which has a least known depth of 2 fathoms, is located about 14 miles northeastward of Swallow Reef. This reef, which has not been fully examined, extends in a northeasterly and southwesterly direction for a distance of about 20 miles.

A description of the dangerous ground northward and northeastward of Aradasier Bank is contained in H.O. Pub. No. 92.

**10-57 COAST FROM TANJONG BARAM TO BRUNEI BAY.**—From Tanjong Baram the coast trends in an easterly direction for a distance of about 12 miles to the mouth of the Sungei Belait, and thence in an east-northeasterly and northeasterly direction for a distance of about 28 miles to the mouth of the Sungei Tutong. This section of the coast is low, densely wooded, and intersected by many creeks. Shoal water, with depths of less than 3 fathoms, extends from this part of the coast for a distance of 1 to 2 miles.

**LANDMARKS.**—Mount Scott, a conspicuous isolated whale-backed mountain 1,365 feet high, lies about 33 miles east-southeastward of Tanjong Baram.

Bukit Ambok, a hill 251 feet high, is situated near the northern bank of the Sungei Tutong in a position about 4 1/2 miles east-northeastward of its entrance. This hill is fairly conspicuous in contrast to the densely wooded country by which it is surrounded.

Gunong Mulu, one of the highest mountains in this part of Borneo, is situated about 68 miles east-southeastward of Tanjong Baram. This conical-shaped mountain has a slightly flattened top, and rises to an elevation of 7,896 feet. Several sharp-pointed conical peaks lie to the eastward of Gunong Mulu.

**SUNGEI BELAIT.**—This river, the banks of which are nearly always flooded, had a least depth of 4 feet (1966) over the bar. Within the entrance there are general depths of about 12 feet. Small craft with a draft of 5 feet, can navigate the river for about 13 miles above the entrance. The town of

Kuala Belait is situated on the east bank of the river just inside its entrance. It is the port of the Sena Oilfields. Brunei Shell Petroleum Co. has its own wharves, workshops, tugs, barges, and other craft necessary for its operations. A well equipped private hospital is located at Kuala Belait. A pier, 90 feet long with a depth of 8 feet alongside, stands about 3/4 mile within the bar. Five cranes of up to 25-tons and a 22-ton derrick are available at this port.

Two pairs of range beacons lead into the river. These beacons are moved to conform with the channel over the bar.

Lights mark a drilling platform located about 6 1/4 miles north by west of the mouth of the Sungei Belait. Pipelines extend from the platform to the shore.

A red can buoy, marked "M.S.T.", is located about 2 miles northward of the mouth of the Sungei Belait.

The oilfield at Seria, for which the town of Kuala Belait is the administrative headquarters, is situated about 8 miles east-northeastward of the entrance to the Sungei Belait. The total population of both towns is about 25,000 (1966). There are three piers extending from the shore at this point, with lengths of 300 to 825 feet. The pier heads are strongly constructed in order to carry oil derricks, but the approaches to the pier heads are intended merely as gangways. In the vicinity of these piers are a number of

conspicuous oil derricks, which are painted red and grey. Some of the drilling structures are lighted.

Four very bright flares were reported (1956) burning continuously in the vicinity of the oil field and were visible for a distance of more than 80 miles under normal weather conditions.

A prohibited area is located in the vicinity of Seria. It extends two miles offshore and to points about 4 3/4 miles east-northeastward and 3 1/2 miles west-southwestward of the town. Oil drilling operations are being carried on in this area.

**SUNGEI TUTONG.**—This river is navigable only by very shallow draft vessels. In 1965 the bar had a depth of 2 feet, and was continually shifting. The village of Tutong, which has a post office, custom-house, and dispensary, is situated on the northern bank of the river about 8 miles from its entrance. A pier is located about 1/2 mile upstream from the mouth of the river.

**10-58 OFF-LYING DANGERS.**—Brock Patch, with a depth of 2 1/2 fathoms, lies about 5 miles westward of the entrance to the Sungei Tutong.

Chernley (Chearnley) Shoal, with a least depth of 4 fathoms near its center, lies about 18 miles north-northeastward of the entrance to the Sungei Belait. Two 9-fathom patches lie respectively about 3 1/4 miles westward, (continued on page 201)

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and  $1\frac{1}{4}$  miles north-northwestward of the shallowest part of Chernley Shoal.

Browne Patch, a coral head with a least depth of 4  $\frac{1}{2}$  fathoms, is situated about 3  $\frac{1}{2}$  miles north-northwestward of Chernley Shoal.

Porter Patch, with a least depth of 6 fathoms, is situated about 5  $\frac{1}{4}$  miles east-northeastward of Chernley Shoal.

Fairley Patches, which consist of a narrow ridge of shoals having a least depth of 5 fathoms, extend in a northerly and southerly direction for a distance of about 1  $\frac{1}{2}$  miles. The southernmost of these patches is situated about 2 miles northeastward of Browne Patch.

Ampa Patches, composed of sand and coral, are situated about 2 miles eastward of Fairley Patches. These patches extend in a northeasterly and southwesterly direction for a distance of about 4 miles, and have a greatest breadth of about 3 miles. Within this area the soundings range from 4 to 10 fathoms. A detached 5-fathom patch lies near the western side of Ampa Patches in a position about 1  $\frac{1}{4}$  miles northeastward of Fairley Patches.

A light is shown from a white tripod tower situated on the northwestern portion of Ampa Patches.

**10-59 Coast.**—From the entrance to the Sungei Tutong the coast trends in a northeasterly direction for a distance of about 19 miles to Brunei Cliffs, which are about 80 to 90 feet high, and consist of white sand and patches of short grass.

Pulau Punyit, an islet 60 feet high, lies about  $\frac{1}{2}$  mile northwestward of a point of land situated close eastward of Brunei Cliffs. This islet is almost connected to the point by rocky ledges. A rock awash lies about  $\frac{1}{5}$  mile northwestward of Pulau Punyit. Small craft can find shelter during the southwest monsoon in a position eastward of the islet and ledges.

Between the entrance of the Sungei Tutong and Pulau Punyit the coast is sandy, and is backed in most places by dull reddish cliffs about 40 to 60 feet high. It is interrupted by several low beaches, on which there are high casuarina trees, and by the mouths of numerous small rivers.

From Brunei Cliffs the coast trends in an east-northeasterly direction for about 14 miles to Brunei Bluff, the southwest entrance point of

Brunei Bay. Shoal water, with depths of less than 3 fathoms, extends about  $\frac{1}{2}$  mile to  $1\frac{1}{2}$  miles from the section of the coast between the Sungei Tutong and Brunei Bluff.

A dangerous wreck is located about  $3\frac{3}{4}$  miles offshore in a position about 10 miles westward of Brunei Bluff.

**10-60 Landmarks.**—Sharp Peak (Mount Chevalier), a conspicuous mountain 1,427 feet high, is located about 15 miles southeastward of the entrance of the Sungei Tutong. This mountain is usually visible when the higher mountains are obscured by clouds.

Woody Peak, 454 feet high, is located about 3 miles southward of Brunei Cliffs. It is the highest peak of a range of hills that runs parallel to the coast.

Bukit Shabandar, a grassy ridge with numerous sharp peaks 391 to 470 feet high, extends southward from Brunei Cliffs. From a position close eastward of this ridge a coastal range of hills, 200 to 358 feet high and densely wooded, trends in an east-northeasterly direction to Brunei Bluff.

Bukit Loura, a sharp peak 756 feet high, is located about 10 miles southwestward of Brunei Bluff. On it is a conspicuous solitary tree. This peak is the summit of a ridge that extends northeastward and southwestward from it for about  $2\frac{1}{2}$  miles.

Jajak Ridge, which is steep and wooded, except for occasional clearings, lies close eastward of and parallel to Bukit Loura. This ridge, which has a summit of 537 feet, terminates close southwestward of Brunei Bluff.

Bukit Buang Sakar, 767 feet high, and Bukit Saeh, 738 feet high, are two conspicuous wooded peaks that are situated about 3  $\frac{1}{2}$  miles south-southwestward of Bukit Loura. Bukit Buang Sakar has a sharp summit, and Bukit Saeh a rounded summit.

Bukit Pisang, a hill 540 feet high, is situated about 2  $\frac{1}{4}$  miles southwestward of Brunei Bluff. There is a small **beacon** on the summit of this hill. Bukit Cowie, a hill more than 200 feet high, is situated on the same ridge in a position about  $\frac{3}{4}$  mile southward of Bukit Pisang.

**10-61 Offlying dangers.**—Victoria Patches, consisting of several coral shoals with depths of less than 3 fathoms, lie about 7 to 9 miles north-northeastward of the entrance to the Sungei Tu-

tong in a position about 3 miles offshore. The shoalest patch, with a depth of  $1\frac{1}{2}$  fathoms, lies about  $8\frac{1}{4}$  miles north-northeastward of the entrance to the Sungei Tutong. An isolated 3-fathom patch lies about 2 miles offshore in a position about  $5\frac{1}{4}$  miles eastward of the shoalest of the Victoria Patches.

Scout Patches consist of two shoals. Scout Rock, with a depth of less than 1 fathom over it, lies on the southeastern shoal, which is situated northward of Victoria Patches in a position about  $10\frac{1}{2}$  miles north-northeastward of the entrance to the Sungei Tutong. The northwestern shoal, with a depth of  $3\frac{1}{2}$  fathoms, lies about 1 mile northwestward of Scout Rock.

Cunningham Patch, with a least depth of  $3\frac{1}{2}$  fathoms, lies about  $3\frac{1}{4}$  miles northwestward of Scout Rock.

Blunt Rock, with a depth of  $2\frac{1}{2}$  fathoms over it, lies about  $2\frac{1}{4}$  miles north-northeastward of Scout Rock.

Brunei Patches consist of a number of shoals with depths of less than 3 fathoms. The shoalest spot, which is a rock with a depth of less than 1 fathom over it, lies about  $6\frac{1}{2}$  miles northeastward of Scout Rock. A dangerous wreck is located on Brunei Patches.

Amcotts Rock, with a depth of  $4\frac{1}{2}$  fathoms over it, lies about  $6\frac{1}{4}$  miles north-northwestward of Scout Rock. A  $5\frac{1}{2}$ -fathom patch lies about 2 miles east-southeastward of Amcotts Rock. There is a 36-foot patch about 2 miles eastward of the same rock.

Iron Duke Shoals consist of three distinct shoals. Otterspool Rock, with a depth of  $2\frac{1}{4}$  fathoms over it, lies about 8 miles northward of Scout Rock. Nankivell Rock, with a depth of  $4\frac{1}{2}$  fathoms over it, lies about 2 miles northwestward of Otterspool Rock, and Silk Rock, with a depth of 5 fathoms over it, lies about  $2\frac{1}{4}$  miles northeastward of Nankivell Rock.

Littledale Shoal, with a depth of  $4\frac{1}{2}$  fathoms, lies about  $9\frac{1}{2}$  miles north-northwestward of Brunei Cliffs.

Champion Shoals, consisting of several shoal heads with depths of  $3\frac{1}{2}$  to  $5\frac{1}{2}$  fathoms, and extending in a northerly and southerly direction for a distance of about  $2\frac{3}{4}$  miles are situated about  $13\frac{1}{2}$  miles north-northwestward of Brunei Cliffs.

Colombo Shoal, with a least depth of 4 fathoms, lies about 2 miles northwestward of Champion Shoals.

**10-62 APPROACHES TO BRUNEI BAY—LABUAN.**—The entrance to Brunei Bay lies between Brunei Bluff and Tanjong Klias, situated about 23 miles northeastward. The island of Labuan, together with several smaller islands, stretch across the entrance to the bay and divide it into two main channels, one southward and one eastward of the islands.

**10-63 Labuan with adjacent islands and dangers.**—The island of Labuan is situated in the entrance to Brunei Bay in a position about  $13\frac{1}{2}$  miles north-northeastward of Brunei Bluff and about  $4\frac{1}{2}$  miles westward of Tanjong Klias. It is roughly triangular in shape, having a length of about 10 miles and a greatest width of about  $5\frac{1}{2}$  miles. The highest point of the island is situated near its northern extremity, and has an elevation of 336 feet. The entire island is densely wooded.

From Bethune Head, its northern extremity, the coast of Labuan trends in a general southwesterly direction for a distance of about  $4\frac{1}{2}$  miles to Tanjong Layangan (Luke Point), a cliffy headland about 80 feet high, and thence in a south-southwesterly direction for a distance of about  $6\frac{1}{2}$  miles to Tanjong Kiamsan, the southwestern extremity of the island. Foul ground, with rocks awash, extends in a northerly and northwesterly direction from Bethune Head for a distance of about 2 miles. From Bethune Head to Tanjong Kiamsan the coast consists of sandy beaches, from which rocks and coral reefs extend for a distance of  $\frac{1}{2}$  to 1 mile. Between Bethune Head and Tanjong Layangan a range of grass-covered hills, rising to an elevation of 336 feet, runs parallel to the coast about  $\frac{1}{2}$  mile inland. A densely wooded range of hills extends in a northeasterly direction from Tanjong Kiamsan. Bukit Kalam, about 296 feet high to the tops of the trees, is the northernmost and highest hill of this range. It is situated about 5 miles northeastward of Tanjong Kiamsan. A conspicuous islet, 30 feet high, lies about  $\frac{1}{2}$  mile southwestward of Tanjong Layangan. Coral reefs, some of which are above water, extend in a southwesterly direction from Tanjong Kiamsan for a distance of nearly 1 mile, and a shoal, with a

least depth of 4 1/2 fathoms, lies about 1 mile westward of the same point.

Between Tanjong Kiamisan and Hamilton Point, situated about 4 1/2 miles eastward, the southern coast of Labuan is indented to a distance of about 1 1/2 miles by a shallow bay, practically all of which is foul. Foul ground extends in a southeasterly direction from Hamilton Point for a distance of about 3/4 mile.

Ramsay Point, the northeastern entrance point of Victoria Harbor (see sec. 10-70), is situated about 1 1/2 miles northeastward of Hamilton Point. From Ramsay Point the coast of Labuan trends in a northeasterly direction for a distance of about 1 1/4 miles to Tanjong Taras (Collier Head) and thence in a north-northwesterly and northerly direction for a distance of about 5 3/4 miles to Coal Point, which is located about 1/2 mile southeastward of Bethune Head. Shoal water, with depths of less than 3 fathoms, and several drying rocky ledges, extend as much as 1 1/4 miles from this section of the coast of Labuan.

Four Fathom Patches consist of several small shoals, with a least depth of 4 fathoms, situated about 3 1/4 to 4 1/2 miles north-westward of Bethune Head.

Glazer Rock, with a depth of 5 fathoms over it, lies about 11 3/4 miles west-northwestward of Bethune Head.

A shoal, with a least depth of 2 fathoms, lies about 3 1/4 miles westward of Bethune Head. This shoal extends in a north-northeasterly and south-southwesterly direction for a distance of about 1 1/2 miles. A 3 1/2-fathom patch lies about 1/2 mile southwestward of the southern extremity of this shoal in a position about 4 miles west-southwestward of Bethune Head.

The shoals and dangers described above are all steep-to. Other dangers may exist in this vicinity, and these waters should be navigated with great caution.

Pulau Kuraman, an island 185 feet high and about 1 3/4 miles long, is located about 2 miles southwestward of Tanjong Kiamisan, from which it is separated by Kuraman Channel. The island is fringed by drying reefs and foul ground that extends as much as 1/2 mile offshore in places.

UNDAUNTED ROCK, with a depth of 2 fathoms over it, lies in the channel about

midway between Tanjong Kiamisan and the northeastern side of Pulau Kuraman.

10-64 A LIGHT is shown on the summit of Pulau Kuraman.

Pulau Rusukan Kechil, an islet 150 feet high, is situated nearly 1 mile southward of the eastern extremity of Pulau Kuraman. A reef, with depths of less than 1 fathom, extends in a southeasterly direction from this islet for about 1 mile.

Pulau Kuraman and Pulau Rusukan Kechil lie on an extensive shoal with depths of less than 3 fathoms over it. A reef, which dries 3 feet, lies near the southwestern edge of this shoal in a position about 1 mile southwestward of the southwestern extremity of Pulau Kuraman. A detached shoal, with a depth of 4 fathoms, lies about 1/2 mile east-southeastward of the southeastern extremity of Pulau Kuraman.

