curve. For additional information on tides and tidal currents, see section 10–3.

WINDS AND WEATHER

10C–5 See section 10–2.

COASTAL FEATURES

10C–6 BETWEEN TANDJUNG ARU AND TANDJUNG GILING, the coast is very low and is intersected by a number of rivers. The latter point has a large round-topped tree on it. Drying reefs and dangers lie within the 3-fathom curve.

TELUK APAR, formed by the delta of a large stream, flows out just southward of Tandjung Giling. The outer bar has depths of 3 fathoms and less. There is, however, an area in the middle part of the entrance with depths of 3 to 6 fathoms. Within this area the depths decrease sharply and the stream is only navigable by small craft. An out-going current of 2 knots is felt between the 5- and 10-fathom curves during the rainy season.

SUNGAI PASIR flows out through the north part of the coast between Tandjung Giling and Tandjung Mandu. Karangan Reef, Batu Meha Reef, and Palambu Reef, partly drying reefs, all lie within the 5-fathom curve in the southeast approach to the river. The first-named reef is marked by a red BEACON with a red cylindrical topmark. A 4¾-fathom patch lies about 1¾ miles eastward of the beacon. The entrance BUOY for the Sungai Pasir is a conical buoy, painted in red and white stripes and having a cross topmark. The buoy is moored about 7 miles eastward of Tandjung Teriti. The entrance channel is marked but is only suitable for small light-draft craft.

TELUK ADANG, entered between Tandjung Mandu and Tandjung Maruat, is a broad estuary which indents the coast to a distance of 15 miles. Several rather important rivers intersect the shores of the estuary. The shores of the bay are low. Pasirmajang, a large village, stands on the left bank of the Sungai Pasirmajang which flows into the head of the bay.

DEPTHS AND DANGERS.—A mud bank, 2¾ miles broad in places, fronts the north shore of the bay. A dangerous wreck with masts showing is located 4½ miles east-northeastward of Tandjung Mandu. A wreck is charted in a position about 8½ miles eastward of the same point. A 2¾-fathom patch lies about 4½ miles northeastward of this point.

The channel has depths of 15 to 30 feet in the fairway along the south shore of the bay.

The entrances of the rivers are for the most part blocked by mud banks. However vessels with local knowledge and having a draft of 18 feet can proceed as far as Pasirmajang. Such vessels having depths of 16 and 11½ feet, respectively can reach the mouths of the Sungai Samunta (Lombok) and Sungai Adang.

ANCHORAGES.—Teluk Adang is open to easterly winds and swells. Small craft with local knowledge can find protection within the river mouths. Strong currents are reported at times in the bay and in its approaches.

BETWEEN TANDJUNG MARUAT AND TANDJUNG DJUMALAI, the coast is low and muddy. All dangers are contained within the 5-fathom curve which lies up to 3½ miles offshore. Several drying reefs lie within this curve to the southward and southeastward of the latter point. A BEACON with a black topmark stands on the southernmost reef.

It was reported (1963) that Tandjung Djumalai was a good radar target at a distance of 15 miles.

TELUK BALIKPAPAN AND BALIKPAPAN

10C–7 TELUK BALIKPAPAN is entered between Tandjung Djumalai and Tandjung Tokong, about 5 miles north-northeastward. The land surrounding the bay is mostly low and swampy. Several rivers flow into the bay; most of them have wide mouths, but are very narrow close within. There are some hilly ridges backing the east shore of the bay. Some of these stand close to the shore, especially to the northward of Tandjung Makasar. Several islands

(4159) **INDONESIA—Borneo—Southeast coast—Balik Papan—Wreck.**—A dangerous wreck with only masts visible should be charted 0.92 mile **337°** from the Fl. light (1°16′28″ S., 116°48′29″ E. approx.).

(N.M. 32/64.)

(N.M. 25(1198), London, 1964.
H.O. Chart **2990**, 3097.
H.O. Pub. 72, 1962, page **362.**

(5801) **INDONESIA—Borneo—Southeast coast—Balikpapan—Chart amendments.**—1. The wreck (mast) charted about 2.5 miles 193° from Balikpapan Light (1°16.5′ S., 116°48.5′ E. approx.) will be expunged.

2. A dangerous wreck (mast) will be charted about 9.4 miles 105° from the light in (1).

(See N.M. 32 (4267) 1962.)

(N.M. 40/65.)

(B.P.I. 22 (168), Djakarta, 1965.)
H.O. Charts **2990, 3097, 3044** (2), **3045** (2).
H.O. Pub. 72, 1962, page **362.**

(5376) **INDONESIA—Borneo—Southeast coast—Balikpapan—Buoy established.**—A green spherical buoy should be charted close south of the dangerous wreck (masts) 0.92 mile 337° from the Fl. light (1°16′28″ S., 116°48′29″ E. approx.).

(See N.M. 32(4159) 1964.)

(N.M. 30(1423), London, 1964.)
H.O. Charts **2990,** 3097.
H.O. Pub. 72, 1962, page **362.**

(N.M. 41/64.)

SEE SHORT CORRECTIONS

are found in the middle of the inner part of the bay. Most of these are mangrove swamps, although the larger ones usually have a hill in their middle part. Balikpapan, the site of an oil refinery, is located on the east shore of the bay.

THE SUNGAI BALIKPAPAN carries comparatively deep water for a distance of 15 miles upriver, but neither the main river or its tributaries afford adequate inland communication.

TIDES AND CURRENTS.—The tides are mixed, but mostly of a semi-diurnal nature. The semidiurnal range at springs is about 8 feet, and the diurnal range is 1½ feet. The range at neaps is negligable.

Tidal currents are mostly of a semidiurnal nature. The current sets in a north-south direction. The south-going current usually flows at a greater rate, the maximum rate being about 2 knots. During the rainy season the out-going current can prevail. The change of direction usually occurs at about high water and low water. A strong current sets between Pulau Tokong and the coast to the eastward. The incoming tidal current sets away from the piers and the outgoing tidal current sets toward the piers.

DEPTHS AND DANGERS.—The times of entering or leaving the harbor is governed by the depth of water over the bar. In 1963 it was reported that a vessel with a draft of 25 feet 03 inches could cross the bar at any state of the tide with the maximum permitted HW draft being 32 feet 03 inches. In the inner roadstead, off the oil refinery, there were depths of 6 to 9 fathoms. Vessels having a length of 980 feet and draft of 34 feet could berth at the oil piers. The bottom of the entrance channel is of mud and sand. Shoal flats, as defined by the 3-fathom curve, extend 8 miles eastward from Tandjung Djumalai and 3¼ miles southeastward from the east entrance point, narrowing the entrance channel to a width of 1½ miles in places. Shoal patches, with depths of 2 and 2½ fathoms, lie 4¾ miles, 141½° and 6⅕ miles, 125°, from the light structure on Tokong Hill.

A danger area, which has a radius of 1 mile, lies with its center 4⅓ miles offshore and about 8 miles east-southeastward of the east entrance point. A depth of 4 fathoms has been reported (1959) to lie within this danger area in a position 8¾ miles east-southeastward of the same point. In late 1960, an obstruction was reported to lie about ⅓ mile west-northwestward of this position.