Pulau Rusukan Besar, an island about 153 feet high to the tops of the trees, is situated about 3/4 mile south-southwestward of Pulau Rusukan Kechil. This island is entirely surrounded by reefs and shoals. A rock, 1 foot high, lies near the southwestern extremity of these shoals in a position about 3/4 mile south-southwestward of the southwestern extremity of the island, and two shoals, with depths of 2 and 4 1/2 fathoms, lie respectively about 1 mile and 1 1/4 miles east-southeastward of the island. A 5 1/2-fathom patch lies about 1 1/4 miles southward of the island, and a 5-fathom patch lies the same distance west-southwestward of the island.

Pulau Burong, an islet about 180 feet high to the tops of the trees, lies about 2 miles east-southeastward of Tanjong Kiamisan on Labuan.

A detached 5-fathom patch lies about 800 yards south-southwestward of the islet.

Pulau Enoe, an islet about 110 feet high to the tops of the trees, lies on an extensive shoal that extends southward from Hamilton Point. It is situated about 3/5 mile south-southeastward of Hamilton Point. Foul ground and rocks, which dry from 1 foot to 5 feet, extends about 2/5 mile southward and 1 1/4 miles southwestward from Pulau Enoe, and a rock, with a depth of less than 1 fathom over it, lies about 1 1/2 miles southwestward of the islet.

10-65 A LIGHT is shown on the east edge of the shoal in a position about  $3/5$  mile northeastward of Pulau Enoe.

Outer Shoal, a coral patch with a least depth of 3 feet, is located nearly 1 mile east-northeastward of Pulau Enoe. A light is shown from the southeast side of Outer Shoal. Two beacons, located 160 yards west-northwestward and 180 yards north-northwestward, respectively, of the light structure, mark the northwest and north sides of Outer Shoal. Each beacon has a rectangular topmark, painted red on the side on which it is dangerous to pass, and white on the safe side.

Harbor Shoal, with a least depth of 7 feet, coral bottom, lies about  $3/5$  mile south-southwestward of Ramsay Point. A light marks the location of this shoal.

Trident Shoal, with a least depth of  $3/4$  fathom lies nearly 1 mile south-southwestward of Pulau Enoe. A conical beacon, 14 feet high, painted in red and yellow horizontal bands and carrying a cylindrical topmark marks the southern side of this shoal. A tangent on the northwestern side of Pulau Daat (see sec. 10-68) in range about  $055^\circ$  with the southeastern extremity of Pulau Papan (see sec. 10-68) leads southeastward of Trident Shoal.

Button Islet, 23 feet high, and covered with grass, lies about  $1/4$  mile southeastward of Hamilton Point. A stake marks the south extremity of the drying reef which fringes this islet. There is a boat channel southward of this islet, but it is encumbered with drying and sunken reefs.

10-66 SOUTHERN APPROACH TO BRUNEI BAY--DANGERS IN FAIRWAY.--Barat Banks, consisting of two sand and coral shoals, lie southwestward of Pulau Kuraman. The northeastern shoal, with a least depth of  $2\frac{1}{4}$  fathoms, lies about 3 miles southwestward of Pulau Kuraman, and the southwestern shoal, with a least depth of  $2\frac{1}{2}$  fathoms, lies about  $3/4$  mile farther in the same direction. These two shoals are separated by depths of 9 fathoms. The southernmost extremity of these shoals is marked by a light.

Two wrecks, with a least depth of  $6\frac{1}{2}$  fathoms over them, lie about  $3/4$  of a mile southward and south-southwestward of the above buoy.

Abana Rock, a coral patch with a depth of 3 fathoms, lies about 4 miles north-northeastward of Brunei Bluff.

Pelong Rocks, a group of sandstone rocks, the highest of which is 41 feet, are situated about 2 miles northward of Brunei Bluff. Coral reefs extend about  $1/2$  mile northward and about  $1/4$  mile southeastward from the highest of Pelong Rocks. Several patches, with depths of 7 to 9 fathoms, lie between Pelong Rocks and Abana Rock.

A light is shown on the summit of the southernmost of the Pelong Rocks.

Two Fathom Rock, a coral patch with a depth of 2 fathoms, lies about  $6\frac{1}{4}$  miles west-northwestward of Brunei Bluff. A  $2\frac{1}{2}$ -fathom patch lies about 1 mile farther in the same direction.

A 5-fathom patch lies about  $3/4$  mile northward of Two Fathom Rock.

10-67 DIRECTIONS.--Between Tanjong Kidurong and Tanjong Baram vessels should keep in depths greater than 15 fathoms. They should give the offlying dangers eastward of Tanjong Baram a wide berth, and in thick weather should keep in depths greater than 25 fathoms in order to insure their passing outside of all these dangers. It is recommended that vessels approach the entrance of Brunei Bay on a course of  $124^\circ$ , and pass between Barat Banks and Abana Rock.

Woody Peak, Bukit Pisang, and Pulau Kuraman are useful landmarks in the southern approach to Brunei Bay. Vessels without local knowledge should not attempt to pass through Kuraman Channel. Undaunted ROCK is not marked, and the tidal currents in this channel are sometimes very strong.

10-68 EASTERN APPROACH TO BRUNEI BAY--ISLANDS AND DANGERS.--East Channel is entered between Bethune Head and Tanjong Sakat, which is situated about  $5\frac{1}{2}$  miles north-northeastward of Tanjong Klias and about  $6\frac{1}{2}$  miles eastward of Bethune Head. In the deeper part of the fairway, the channel has a least charted depth of  $5\frac{1}{2}$  fathoms.

A shoal, with a least depth of  $1\frac{3}{4}$  fathoms, lies about  $1\frac{3}{4}$  miles northward of Tanjong Sakat, and a drying rock lies about 1 mile northwestward of the same point.



(5572) **EAST INDIES—Borneo—Northwest coast—Brunei Bay—Abana Rock—Beacon nonexistent.**—The black and white beacon (12) in (approx.)  $5^{\circ}06'40''$  N.,  $115^{\circ}04'12''$  E. will be expunged.

(N.M. 35/66.)

(N.M. 28 (1244), London, 1966.)

H.O. Charts 2394, 2123.

H.O. Pub. 71, 1951, page 224.

Pulau Lambidan (Lubidan Island), a cliffy islet about 50 feet high to the tops of the trees, lies about 2/5 mile westward of Tanjong Sakat. This islet is difficult to identify when viewed from the westward.

A conspicuous chimney is situated on the northern part of Labuan in a position about 4/5 mile southward of Bethune Head.

A light marks the east edge of the shoal water and rocky ledges which extend up to 1 1/4 miles from the east side of Labuan. This light stands about 1 1/4 miles north-eastward of Tanjong Taras. In 1965, the light structure was moved about 100 yards to the east. The beacon has been numbered "1", and has a black and white checkered cone daymark.

A white beacon, 12 feet high, with red and white bands, lies near the southern extremity of Ramsay Point on Labuan. It was reported (1961) that the above beacon was equipped with a radar reflector.

Beacon No. 3, lighted, and painted red and white with a red and white cone topmark, stands about 7/8 mile south-southeast of Tanjong Taras.

The following unlighted beacons are painted black and white.

Beacon No. 2 stands about 3/5 mile south-east of Tanjong Taras.

Beacon No. 4 stands about 1 mile eastward of Ramsay Point Beacon.

Beacon No. 5 stands about 3/5 mile east-southeast of Ramsay Point Beacon.

Beacon No. 6 stands about 1/4 mile south-east by south of Ramsay Point Beacon.

Beacon No. 7 stands about 2/5 mile west of Ramsay Point Beacon.

From Tanjong Sakat the coast of the mainland trends in a southerly direction for about 2 1/2 miles to Tanjong Liba, and thence in a south-southwesterly direction for about 3 miles to Tanjong Klias. Between Tanjong Sakat and Tanjong Liba shoal water, with depths of less than 3 fathoms, parts of which dry, extends about 3/4 mile offshore. Southward of Tanjong Liba this shoal water, the outer edge of which is fairly steep-to, extends from the shore for a distance of nearly 3 1/2 miles.

Pulau Daat, an island about 300 feet high to the tops of the trees, lies near the southern part of the extensive shoal that is described above. The eastern end of the island is situated about 1 1/4 miles southwestward of Tanjong Klias, from which it is separated by

a narrow channel, with a least depth of 6 feet, that is marked by two beacons, with red and white rectangular topmarks. Some rocks, which dry from one foot to six feet, lie within 1 1/2 miles northward of Pulau Daat.

From Pulau Daat the shoal continues in a west-southwesterly direction for about 2 miles. A rock, 15 feet high, lies on the shoal in a position about 1/2 mile westward of Pulau Daat. Another rock, 5 feet high, lies close southward of the 15-foot rock. Several other rocks, some of which dry 3 to 6 feet lie on this shoal northward and southwestward of Pulau Daat. A conical BEACON, 15 feet high, painted red and carrying a white ball topmark, is situated near the southern edge of the shoal in a position about 2 miles east-southeastward of Pulau PAPAN LIGHT.

Pulau Papan, a flat wooded island about 148 feet high to the tops of the trees, is situated about 2 1/4 miles west-southwestward of Pulau Daat. This island is surrounded by a reef, which dries in parts, and extends as much as 1/3 mile from its southern side. Between this reef and the shoal that extends in a west-southwesterly direction from Pulau Daat there is a narrow channel, with depths of 3 1/2 to 11 fathoms in the fairway. The channel is about 50 feet wide at its narrowest part.

A LIGHT is shown near the west side of Pulau Papan.

10-69 DIRECTIONS.—For vessels entering East Channel a good approach from the north-westward is between Samarang Bank (see sec. 10-104) and Vernon Bank. (See sec. 10-105.) This channel is about 4 1/2 miles wide, and has depths of more than 10 fathoms. Fury Rocks, which lie near the center of Vernon Bank, may be marked by breakers, which is the only visible means of identifying Vernon Bank. Vessels should then pass between MacKenzie-Grieve Shoals (see sec. 10-103) and Four Fathoms Patches to a position about 3 1/2 miles westward of Iris Shoals. (See sec. 10-101.)

Vessels approaching East Channel from the northeastward should pass about 2 1/2 miles northwestward of Deluar Shoals (see sec. 10-109), thence between Nosong Shoals and those westward of Pulau Tiga (see sec. 10-109), and thence southeastward of Jahat Shoals (see sec. 10-103) to a position about 3 1/2 miles westward of Iris Shoals.

From this position the summit of Pulau Daat should be steered for, bearing 176°, until the summit of Pulau Papan bears 195°, which course should be steered until the summit of Pulau Daat bears 164°. From this position a course of 186° should be steered, which will lead eastward of the light beacon northeastward of Tanjong Taras, until the southeast side of Pulau Enoe is in range 238° with the southeast side of Pulau Rusukan Besar. A course of 238° should then be steered, passing about 500 yards south-southeastward of Light Beacon No. 2, until reaching a position about 3/5 mile northwestward of Pulau Papan, at which point the vessel may enter Victoria Harbor.

Vessels without local knowledge should not attempt this passage at night.

**10-70 VICTORIA HARBOR.**—This harbor, which is well sheltered from both monsoons, is entered between Hamilton Point and Ramsay Point. The limits of the harbor are defined by a line from Tanjong Taras to the eastern extremity of Pulau Papan, thence by the southern side of this island to its southwestern extremity, thence by a line to the northern extremity of Pulau Enoe, and thence to Hamilton Point.

**Depths.**—The depths in the entrance of Victoria Harbor are 5 1/2 to 8 fathoms, and decrease gradually to its head. A vessel with a draft of 30 feet 10 inches entered the port in 1955 with no difficulty.

**10-71 Aspect.**—From Hamilton Point the western side of Victoria Harbor trends in a general northerly direction for about 2 miles to its head. This side of the harbor is bordered by mangroves, and indented by several small bays and inlets. Shoal water, with depths of less than 3 fathoms, with a number of rocks, some of which dry, extends from the shore for about 1/4 mile.

From Ramsay Point the north side of the harbor trends in a west-northwesterly direction for about 3/4 mile to Liberty Pier. The signal station flagstaff which stands on the roof of the Harbor and Customs office is located close northward of the inshore end of the pier. A drying sandbank extends up to 160 yards from the shore between Ramsay Point and the pier. The outer edge of the sandbank is marked by a conical beacon, with

red and yellow stripes, and surmounted by a yellow sphere.

A beacon, painted in black and yellow, stands near the edge of the shoal ground extending 1/4 mile southeastward from Ramsay Point.

For about 1/3 mile northwestward of Liberty Pier the north shore of the harbor is occupied by small piers, jetties, and Victoria Wharf. A light is shown from the southeast side of the head of Liberty Pier.

Northwestward of Victoria Wharf, the harbor opens out into a basin, nearly all of which dries.

**Signals.**—Tidal and berthing signals are shown from the signal station flagstaff. Tidal signals indicate the direction of the tidal current at the berth assigned.

A cone, point down..... Flood tide.

A cone, point up..... Ebb tide.

A ball..... Slack water.

Berths to which vessels are assigned are indicated by a red and white checkered flag in conjunction with the International Code pennant.

Pennant No. 0....Anchor.

Pennant No. 1....Liberty Pier, southeastern section of seaward face.

Pennant No. 2....Liberty Pier, northwestern section of seaward face.

Pennant No. 3....Liberty Pier, southeastern section of inside face.

Pennant No. 4....Liberty Pier, northwestern section of inside face.

Pennant No. 5....Marine Jetty.

Pennant No. 6....Victoria Wharf.

Pennant No. 7....Landing craft ramp. (New Beach)

Pennant No. 8....Liberty Pier, landing steps.

Pennant No. 9....Oil jetty.

Vessels will acknowledge the berthing signal with the answering pennant. The hoist at half mast indicates a vessel should prepare to move, but should not get underway until the hoist is close up.

Red and white checkered flags will indicate the bow and/or stern of the vessel on the berth assigned.

International Code flag "B" will be shown at the signal station when a vessel loaded with inflammable or dangerous cargo is berthing or unberthing.

**10-72 Anchorage.**—Vessels should be moored, with open hawse southwestward, in suitable depths, which are clear of the fair-

way to the inner part of the harbor. There is good anchorage for four large vessels in a least depth of 5 1/2 fathoms within 1 mile of Liberty Pier.

The naval anchorage is located about 1/3 mile south-southwestward of the flagstaff that is located about 1/8 mile eastward of Liberty Pier.

The quarantine and explosives anchorage area is bounded on the west by a line running between Enoe Beacon and Harbor Shoal Beacon, then eastward to the eastern harbor limit line. On the south the area is bounded by a line running from Pulau Papan to Enoe Beacon. The eastern half of this area is the quarantine anchorage, and the western area is for vessels carrying explosives.

The petroleum anchorage area lies northward of and adjacent to the explosives anchorage.

Anchorage is prohibited within a distance of 1/4 mile of the seaward side of the light located on the southeast side of the head of Liberty Pier.

10-73 Tides.—Tidal heights above datum soundings are: M.H.H.W. 7.2 feet; M.L.H.W. 5.4 feet; M.H.L.W. 4.6 feet; M.L.L.W. 2.7 feet.

10-74 Tidal currents.—The tidal currents at Victoria Harbor have a velocity of 1/2 to 1 knot, the flood setting northwestward and the ebb southeastward.

Pilotage.—Pilots are available but pilotage is not compulsory. Ships should notify the harbor master, Labuan, through Jesselton radio, if a pilot is desired. The pilot will normally board off Pappan Island.

10-75 Directions—Western Approach.—From a position about midway between Barat Banks and Abana Rock an easterly course should be steered until Pulau Papan light bears 045°. Pulau Papan should be steered for on that bearing until Outer Shoal light beacon and Harbor Shoal light beacon are in line bearing 339°; thence steer 013° with beacon No. 4 in line with Tanjong Taras, passing midway between Outer Shoal and Pulau Papan, into the harbor.

As an alternate route, maintain the easterly course steered from midway Barat Banks and Abana Rock until Pulau Papan bears 050°. Steer for Pulau Papan on that bearing. When Ramsay Point beacon bears 012°,

change course to 012°. This will pass between Enoe beacon and Outer Shoal beacon, and into the harbor. Vessels without local knowledge should not attempt to enter at night.

Directions for vessels approaching Victoria Harbor by way of East Channel are given in section 10-69.

10-76 Victoria (Labuan) (5° 17' N., 115° 14' E.), the principal town, and the only port on the island of Labuan, is a free port. It is located on the north side of Victoria Harbor, and is under the jurisdiction of North Borneo. The port installations and main bazaar are located along the east end of the town. The Government offices are located near the southeast end of the main bazaar, and the European residential area are located about 1 mile northeastward on slightly higher ground. The population of the town in 1960 was about 3,263. Timber (logs and sawed) is the chief export, with copra next. There are 2 mobile cranes available in the port, but vessels should be ready to use ship's gear in loading and discharging cargo if necessary.