Several submerged and stranded WRECKS lie in the approach to Teluk Balikpapan. Some are marked by buoys. A dangerous wreck with its mast visible is located about 2 1/5 miles 193°40' from the light structure on Tokong Hill. A dangerous wreck, marked by a BEACON with a red bell topmark, surmounted by a red cylinder, lies about 4 miles south by eastward of the prominent (charted) hangar.

A reef with a least depth of 3 feet lies about ¾ mile north by eastward of Tandjung Tokong. A stranded wreck lies on the west side of the reef. A BEACON marks the northwest side of the reef.

LANDMARKS.—BALIKPAPAN PEAK (1°03′ S., 116°21′ E.), 4,439 feet high, can be seen from a great distance in clear weather. On bearings south of west the peak appears to be an irregular shaped trapezoid and on bearings north of west it appears conical in shape.

The neck of land on which Balikpapan stands is rather high. The yellow hangar of the airport, located 5½ miles eastward of Balikpapan, is prominent. A red cleft in the hills eastward of the hangar was reported to be conspicuous. Tokong Hill is 295 feet high and conical. A hotel with a black roof, on which is painted in white letters "Aera Hotel Kutai", is conspicuous. At night the glow of the lights of the oil refinery can be seen from a considerable distance.

10C-8 NAVIGATIONAL AIDS.—A light is shown from Tokong Hill.

A green Can Buoy is moored about 8¼ miles east of Tandjung Djumalai.

Outer Fairway Can Buoy painted in red and white vertical stripes and having a red cylindrical topmark, is moored about 9¼ miles eastward of Tandjung Djumalai.

Outer Fairway Lighted Buoy No. 2, painted red, is moored on the north side of the entrance channel.

The channel is marked by lighted and unlighted buoys. Navigators are cautioned that the positions of these buoys cannot always be relied upon. The channel lights have been reported (1959) extinguished.

SIGNALS are displayed from the signal station on Tokong Hill. The signal station is in telephonic communication with the office of the Captain of the Port. The code flag displayed from the signal station indicates which pier the vessel is to take. Flag "R" indicates vessel should anchor in the roadstead.

ANCHORAGES.—Vessels can anchor in 6 to 12 fathoms in the middle of the roadstead. A number of mooring buoys and hauling off buoys are located near the piers. Anchorage is prohibited within the area indicated by dashed lines on the chart.

PILOTS.—Pilotage is compulsory except for naval vessels. Pilots are requested by radio, or by signal lamp to the signal station. Ships arriving at night must anchor outside the outer buoy and send ship's names by signal lamp to the signal station. In 1962, pilots were available from 0600 to 1800. In 1962 it was reported due to the shortage of pilots, no movement of vessels were made after 2100.

Pilots board incoming vessels off the outer fairway buoy and take the ship through the swept channel to a position off the signal station on Tokong Hill. At this position a docking pilot will take over and berth the vessel. The pilot boat is a white launch flying the pilot flag.

Vessels should notify the port 48 hours in advance via radio stations Djakarta or Makasar, of their draft and ETA.

CAUTIONS.—Caution is necessary when approaching Balikpapan because of heavy refraction encountered at various times of the day. It has also been reported that numerous small fishing craft lie in the vicinity of the outer fairway buoy. The signals made from the signal station at night require that Tokong Hill Light be temporarily extinguished.

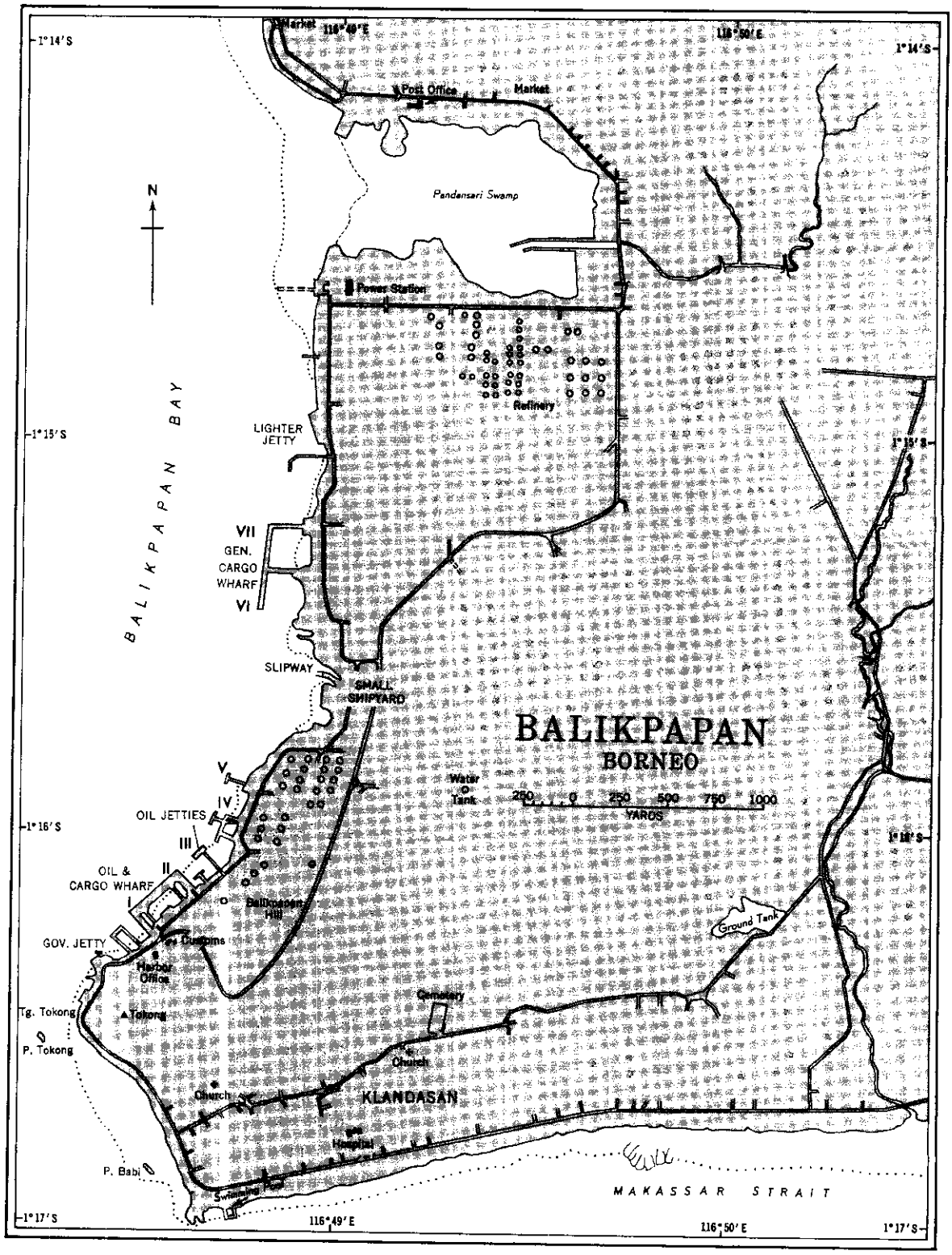
Much discolored water was noted (May 1962) off Balikpapan in 00°55′ S., 117°40′ E. The discoloration extended offshore about 20 to 30 miles in depths of 20 to 40 fathoms.