Berths.—Liberty Pier, located close southward of the town, is L-shaped with a length of 400 feet along its outer face (600 feet between dolphins). One ocean-going vessel using the mooring dolphins can be accommodated at this berth. There is a least depth of 26 feet (1965) at the seaward berth. The inner berth is about 360 feet in length, with a depth of 18 feet alongside (1965), and can accommodate a 3,000 ton vessel. Mooring dolphins stand about 100 feet off each end of the pier and are connected to the pier by catwalks.

Marine Jetty, a bi-angular L-shaped pier with 19 feet alongside, is located about 200 yards northwestward of Liberty Pier. Several small-craft landings are located close eastward of Marine Jetty.

Victoria Wharf, located about 200 yards northwestward of Marine jetty, is 275 feet long and has a depth of 12 feet alongside. A landing craft ramp is located close northward of Victoria Wharf. Victoria Wharf was closed to vehicles in 1960 because of delapidated decking.

The T-head Shell Oil Jetty, 175 feet long across its face, extends from the shore close westward of Ramsay Point. Mooring dolphins, 700 feet apart, are placed beyond each end. There is a least depth of 31 feet at this berth.

Buoy Jetty is located between Marine Jetty

and Victoria Wharf, and has a length of about 138 feet. The depth alongside is 12 feet.

North Borneo Refrigeration Pier is located northwest of Victoria Pier, and has a length of about 75 feet. The depth at the face of this pier is about 10 feet.

Repairs.—The government slipway can haul out vessels up to 200 tons and 110 feet in length. Small repairs, including welding and lathe work, can be accomplished at the work shops.

Supplies.—Fresh provisions are available but advance notice should be given if a large quantity is needed. Fresh water and fuel oil are laid onto Liberty Pier. Limited quantities are available.

Water is also available at the Shell Oil Jetty. Fuel oil, in limited quantity, and diesel oil are available. In addition, stocks of petroleum, kerosene, lubricating oils are maintained.

Communications.—There is regular weekly communications by steamer with Singapore, Kuching, Miri, Jesselton, Kudat, Sandakan and Tawan, also regular service to Brunei. There is regular steamer communications with Australia, Hong Kong, Japan and Europe.

There is regular air service between Labuan and Singapore, extending to Sandakan. An internal airline provides service with North Borneo, Brunei, and Sarawak. A weekly air service is maintained with Manila and Hong Kong.

Victoria is connected with Hong Kong, Singapore, and Sandakan by telegraph.

Hospital.—There is a government hospital at Victoria, but it has no accommodations for Europeans. The facilities of this hospital are available to seamen only through the permission of the Resident.

Meteorological table.—See Appendix II.

10-77 BRUNEI BAY—Approaches to Sungei Brunei.—Tanjong Pelompong, the northwest entrance point of the Sungei Brunei, is located on the south side of the entrance of Brunei Bay in a position about 3 1/2 miles eastward of Brunei Bluff. This point, which is composed of sand, is covered with driftwood, and is nearly awash at highwater spring tides. The point is extending eastward at the rate of 100 feet a year. A compact grove of casuarina and palm trees, 60 to 120 feet high, extends in a westerly direction from Tanjong Pelompong for about 1 1/4 miles.

Caution.—Logs of wood and dead trees may be encountered in Brunei Bay for a considerable distance offshore. After heavy rains in the interior, floating islands of trees and earth float down the rivers and eventually find their way out to sea.

Muara Spit, composed of sand, extends in an east-northeasterly direction from Tanjong Pelompong for a distance of about 3 3/4 miles. This spit is awash for a distance of 2 miles eastward of Tanjong Pelompong. The depths on the remainder of the spit increase, by a series of irregular shoals, to a depth of about 2 1/2 fathoms at its eastern extremity, which is usually marked by tide rips.

Tanjong Pelompong Beacon, consisting of a red and white drum on an iron pipe, 40 feet high, stands on the southern side of Tanjong Pelompong. The beacon may be obscured by heavy tree growth.

Tanjong Gosok, the southeastern entrance point of the Sungei Brunei, is situated about 7 miles southeastward of Tanjong Pelompong. This point, which is low, and covered with trees about 80 feet high, is the northwestern extremity of a promontory that projects in a northerly direction from the mainland for a distance of about 2 1/2 miles.

Sunda Spit, which dries, is composed of sand and mud. It extends in a northwesterly direction from Tanjong Gosok for a distance of about 2 3/4 miles. Sunda Spit Beacon, consisting of a red and white drum on an iron pipe, 40 feet high, is situated on the western side of Sunda Spit in a position about 2 1/2 miles east-southeastward of Tanjong Sapo, hereinafter described. The beacon cannot be seen until within 1 mile of it because of the coastal configuration.

Sunda Bank, with depths of less than 3 fathoms, extends in a north-northeasterly direction from the northeastern side of Sunda Spit for a distance of about 5 1/2 miles.

Pulau Sunda, an islet, lies close offshore in a position about 1 3/4 miles east-northeastward of Tanjong Gosok, and Pulau Alang, an islet 80 feet high to the tops of the trees, lies about 1/2 mile southward of Tanjong Gosok.

10-78 The entrance channel of the Sungei Brunei estuary, which lies between Sunda Spit and the shoals southeastward of Muara Spit, is about 1 1/4 miles wide. The outer bar, which lies about 5 miles eastward of

Tanjong Pelompong, has a least depth in that fairway of 23 feet (1956). Several 3-fathom patches lie in the fairway in a position about 5 miles eastward of Tanjong Pelompong. Within the bar there are depths of 6 to 11 fathoms. In clear weather passage over this bar is considered safe for vessels drawing up to 21 feet, if the passage is made at a time when the tide is at least three-quarters flood.

PULAU MUARA, a flat marshy island about 3 1/2 miles long, is situated about 1 3/4 miles southward of Tanjong Pelompong, from which it is separated by Anson Passage. This passage, which is the northern channel leading to Muara Harbor, is unmarked and available only for small vessels with local knowledge. The least charted depth in the fairway is 7

feet, and in 1956 there was no trace of silting in the channel. Pulau Muara is partly wooded with trees 60 to 100 feet high.

From Tanjong Sapo, its southeastern extremity, the northern coast of Pulau Muara trends in a north-northwesterly direction for a distance of about 1 mile to Tanjong Kramati, and thence in a westerly direction for a distance of about 2 3/4 miles to Ledong Point, the northwestern extremity of the island. Between Tanjong Sapo and Tanjong Kramati the coast is fronted by a white sandy beach. A shoal, with depths of less than 1 fathom, parts of which dry, extends nearly 1 mile northward and about 1 3/4 miles northeastward from the northern side of Pulau Muara.

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From Tanjong Sapo the southern coast of Pulau Muara trends in a westerly direction for about 2 1/4 miles to Tanjong Bowong, and thence in a northerly and northwesterly direction for a distance of about 2 miles to Ledong Point.

The south side of Pulau Muara is fringed by a bank of mud and sand, with depths of less than 18 feet, extending from 300 to 700 yards offshore. The inner part of this bank dries at low water.

A light is shown from a 73-foot steel framework tower on Tanjong Sapo.

10-79 Tanjong Sapo Anchorage—Directions.—Vessels approaching the anchorage from the westward should steer eastward, keeping Pelong Rocks astern bearing 270° until the eastern extremity of Pulau Rusukan Besar is in range 332° with the western extremity of Pulau Kuraman. The course should then be changed to 175°; when the light on Tanjong Sapo bears 244° the vessel should then head toward the light. On approaching the light a vessel should steer around the point at a distance of about 1/4 mile, and anchor in about 8 fathoms, in a position about 1/2 mile south-southwestward of Tanjong Sapo. The least charted depth in this approach to the anchorage is 20 feet.

Vessels with a draft of less than 20 feet proceeding from Labuan to Tanjong Sapo Anchorage should pass between Pulau Papan and Pulau Enoe, and then steer a course of about 200°, keeping the western extremity of Pulau Papan bearing not less than 022°, until Pelong Rocks bear 270°. From this position vessels should proceed as directed above.

10-80 MUARA HARBOR.—The approach to Muara Harbor and Brunei Channel lies between the southern side of Pulau Muara and the northern side of Rambler Banks, which lie about 1/2 mile southward. From Tanjong Sapo Anchorage the channel trends in a westerly direction for a distance of about 2 miles to Muara Bar, which lies nearly 1/4 mile southwestward of Tanjong Bowong. In 1956 the bar, which is composed of mud, had a least depth of 11 feet in the fairway. The channel at its narrowest part is only about 500 feet wide between the 1-fathom curves on either side. The channel is navigable

by vessels drawing up to 15 feet during the second half of the flood tide. Muara Harbor has depths of 3 to 8 1/2 fathoms. An obstruction, with a least depth of 31 feet, was reported (1956) to lie about 400 yards southward of the jetty at Brooketon.

Light beacon—beacons.—A light is shown from a concrete pile beacon which stands off the north end of Rambler Banks.

Muara Bar is marked by two beacons. The south beacon is a concrete structure and the north beacon is an iron post. A beacon stands about 1 mile northwestward of the north beacon. A light is shown, at a height of 16 feet, from a concrete pedestal marked "2", located on the south side of the east approach, to the channel through Muara bar, about 1,200 yards west-northwestward of Rambler Banks light-structure.

A mooring buoy is moored about 1 1/4 miles westward of Tanjong Bowong.

10-81 Anchorage.—Muara Harbor lies between the western extremity of Pulau Muara and the mainland westward of it. The harbor is completely sheltered from the weather. Vessels can anchor off the town of Brooketon, situated on the mainland near the northwestern side of the harbor, in depths of 7 to 8 fathoms, mud bottom. It is advisable to use two anchors because of the restricted swinging space.

10-82 Directions.—From Tanjong Sapo Anchorage vessels should steer for the south beacon on Muara Bar bearing 274°. On approaching the bar, Pisang Hill should be steered for on bearing 294° until the south beacon on Muara Bar bears 165°. Thence a midchannel course should be steered until the jetty at Brooketon bears 000°, at which time the course should be altered for the anchorage.

10-83 BROOKETON (5° 02' N., 115° 04' E.), a town situated near the northwest side of Muara Harbor, is of little importance to shipping. A jetty, with a depth of 7 feet alongside and capable of berthing craft up to 90 feet long, is located close southeastward of the town. Depths 250 feet off the face of the jetty increase to 6 fathoms. A small slipway located close eastward of the jetty



can accommodate craft up to 90 feet in length. Small quantities of fresh provisions and water can be obtained at Brooketon, but the water should not be used for drinking purposes. There is biweekly mail service from Brunei and an unsurfaced road connects the two towns. There is a tidal station. A radio mast is conspicuous.

10-84 Sungei Brunei.—Between the southwestern entrance point of Muara Harbor and Tanjong Lumut, a point situated about 2 miles south-southwestward, the coast recedes to a distance of about 1 1/2 miles forming a bay, almost all of which dries. On the drying coastal bank there are several mangrove-covered islets, and numerous fish traps exist in this bay. At high water boats can enter this bay and proceed as far as the western side of Bukit Pisang.

Pulau Bedukang, a densely wooded islet 105 feet high to the tops of the trees, and surrounded by mangrove swamps, is situated about 1/3 mile east-northeastward of Tanjong Lumut, to which it is joined by a sandbank. This sandbank also extends from the northeastern side of the islet for a distance of about 1/4 mile. Oyster Rocks, 2 feet high, lie about midway between Pulau Bedukang and Tanjong Lumut.

From Tanjong Lumut the western side of the Sungei Brunei estuary trends in a general southwesterly direction for a distance of about 3 miles to the western side of the entrance of the river proper.

Pulau Kaingaran, a densely wooded island about 120 feet high to the tops of the trees, is situated about 2 1/4 miles southwestward of Pulau Bedukang. It is separated from the mainland westward of it by a narrow channel having a depth of 19 to 34 feet. The north approach to this channel is shoal, but it can be entered from the south, where there is a least depth of 10 feet in the fairway.

The north end of island consists of mangrove swamps, and the actual coastline is not visible. Kaingaran Spit, which dries from 1 foot to 2 feet, and composed of mud and sand, extends in an east-northeasterly direction from this end of the island for a distance of nearly 1 mile. A number of conspicuous

rocks are situated on the southern end of the island, from which boulders extend to Peaked Rock, 2 feet high, lying about 1/10 mile southward. There is a landing place, with a few native huts and palm trees, on the western side of Pulau Kaingaran.

A group of rocks, some of which dry, lie about 1/10 mile eastward of the southern extremity of Pulau Kaingaran. Shoals, with depths of less than 1 fathom, extend in a southeasterly direction for a distance of about 1/5 mile from the northernmost of these rocks, and terminate in a narrow rocky spit known as Batu Pintu.

Pulau Chermin, a densely wooded islet 110 feet high to the tops of the trees, lies about 1/2 mile southward of Pulau Kaingaran.

This island is reported to abound with snakes and crocodiles, and landing is very difficult because of the dense jungle. A conspicuous rock lies close off the northwestern end of this island, and Chermin Rock, with a depth of less than 1 fathom over it, lies about 100 yards farther northward. A light is shown from a tripod with ball topmark, painted in black and red horizontal bands, on Chermin Rock.

10-85 A light is shown from an aluminum colored steel framework tower located on the north part of Pulau Chermin.

A light is shown from a concrete pile structure located about 400 yards northeastward of the northeast extremity of Pulau Chermin.

Lights are shown from concrete structures about 1 mile northeastward and north-northwestward, respectively, of Pulau Sibungor.

River Point, the eastern entrance point of the Sungei Brunei, is situated about 1/2 mile south-southwestward of Pulau Chermin. It can be identified by Kindana Hill, situated about 1 mile south-southwestward. This hill is densely wooded, and surmounted by a conspicuous clump of trees, the tops of which are about 516 feet above sea level.

Rambler Banks, parts of which dry, and on which there are numerous fish wiers, extend in a northeasterly direction from River Point for a distance of about 6 1/2 miles.

Pulau Pepatan and Pulau Baru Baru, are two small islets lying on the inner part of Rambler Banks, and lie about 1 1/2 miles eastward of Kindana Hill. Pulau Pepatan, the northern islet, is flat and wooded and about 125 feet high to the tops of the trees. Pulau Baru Baru, the southern islet, is flat and wooded, about 121 feet high to the tops of the trees, except near its southern end where a hill rises about 200 feet to the tree tops.

10-86 CHANNELS.—Brunei Channel is entered close southeastward of Muara Bar. The channel is from 200 to 400 yards wide with a least depth of 19 feet. From its entrance the channel trends in a southwesterly direction for a distance of about 4 miles to a position abreast Kaingaran Spit. Vessels drawing up to 18 feet can proceed through Brunei Channel, but vessels drawing more than 15 feet and over 250 feet in length should not proceed beyond Tanjong Sapo anchorage.

Two leading beacons, located on the south side of Pulau Muara Besar about 1 3/4 miles westward of Tanjong Sapo, indicate the fairway through Brunei Channel when in line bearing about 051°. They are white triangular structures about 900 feet apart.

Brunei Inner Bar extends from Kaingaran Spit to Pulau Chermin. This bar presents the main difficulty in the approach to Brunei. The principal shoals comprising Inner Bar are North Bar Bank, with a least depth of 2 feet, which is situated about 1/3 mile southeastward of Pulau Kaingaran and South Bar Bank, with a least depth of 1 foot, which lies about 1/10 mile farther in the same direction. There are fishing stakes on the North Bar Bank and South Bar Bank.

The third obstruction on Inner Bar is The Barrier, which almost crosses the channel close westward of North Bar Bank and South Bar Bank. This ancient obstruction is composed of rocks and boulders held together in places by marine growth. Its origin probably dates back about 300 years to the time of the Chinese occupation. There are depths of 3 feet over the south end of The Barrier and 1 foot over the north end.

Simpson Channel, the southeastern channel over Brunei Inner Bar, lies between North Bar Bank and South Bar Bank. This channel, which is nearly straight, is about 1/10 mile wide, and has a least depth in the fairway of 7 feet. It is not buoyed. The banks on either

side of Simpson Channel are not readily visible as the water is generally muddy.

From the southern end of Simpson Channel a narrow winding passage leads between South Bank Bar and The Barrier. In 1963 this passage had a least depth of 7 feet in the fairway. On either side of it there are rocks with depths of less than 6 feet over them.

The channel between North Bar Bank and Kaingaran Spit, which formerly was the one commonly used is no longer attempted.