DIRECTIONS.—It is recommended that due to the unreliability of aids and the danger of drifting mines, that the approach to Balikpapan be made only during daylight hours. Vessels not having local knowledge should not attempt to enter the channel without the services of a pilot. Vessels approaching the piers should take in account the currents when berthing at the piers. Vessels of moderate draft moor to the oil piers on a northerly heading and when leaving can safely pass eastward and northward of the reef ¼ mile off these docks. Vessels of deep draft berthing at Pier 6 or 7 should dock port side to. The approach to the pier should be made at slack water or with the incoming tidal current.

The harbor master advises that tankers should enter in water ballast (which must be clean), as the winds are often strong. Ships lying at piers or at moorings must keep a wire tow rope ready at all times.

BALIKPAPAN (1°16′ S., 116°49′ E.)

10C-9 FACILITIES - BALIKPAPAN is the site of a large refinery which is located northeastward of Tandjung Tokong. The population is estimated to be about 91,706 (1961). The office of the port captain is located on the west side of a hill to eastward of Tandjung Tokong. The harbor office and customs office are located near the Government Jetty. The superintendent of pilotage for the east coast of Borneo has


Market
116°49'E
116°50'E
1°14'S
Post Office
Market
Pandansari Swamp
N
Power Station
Refinery
1°15'S
LIGHTER JETTY
BALIKPAPAN BAY
VII
GEN. CARGO WHARF
VI
SLIPWAY
SMALL SHIPYARD
BALIKPAPAN
BORNEO
V
IV
Water Tank
250 0 250 500 750 1000
YARDS
OIL JETTIES
1°16'S
III
II
OIL & CARGO WHARF
I
Balikpapan Hill
Ground Tank
GOV. JETTY
Customs
Harbour Office
Cemetery
Tg. Tokong
Tokong
P. Tokong
Church
Church
KLANDASAN
Hospital
P. Babi
Swimming Pool
MAKASSAR STRAIT
1°17'S
116°49'E
116°50'E
1°17'S

H. O. 72

offices in this vicinity. There is a chart depot at the harbor office. Exports include petroleum products, timber, rattan, and scrap iron.

PIERS.—Government Jetty, a pontoon pier, is used by small ships and pilot boats. Ships with a draft of 20 feet and a length of 196 feet can berth at this pier.

The largest ship to berth had a length of 665 feet.

Tanker limits (1962): 685 feet LOA, draft 24' 03" plus tidal rise.

	Berths	Berthing length	Depth	Use
		Feet	*Feet*	
Oil and cargo wharf	I and II	984	36½ to 39¾	General cargo—bunkering (tankers in an emergency).
Oil jetty	III	394	39¾	Tankers.
Do	IV	164	40	Do.
Do	V	164	35½	Do.
General cargo wharf[1]	VI and VII.	[2]780	36	General cargo and coaling.

[1]The south extension of Pier VI and Pier VII is 470 feet long, with a depth of 32 feet (Reported in disuse (1960).
[2]Approximately.

One TUG of 300 HP reported available (1962). There are many towing launches available.

CARGO INFORMATION.—Ships use their own gear in cargo operations. Piers I and II are equipped with two small cranes. Piers VI and VII have a 25-ton crane and a 5-ton crane. A crane stands on the south extension of Piers VI and VII. A 20-ton crane stands on the northeast corner of the latter pier. There are two floating cranes, one of 10-ton capacity and the other of 100-ton capacity. Many lighters with capacities of up to 400 tons and a floating pile driver are available.

The unloading capacity is about 2,500 tons per day, but the inland clearance is inadequate. Covered, open, and refrigerated storage facilities are available. There are railroad sidings on the cargo piers.

PROVISIONS.—Fresh provisions are obtainable in limited quantities and are expensive (1962).

DECK AND ENGINE SUPPLIES are not obtainable.

FUEL.—Oil is piped onto the piers and can be taken at a rate of 250 tons per hour. Diesel oil is obtainable at the same rate. Lubricating oil is unobtainable.

COAL for bunkering is not obtainable.

WATER is piped onto the main berths. It should be boiled before using. Available in emergencies only (1962).

REPAIRS of a minor nature can be accomplished. A slipway can accomodate vessels up to 135 feet in length, and up to 150 tons displacement.

COMMUNICATIONS.—Tankers call regularly at Balikpapan. These ships serve as mail carriers. The port is connected with the general telegraph system and has local telephone service. **There is a radio station (PKN) at the port. The airport is located about 5 miles eastward of the port.**

MEDICAL.—There is a modern hospital at Balikpapan. A harbor doctor is available and there is a waterfront clinic. There are facilities for disinfection, but not for fumigation. There is no quarantine station.

CLIMATOLOGICAL TABLES.—(See Appendix.)

COASTAL FEATURES (CONTINUED)

10C–10 BETWEEN TANDJUNG TOKONG (SEC 10C–7) AND TANDJUNG TAMBANGONGOT, the coast is somewhat higher than that to southward of Teluk Balikpapan. Some tall trees stand on the hills which are fronted by a sandy beach. Tandjung Tanahmerah can be identified by a small, steep hill of red sand standing near it. The sandy beach terminates at the settlement of Senipah and the shore northward becomes low and marshy. Sembodjalama (Sambodja), a settlement of oil refinery workers, is conected by telephone with Balikpapan.

DEPTHS.—Between Tandjung Tokung and Tandjung Tambangongot, the 5-fathom curve is

parallel with and about 3 to 5 miles from the shore. Within this curve the depths decrease gradually and the bottom is mostly of mud.

BUOY.—A white (unofficial) mooring buoy, from which a fixed violet light is shown when vessels are expected, is charted in a position about 5¼ miles east-northeastward of Sembodjalama.

DELTA OF SUNGAI MAHAKAM

10C–11 TANDJUNG TAMBANGONGOT (0°55′ S., 117°15′ E.), the southwest point of the delta, is low, but can be identified by a group of tall trees, about ¾ mile within its extremity.

GENERAL REMARKS

10C–12 SUNGAI MAHAKAM, the most important river on the east coast of Borneo, is navigable by small ships, having local knowledge, to Muara Pahu, a village about 150 miles upriver of Samerinda. The latter is an important river port.

Between Tandjung Tambangongot and an unnamed point about 43 miles north-northeastward, the coast is formed by a wide delta consisting of four main channels and numerous connecting passages. The outer shores of the islands forming the delta are low, swampy, and covered with stunted trees.

DEPTHS AND DANGERS

10C–13 There are three main channels among the various arms of the delta. These are Muara Pegah, Muara Bekapai and Muara Bajor. Muara Djawa, the west channel, has a very shallow outer bar. It, however, becomes the main channel, northward of its intersection with the Muara Pegah. Muara Berau, the north channel, is foul in its approach and shallow in its entrance.

A fringing bank from 3 to 7 miles wide extends out from the islands that form the delta. This bank dries in many places, and deepens sharply into 5 fathoms and thence into 10 fathoms. The various channels leading through this bank have depths of up to 10 feet.

Northward of the mouth of Muara Berau lie several charted reefs, seldom marked by discoloration, and of considerable danger to shipping. The northernmost known danger is a reef, with a depth of 8 feet, located 14½ miles north by eastward of Tandjung Lerung. A shoal, with a least depth of 4 feet, is located about 7 miles northeastward of this point. The easternmost of these dangers, a 1¾-fathom shoal, located 11 miles north-northeastward of the same point, is marked by a white BEACON with a ball topmark. Dangers extend 5 miles west-northwestward from this danger.

A 4-foot shoal, located about 8½ miles northward of the above point, is marked on its north side by a BEACON with a red truncated conical topmark. Detached dangers lie between this shoal and the coast to the westward and the dangers to the eastward.

WRECKS with masts projecting above water are located about 8 miles eastward of Tandjung Pamarung and 4½ miles east-northeastward of Tandjung Bajor.

TIDES—CURRENTS–TIDAL CURRENTS

10C–14 TIDE GAUGES, graduated in decimeters and giving the depths of the shoalest part of the outer bar of the Muara Pegah, are located 4¾ miles south-southwestward and 4½ miles north-northwestward of Tandjung Pegah. A tide gauge for outward-bound ships is located about 1¾ miles north-northwestward of Tandjung Pemarung. The gauge indicates the depth in feet on the outer bar channel of the Muara Bekapai.

In the Muara Djawa, the maximum spring rise of the tide is about 6 feet, and the maximum rise of the neap tide is 1⅔ feet. In the Muara Pegah, the tide is mixed, but predominently semidiurnal. The average spring range of semidiurnal tides is about 6 feet; the range at neaps is about ½ foot. The average spring range of diurnal tides is 2½ feet; the neap range is ⅓ foot.

SEE SHORT CORRECTIONS

The mean range of tide in the entrance of Muara Bajor (near Pulau Nubi) is 4¾ feet; the spring range is 6¾ feet.

CURRENTS.—For a considerable distance outside the delta there is either an inset or a strong outset of current. Outside the influence of the delta the constant south-going current through Makasar Strait is felt.

TIDAL CURRENTS.—Tidal currents of up to 2½ knots at ebb and 2 knots at flood were experienced in Muara Djawa during the months of September through December. During the rainy season and at neap tide the ebb current prevails. Near the outer bars of the Muara Pegah and the Muara Bekapai, the tidal currents set mostly in an easterly direction. At a position about 4 miles south-southeastward of Tandjung Tambangongot, the tidal currents vary between east and southeast with an average rate of ½ knot. At a position about the same distance south-southeastward of Tandjung Pegah, the tidal currents vary between southeast and northeast with an average rate of 1½ knots. At a position about 5 miles southeastward of Tandjung Pemarung, the tidal currents vary between southeast and northeast and have an average rate of 1½ knots.

The tidal currents in the Muara Pegah are semidiurnal. During spring tide the maximum rate at ebb is 3½ knots and at flood 2½ knots. During the rainy season the ebb current may be somewhat stronger. At spring tides the current changes its directions from ½ hour to 1 hour after the times of high and low water. At neap tides the ebb current predominates.

The tidal currents in the Muara Bajor are semidiurnal. The change in direction of the current near Pulau Nubi occurs from ½ hour to 1½ hours after high and low water there. The maximum rate is 2 knots. In the mouth of the Mura Bajor, the ebb current somewhat prevails because of the water discharged by the river. This influence becomes steadily greater farther upstream.

The currents in the Muara Berau are of a semidiurnal character. The flood current is strongest and can attain a rate of 2½ knots.

LANDMARKS—NAVIGATIONAL AIDS

10C–15 There are no good landmarks for the approach to Muara Djawa or Muara Pegah. It is reported that flaming gases on the north bank of the Sungai Mahakam, abreast the mouth of the Sungai Sanga Sanga, are visible from the offing and serve as good marks for making the approach to the above entrances.

TANDJUNG PEMARUNG can be identified by some tall trees with a wide opening on the north side. This point and the tree-covered Pulau Datu serve as useful landmarks for vessels approaching the Sungai Bekapai. Tandjung Bajor is a well defined point. A grove of high trees, which appear from the offing as an islet, stand near a village located on the south side of Muara Bajor in a position about 7 miles westward of Tandjung Bajor.

TANDJUNG SISI (Pelai) can be identified by a conspicuous group of trees standing on it. A similar group of trees stand on the east side of Muara Berau in the vicinity of Tandjung Lerung. The hill on Pulau Tunung is prominent from the southeastward.

NAVIGATIONAL AIDS.—A beacon with topmark of two red cylinders is located about 4 miles south-southeastward of Tandjung Tambangongot. The Muara Djawa is partially marked by buoys.

A beacon with a topmark of a red cylinder, surmounted by a rectangular board, and fitted with reflectors, is located about 4¾ miles south-southwestward of Tandjung Pegah. There is a tide gauge at this beacon (see section 10C–14).

A lighted buoy, painted in black and white checkers, is moored about 4¾ miles south-southwestward of Tandjung Pegah. (Reported missing, 1962). A lighted buoy, painted in black and yellow checkers, is moored about 4 miles south-southwestward of the same point. A lighted buoy, painted red, is moored about

SEE SHORT CORRECTIONS

2½ miles west-southwestward of the above point.

The channel across the bar of the Muara Pegah and into that river is partially marked by buoys. A beacon with two red truncated cones stands about 3 miles southward of Tandjung Pegah. A beacon with a truncated cone surmounted by a ball, both painted in black and white vertical stripes, stands about 3¾ miles south-southwestward of the same point.

The outer bars of the Muara Bekapai, Muara Bajor, and Muara Berau are unmarked. A light buoy, painted in red and white stripes, is moored off the entrance of Muara Budjet in a position about 8 miles south-southeastward of Tandjung Bajor.

PILOTS

10C–16 PILOTAGE is compusory for the Muara Djawa, Muara Pegah, Muara Bekapai, and Muara Bajor, except for certain exceptions. Pilot vessels are not on station. The pilots are qualified to take vessels up the Sungai Sanga Sanga, and up the Sungai Mahakam above Samarinda as far as Sebulu.

The pilot for inbound vessels should be requested by radio through their agent from the Harbor Master. The pilot boards all vessels close outside the lighted buoy at the outer entrance of Muara Pegah.

Pilotage at night is only permitted for certain vessels.

In case the pilot is unable to board the vessel outside the bar of Muara Pegah, the pilot boat will show a white light and will lead the vessel across the bar. The pilot will then board the vessel about 3¾ miles northward of the outer tide-gauge beacon.