From South Bar Bank Light a channel about 100 yards wide and 500 yards long leads across The Barrier. In 1960, the channel had a least depth of 7 feet and was marked by beacons. It should be used only by small craft with local knowledge.

10-87 LIGHT BEACON—BEACONS.—South Bar Bank Light is shown from a framework beacon located about 1/2 mile northeastward of the northeast extremity of Pulau Chermin.

A beacon with a square topmark, painted white towards the channel and red towards the shoal side, is located on the east side of The Barrier in a position about 2/5 mile north-northeastward of Pulau Chermin.

A similar beacon is located near the southwest extremity of South Bar Bank, about 600 yards east-northeastward of the north extremity of Pulau Chermin.

A wooden tripod beacon with rectangular topmark, painted white on the channel side about 16 feet in height, and red toward the bank, stands near the northeastern end of North Bar Bank about 3/4 mile east-northeastward of the southern extremity of Pulau Kaingaran. A similar beacon 14 feet in height, stands near the northeast end of South Bar Bank, about 250 yards southeast of the above beacon.

10-88 ANCHORAGES.—Vessels not intending to cross Inner Bar should anchor, in depths of about 20 feet, in a position about 9/10 mile eastward of the northern extremity of Pulau Kaingaran.

There is good anchorage, in depths of 7 fathoms, off the Sultan's palace in the town of Brunei. There is sufficient swinging room at this anchorage for a vessel with a length of 170 feet.

There is also anchorage in the fairway abreast the Sungei Kianghi in a depth of 6 fathoms, mud bottom, and another anchorage is located abreast the government office.

10-89 TIDES.—Tidal heights above datum soundings are: M.H.H.W. 6.7 feet; M.L.H.W. 4.9 feet; M.L.L.W. 2.2 feet; M.H.L.W. 4.7 feet.

10-90 TIDAL CURRENTS.—In Brunei Channel abreast Muara Bar the tidal currents sometimes set across the fairway, but in the remainder of the channel they set parallel to the fairway. In Simpson Channel the flood current has a velocity of about 2 knots, and the ebb current a velocity of about 3 knots. In Brunei Channel abreast Muara Bar the flood currents commence about 15 minutes after lower low water at Labuan, and about 5 hours 40 minutes before higher high water. Their mean velocities are respectively about 1/4 knots and 1 1/4 knots at spring tides. The stronger ebb current commences about 35 minutes after higher high water at Labuan. Its mean velocity is about 1 1/4 knots, and 2 to 2 1/2 knots at spring tides. The weaker ebb current commences at about 7 hours 15 minutes after lower low water at Labuan. Its velocity is about 1/4 to 1/2 knot.

10-91 PILOTS.—Pilots are available on application to the Marine Office at Brunei.

10-92 DIRECTIONS.—From a position about 1/3 mile southeastward of Tanjong Bo-wong on Pulau Muara, with the summit of Pulau Chermin in range about 230° with Bukit Saeh, a vessel should steer 240° until Bukit Pisang bears 303°. Thence a midchannel course of 233° should be steered until South Bar Bank Light Beacon is in range about 225° with Bukit Buang Sakar. This range should be steered until almost to South Bar Bank Light Beacon. The vessel should pass about 60 yards west-northwestward of this beacon, and then steer a course of 209° in order to pass eastward of the beacon marking the eastern side of The Barrier, and midway between the beacons marking the southern extremity of South Bar Bank and the southern extremity of The Barrier. After passing between these two beacons, the course should be changed so as to pass close around the beacon marking the southern extremity of The Barrier, and a course of 295° should then be steered, which will pass about 300 yards northward of Pulau Chermin and clear of Chermin Rock.

When passing through the channel south-westward of Simpson Channel vessels must

keep in midchannel between the beacons, and must not haul over to either side. No vessel should enter this channel if there is any possibility of meeting another vessel, and no vessel should proceed farther than Muara Bar unless Bukit Saeh, Bukit Buang Sakar, and Pulau Chermin are plainly visible.

After passing Chermin Rock, a southwesterly course should be steered into the Sungei Brunei, keeping close to the western bank where the depths are greater. No further directions can be given, other than that vessels should pass westward of the two beacons situated westward of Pulau Sibungor, an island situated at the confluence of the Sungei Brunei and the Sungei Butir, in a position about 5 miles southwestward of River Point. Because of the presence of tidal whirls and eddies great caution is necessary in navigating the Sungei Brunei.

10-93 BRUNEI (4°53' N., 114°56' E.), the capital of the State of Brunei, is situated at a wide bend of the Sungei Brunei in a position about 9 miles from its mouth. The old native town is built on mud flats in the river, the houses standing on piles in 3 to 4 feet of water. The new town, which contains the government buildings, is situated on the northern bank of the river. This town is the residence of the Sultan of Brunei, and also that of a British Government official. In 1960 the population of Brunei was about 22,000.

Wharves.—The principal wharf at Brunei is the Customs Wharf, which is of concrete construction on pilings, and about 385 feet long. It has depths of 16 to 19 feet alongside. Water is available, and a good road leads from the wharf to the town. Six lighters are available but about 1 weeks notice is required for their use.

An oil wharf, about 1/2 mile downstream, has depths of 6 to 19 feet alongside.

Supplies.—Fresh water is piped to the wharf. High speed diesel oil is obtainable.

Repairs.—Repairs can be effected in the large workshop located in Brunei.

Communications.—There is regular steamer communication with Singapore. There is local telephone service. Radio-telegraph and daily air service is available to Singapore.

Hospital.—There is a modern 150-bed hospital at Brunei.

Health.—Skin diseases and malaria are common at Brunei.

**10-94 Sungei Limbang and approaches.**—The approach to the Sungei Limbang, southward of Tanjong Sapo on Pulau Muara, is by a straight channel nearly 6 miles long to a position about 1 1/4 miles northwestward of Tanjong Selirong, which is situated about 6 1/4 miles south-southwestward of Tanjong Sapo. This channel, which is separated from Brunei Channel by Rambler Banks, has a least depth in the fairway of 26 feet.

Pulau Berbunut, an island situated about 1/2 mile southeastward of Pulau Baru Baru, has two summits connected by low land. The northeastern summit, 220 feet high, is wooded, and the south-western summit, 190 feet high, is covered with low brush. Two conspicuous trees stand near the southeastern extremity of the island. There is a fishing village on the island. Pulau Lelipan and Pulau Selamok are two islets situated respectively about 1/5 and 1/3 mile south-eastward of Pulau Berbunut.

Between Tanjong Selirong and Pulau Siarau, a peninsula situated about 5 1/2 miles southwestward that separates the mouths of the Sungei Temburong and the Sungei Pandaruan, the eastern shore of the estuary is composed of mangrove swamps intersected by several small rivers that are difficult to identify from seaward.

Sungei Pandaruan is entered westward of Pulau Siarau. Kampong Rantau, from which a boat channel leads westward to Sungei Limbang, lies on the west side of the entrance. There is a least charted depth of 1 1/4 fathoms in the approach to this river, from a position abreast the entrance of the Sungei Limbang, to within 1 mile of the entrance. At this position there is a bar with a least depth of 4 feet. This river is navigable by small craft with a draft of 4 feet, for a distance of 9 miles above the entrance.

Sungei Temburong is entered eastward of Pulau Siarau. There is a least charted depth of 1 1/4 fathoms in the approach to this river from a position abreast the light buoy to the entrance. The river is navigable by small craft drawing 4 feet, about 8 miles above the entrance. The channel in the approach to the entrance is marked by beacons. A black can buoy, with "MST" in white, lies about 1 1/4 miles east-southeastward of the north end of Pulau Siarau.

Bukit Apoi, a mountain 1,225 feet high, is

situated about 11 miles south-southeastward of Tanjong Selirong. It is the southern peak of a high saddleback ridge, and is usually conspicuous against the mountains situated farther inland.

The western side of the estuary between Pulau Berbunut and Pulau Siarau is occupied by the mouths of the Sungei Limbang and the Sungei Pandaruan.

Bukit Terumi, the summit of which is low and cleared, is situated about 2 1/2 miles southward of the northern extremity of Pulau Siarau.

Bukit Peninjauhan, a mountain 640 feet high, is situated about 2 1/2 miles south-southwestward of Bukit Terumi. There is a conspicuous tree on its summit.

Vessels drawing up to 10 feet can navigate the Sungei Limbang as far as the village of Limbang, which is situated about 7 miles upstream from its mouth. Small craft can proceed about 43 miles farther upstream.

The narrow channel between Tanjong Selirong and the bar of the Sungei Limbang, which is situated about 4 miles southwestward has depths in the fairway of about 3 fathoms and is marked by beacons. A black and white checkered, conical lighted buoy is moored on the western side of the channel in a position about 3 1/4 miles southwestward of Tanjong Selirong. The channel is steep to on its western side, and shoals gradually on its eastern side. This channel also forms the entrance to the Sungei Pandaruan and the Sungei Temburong.

In 1960, the channel across the Sungei Limbang bar has a least depth of 4 feet. This channel is marked by beacons consisting of iron posts surmounted by boards that are painted white on the side toward the channel, and red on the side towards the shoals.

Inside the bar the depths in the river are about 1 fathom to 14 fathoms for a distance of about 11 miles. At this point the channel is obstructed by some sunken rocks, over which there are strong eddies. Upstream from these rocks the depths in the channel are 2 to 4 fathoms. Just before reaching Limbang there is a sharp bend in the river where very strong eddies are encountered.

**10-95 Directions.**—From Tanjong Sapo a vessel should steer a southwesterly course through the approach channel, the limits of which are usually marked by large fish traps, to a position about 1 1/3 miles north-northwestward of Tanjong Selirong. The vessel should then steer for Bukit Terumi bearing 202°, and seen just to the eastward of Bukit Peninjauhan, until Pulau Selamok is in range about 308° with Kindana Hill. From this position the vessel should steer for Kampong Rangau, a small village situated on the western side of the estuary, bearing 225° until the two outer beacons on the southern side of the channel are in range. The course should then be changed westward in order to pass the pairs of beacons, leaving the last two beacons to starboard as the deepest water is close to the river bank. After passing the inner beacon a midchannel course should be steered to Limbang. A good lookout must be kept for floating trees as the river brings down quantities of timber.

**10-96 Limbang** (4°45'N., 115°00'E.) is a village situated on the eastern bank of the Sungei Limbang near Bukit Peninjauhan. This village is the headquarters of a resident officer. In 1947 the population was about 2,900. There is a wharf, with a length of 150 feet and a depth alongside of 10 feet. The Customs Wharf has a length of 66 feet and a least depth alongside of 10 feet (1960). Fresh provisions are available.

There is regular communication by launch with Brunel and Labuan, and occasional steamer communication with Kaching. A small hospital is located at Limbang. Some 950 vessels call here annually.

**10-97 Southeastern and northeastern shores of Brunei Bay.**—Between Pulau Sunda (see sec. 10-77) and Bukit Sari, a small peninsula, 460 feet high, that is situated about 10 miles east-southeastward, the southeastern side of Brunei Bay recedes to a distance of about 4 miles forming a smaller bay, into which flow several small rivers. Bukit Sari is often difficult to distinguish because of the higher hills inland. Shoal water, with depths of less than 3 fathoms, extends from this section of the coast for a distance of 1/2 mile to 1 3/4 miles. A 1-fathom patch lies about 1 1/4 miles offshore in a position about 1 1/2 miles southwestward of Bukit Sari.

From Bukit Sari the coast trends in a general northeasterly direction for a distance of about 12 1/2 miles to the mouth of the Sungei Sipitang, and thence in a general northerly direction for a distance of about 3 1/2 miles to the southern entrance point of Padas Bay. Shoal water, with depths of less than 3 fathoms, parts of which dry, extends from this section of the coast for a distance of 1/2 mile to 1 3/4 miles offshore.

Batang Lawas, the mouth of which is situated about 2 miles northeastward of Bukit Sari, is navigable by small craft for a considerable distance. In 1960 there was a least depth of 4 feet on the bar. The channel is marked by wooden stakes with red and white topmarks. These stakes are moved as necessary to conform with the channel.

A conical light buoy, painted in black and white checkers, marks the entrance to Batang Lawas channel and is located about 3 1/4 miles northward of Bukit Sari. Vessels should pass northeastward of this buoy. The buoy is moved as necessary to conform with the channel.

A beacon stands close northward of the light buoy, about 3 1/2 miles northward of Bukit Sari.

Lawas, the principal town of the district, is located about 11 miles upriver of the river entrance. A wharf with a length of 70 feet and a depth of 11 feet alongside is located at the town. There is a government station at Lawas.

Anchorage can be taken in 10 fathoms about 1 1/2 miles eastward of the entrance of the Batang Lawas. Timber is loaded at this open anchorage.

**Sungei Mangalong**, navigable for small boats, discharges about 3 miles northeastward of Batang Lawas. Between this stream and Sipitang northeastward, is a sandy shore with occasional rocky promontories. The coast rises fairly steep to a narrow ridge on which are a number of peaks, the highest attaining an elevation of 410 feet.

**Tanjung Merintaman**, about  $1\frac{1}{4}$  miles south-westward of Sipitang, projects northward into the bay, and has a 100-foot elevation close within the extremity. **Takat Mengal**, a rocky patch with a least depth of  $1\frac{1}{2}$  fathoms, lies about  $\frac{1}{4}$  mile northward of Tanjung Merintaman.

**Takat Besar**, a group of sunken rocks with least depth of 3 feet, lies about  $1\frac{1}{2}$  miles offshore and about  $1\frac{3}{4}$  miles west-south-westward of Tanjung Merintaman. Numerous other rocky shoal patches lie between Takat Besar and the mainland, and the chart should be consulted for their positions. Passage between these rocks and the coast is possible, but should not ordinarily be attempted as the dangers are unmarked.

Sungei Sipitang is a small river, at the mouth of which is a large village of the same name. There is a government station here. A conspicuous flagstaff stands near the south bank of the river entrance. A boat channel, with a depth of 1 foot, marked by perches, leads into a small landing stage. A reef, which dries 8 feet, lies on the south side of the boat channel entrance.

**Anchorage** can be obtained in 6 fathoms, good mud holding ground, approaching the river entrance with the flagstaff bearing  $110^\circ$ . Anchor about 1 mile offshore, with Tanjung Merintaman bearing  $200^\circ$ .

Padas Bay, which is formed by the several mouths of the Sungei Padas, is situated on the northeastern side of Brunei Bay. It is encumbered with drying sand and mud flats, through which run the channels formed by the several small rivers that flow into it. In 1945 the main channel leading to the Sungei Padas was reported to have a least depth of 6 feet at the entrance, and 5 feet on the bar near the village of Weston. The channel is marked by beacons, which are frequently carried away by log rafts.

**10-98 Weston** ( $5^\circ 13'N.$ ,  $115^\circ 36'E.$ ) is a village situated on the southern bank of the Sungei Padas in a position about  $2\frac{1}{2}$  miles from its mouth. It is connected to the British North Borneo railway and telegraph systems.

Between Padas Bay and Tanjong Kilas (see sec. 10-62) the northeastern shore of Brunei Bay, which is flat, is fringed with mangroves and intersected by several small rivers. The country inland consists of dense jungle, and in the vicinity of Sungei Klias the tops of the trees are about 90 feet high. Flats, with depths of less than 3 fathoms and drying flats extend from this section of the coast for a distance of from 1 mile to  $3\frac{1}{2}$  miles. The outer edge of these flats is fairly steep-to.

A detached 6-fathom sandy patch lies about  $4\frac{1}{2}$  miles southward of Tanjong Klias.

The entrance to the Sungei Klias is situated about  $1\frac{1}{2}$  miles eastward of Tanjong Klias. It is obstructed by a drying flat that divides the channel into two parts, the main channel passing close southward of Tanjong Klias.

There is a least depth of 6 feet over the bar in the channel, and the same depth can be carried for several miles within the entrance.

**10-99 Mempakul** ( $5^\circ 18'N.$ ,  $115^\circ 21'E.$ ), a village situated on the south side of Tanjong Klias, has two landing jetties and a flagstaff. It is connected to the British North Borneo telegraph system.

**10-100 Coast.**—From Tanjong Klias the coast trends in a general north-northeasterly direction for a distance of about 3 miles to Tanjong Liba, a bare brown rock 25 feet high. **Shoal water**, with depths of less than 3 fathoms, parts of which dry, extends from this section of the coast for a distance of about  $3\frac{1}{2}$  miles.