CAUTIONS

10C–17 The water of the delta channels and surrounding coast are always muddy, and in the rainy season trees and large patches of vegetation are carried out to sea. These sometimes resemble islands or praus under sail. Vessels should keep well outside the 10-fathom curve in rounding the delta.

The passages over the bars and through the delta channels are subject to change and are only partially marked. Local knowledge is required and pilotage is obligatory.

DIRECTIONS

10C–18 SELAT LAUT TO SUNGAI MAHAKAM.—Vessels may follow the Borneo coast in depths of 8 to 10 fathoms as far as Tandjung Aru; passing westward of Hercules Reef (sec. 10A–3) and eastward of Aru Bank (sec. 10A–8), thence steering for the entrance of the Muara Pegah. Attention must be paid to the current which sometimes sets fairly strongly either toward or away from the coast. No directions are given for the entrances of the delta because local knowledge is necessary and pilotage is obligatory.

DELTA CHANNELS

10C–19 MUARA DJAWA, the west channel, is unmarked and is suitable only for prau traffic. The charted depths are unreliable. The inner bar at Pulau Tjerotjok and the strong currents hinder passage by ships of any size. The channel is about 25 miles long from the outer bar to its junction with the main stream. Sungai Dundang, which is spanned by a bridge, flows into the Muara Djawa at a position about 6 miles northward of Tandjung Tambangongot. It is navigable by small craft for a distance of 4 miles within the entrance.

MUARA PEGAR is reported to be the deepest channel in the delta and is reported to be the one now used. The channel over the bar is marked. In 1952 there was a least depth of 7½ feet on the bar. The Muara Pegar joins the Muara Djawa to the northward of Pulau Karbau.

MUARA BEKAPAI can be entered by ships not exceeding 10 feet draft at high water. The

passage, which is entered through Sungai Bagusan (Bekapi-baru) joins the Muara Bajor off the west entrance of Kleine Kali. The outer bar has a reported depth of 10 feet and the inner bar, located 3 miles northward of Tandjung Pemarung, has a depth of 6 feet, hard sand. The south part of Sungai Bagusan is fairly straight, but the north part is narrow and winding. The channels are unmarked and should only be attempted by small craft with local knowledge. CAUTION is necessary when rounding the unnamed point, located 2⅔ miles northward of Tandjung Pemarung, as the outgoing current sets eastward and the ingoing current sets westward. Signal posts are located at the entrance of the narrows and at the junction of Sungai Bagusan and Muara Bekapai.

MUARA BAJOR should only be entered by vessels with local knowledge. PILOTAGE is obligatory. The bar channel is unmarked and the entrance is hard to identify.

There is a depth of 11 feet over the outer bar and 8 feet over the inner bar, to the westward of Pulau Nubi. A stranded wreck lies off the west end of the islet and an obstruction is reported in the channel to northward of the islet.

The main channel leads northward of Pulau Nubi and trends in a northwesterly direction for 4¾ miles to the entrance of the Trusan Klambu which can be identified by the small, but prominent, islet lying in its mouth. Here the passage, known as Kleine Kali, trends sharply to the southward and is narrow and tortuous for about 5 miles. Signal posts, for the control of traffic, are reported to be located at each end of the narrows. At the west end of the Kleine Kali the main stream, having been joined by Muara Bekapai, widens out and trends in a northwesterly direction to its junction with the Muara Djawa. Pulau Tungku Kaju, covered with high trees, stands in mid-river, about 2 miles northwestward of the west entrance of Kleine Kali. The channel passes eastward of this islet.

MUARA BERAU is unmarked and has some dangerous reefs northward of the entrance. It is suitable only for small craft with local knowledge. Pilotage is not available.

MAIN CHANNELS–NORTHWARD AND WESTWARD OF TANDJUNG DEWA

10C-20 TANDJUNG DEWA (00°37′ S., 117°18′ E.), a rather sharp point fronted by a mudbank, is located at the intersection of the Muara Djawa and Muara Bajor. Between this point and Tandjung Muara Berau, the channel widens out and intersects the main part of the Sungai Mahakam. Sungai Sanga Sanga, an important waterway, flows into the wide channel at a position about 1 mile southward of Tandjung Muara Berau. The Muara Berau intersects the main channel to the northward of the latter point. Sungaimariam, located just westward of the inner entrance of Muara Berau, is the site of an oil establishment. Between this place and Samarinda, about 10 miles west-northwestward, the Sungai Mahakam is wide and fairly deep.

TIDES AND CURRENTS.—The time of high water and low water from the sea to Tandjung Dewa occurs ½ hour later for each 8 miles. The tides off Tandjung Dewa are mixed, but predominently semidiurnal. The average spring range of the semidiurnal tides is 5¼ feet; the average neap range is 1⅓ feet. The average spring range of the diurnal tide is 2 feet; the average neap range is negligible.

The tides between Sungaimariam and Samarinda are mixed, but predominently semidiurnal. The average spring range of the semidiurnal tide is 4½ feet; the average neap range is 1 foot. The average spring range of the diurnal tide is 3 feet; the average neap range is 1 foot.

A tide gauge, marked in centimeters, is located near the harbor office at Samarinda. The readings of the gauge must be decreased by 15 centimeters to obtain the exact level of water above chart datum.

SEE SHORT CORRECTIONS

At Samarinda high water occurs simultaneously with Muara Bajor and low occurs about 1 hour later. The spring range is from 3½ to 5 feet: it is highest from February to May and lowest from July to October, but it depends to a great extent on the volume of water discharged from the river.

Strong currents are met with around Tandjung Dewa. Close under the shore there is a counter current. During the months of July to October the flood current is frequently apparent at Samarinda, making it advisable for vessels to anchor sufficiently far from the shore to allow for swinging. In other months only the out-going current is experienced. CURRENT SIGNALS (day and night) are displayed from the main pier.

DANGERS.—A wreck lies sunk southward of Tandjung Sanga Sanga. A drum BUOY, painted in red and white stripes, is moored close northwestward of the wreck. A shoal flat extends nearly ⅔ mile southeastward from Tandjung Sanga Sanga. A red conical BUOY marks the outer edge of this flat. The channel into the Sungai Sanga Sanga leads between this flat and the south side of the entrance of the river and between the wreck and the same shore.

An oil derrick, marked by a FLAG and a fixed red LIGHT, stands in 3¾ fathoms close northward of Tandjung Sanga Sanga.

The dangers between Sungaimariam and Samarinda are best seen on the chart.

NAVIGATIONAL AIDS.—A number of beacons, both lighted and unlighted, are found along the shores of the channel, between Tandjung Dewa and Sungaimariam. Some of these mark the prohibited anchorage areas, which are shown on the chart.

SUNGAI SANGA SANGA is navigable by small vessels with local knowledge for a distance of about 6 miles to an oil settlement. The channel is marked, and a flagstaff stands near the inner south entrance point. Loading wharves for small vessels are located at the settlement. There are two marine railways for small craft. Repairs to these craft can be carried out. The settlement is connected to the regional telephone network. Oil is pumped from here to Teluk Balikpapan.