From Tanjong Liba the coast trends in a general northerly direction for a distance of about  $2\frac{1}{2}$  miles to Tanjong Sakat (see sec. 10-68), and thence in a general northeasterly direction for a distance of about 2 miles to Tanjong Toulak. Between Tanjong Liba and Tanjong Sakat **shoal water**, with depths of less than 3 fathoms, extends from the shore for a distance of about  $\frac{3}{4}$  mile, and between Tanjong Sakat and Tanjong Toulak shoals and **foul ground** extend from the shore for distances as great as 1 mile.

(1492) **EAST INDIES—Borneo—Northwest coast—Brunei Bay approach—Jahat Shoals—Aid changed.**—A red conical light buoy, *Fl. 3 sec.*, will be substituted for the Fl. light charted in approx.  $5^{\circ}34.5' \text{ N.}$ ,  $115^{\circ}23.5' \text{ E.}$

(N.M. 11/63.)

(N.M. 6(285), London, 1963.)

H.O. Charts **2122, 2123.**

H.O. Pub. 112, No. **28636.**

(4374) **BORNEO—Northwest coast—Iris Shoals—Beacon information.**—A beacon, 11 feet high with a red and white checkered can topmark, exists in  $5^{\circ}30'38'' \text{ N.}$ ,  $115^{\circ}21'05'' \text{ E.}$  (approx.).

(N.M. 27/66.)

(N.M. 10(444), London, 1966.)

H.O. Charts **2122, 2123.**

H.O. Pub. 71, 1951, page **234.**

### 10-101 TANJONG TOULAK TO TANJONG NOSONG WITH OUT-LYING DANGERS

—From Tanjong Toulak the coast trends regularly northeastward for about 18 miles to Tanjong Nosong without any pronounced indentation or projection. From a position about  $3\frac{1}{2}$  miles northeastward of Tanjong Toulak to Pine Point, about  $6\frac{1}{2}$  miles farther in the same direction, the coast rises to a range of hills, the highest elevation being a conspicuous 530-foot peak near the southwestern end of the range. Goenoeng Nosong, 360 feet high, is a hill about  $1\frac{1}{2}$  miles southward of Tanjong Nosong, and from it a densely wooded ridge extends southwestward along the coast for almost 6 miles.

Shoal water with depths of less than 6 fathoms fringes this coast to a greatest distance of almost 2 miles, and off the stretch between Tanjong Toulak and Pine Point the 10-fathom curve lies as much as  $5\frac{1}{2}$  miles offshore. Within this latter area lie Pine Point Shoals with a least depth of 1 foot, Iris Shoals with a least depth of 2 fathoms, and a large number of rocky patches with depths of 1 to 5 fathoms.

A series of shoals and reefs, with navigable channels between, extend off this coast for more than 30 miles.

10-102 Tanjong Nosong ( $5^{\circ}38'N.$ ,  $115^{\circ}35'E.$ ) is a densely wooded point at the northern extremity of a peninsula that forms the western side of Kimanis Bay. Foul ground and shoal water fringe the point, extending to a greatest distance of about 3 miles north-northeastward, with rocks above water as much as  $\frac{3}{4}$  mile offshore. Nosong Patch, with a depth of  $3\frac{1}{2}$  fathoms, lies about  $2\frac{1}{4}$  miles west-northwestward of Tanjong Nosong.

10-103 Outlying dangers.—Jahat Shoals, about 11 miles west-southwestward of Tanjong Nosong, extend within the 10-fathom curve for a distance of nearly 4 miles in an east and west direction and about 3 miles in a north and south direction.

There are numerous shoal patches of  $1\frac{1}{4}$  to 3 fathoms with deep water between them. Jahat Rock, which dries about 2 feet, is located near the center. There are detached patches, having from

$4\frac{3}{4}$  to 10 fathoms, lying between Iris and Jahat Shoals. A  $4\frac{3}{4}$ -fathom shoal is located about 3 miles southwestward of Jahat Shoals Light.

A light is shown on the southeast side of Jahat Shoals.

**Middle Patches**, four in number, close together, and lying about  $4\frac{1}{2}$  miles west-northwestward of the beacon, extend nearly 1 mile in an east and west direction and  $\frac{3}{4}$  mile in a north and south direction within the 10-fathom curve. The least depth,  $4\frac{1}{2}$  fathoms, found near the south end of the western patch.

**Gordon Patches** lie about 20 miles westward of Tanjong Nosong and consist of one large shoal area about 2 miles in extent within the 10-fathom curve and several small patches, having depths of 7 to 10 fathoms, located near it.

A least depth of  $3\frac{3}{4}$  fathoms is found near the western side of the large shoal.

**Mackenzie-Grieve Shoals** lie southwestward of Gordon Patches and about 24 miles to the westward of Tanjong Nosong. They consist of three patches, which are together about 2 miles in extent.

**Winchester Shoals** lie northward of Middle Patches and about 15 miles west-northwestward of Tanjong Nosong. They are formed by two patches which together extend about 2 miles in a north and south direction and about 1 mile in an east and west direction within the 10-fathom curve. The least depth is  $1\frac{3}{4}$  fathoms, located near the center of the northern and larger patch.

**Paisley Shoal**, with a depth of  $3\frac{3}{4}$  fathoms, lies about 6 miles northward of Winchester Shoals.

**Growler Bank** lies about 8 miles west-northwestward of Tanjong Nosong and is about 1 mile in extent, with a least depth of  $4\frac{3}{4}$  fathoms.

**Nosong Shoals** lie about 7 miles northwestward of Tanjong Nosong and extend about 2 miles in an east-northeasterly and opposite direction and about  $1\frac{3}{4}$  miles in a northwest and southeast direction within the 6-fathom curve. Two islets, composed of white broken coral, are located near the center of this shoal. The southeastern



(1786) **EAST INDIES—Borneo—Northwest coast—Samarang Bank—Ammunition dumping ground established westward.**—1. An ammunition dumping ground has been established bounded by the parallels  $5^{\circ}25'$  N. and  $5^{\circ}40'$  N. and the meridians  $114^{\circ}00'$  E. and  $114^{\circ}16'$  E.

2. The legend "Disused" will be charted in the ammunition dumping ground centered about 50 miles northeastward of (1).

(See N.M. 52(6997) 1964.)

(N.M. 13/65.)

(N.M. 4(243), London, 1965.)

H.O. Charts **2123** (1), **5502**, **5591** (2), **5592** (2).

H.O. Pub. 71, 1951, page **235**.

(6997) **EAST INDIES—Borneo—Northwest coast—Vernon Bank—Ammunition dumping ground established northwestward.**—An ammunition dumping ground has been established bounded by the parallels  $6^{\circ}00'$  N., and  $6^{\circ}20'$  N. and the meridians  $114^{\circ}30'$  E., and  $114^{\circ}50'$  E.

(N.M. 52/64.)

(N.M. 39(1833), London, 1964.)

H.O. Charts **5502**, **5591**, **5592**.

H.O. Pub. 71, 1951, page **235**.

and higher of these islets is 5 feet high. A rock dries 1 1/2 feet at the northeastern end of this shoal. A **beacon** is located on the southeastern islet; in 1949 this beacon was reported missing.

**10-104 Haselfoot Patches** ( $5^{\circ}28' N.$ ,  $114^{\circ}57' E.$ ) consists of two coral heads about 1/2 mile apart, with a least depth of 4 fathoms, located about 26 miles to the westward of Tanjong Toulak.

**Samarang Bank**, located about 22 miles west-northwestward of Bethune Head, the northern extremity of Labuan, extends about 6 miles in an east and west direction and 5 miles in a north and south direction within the 10-fathom curve. It is steep-to beyond the 10-fathom curve. It has general depths of 4 to 6 fathoms, and the least depth is 3 1/2 fathoms, located in its northern part. There are two patches of 3 1/2 and 4 fathoms near its southeastern extremity. The bottom is dead coral, with sandy patches.

**10-105 Vernon Bank—Fury Rocks** ( $5^{\circ}43' N.$ ,  $115^{\circ}01' E.$ ).—Vernon Bank lies about 29 miles westward of Tanjong Nosong and extends about 13 miles in a northeast and southwest direction and about 10 miles in an east and west direction within the 10-fathom curve. It is steep-to on the northern and western sides, with general depths of 4 to 8 fathoms over a coral bottom. Fury Rocks, about 2 miles in extent, lie in an area between 4 and 5 miles northward of the southern extremity of the 10-fathom curve. They consist of coral heads with 2 or 3 fathoms of water over them, with some pinnacle rocks of less than 1 fathom. There is seldom any breaking of the seas over them in fine weather and none at all at high water.

There are several shoal patches, with depths of 4 3/4 to 10 fathoms, lying within 4 1/2 miles of the easternmost part of the 10-fathom curve.

There are several patches, which have not been completely examined, with depths of 8 to 10 fathoms over them, lying within 3 miles of the northeastern edge of Vernon Bank.

Hawkin Shoal, lies about 4 1/2 miles eastward of the north part of Vernon Bank. It is about 1/2 mile in extent and has a least depth of 5 1/2 fathoms over it.

**10-106 Currents.**—Near the coast the tidal currents are scarcely perceptible, but the flood appears to set to the southward and the ebb to the northward.

From July to the middle of October farther from the shore and southward of Gordon Patches and Winchester Shoals the current, with few exceptions, sets to the northward and northeastward, attaining usually a velocity of 1/4 to 1/2 knot, the maximum current observed being 1 1/3 knots.

In December near Four Fathom Patches, which lie about 3 1/2 miles northwestward of Labuan, the current was found setting to the westward at a maximum velocity of a little more than 1/2 knot, and northward of Labuan it sets west-southwestward with a velocity of about 1/2 knot.

**Caution.**—The water along this coast is generally much discolored, and the shoals are difficult to see.

#### 10-107 KIMANIS BAY AND APPROACH.—

From the peninsula terminating in Tanjong Nosong, a chain of islands, reefs, and shoals extends for about 18 miles north-northeastward, somewhat encumbering the approach to Kimanis Bay from the northward and northwestward. Two channels lead through this chain; Tiga Channel, the southern, is used by most of the coasting traffic navigating along this coast.

Kimanis Bay is entered between Tanjong Nosong and Tanjong Papar, which is located about 20 miles east-northeastward of Tanjong Nosong. The bay indents the coast to a distance of about 9 miles between the above points and is apparently free from dangers. From about 20 fathoms in the entrance, the depths shoal regularly to the 6-fathom curve, which lies from 1/2 to 1 mile off the southern and eastern sides of the bay and as much as 3 miles off the southwestern side.

**10-108 Landmarks — Aspect.** — Kinandukan Peak, on the eastern side of the bay, about 2 1/2 miles south-southwestward of Tanjong Papar, is 475 feet high and conspicuous, being covered with dark trees, which show distinctly against the background of the more distant hills; these hills are often partially obscured by mist or rain.

(4375) **BORNEO—Northwest coast—Tiga Channel—Dunlop Shoal—Beacon information.**—A beacon, 12 feet high with a red, white and black banded spherical topmark, exists on Dunlop Shoal in  $5^{\circ}41'42''$  N.,  $115^{\circ}37'$  (approx.).

(N.M. 27/11)

(N.M. 10(445), London, 1966.)

H.O. Chart 2122.

H.O. Pub. 71, 1951, page 236.

The Suniatan Range of mountains are located from about 13 to 17½ miles from the eastern side of the bay and are densely wooded. These mountains rise to a height of 5,013 feet, and slope on their western sides to the low coastal plain.

Kilatuan, a conspicuous round hill 1,536 feet high, stands on this plain and is located about 5 1/4 miles southeastward of Kinandukan Peak.

Tinamandukan, the northwestern extremity of a serrated ridge running down from the Suniatan Range, lies to the southeastward of Kilatuan and rises to a height of 2,460 feet and is conspicuous from all directions.

Castle Peak (Bukit Tebelong) is a conspicuous hill lying 8 3/4 miles northeastward of Kilatuan and rising to a height of 2,033 feet.

The shore of Kimanis Bay is low, swampy and fronted by a sandy beach, which in most parts is backed by a narrow band of casuarina trees, behind which the ground is flat and swampy or covered with dense jungle, especially at the southeastern part of the bay.

**10-109 Islands and dangers.**—Pulau Tiga, an island 2 3/4 miles in length northwest and southeast, is located about 6 miles north-northeastward of Tanjong Nosong. There are three peaks on the island, the highest of which is 330 feet. Large casuarina trees grow on the sand spit at the southeastern extremity of the island and also on the southeast peak. The rest of the island is covered with jungle.

A spit, with a depth of 1¼ fathoms at its outer end and steep-to, extends from the southeastern point of the island for a distance of ½ mile. A light is shown from the outer end of this spit. The east side of the island is foul within the 10-fathom curve, which lies about ½ mile from shore.

A shoal area, with a least depth of 2 1/2 fathoms, extends to the west-southwestward from the western side of the island to a distance of about 2 1/2 miles within the 10-fathom curve.

Shallow water and foul ground extend for a distance of about 4 1/4 miles north-northeastward from the northern side of the island. This shoal area has a breadth of 1 1/2 to 3 miles within the 10-fathom curve. Turtle Island (Pulau Kalampunian Besar), a low sandy island, covered

with trees, which attain a height of 157 feet, and Pulau Burong (Pulau Kalampunian Damit), a small, round and rocky islet, surmounted by trees and bushes which attain a height of 112 feet, lie in this foul area about 1 1/2 and 2 miles, respectively, to the northeastward of Pulau Tiga. Two rocks, one drying 5 feet and the other 3 feet, are located in this foul area about 2 3/4 and 3 miles, respectively, north-northeastward of Pulau Tiga.

Two detached patches of 5 1/2 fathoms and 5 fathoms lie about 1/2 mile and 1 mile, respectively, northward of the northern limit of the 10-fathom curve surrounding the foul area.

**Deiuar Shoals**, with depths of less than 3 fathoms, on which the sea breaks, lie about 6 1/2 miles northward of Pulau Tiga and extend northward for a distance of about 4 miles within the 6-fathom curve and have a breadth of about 1/4 mile. A number of rocks, above water, one of which is 2 feet high, are located on these shoals about 1 1/2 miles from their northern end.

A detached shoal, with a least depth of 4½ fathoms, lies about 1 mile southwestward of the two-foot high rock, and a 7-fathom patch lies about 1½ miles northeastward of the same rock.

**Pulau Lyang Lyang**, 103 feet high and densely covered with bushes, is a rocky islet located about 1 1/2 miles northwestward of Tanjong Papar. The islet is surrounded by shoal water with depths of less than 3 fathoms, which extends about 1/4 mile eastward and westward from it.

**10-110 Tiga Channel** lies between Tanjong Nosong and Pulau Tiga, an island about 6 miles north-northeastward, and is mainly used by vessels passing up and down the coast. The channel is divided into a northern and a southern passage by Dunlop Shoal, which lies about 2 miles southward of the western extremity of Pulau Tiga and has a least depth of 3 fathoms.

The south channel, about 1 mile wide, lies between Dunlop Shoal and the 6-fathom curve lying northward of Tanjong Nosong and has depths of 6 to 12 fathoms.

The north channel lies between the 10-fathom curve off the southern side of Pulau Tiga and Dunlop Shoal, and has a 5-fathom patch in mid-fairway about 1 1/2 miles southward of the west-

outer face, 27 feet; north inner face, 21 feet; south inner face, 19 feet. A 5-foot wide catwalk extends about 100 feet southward from the south end of the wharf to a dolphin, and a mooring buoy is located about 250 feet south of the dolphin. An island dolphin is located about 250 feet westward of the south end of the wharf.

The approach section of the wharf is about 270 feet long and 40 feet wide. It extends in a west by north direction from the west extremity of an area of reclaimed land to its junction with the outer section of the wharf. The reclaimed area, bounded by a sea-wall, extends into the water in a northwest direction for about 290 feet and is about 270 feet wide at its outer end. The westernmost corner of the reclaimed area connects to the wharf approach section. A boat landing stage about 20 by 25 feet, with steps, and an LST ramp are located on the outer end of the reclaimed area. A projection, extending northeastward for about 70 feet from near the north extremity of the reclaimed area is fitted with a bollard.

A meter-gage, single track line serves the entire length of the outer wharf and its approach. Spur lines connect to adjacent oil installations. A 6 inch pipeline connects the oil installations to the wharf. There are no fixed cranes on the wharf.

**Repairs.**—Minor ship repairs may be made.

**Supplies.**—A small quantity of fresh provisions can be obtained. Boiler water and diesel oil are obtainable by truck. Drinking water can be obtained from outlets on the pier.