SUNGAIMARIAM, an oil shipping establishment, can be identified by its tanks and oil derricks. There are some buildings and some small piers. There are a number of drill towers on Tandjung Muara Berau and on Tandjung Sanga Sanga. These towers are all lighted at night.

About 250 yards southward of the wharves at Sungaimariam are two rocky patches with 18 feet least water, marked by a black conical BUOY with a green triangular topmark. Vessels passing northward of this buoy must give it a berth of 35 yards.

BETWEEN SUNGAIMARIAM AND SAMARINDA, the Sungai Mahakam is fairly wide and rather deep. Pulau Balai Lumba, about 2½ miles westward of Tandjung Muara Berau, is a small wooded islet 130 yards from the south bank. Pulau Buaja, a wooded islet, is located near the north bank, about 1 mile farther upriver. Gosong Buaja, near the south bank, is a wooded islet with high trees. Pelarang, a small settlement, is the site of some coal piers (in ruins).

SAMARINDA (0°30′ S., 117°08′ E.), the main port on the Sungai Mahakam, extends for a distance of nearly 2 miles on both sides of the river. The town is surrounded by a dense jungle. Depths of 24 feet are found along the north bank of the river. Anchorage is prohibited in the area shown on the chart and marked by notice boards.

SAMARINDA

10C–21 FACILITIES—SAMARINDA is the seat of a government administrator. There is a harbormaster at the port. Vessels can obtain clearance. The surrounding territory is rich in coal, mineral, and petroleum resources.

PIERS.—There are several small piers. The largest has a length of 500 feet with a depth of 7 feet alongside and 15 feet close off. A late 1960 report gives these depths as 9½ and 18 feet, respectively. Vessels with greater draft are breasted off the pier by a lighter to avoid grounding.

PROVISIONS.—Fresh provisions are scarce and expensive. Meat is obtainable.

DECK AND ENGINE supplies are obtainable in very limited quantities.

FUEL.—Diesel oil is obtainable in drums. Advance notice is required for any sizeable amount.

COAL can be obtained at the coal wharves upriver at a rate of 150 tons per hour by conveyors or in baskets at the upriver wharves or from lighters at the anchorage.

WATER.—Drinking water can be obtained at the piers at a rate of 20 tons per hour. Boiler water can be taken from the river.

REPAIRS of a minor nature can be made to hulls, engines and boilers. There are two marine railways with lifting capacities of about 300 tons. It was reported (1960) that facilities were being expanded so that repairs to vessels of up to 1,000 tons could be made.

COMMUNICATIONS.—Ocean-going ships call at the port. River steamers ply between the various river ports. Radio and telephone facilities are available. There is weekly air communication with Djakarta via Balikpapan.

MEDICAL.—There are two hospitals which will accept seamen.

SUNGAI MAHAKAM UPRIVER OF SAMARINDA

10C–22 BETWEEN SAMARINDA AND TENGGARONG, the river is from 600 to 800 yards wide, except near the bends where it sometimes narrows to 300 yards. The banks are steep and the depths vary from 4 to 30 fathoms.

TIDAL CURRENTS.—The flood current has occurred as far upriver as Sebulu.

DANGERS.—There are many dangers, most of which are shown on the chart and are marked by "warning boards" on the banks of the river.

FEATURES.—A large sawmill is located on the east point of the mouth of a small stream which intersects the left bank at a position about ½ mile upriver of Samarinda. A PIER, 150 feet long and having a depth of 10½ feet, is located about ¾ mile upriver of Samarinda. A PIER, 65 feet long and having a depth of 28 feet, is located just northward of the mouth of the Sungai Mangies.

A TELEPHONE CABLE, marked by warning boards, crosses the river at Loabuah. A submarine cable, marked by warning boards, crosses the river at Tandjung Batu Berhala. Two submarine high tension cables, marked by warning boards, cross the river at Loakulu. A submarine cable, marked by warning boards, crosses the river at Tandjung Luton. Cable houses are located on the point.

A COAL PIER, 195 feet long and having a depth of 13 feet, is located at Loakula, a village of some size. The pier is the shipping place for the coal mines nearby. Four hatches can be loaded simultaneously at a total rate of around 400 tons per hour. A GENERAL CARGO PIER, 190 feet long and having a depth of 14¾ feet, and a pontoon pier, 135 feet long, are located upriver of the coal pier. At Loakula, CURRENT SIGNALS are shown. A large red arrow on the 65-foot mine head indicates the direction of the current. At slack water the arrow points downward.

TENGGARONG, a rather large village, located on the right bank just upriver of Pulau Tenggarong, is the residence of the Sultan of Kutei. The village is connected to the telephone system and has daily river steamer service with Samarinda. A SUBMARINE CABLE, marked by warning boards, crosses the river here.

A PIER, which can accommodate vessels up to 260 feet long and which has a depth of 16 feet, is located on the left bank of the river at Lua Bukit. On the opposite side of the river at Loatebu, there is a PIER with a depth of 13 feet. There is a small PIER at Batu Dinding.

SEBULU is a trading place for forest products. River steamers can ascend the river to Melak, 170 miles upriver of Samarinda.

COASTAL FEATURES (CONTINUED)

10C–23 Between the unnamed point (0°13′ S., 117°26′ E.), which forms the north point of the delta of the Sungai Mahakam, and Tandjung Santan, the coast is flat. The latter point can be recognized by a row of casuarina trees. A small river flows out near the point.

Attaka Reef, the outer danger off this coast, is described in section 10C–3. The dangers in the north approach to the Muara Berau are described in section 10C–13.

Between Tandjung Santan and Tandjung Sengata, the coast for 3 or more miles out is foul, lined with reefs and densely wooded islets, usually flooded at high water. Kepulauan Keringdingan, the principal group of islets, are visible from a distance of 12 to 14 miles. Barat Basa, a white coral islet, has some trees on it. The islet is frequented by fishermen in search of turtles' eggs.

ANCHORAGE can be taken in 11 to 14 fathoms, soft mud, with Tandjung Santan bearing 272° and Barat Basa bearing 007°.

DANGERS.—A reef, with a depth of 1¾ fathoms, lies 6 miles offshore in position about 10¾ miles north-northeastward of the outer islet of the Kepulauan Kerindingan. A 3½-fathom patch lies 1 mile westward of this reef. A reef, which dries at low water, lies 2½ miles from the coast in position about 13 miles northward of the above islet. A 3½-fathom patch lies about ½ mile eastward of this reef, and a reef, with a depth of 3 feet, lies 1 mile to the westward.

Sengata Reef, the outer danger, is described in section 10C–3. A reef, with a diameter of 300 yards and a least depth of 1¼ fathoms, is located 2 miles northwestward of Sengata Reef.

BONTANG, a small village, can be reached through a passage in the coastal reef. The passage is marked by three beacons with triangular topmarks. Depths of 5 to 23 fathoms are charted, but only small vessels with local knowledge should attempt entry. The best time to enter is at low water, when the edges of the reefs can be readily seen.

ANCHORAGES.—Small vessels with local knowledge can anchor within the passage or in a break in the reef, just northward of the outer islet of the Kepulauan Kerindingan.