**Communications.**—A post office is located here, and the town is connected to the North Borneo railroad and telegraphic systems. There is regular steamship communication with Singapore and Tawau, via intermediate ports and also with Hong Kong, Japan, Australia and Europe.

There is a radio station at Jesselton open for public correspondence.

**Hospital.**—A government hospital with a European doctor in charge is available for seamen.

**Meteorological table.**—See Appendix II.

#### 10-138 GAYA HEAD TO AMBONG BAY.—

From Gaya Head, the coast trends generally northeastward for about 17½ miles to Tanjong Semburong, the western entrance point to Ambong Bay. Along this coast the 6-fathom curve lies between 1 mile and 2 miles offshore. The muddy water discharged from the rivers along this coast reaches a distance of about 5 miles offshore where its limit is clearly defined.

**Aspect.**—Mount Kina Balu, 13,450 feet high, located about 29 miles eastward of Gaya Head is very conspicuous and in clear weather is visible at a great distance. It is the highest mountain in Borneo. The summit of this mountain, usually obscured by clouds for the greater part of the day, consists of a number of serrated peaks of equal elevation. Northward of these peaks the mountain slopes gradually for 4 miles and then falls away abruptly.

Mount Tambuyukon ( $6^{\circ}12' N.$ ,  $116^{\circ}40' E.$ ), a conspicuous round peak, 8,445 feet high, lies on the same range as Mount Kina Balu and about 10 miles north-northeastward.

Gunong Sadok Sadok, 5,500 feet high, is located about 4 1/2 miles westward of Mount Kina Balu and appears as a sharp cone when viewed from the northward.

**Currents.**—It was reported that during the strength of the northeast monsoon, a strong current was found setting northeastward at a distance of 7 miles offshore.

**10-139 Sungei Mengkabong.**—The entrance of the Sungei Mengkabong, which is about 1 mile wide, lies about midway between Tanjong Kaitan, about 1 mile northeastward of Gaya Head, and Mengkabong Bluff, located about 3 3/4 miles farther northeastward. Shoals, with depths of less than 3 fathoms, extend about 1 mile seaward from the mouth of the river. Close inside the bar, the river opens out into an area of marshes and lagoons. There is a fishing village at a short distance within the entrance.

**Mengkabong Bluff**, about 369 feet high to the tree tops, lies about 4 miles northeastward of Tanjong Kaitan. Reefs extend a short distance seaward from the bluff and a sandy beach connects it with the mouth of the Sungei Mengkabong. A small stream connected to the Sungei Mengkabong enters the sea close to the northward of the bluff.

**10-140 Coast—Sungei Tuaran.**—Between Mengkabong Bluff and Tanjong Indai, about 5 1/2 miles north-northeastward, the coast is low and sandy and is covered with casuarina trees.

Sungei Tuaran lies about 3¼ miles northeastward of Mengkabong Bluff, and it admits craft of 6-foot draft in favorable weather. A flat, with depths of less than 6 feet over it, extends about 1/3 mile from the river entrance.

There is a depth of 3 fathoms within the bar, and the river is reported to be navigable by boats for a considerable distance.

The river gives its name to the district through which it runs, and the village, which is about 6 miles upstream. The village is connected by a metalled road with Jesselton and by telephone with Jesselton and Kudat.

**10-141 Coast—Sungei Sulaman.**—Between Tanjong Indai and Tanjong Semburong, about 7 1/3 miles northeastward, the coast is irregular

and mountainous. Vessels should give a berth of at least 2 miles to Tanjong Indai and the coast northward of it, on account of the shifting nature of the banks.

The entrance of the Sungei Sulaman lies between Tanjong Indai and the sand banks which extend about  $1\frac{3}{4}$  miles westward from Tanjong Torong Gusu, lying about  $1\frac{1}{4}$  miles east-northeastward of Tanjong Indai. The sea generally breaks on these sand banks, parts of which are dry. An islet, 80 feet high, lies in the entrance, about  $\frac{3}{4}$  mile east-northeastward of Tanjong Indai.

Inside the entrance, a channel 3 miles long and with a depth of  $3\frac{1}{2}$  fathoms leads to Sulaman Bay, a shallow lagoon encumbered with flats and surrounded by mangrove swamps, amongst which the river is lost. The small village of Kindu lies on the southernmost part of this lagoon and is connected to Tuaran by bridle path.

Junction Bluff lies about 3 miles north-northeastward of Tanjong Torong Gusu. From this bluff the land rises sharply to the conspicuous Mt. Lokpussok, 1,430 feet high and densely wooded, about  $\frac{3}{4}$  mile southeastward.

About midway between Junction Bluff and Tanjong Semburong, the coast recedes forming a bight from the head of which a coastal bank, with depths of less than 3 fathoms, extends nearly 1 mile offshore. A rock, 10 feet high, lies on this bank about  $1\frac{1}{4}$  miles east-northeastward of the bluff.

**10-142 Anchorage.**—There is good anchorage about  $\frac{1}{2}$  mile offshore, anywhere between Gaya Head and a position about 1 mile southward of Tanjong Indai, excepting close off the mouths of the rivers.

**10-143 TANJONG SEMBURONG TO PULAU USUKAN INCLUDING AMBONG AND USUKAN BAYS.**—The coast between Tanjong Semburong and Pulau Usukan, an island located about 5 miles northeastward and close offshore, is irregular and is indented by several bays, the principal of which, Ambong Bay and Usukan Bay afford shelter during the monsoons.

**Aspect—Landmarks.**—In contrast with the land to the north and south, the vicinity of Ambong and Usukan Bays is characterized by the proximity of the mountains to the coast. When

viewed from northward the mountain peaks appear to fall perpendicularly to the sea. Many of the mountains in the vicinity appear to have rounded summits. Ambong Bay is completely backed by mountain ranges, and if the weather is sufficiently clear Kina Balu, a bluish mountain 13,450 feet high and located about 29 miles eastward of Gaya Head, may be seen. Mt. Tambuyukon, 8,445 feet high, located about 10 miles northeastward of Kina Balu, is conspicuous. Mt. Lokpussok, 1,430 feet high and densely wooded, lies about 4 miles southwestward of Tanjong Semburong and is a prominent and useful mark.

Pulau Usukan appears as a bushy cone.

**10-144 Ambong Bay** is entered between Tanjong Semburong, a moderately bold headland at the northern extremity of a peninsula, 548 feet high, forming the western side of the bay, and Tanjong Perunjuk, which lies about  $1\frac{1}{4}$  miles eastward. Tanjong Perunjuk is the western extremity of a narrow and hilly finger-like projection extending westward from the coast. The shores of Ambong Bay, which are very irregular, are fringed with partially drying coral reefs up to a distance of about  $\frac{1}{2}$  mile. The head of the bay, which lies about  $1\frac{1}{2}$  miles southward of the entrance points, is separated into two similar coves by Pulau Telur, a reef fringed and thickly wooded island, 234 feet high, lying close offshore. The village of Ambong is located on the northern side of the eastern cove.

**Depths** in Ambong Bay shoal gradually shoreward from greatest depths of 7 to 8 fathoms between the entrance points. The 3-fathom curve lies up to 300 yards outside the fringing reef over most of the bay. A 3-fathom patch lies about 300 yards south-southwestward of Tanjong Perunjuk.

**10-145 Dangers in approach.**—Rodney Mundy Shoal, a coral formation about 500 yards in extent and with a least depth of  $1\frac{1}{4}$  fathoms, lies about 800 yards northward of Tanjong Semburong. Small vessels with local knowledge may pass between the shoal and the point.

Belcher Shoal, which has a least depth of 3 feet, lies about 500 yards northeastward of Rodney Mundy Shoal and about  $\frac{3}{4}$  mile north-northeastward of Tanjong Semburong.

**10-146 Anchorage.**—Large vessels can anchor in a depth of 7 fathoms, mud, about  $\frac{1}{2}$  mile southwestward of Tanjong Perunjuk where there is partial shelter from the swell caused by the monsoons.

ern extremity of Pulau Tiga. This channel is about 1 mile wide and has depths of 8 to 13 fathoms excluding the 5-fathom patch. A 6¾-fathom patch was reported (1959) to lie about 3¼ miles westward of Pulau Tiga.

**10-111 Currents.**—The tidal currents off the southeastern end of Pulau Tiga are irregular and appear to be influenced by currents set up in the offing by the winds. In December the currents often set between east-northeast and southeast and attain a strength of over 3/4 knot, the ebb setting east-northeastward; occasionally, with the rising tide, the current flows southwestward.

**10-112 Southwestern side of Kimanis Bay.**—Sungei Penyu, a small river, flows into the southwestern part of the bay under the eastern side of Tanjong Nosong and has about 4 feet of water over its bar. It is fronted by a bank with less than 3 fathoms to a distance of nearly 3 miles. The bar is free from rollers, and the river affords protection for small boats from all winds westward of north. There are a few huts on its bank at the mouth of the river. The river leads to a shallow lake about 1½ miles within the entrance.

**10-113 Southern and eastern sides of Kimanis Bay.**—The small streams named Sungei Lama, Sungei Membakut and Sungei Bongawan discharge into the head of Kimanis Bay. The settlement of Bongawan lies about 2 miles up the river of the same name and has a railroad station.

Sungei Kimanis, Sungei Benoni, Sungei Menani, and the Sungei Papar all flow into the eastern side of Kimanis Bay. All these small rivers are obstructed by bars over which only small boats can pass, and are frequented by fishermen, who inhabit the villages on their banks.

The settlement of Kimanis is located about 2 miles up the Sungei Kimanis, and the populous town of Papar lies about 2 miles southeastward of Tanjong Papar. A railroad runs along the eastern side of the bay and connects these settlements to the railroad system.

No immediate supplies are available, however, limited supplies can be obtained at short notice.

**10-114 Anchorage.**—There is good holding ground anywhere in Kimanis Bay, but the best anchorage is near its eastern side, where it is deeper close inshore and where the bottom is stiffer and less sandy. During the northeast monsoon, vessels can anchor, in a depth of about 9 fathoms,

about 1 1/2 miles southeastward of the southern extremity of the western end of Pulau Tiga. During the southwest monsoon, vessels can anchor, in a depth of 10 fathoms, northward of the sand spit at the southeastern extremity of that island, or they can anchor, in a depth of 12 to 14 fathoms, about 1/2 mile eastward of Turtle Island.

Both monsoons cause a swell in Kimanis Bay.

**10-115 KIMANIS BAY TO JESSELTON HARBOR APPROACH.**—From Tanjong Papar the coast trends north-northeastward for about 17 miles to the town of Jesselton, about 1 mile off which lies Pulau Gaya, a fairly extensive island that forms the western side of Jesselton Harbor and the southern side of its main approach. The 10-fathom curve lies from 1½ to 2½ miles off this coast, and except for two small islands and an off-lying pinnacle rock off the northern part, there are no dangers outside this limit. A number of streams flow into the sea along this stretch of coast, but they are navigable only by boats.

**Coast.**—From Tanjong Papar the low sandy coast trends for about 7 1/4 miles northeastward to the mouth of the Sungei Kinarut. A bluff salient headland named Tanjong Pangallat, 289 feet high to the tops of the trees, projects from the middle of this stretch. The 6-fathom curve lies from 1 to 2 miles offshore, and between Tanjong Pangallat and the Sungei Kinarut drying ledges fringe the coast to a distance of 1/2 mile.

**10-116 Dinawan Anchorage,** suitable for small craft, lies between Pulau Dinawan, an island about 1¾ miles northwestward of the mouth of the Sungei Kinarut, and Everett Reef, about 3/8 mile eastward. Pulau Dinawan, about 5/8 mile long north and south, consists of three parts, the southernmost connected to the large middle part by a drying ridge. When seen from the westward Pulau Dinawan appears to be three islets. The island is densely wooded and is 240 feet high. A reef, which dries in places and near the southeastern extremity of which is a patch 3 feet high, extends 3/8 mile south-southeastward from the southern end of the island and fringes all of its eastern side except Flagstaff Point, the island's eastern extremity. Between the 6-fathom curve off the southeastern extremity of this reef and that

off the mainland coast is a channel more than 1/4 mile wide, but it is encumbered by several reefs, some of which dry. Everett Reef dries in places and has on it a rock 3 feet high. Small craft can anchor in a depth of 7 fathoms between Everett Reef and Flagstaff Point. They may also anchor in about 9 fathoms about 500 yards northeastward of Flagstaff Point.

10-117 Coast (continued).—Between the mouth of the Sungei Kinarut and Tanjong Dumpil, a point about 4 1/2 miles northward, the coast recedes to form a bight strewn with shoals and reefs, many of which dry, that lie as much as 1 1/2 miles from the shore is limited by the 6-fathom curve. Several islets are situated in this bight; Pulau Sugara, the largest and highest, is located almost 3/4 mile northward of the mouth of the Sungei Kinarut.

TANJONG DUMPIL (5°54' N., 116°02' E.) is a salient headland, about 180 feet high, on which stand some trees. A reef extends about 1 mile westward from Tanjong Dumpil as limited by the 6-fathom curve, and about 1/2 mile within its outer extremity is Dumpil Rock, a head that uncovers 1 foot.

From Tanjong Dumpil the coast trends regularly northward for about 3 1/4 miles to Tanjong Aru, a low flat point, and then north-eastward for about 4 miles to Tanjong Lipat, the southeastern entrance point of Jesselton Harbor. Between Tanjong Dumpil and Tanjong Aru shoal water with depths of less than 6 fathoms fringes the coast to a distance of 3/4 mile. Foul ground with drying and above-water rocks extends about 1 mile from Tanjong Aru as limited by the 6-fathom curve, and islets and detached dangers, described below, lie farther off. A shallow ridge, on which are many drying and above-water heads, connects the eastern extremity of Pulau Gaya to the coast in the vicinity of Jesselton, about 1 mile southeastward. South Channel, intricate, narrow, and unmarked, leads across this ridge into Jesselton Harbor, but it is used only by local boats. A 1925 report gives its depth as 6 feet.

A radio mast marked by a red obstruction light is located about 1 1/4 miles south-southeastward of Tanjong Aru.

10-118 Off-lying islands and dangers.—A group of three islands lies from 1 3/4 to 2 3/4 miles west-northwestward of Tanjong

Aru, and between them and the foul ground extending off the point are several detached reefs and shoals. Foul ground with depths of less than 6 fathoms fringes these islands to a greatest distance of 3/8 mile. Pulau Manukan, the largest and northernmost island, is 352 feet high and almost 1 mile long in an east-west direction. The two smaller islands, Pulau Mamutik and Pulau Sulug, lie respectively southward of its eastern and western extremities. In northerly winds anchorage can be taken off the southern side of Pulau Manukan in a depth of 14 fathoms, mud.

10-119 Cable area—Caution.—A cable area lies off Tanjong Aru within the following limits:

From a position about 2 miles, 325°30' from the south end of Pulau Manukan the north limit extends to the south end of Pulau Manukan, and thence in a 090° direction to the shore.

The south limit extends about 4 3/4 miles, 270° on the 5°56' parallel of latitude, from the shore southward of Tanjong Aru.

Vessels are warned not to anchor within these limits owing to the existence of telegraph cables.

10-120 SOUTH HILL ROCK (5°59' N., 115°52' E.), a pinnacle with a depth of 2 3/4 fathoms, lies about 7 1/2 miles westward of Pulau Manukan.

10-121 Southern and western side of Pulau Gaya.—Pulau Gaya, about 4 miles long in an east-southeast and west-northwest direction, lies with Tanjong Sindian, its eastern extremity, about 1 1/4 miles westward of Tanjong Lipat. The island is densely wooded except for its summit, 950 feet high.

Between Tanjong Sindian and Tanjong Wokong, the south extremity of the island, about 1 1/2 miles west-southwestward, the coast is indented by a foul bight known as Karei Bay. A shoal with a least depth of 1 1/4 fathoms lies about 5/8 mile south-eastward of the southern extremity of the island and in the approach to South Channel. A red beacon and a white beacon mark the southern side of this shoal. Two other shoals lie in the approach to South Channel to the southward of the one marked by beacons.



Between the southern extremity of Pulau Gaya and the southwestern extremity of the island, about  $2\frac{1}{4}$  miles west-northwestward, the coast is indented by several coves. The 6-fathom curve lies nowhere more than  $\frac{1}{8}$  mile offshore, and there are no dangers outside this limit.

From the southwestern extremity of Pulau Gaya a shoal tongue with depths of less than 6 fathoms extends for about  $\frac{5}{8}$  mile southwestward and  $\frac{1}{2}$  mile westward. Close off the point and on this tongue is a 355-foot thickly wooded islet named Pulau Sinjataan (Loney). A detached  $3\frac{1}{2}$ -fathom patch lies about 400 yards southward of the islet.