TELUK LOMBOK, a reef-fringed inlet located about 2 miles westward of Tandjung Sengata, is identifiable from the vicinity of Sengata Reef. ANCHORAGE can be taken off the entrance, between the coast and the northern of two drying reefs. These reefs lie 2½ miles southwestward of Tandjung Sengata. There is a depth of 23 feet at the anchorage. Small craft with local knowledge can enter the inlet. Strong CURRENTS are felt at spring tides within the inlet, but the currents seldom exceed 1 knot at the anchorage.

Between Tandjung Sengata and the west entrance of Teluk Sangkulirang, the coast is intersected by a number of small and shallow rivers. The aspect of this coast is described in section 10C–2. The former point is not prominent from the offing. A small river flows out close northward of the point. Tandjung Bungalun can be recognized from a distance of about 2 miles by some tjemera trees southward of the point.

DANGERS.—The reefs and shoals off this coast do not discolor. False discoloration is prevalent off the river mouths. Vessels bound from the delta of the Sungai Mahakam to Teluk Sangkulirang should not approach within the 100-fathom curve. At this distance the fringe of woods standing along the coast can be made out in clear weather.

Several reefs lie within the 100-fathom curve in positions 7 to 8 miles, south-southeastward of Tandjung Bungalun. The north reef has a depth of 3 feet, the middle reef a depth of 1¼ fathoms and the south reef a depth of 3 feet. A reef, with a least depth of 1¼ fathoms, lies about 6½ miles northeastward of Tandjung Sengata. This reef is marked by discoloration.

A reef, with a depth of 3 feet and a diameter of 200 yards, is located about 8 miles eastward of Tandjung Bungalun.

Numerous dangers are found within the 10-fathom curve.

TELUK GOLOK, a small shoal bay, indents the north part of this coast. A rock, having a depth of 3 feet over it, lies close off the entrance of the bay. ANCHORAGE can be taken in 8 to 10 fathoms in the entrance of the bay.

PULAU MIANG-BESAR AND ADJACENT DANGERS.—Pulau Miang-besar, a densely wooded coral island, is surrounded by a belt of mangroves and fringed by a drying reef. The island is 280 feet high and prominent from the offing. Reefs and shoals lie up to 3½ miles west-northwestward and westward of the north point of the island. A reef, that dries at low water, lies just within the 100-fathom curve in position 4 miles westward of the south point of the island. A 3¾-fathom shoal lies ½ mile westward of this reef.

ANCHORAGE.—There is anchorage off the north side of the island in 12 or 13 fathoms, mud, ¼ mile from the reef in the line of direction of the pier, which will bear about 172°. The approach to the anchorage should be made from the eastward.

SETTLEMENT.—There is a settlement at the head of a small basin which indents the reef fringing the north side of the island. There is a pier at the settlement. Only small craft with local knowledge should attempt to enter the basin.

TELUK SANGKULIRANG

10C-24 · TELUK SANGKULIRANG, entered between a point located 3 miles eastward of Tandjung Pamerikan and Tandjung Pager, is the outer estuary of the Sungai Sangkulirang. The west shore of the bay is low and covered with high timber. Tandjung Tanah Merah is prominent and has a rocky part with some huts near it. The east shore of the bay is hilly and densely wooded. There are prominent hills on Tandjung Batu and on the small peninsula located 4¾ miles northwestward.

Benoa Baru (Sangkulirang), the principal settlement, is located on the west side of the river in position about 6 miles upriver of Tandjung Batu. Sampajau, an oil settlement, stands on the west side of the river in a position about 11 miles upriver of Benoa Baru.

TIDES AND TIDAL CURRENTS.—The tides are mixed, but mostly of a semidiurnal nature. The semidiurnal range at springs averages about 5½ knots, and the range at neaps is about 1¼ feet. The diurnal range at springs averages about 2¼ feet and the range at neaps is negligible. During the period from December through February the springs rose 8 feet and the neaps 4 feet at Pulau Miang-besar. The evening tide was higher than the morning tide.

A northeasterly current of about ½ knot is usually experienced in the approach to the bay. The tidal currents in the outer part of the bay are usually weak. Strong currents are experienced in the vicinity of the pier at Benoa Baru. The out-going current, which may attain a rate of 3¼ knots, sets onto the pier. The in-going current sets off the pier. The tidal currents between Benoa Baru and Sampajau attain a rate of 3 to 3½ knots.

DEPTHS.—The 10-fathom curve lies between the east side of Pulau Miang-besar and a position close off Tandjung Pager. The least depth in the channel into the bay is 3¼ fathoms on the bar in a position about 3½ miles northeastward of the above island. Vessels drawing 20 feet can reach Benoa Baru at all times. Depths in the river between Benoa Baru and Sampajau vary between 8½ to 16½ feet. Depths of 9 to 19½ feet are found upriver of the latter place, but the channel is extremely narrow.

An extensive mud bank, with depths of less than 3 fathoms, lies up to 5¾ miles off the east shore of the bay, between Tandjung Batu and Tandjung Pager. The west edge of this bank

forms the east side of the outer part of the channel.

ISLANDS AND DANGERS.—Numerous reefs, islands, and mud banks lie in the bay. Pulau Miang-ketjil is a low mangrove-covered island, separated from the west entrance point of the bay by a narrow and intricate channel. Foul ground extends 2 miles eastward from the island.

An extensive bank of mud and stones, the great portion of which dries, fronts the west side of the entrance of the river. Pulau Rending, Pulau Sirrh, and Pulau Senumpa lie on this bank. Muara Suwalang, foul at both ends, separates this bank from the shore to the westward. Pulau Rending is low, but prominent. It is divided into two parts by a creek that dries. The north part of the island is a swamp; the south part is surrounded by a white sandy beach, about 7 feet high. There are some coconut trees in the middle of the island. Two settlements are located on the island. Pulau Sirrih is a red, rocky islet, covered with vegetation. Pulau Senumpa, the largest island, is swampy in its south part; the north part has some hillocks, planted with coconut palms, on it.

A shoal spit, as defined by the 3-fathom curve, extends about 2¼ miles south-southeastward from a position about ¾ mile eastward of the south end of Pulau Rending. There is a small drying patch on the north end of this spit.

Pulau Badjo and Pulau Antung stand on the drying mud bank extending from the east shore of the bay. These very small islets are covered with vegetation.

A conspicuous small rocky islet, with some bushes on it, is located 1 mile westward of Tandjung Batu. The islet is surrounded by a drying bank of mud and stones, but is steep-to on its west side.

10C–25 NAVIGATIONAL AIDS.—A black beacon marks the east edge of the foul ground that extends eastward from Pulau Miang-ketjil. The channel leads eastward of this beacon.

A beacon stands on the reef fringing the southwest entrance point of the bay.

A black beacon stands on a reef on the west side of the channel in a position about 1 mile southeastward of Pulau Rending.

A beacon, fitted with a reflector, marks the north side of a 5-foot shoal located 1 mile eastward of Pulau Sirrih. A buoy marks the north side of a 3-foot shoal which lies in midchannel in a position about 1 mile east-northeastward of the above islet. The channel leads westward of these dangers.