Edgell Patches, two small 7-fathom banks, lie from  $\frac{3}{4}$  mile to 1 mile westward of Pulau Sinjataan. Another 7-fathom patch lies about  $1\frac{1}{4}$  miles north-northeastward of Edgell Patches, about  $\frac{1}{4}$  mile off the west side of Pulau Gaya.

The western coast of Pulau Gaya extends northward from the island's southwestern extremity to Tanjong Bulijong, its northern extremity. The 6-fathom curve lies at a greatest distance of about 400 yards from this coast and about 250 yards northward of Tanjong Bulijong; there are no dangers outside this limit.

A light is shown from Tanjong Bulijong.

**10-122 JESSELTON HARBOR APPROACH.**—Jesselton Harbor is approached through an extensive bight formed between the northeastern side of Pulau Gaya and a mainland projection about 5 miles northeastward. Pulau Sapangar, a densely wooded island, lies somewhat to the northward of the middle of this bight; that part of the bight to the eastward of this island is known as Sapangar Bay and the part to the southward is known as Gaya Bay. The depths in the channel southward of Pulau Sapangar and through Gaya Bay to Jesselton Harbor are ample for vessels of any draft, and with the exception of Creighton Patch, described in sec. 10-127, there are no detached dangers along this route.

Gaya Head, the western extremity of the peninsula on the northeastern side of the approach, is located almost  $5\frac{3}{4}$  miles north-eastward of Tanjong Bulijong. It is a dense-

ly wooded bluff, from which the land rises sharply to Bukit Penaga, 1,112 feet high, about  $\frac{3}{4}$  mile eastward.

**10-123 Northeastern side of the approach.**—From Gaya Head the coast trends south-south-eastward for a distance of about 2 miles to Tanjong Melanim, the western entrance point of the inner part of Sapangar Bay. Several coral patches, with a least depth of 6 fathoms, lie about 1 mile southward of Gaya Head and about  $\frac{1}{4}$  to  $\frac{1}{2}$  mile off the coast.

**Pulau Sapangar**, 670 feet high and densely wooded, lies about  $1\frac{1}{2}$  miles west-southwestward of Tanjong Melanim. This island is fringed with reefs except near the western side of its southern end. Shoal water, with depths of less than 6 fathoms, extends about 400 yards from the southern, and 600 yards from the northern extremity of this island. A drying reef extends about 475 yards southward from the eastern extremity of the central part of the island.

**10-124 Islets and channels between Pulau Sapangar and the northeastern shore of the approach.**—Pulau Udar Besar, 201 feet high, lies about 800 yards eastward of the northern extremity of Pulau Sapangar, from which it is separated by a narrow unmarked channel, with depths of 7 to 14 fathoms. The channel has a least width of about 200 yards at its north part.

Pulau Udar Besar stands on a bank, with depths of less than 3 fathoms, which extends about 400 yards southwestward from the island and 200 yards elsewhere. A rock, awash, lies on the southwest edge of this bank, and a similar rock stands near the north edge.

Pulau Udar Kechil, 166 feet high, and Pulau Udar Priok, 97 feet high, lie between Pulau Udar Besar and the coast and are located about  $\frac{5}{8}$  mile northwestward of Tanjong Melanim. These islets are connected to each other, and to the coast northeastward, by a reef, which also extends about 100 yards southwestward from the former islet. An unmarked channel, with depths of from 7 to 12 fathoms, with a least width of 150 yards between the 6-fathom curves, lies between Pulau Udar Besar and Pulau Udar Kechil. These islets together with Pulau Sapangar and Pulau Udar Besar form the western side of Sapangar Bay.

**10-125 Sapangar Bay** is entered between the southern point of Pulau Sapangar and Tanjong Tarak Tarak, which lies about 2 1/2 miles east-southeastward. It is one of the most secure harbors on the northwest coast of Borneo and is available to all classes of vessels.

From Tanjong Tarak Tarak the eastern side of the bay trends northeastward for almost 1 mile to the Sungei Kabatuan. A conspicuous yellow patch lies on the hillside about 6/10 mile northeastward of Tanjong Tarak Tarak.

Coral reefs, above water in places, extend about 800 yards offshore from Tanjong Tarak Tarak and also from the coast between that point and the mouth of the Sungei Kabatuan.

The Sungei Kabatuan may be identified by a yellow sandstone bluff on the northern side and by the abrupt angle of the coast on the southern side of the entrance. The bar, composed of coral knolls, has a least depth of about 2 feet, but there are greater depths within.

From its entrance, between Sungei Kabatuan and Tanjong Melanim, a distance of about 1 mile, the inner part of Sapangar Bay extends northeastward for about 1 1/2 miles to its head. Coral reefs, above water in places, extend from 300 to 500 yards from the shores of this part of the bay. Several drying reefs lie within the 6-fathom curve about 1 mile northward of the mouth of the Sungei Kabatuan.

**10-126 Anchorage.**—The usual anchorage in Sapangar Bay is in depths of 9 to 12 fathoms off the mouth of the Sungei Kabatuan. Vessels can anchor anywhere in the bay according to the prevailing wind. The bay affords very secure anchorage in the Northeast Monsoon.

**10-127 Southwestern side of the approach.**—Between Tanjong Bulijong and Tanjong Torajun, which lies about 2 1/4 miles east-southeastward, the northern coast of Pulau Gaya is indented by two bays, which are separated by Merangis Point. A reef extends about 1/4 mile northeastward from Tanjong Torajun.

**Gaya Bay**, the name given to the area southwestward of Sapangar Bay, is entered from sea-

ward between the southern extremity of Pulau Sapangar and Tanjong Torajun.

Malaohom Bay lies on the southern side of the entrance between Tanjong Torajun and Tanjong Logong, which is located about 1 mile southeastward. Coral reefs fringe the shores of this bay, especially near its southeastern end.

From Tanjong Tarak Tarak the eastern side of the bay trends southward for nearly 1 1/2 miles to Tanjong Lita. Between the latter point and Tanjong Lipat, about 2 miles southwestward, the coast recedes forming a shallow bay, the greater part of which dries. Sungei Inanam, which is available for small boats, flows into this bay.

A flat, almost awash in parts and on the outer part of which there is a reef, extends about 6/10 mile westward from Tanjong Lita. A rock, 4 feet high, lies on the northern part of the reef, and a rock, 5 feet high, lies on the southern part of the reef.

A coral patch, with a least depth of 1 1/2 fathoms, lies within the 6-fathom curve about 1 mile southwestward of Tanjong Lita.

A detached 4-fathom patch lies about 1/2 mile west-northwestward of Tanjong Lita.

Crichton Patch, with a least depth of 5 fathoms, lies about 1 1/2 miles west-southwestward of Tanjong Lita and in the fairway of the approach to Jesselton Harbor.

**10-128 Anchorage.—Directions.**—Vessels can anchor anywhere in Gaya Bay.

Vessels proceeding to Gaya or Sapangar Bays should pass about 1 mile southward of Pulau Sapangar and thence to the anchorage selected.

Small craft with local knowledge can enter through the narrow channel between Pulau Sapangar and Pulau Udar Besar.

**10-129 JESSELTON HARBOR**, the principal port on the northwest coast of Borneo, comprises the area lying between the eastern side of Pulau Gaya on the westward, the Borneo shore to the southeastward, and the shallow ridge connecting Pulau Gaya to the mainland on the southwestward. The harbor is partly exposed

to the northward, but receives some protection from Pulau Sapangar and the reefs projecting from the northwestern side of the entrance. The main entrance lies between Tanjong Logong and Tanjong Lipat, about 2 miles southeastward, but local small craft can enter from the southwestward via South Channel. (See sec. 10-117.) Reefs fringe much of the shoreline of the harbor, extending a considerable distance from the western side. Within this fringing reef the depths range from 6 to 12 fathoms.

A conspicuous building stands on the range of hills backing the town, about 1600 yards southwestward of Tanjong Lipat.

**10-130 WESTERN SIDE OF JESSELTON HARBOR.**—From a point about 3/8 mile southward of Tanjong Logong, a reef extends about 5/8 mile to the eastward. A LIGHT BEACON, painted black and white, located a little less than 2/3 mile 349 1/2° from Grieve Reef Light Beacon, stands on the east extremity of this reef. Pulau Plompong, an islet 46 feet high and a small islet close southwestward, lies on this reef about 1/2 mile southeastward of Tanjong Logong. Shoal water within the 3-fathom curve extends for a distance of 275 yards to the northward and 875 yards to the southward from Pulau Plompong.

Gaya Harbor lies between the foul ground described above and a reef which extends about 1/4 mile east-northeastward from Tanjong Sindian, which lies about 1 mile southward of Tanjong Logong. From the head of this harbor reefs almost awash and with a patch, which dries near their eastern edge, extend about 600 yards offshore; these reefs are steep-to. A detached shoal, with a least depth of 4 feet, lies about 1/2 mile northward of Tanjong Sindian. Several tongues of deeper water extend into these reefs. Depths of 6 to 9 1/2 fathoms are found in this harbor outside the fringing reefs.

Reefs, which dry near the shore, extend about 600 yards east-southeastward from Tanjong Sindian. A detached reef, with a least depth of 1 foot, lies about 100 yards farther in the same direction. The northeastern side of this detached reef is marked by a black stake located about 850 yards eastward of Tanjong Sindian.

Harris Reef, with a least depth of 1 foot and marked by a black and yellow BEACON

surmounted by a cone, lies about 1/2 mile east-southeastward of Tanjong Sindian.

A reef lying about 100 yards southwestward of Harris Reef is marked by a black and yellow stake on its east side.

A 14-foot shoal, marked by a red BUOY on its north side, lies about 400 yards southward of Harris Reef Beacon. Two shoals, with depths of 15 feet and 9 feet, lie close together about 570 yards south-southeastward of the above beacon. A detached reef, with a least depth of 1 1/2 feet, is located about 1/4 mile south-southwestward of Harris Reef. A black and yellow stake marks its north side.

**10-131 SOUTHEASTERN SIDE OF JESSELTON HARBOR.**—From Tanjong Lipat the coast trends regularly southwestward for about 3/4 mile to the pier, and the town fronts the shore for about another 3/4 mile southwestward. A light is shown from the north end of the pier. About 350 yards within its extremity Tanjong Lipat rises to a 267-foot hill, on the summit of which stands a white triangular BEACON. A flagstaff, from which signal communication with vessels in the harbor is carried out, stands on a 280-foot hill located south-southeastward of the pier.

An apartment building located about 1/4 mile southeastward of the root of the pier forms a conspicuous mark.

A group of oil tanks are located about 400 yards east-southeastward of the north extremity of the pier. In 1961, building was in progress on reclaimed land which extends about 800 yards northeastward from the oil tanks.

**10-132 DANGERS ON THE SOUTHEASTERN SIDE OF THE HARBOR.**—Reefs and shoal water with depths of less than 6 fathoms extend for about 3/8 mile northwestward from Tanjong Lipat. Normanhurst Reef, at the outer end of this area, has a least depth of 3/4 fathom, and Comber Reef, with a least depth of 2 feet, lies about midway between it and the point.

Between Tanjong Lipat and the pier, shoal water with depths of less than 3 fathoms fringes the shore to a greatest distance of about 400 yards. A stake, painted red and white, with a triangular topmark, stands near the outer edge of this shoal 125 yards east-southeastward of the north end of the pier.

Hewlett Reef, with a least depth of 1 foot lies about 1/2 mile west-southwestward of Tanjong Lipat and 400 yards offshore. It is marked by a red and white beacon, with a rectangular, red and white topmark.

A detached reef, with a least depth of 1 foot, extends about 150 yards northwestward from a position about 100 yards west-southwestward of the southwest end of the pier. A black and yellow beacon marks the north edge of the reef and a yellow stake stands near the east end of the reef.

A dangerous wreck with 2 feet over it lies about 200 yards northeastward of Hewlett Reef Beacon.

10-133 Dangers in the fairway.—Grieve Reef, with a least depth of 5 feet, lies about 8/10 mile to the west-northwestward of Tanjong Lipat.

A light is shown on the east side of Grieve Reef. This light marks the west side of the fairway.

GUERITZ SHOAL, marking the eastern side of the fairway, has a least depth of 9 feet and lies about 1/2 mile to the west-northwestward of Tanjong Lipat. It is about 120 yards in extent within the 6-fathom curve. A lighted beacon with a rectangular topmark, painted red and white, stands on Gueritz Shoal.

10-134 Anchorage.—Good anchorage in 9 fathoms is afforded 1/4 mile northwestward of Grieve Reef. Very secure anchorage in the northeast monsoon is afforded in Sapangar Bay (sec. 10-125).

Anchorage is prohibited within 1/2 mile of pier at Jesselton. Vessels of less than 150 feet in length may anchor eastward of a line joining the head of the above pier and Gueritz Shoal.

A dangerous petroleum anchorage area, about 1 mile long in an east-west direction and about 3/4 mile wide in a north-south direction, lies with its center about 1 mile north-northeastward of Gueritz Shoal.

An explosives anchorage area of the same dimensions lies northward of and adjacent to the dangerous petroleum anchorage area.

The quarantine anchorage, a circular area with a radius of 1/3 mile, lies with its

center about 1 mile northward of Tanjong Logong (sec. 10-127).

10-135 Tides.—Tidal heights above datum of soundings are:—M.H.H.W. 5.6 feet; M.L.H.W. 3.9 feet; M.H.L.W. 3.8 feet; M.L.L.W. 1.8 feet.

Berthing signals.—Berthing signals are shown from the signal station flagstaff.

Berths to which vessels are assigned are indicated by a red and white checkered flag in conjunction with the International Code pennant.

Pennant No. 0....Anchor.

Pennant No. 1....Government Wharf, north section of seaward face.

Pennant No. 2....Government Wharf, south section of seaward face.

Pennant No. 3....Government Wharf, north section of inside face.

Pennant No. 4....Government Wharf, inner north section of inside face.

Pennant No. 5....Government Wharf, inner south section of inside face.

Pennant No. 6....Government Wharf, landing steps

Pennant No. 7....Small launch jetty.

Vessels will acknowledge the berthing signal with the answering pennant. The hoist at half mast indicates a vessel should prepare to move, but should not get underway until the hoist is close up.

Red and white checkered flags will indicate the bow and/or stern of the vessel on the berth assigned.

International Code flag "B" will be shown at the signal station when a vessel loaded with inflammable or dangerous cargo is berthing or unberthing.

Pilotage is not compulsory. Pilots are not normally stationed in Jesselton, however, they can be flown in from Labuan if required.

10-136 Directions.—Vessels approaching Jesselton Harbor should give a berth of about 3/4 mile to the northern coast of Pulau Gaya and pass the extremity of the

reef southeastward of Tanjong Logong at a safe distance; thence pass between the light structure on Grieve Reef and Gueritz Shoal and thence to the pier.

10-137 JESSELTON (5°59' N., 116°04.5' E.).—This town, located on the east side of the bay about 1 1/4 miles south-southwestward of Tanjong Lipat, is the capital and chief port on the northwest coast of Borneo. The town is the terminus of a railroad. The chief export is rubber.

The population consists of Malays, Chinese,

and a few Europeans. The total population (1960) is 22,000.

Berthing.—Delays in berthing of up to 2 days due to weather conditions and port congestion were experienced by vessels in the latter part of 1964.

Wharf.—The main and only deep water wharf is located north of the town. The outer face of the T-headtype wharf is about 647 feet long in a 014°—194° direction and about 40 feet wide. The north inner face is about 480 feet long and the south inner face about 117 feet long. Least depths alongside are:



Smaller vessels can anchor in the center of either of the coves at the head of the bay, but the available space in these is very limited.

10-147 DIRECTIONS.—Vessels approaching from northward should pass eastward of Belcher Shoal by keeping Mt. Kina Balu, if visible, bearing 135° or by keeping Tanjong Perunjuk bearing about 151°. From a position eastward of the shoal, vessels should steer through the entrance and to the anchorage by keeping about 500 or 600 yards westward of Tanjong Perunjuk.

Vessels approaching from southwestward should steer for Pulau Jaga (Pandan Pandan), in line with Robertson Hill, about 1 1/4 miles northeastward, bearing 064°. When eastward of Belcher Shoal proceed as directed above.

10-148 COAST.—Tangah Bay and Saundal Bay lie between Tanjong Perunjuk and Tanjong Saundal, about 2 miles northward. These small bays are separated from each other by a narrow peninsula terminating in Tanjong Tangah, 155 feet high. They are open to the westward, but afford shelter during easterly winds. There is a village at the head of Tangah Bay.

A SHOAL, with depths of less than 3 fathoms, extends about 1/4 mile westward from Tanjong Tangah.

Pulau Jaga (Pandan Pandan), a conspicuous, sandstone-cliffed island 150 feet high and thickly wooded, lies about 1/3 mile southward of Tanjong Saundal and close within the outer end of a coral reef that extends southward from the point. The extremity of the reef lies about 300 yards southeastward of Pulau Jaga.

From Tanjong Saundal the coast trends northeastward about 1 1/4 miles to Tanjong Kaduka (Sak), the southern entrance point of Usukan Bay. Between these points the 3-fathom curve lies up to about 600 yards offshore. This stretch of coast forms the northwestern side of a prominent headland that separates Saundal Bay from Usukan Bay. This grassy-sloped headland rises in Robertson Hill, which is 614 feet high and has a conspicuous grassy summit.

10-149 DANGERS.—Preston Shoal, a coral patch with a least depth of 16 feet, extends about 750 yards northwestward from a position about 1/2 mile west-northwestward of Tanjong Saundal. The shoal has a greatest width of about 300 yards.

A 4 3/4-fathom patch lies about 800 yards northward of Tanjong Saundal and about 500 yards offshore.

Sunk Rock, which dries 5 feet, lies just within the extremity of a shallow spit extending about 1/3 mile westward from Tanjong Sak. Isolated 3-fathom patches lie in the vicinity of Sunk Rock, and a coral patch with a least depth of 3 3/4 fathoms over it lies about 400 yards northwestward of the rock. (See sec. 10-153 for bearing that leads northwestward of the dangers between Tanjong Saundal and Tanjong Sak.)

10-150 USUKAN BAY indents the coast about 1 1/2 miles in a southeasterly direction and is entered between Tanjong Sak and the western extremity of Pulau Usukan, the island lying about 1 1/2 miles northward. Pulau Usukan, conical in shape and densely forested, is 418 feet high and lies close off the extremity of a peninsula that forms the northeastern side of the bay. A sandspit, which dries 3 feet, connects the eastern side of Pulau Usukan to the peninsula. A boat passage with a depth of 3 feet at high water leads through this spit northeastward to Kuala Abai, a shallow bay. Usukan Bay has general depths of 6 to 11 fathoms, the 6-fathom curve lying up to about 400 yards from the sides, and up to about 600 yards from the head, of the bay. The shores of Usukan Bay are indented by several small coves and are almost entirely fringed by drying coral reefs. The bay affords the best protection on the northwest coast of Borneo, northward of Gaya Head.

LIGHT.—A light is shown from the west extremity of Pulau Usukan.

10-151 DANGERS.—A mud and coral spit with depths of less than 3 1/4 fathoms over it extends about 3/4 mile southwestward from the western end of Pulau Usukan. Slime Rock, a conspicuous rock 14 feet high, lies on this spit in a position about 1/2 mile southwestward of the western end of Pulau Usukan. IRIS ROCK, which dries 3 feet, lies about midway between Slime Rock and the point. Several rocks lie in the vicinity of Slime Rock and a rock, with less than 6 feet over it, lies about 250 yards southward of Slime Rock.

Reyne Shoal, a steep-to 4-fathom coral patch, lies about 600 yards off the northeastern side of Usukan Bay and about 3/4 mile northeastward of Tanjong Sak.

10-152 ANCHORAGE.—Anchorage is available in a depth of about 8 fathoms, mud, in the center of the inner part of Usukan Bay in a position about 1/2 mile westward of the jetty lying about 1 1/4 miles eastward of Tanjong Sak.

Anchorage for small vessels is available in a depth of about 7 fathoms on the southern side of the inner part of the bay in a position about 600 yards east-southeastward of Shelter Point, a point on the southern side of the bay lying 1/2 mile east-southeastward of Tanjong Sak. During the summer months this anchorage affords shelter from the prevailing winds.

10-153 DIRECTIONS.—Vessels approaching from the southward can clear the dangers between Tanjong Saundal and Tanjong Sak by bringing Abai Bluff to bear 68°. Abai Bluff is a point, 316 feet high, located close eastward of Pulau Usukan and is visible on that bearing between the island and the mainland. This bearing should be maintained until Shelter Point opens northward of Tanjong Sak and bears about 111°. A course of 096° should then be steered. When northward of Shelter Point, vessels should haul southeastward and steer to the anchorage.

Vessels approaching from the northward should steer for Pulau Jaga, bearing 187° and open westward of Tanjong Saundal. This course leads about 500 yards westward of the dangers off Slime Rock. When Slime Rock bears about northeast, the course should be altered to about 104°. When northward of Shelter Point, the course should be altered for the anchorage.

10-154 SETTLEMENT (6° 22' 30" N., 116° 20' 38" E.).—The settlement is located at the east end of the bay. The port which has regular communication by sea with other ports in British North Borneo, is the principal outlet for trade from the interior.

10-155 PULAU USUKAN TO TANJONG SEMPANG MANGAYAU—GENERAL REMARKS.—From Pulau Usukan the coast trends generally north-northeastward about 47 miles to Tanjong Sempang Mangayau, the northern extremity of Borneo. This coast is moderately irregular, having few pronounced indentations, and has a few dangers lying outside the 10-fathom curve.

ASPECT.—This stretch of coast is backed by an extensive range of hills, the bases of some reaching the coastline. The Sir James Brooke Range extends about 16 1/2 miles

northward from a 3,404-foot peak located about 15 miles eastward of Usukan Bay to Mount Cochran (6° 37.5' N., 116° 38.5' E.), a rounded 2,600-foot peak. A rounded 3,957-foot peak lies close northeastward of the 3,404-foot peak, and Genung Madalong, a rounded 3,702-foot peak, lies 7 3/4 miles northward of the same peak. The land between the southern part of the Sir James Brooke Range and the coast is low. Northward, for a distance of about 14 miles from Mount Cochran, the hills gradually decrease in height, and finally terminate in a flat plain. About 6 1/2 miles farther northward the land again becomes hilly, some of the peaks being nearly 800 feet high.

KUALA ABAI, a shallow bay, is entered between Pulau Usukan and Abai Bluff, about 1 mile southeastward, and has a least depth of 4 feet on its outer bar. The Sungei Abai, a shallow river, empties into the head of the bay and the village of Abai lies on the western side of the bay near Abai Bluff. The bay and the river are used by small boats only. Vessels wishing to communicate with Sungei Abai should anchor in Usukan Bay, from which a boat passage leads southward of Pulau Usukan. (See sec. 10-150.)

10-156 COAST.—From Kuala Abai to Tanjong Makarang (Lok Padang), the coast trends northeastward for a distance of about 12 miles. The shores are densely wooded and heavy rollers make landing on this stretch of coast dangerous. The 6-fathom curve fronts the shore at a greatest distance of about 1 1/2 miles.

The Sungei Tempasuk (Tampussuk), a shallow river, is located about 3 1/2 miles northeastward of Abai Bluff and is barred by a sandbank. It is available to boats at high water only.

The Sungei Pandasan (Pendasan), located close southward of Tanjong Makarang, is available to boats only at high water and under favorable conditions. The village of Pandasan (Pendasan) lies about 1 mile eastward of the bar.

10-157 OFF-LYING DANGERS.—Alert Rock, on which the sea breaks and which dries about 6 feet, is located about 1 1/2 miles northward of the western extremity of Pulau Usukan. Rocky spits, with depths of less than 5 fathoms over them extend about 300 yards southward and 300 yards northeastward from the rock.

Mayne Rock, with a least depth of 10 feet,



lies about 4 miles north-northwestward of the western extremity of Pulau Usukan.

North Hill Rock, with a least depth of 1 fathom near its south extremity, lies about 3 3/4 miles northward of the northern extremity of Pulau Usukan.

Arsat Rocks, on which the sea generally breaks, consist of two small rocks, which dry about 8 feet, and are located about 8 miles northeastward of the northern extremity of Pulau Usukan and about 3 1/4 miles offshore. Foul ground, with a depth of 2 fathoms, extends about 1/4 mile northeastward from these rocks.

Tanjong Makarang, a moderately high sloping grassy point, rises to a height of 880 feet about 2 miles east-northeast of the point. A drying reef extends about 1/2 mile northward from the point, and on its outer end are the two Antislets, one of which is 75 feet high.

Ant Rocks consist of two groups of rocks, drying 6 feet and steep to, located between 1/2 mile and 1 mile northwestward of Ant Islets. The inner group is separated from the islets by a 9-fathom channel. Between the two groups of rocks there is a 7-fathom channel. The outer group lies close to the 10-fathom curve. A 3-fathom patch is located about 1/2 mile eastward of the outer group. Vessels should not attempt to pass inshore of these rocks.

A shoal with a depth of 40 feet over it, is located about 3 miles west-northwestward of Tanjong Makarang.

A shoal, with a least depth of 3-fathoms over it, is located about 1 mile north of Tanjong Makarang.

Umpohl Shoals, with least depths of 26 feet lie about 2 miles northward of Tanjong Makarang and outside the 10-fathom curve fronting the coast.

10-158 Coast.—From Tanjong Makarang the coast trends north-northeastward about 8 1/2 miles to a point close westward of which, and joined to it at low water, lies Pulau Bisa (Sisa) (Silad), a small and thickly wooded islet, 220 feet high.

Between Tanjong Makarang and Tanjong Gasap (Dudar), which lies about 5 1/2 miles north-northeastward, foul ground, with depths of less than 3 fathoms, extends up to about 3/4 mile offshore.

Between Tanjong Gasap and Pulau Bisa

the coastal reef extends about 600 yards offshore. A shoal with a least depth of 6 feet is located about 1/2 mile west-southwestward of Tanjong Gasap. A steep-to coral reef, which dries 6 feet, is located about 1/2 mile north-northwestward of Tanjong Gasap and within the 6-fathom curve fronting the shore. Two coral patches, with depths of 8 and 6 fathoms, are located outside the 10-fathom curve and in positions about 2 1/2 miles westward and 1 mile northwestward, respectively, of Tanjong Gasap. Two choral shoals, with depths of 10 and 11 feet over them, are located about 1/2 mile and 1 3/4 miles, respectively, southwestward of Pulau Bisa. There is a 45-foot shoal patch about 1 3/4 miles northwestward of Pulau Bisa.

10-159 WHITE ROCKS BAY.—Between Pulau Bisa and Tanjong Indarasan, 7 1/4 miles north-northeastward, the coast recedes and is fringed with reefs and shoals to a distance up to about 1 1/3 miles. White Rocks Bay, open to the northwestward and southwestward, lies to the eastward of the shoal area surrounding White Rocks, which are located about 4 miles north-northeastward of Pulau Bisa and about 2 1/2 miles from the receding coast. The bay has a greatest width of about 1 3/4 miles and its approaches are obstructed by reefs and shoals. It affords protection during the monsoons.

A 4 1/2-fathom patch lies in the southern approach to this bay about 1 mile northeastward of Pulau Bisa and outside the 6-fathom curve fronting the coast. A dangerous 6-fathom pinnacle lies 1 3/4 miles northwestward of Pulau Bisa.

Harry Shoals have a least depth of 1 1/4 fathoms and are located about 2 1/2 miles northeastward of Pulau Bisa. These shoals are almost joined to the mainland southeastward by a spit extending about 1 mile from the shore.

Beehive Rocks (Batu Laya Laya) are two conspicuous rocks near the outer end of the coastal reef on the southeastern side of the bay. The southwestern rock 38 feet high, is located about 4 miles northeastward of Pulau Bisa; the northeastern rock, 34 feet high, lies about 3/4 mile farther in the same direction. About 400 yards northwestward of the 38-foot Beehive Rock is a depth of 1 1/2 fathoms; about 1/4 mile northwestward of the same rock is a rock awash.

Two shoals with least depths of 4 fathoms lie in the northern approach to the bay, in positions about 1 mile west-southwestward and  $1\frac{1}{2}$  miles west-northwestward of Tanjong Indarasan.

A 3-fathom shoal and a  $4\frac{3}{4}$ -fathom pinnacle, about  $\frac{1}{4}$  mile apart, were reported to lie about  $1\frac{1}{4}$  miles south-southwestward of Tanjong Indarasan.

**10-160 The anchorage** is in a depth of 11 fathoms near the center of the bay in a position about  $1\frac{1}{2}$  miles northeastward of White Rock. Vessels entering by the southern entrance should keep the western extremity of Pulau Bisa, bearing  $217^\circ$  astern until the southwestern Beehive Rock bears about  $81^\circ$ , when course should be altered as necessary for the anchorage. Vessels entering by the northern entrance should steer for the northeastern Beehive Rock, bearing  $154^\circ$ , which course will lead clear of all dangers to the anchorage.

**White Rocks—White Rocks Reef.**—White Rocks, located about  $3\frac{3}{4}$  miles north-northeastward of Pulau Bisa, are a conspicuous group of rocks, the highest of which is 43 feet. Reefs extend about 2 miles northward and 1 mile southwestward from White Rocks. White Rocks Reef, the northern reef, dries 4 feet. These reefs protect White Rocks Bay from the westward. A rock, with a depth of  $6\frac{1}{2}$  fathoms, lies about  $1\frac{3}{4}$  miles south-southwestward of White Rocks.

A detached  $3\frac{1}{2}$ -fathom patch and a detached 6-fathom patch lie 1 mile westward and  $1\frac{1}{4}$  miles west-northwestward, respectively, of White Rocks.

**Mantanini Islands—Light.**—The Mantanini Islands from which a light is shown, lie about 18 miles westward of White Rocks Bay and are described in detail in sec. 10-167.

**10-161 Coast.**—Between Tanjong Indarasan and Tanjong Dandulit, a rocky bluff located about 2 miles northward, shoals with depths of less than 3 fathoms extend about 1 mile off shore.

Between Tanjong Dandulit and Tanjong Tambuluran (Agal-Agal), about 5 miles northward, the coast forms a rather sharp indenture about midway between the two points. Agal Bay lies in this indenture. The coast is foul with rocks and shoals extending about  $1\frac{1}{2}$  miles to 3 miles from the coast.

Agal Bay is obstructed by **reefs**, which extend from both shores, but it is reported to afford secure anchorage, in a depth of about 4 fathoms, for small craft with local knowledge during the northeast monsoon. Sungei Garu, a shallow river, flows into the shallow head of the bay. A **shoal** with a depth of  $5\frac{1}{2}$  fathoms is located near the entrance of Agal Bay and about 2 miles south-southwestward of Tanjong Tambuluran.

Tanjong Tambuluran is low and difficult to distinguish. **Shoal water** with depths of less than 6 fathoms extends about  $2\frac{1}{2}$  miles west-northwestward from it and within this shoal water a narrow reef, on which there are several rocks from 2 to 4 feet high, extends about  $1\frac{3}{4}$  miles westward from Tanjong Tambuluran.

**Batumandi Rock**, 53 feet high and composed of yellow sandstone, is located about  $\frac{1}{4}$  mile westward of the western extremity of the reef fringing Tanjong Tambuluran and is surrounded by a reef. A rock, with a depth of less than 6 feet over it, is located about  $\frac{1}{2}$  mile northwestward of Batumandi Rock and close outside the 6-fathom curve fronting Tanjong Tambuluran.

**10-162 Coast.**—From Tanjong Tambuluran the coast trends north-northeastward about 12 miles to Tanjong Sempang Mangayau, the northern extremity of Borneo. Tanjong Bangau, a black rocky promontory 410 feet high, lies about midway between them. There are heavy rollers along this part of the coast.

The coast between Tanjong Tambuluran and Tanjong Bangau is fringed with reefs, and foul ground extends up to about  $1\frac{1}{4}$  miles from the shore.

Two detached cliffs, one 30 feet high and of a reddish color, and the other 50 feet high and white, lie, respectively, about  $1\frac{1}{4}$  and  $2\frac{3}{4}$  miles east-northeastward of Tanjong Tambuluran. They are good landmarks. Sungei Kurina, a small river navigable by boats at high water, flows out through the sandy beach close southward of the white cliff.

The coast between Tanjong Bangau and Tanjong Sempang Mangayau is fringed by a reef that extends up to about  $\frac{1}{2}$  mile offshore. A rock, which dries 3 feet, lies about  $\frac{1}{2}$  mile northward of Tanjong Bangau. The entrance to the Sungei Ruru, a small river fronted by a drying reef, lies close northeastward of Tanjong Bangau.