A beacon is located on the west side of the channel in a position about 5½ miles north-northwestward of Pulau Sirrih. It marks a drying reef.

DIRECTIONS.—The channel is not lighted, but is marked by beacons and a buoy. Vessels with local knowledge can enter by passing eastward of the outer beacons and westward of the beacon and buoy marking the midchannel shoals.

BENOA BARU, the seat of a civil administrator, is located on the southeast side of Pulau Sinkuang, an island located 2½ miles upriver of Pulau Senumpa. A small PIER, with a depth of about 17 feet alongside its head, is located at the settlement. There is a harbor master and a doctor at Benoa Baru.

An OIL JETTY is located at Sampajau.

COASTAL FEATURES (CONTINUED)

10C–26 TANDJUNG PAGER (1°52′ S., 118°23′ E.) is formed by a hilly ridge with a strip of low mangrove-covered land at the base. Between this point and Tandjung Labuanbini, the coast is indented by two open bays. The aspect of this coast is described in section 10C–2. Pulau Birah and the dangers lying outside the 100-fathom curve are described in section 10C–3.

Teluk Menumbar is for the most part filled by a bank of mud and sand. A small river, navigable only by small craft, flows into the north-

SEE SHORT CORRECTIONS

east part of the bay. ANCHORAGE can be taken in the west part of the bay in 8 fathoms with Pulau Birahan bearing 157° and Tandjung Pager bearing 259°.

TELUK BAKONG, entered between Tandjung Menumbar and Tandjung Pulu Setebah, is fronted by a tongue of relatively moderate depths. The first named point is low and covered with mangroves; the last named point is high and is backed by a prominent range. Reefs and shoals fringe parts of the shores of the bay to a distance of ¾ mile. A 4¾-fathom shoal and a 3¼-fathom shoal lie 2¾ miles west by southward and 3¼ miles west-southwestward, respectively, of Tandjung Pulu Setebah. A small wooded islet lies close offshore in the small bight just eastward of the above point. Small vessels with local knowledge can anchor in 10 to 15 fathoms in this bight.

A narrow reef with some small islets on it fringes the coast to the westward of Tandjung Labuanbini.

Between Tandjung Labuanbini and Tandjung Mangkalihat the coast is low, but is backed by some hills. The coast is rather steep-to, with some small islets lying on the narrow coastal reef. A reef, with a least depth of 2½ fathoms, lies about ½ mile northeastward of Tandjung Djaran Djaran. Teluk Sandaran affords anchorage in its north part in depths of 8 to 10 fathoms. Some protection from northeasterly winds is afforded.

PART D. TANDJUNG MANGKALIHAT TO TANDJUNG AHUS

10D-1 TANDJUNG MANGKALIHAT, the east extremity of Borneo, is the seaward termination of a mountain ridge that extends well into the interior. The extremity of the cape is low, overgrown with mangroves, and fringed by a narrow, steep-to reef. The coast becomes rocky at a position about 2 miles westward of the northeast extremity of the cape.

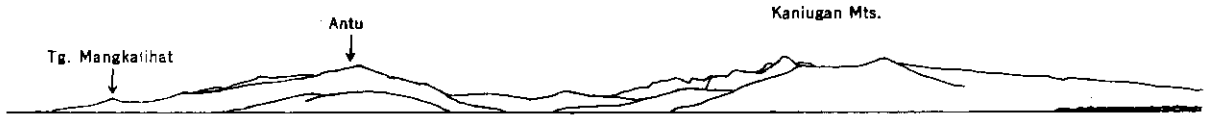
Gunung Mangkalihat, 1,083 feet high and located 2¾ miles west-southwestward of the cape, is hard to distinguish from the other hills in the vicinity. Gunung Antu, 2,461 feet high, is rather prominent from the northward. Its west side is steep and has a cone near it.

Tandjung Mangkalihat is reported to be a good RADAR TARGET from a distance of 20 miles. A LIGHT is shown from a position about 2½ miles southward of the cape. A constant south-going CURRENT is found close off the cape; sometimes it flows at a strong rate.

COAST–GENERAL

10D-2 BETWEEN TANDJUNG MANGKALIHAT AND TANDJUNG BATU, the coast is low and is overgrown with mangroves, except to the southeastward of Teluk Suleman near Tandjung Dumaring, where it is rocky.

MOUNTAINS WEST OF Tg. MANKALIHAT, 36 MILES, 017°



KANIUGAN MOUNTAINS 30 MILES, 202°

Batu Belobang, a prominent rock with a gate-shaped opening, is located about 3 miles west-northwestward of Tandjung Mangkalihat.

Sungai Berau, suitable only for small ships, flows out through an extensive delta in the north part of this coast. Tandjung Redeb (2°-10′ N., 117°29′ E.), located at the junction of the Sungai Kelai and Sungai Segah (Makam), is a river port of some importance.

Between Tandjung Batu and the south entrance of the Muara Selor, the coast is low and for the most part covered with casuarina trees. Tandjung Tanahguning is the only rocky point along this coast. The coast between the mouth of the Muara Selor and Tandjung Ahus is intersected by the vast delta of the Sungai Sesajap and many smaller rivers. The low shores are not always seen against the mountainous background. The latter point is covered with tall trees. Linkas, an oil shipping place of some importance, is located on the southwest side of Pulau Tarakan in the estuary of the Sungai Sesajap.

MOUNTAINS–LANDMARKS.—Pegunungan Kaniungan, a mountain range with two peaks lying close together in its east part, lies northwestward of Gunung Antu (sec. 10D–1). The highest peak is 2,559 feet high and is conical in shape.

A range of hills, with peaks attaining heights of 1,181 and 1,230 feet, is located southward of Pulau Tandjung Buajabuaja.

Gunung Briun (1°20′ N., 117°55′ E.) has two summits 2,953 and 3,051 feet high. This range projects well above the surrounding hills. A prominent 2,264-foot peak is located about 25 miles east-southeastward of Gunung Briun.

Limestone (Kalksteen) Mountains, located northward of Gunung Briun, are a long ridge running parallel with the coast. The northwest part of the ridge attains a height of 3,642 feet. Near the coast and between this range and Tandjung Dumaring is a range of hills attaining a greatest height of 590 feet in its north and south part and 787 feet in its middle part.

A range of hills lies northward of the Limestone Mountains. Sugarloaf (Suikerbrood), 1,722 feet high, is the most prominent peak of this range.

Gunung Suwaran (1°45′ N., 117°35′ E.) is a broad-topped mountain of peculiar shape rising to a height of 4,035 feet. This peak appears isolated when viewed from the northeastward.

Pegunungan Inaran and Pegunungan Njupa are two prominent ranges. The first named has a very rugged crest, attains a height 3,100 feet, but has no conspicuous peaks. The last named has three lofty and conspicuous summits in the shapes of blunt cones, rising to a height of 4,527 feet.

Gunung Samiroa, a dome-shaped isolated hill, 334 feet high, stands close to the coast, near the entrance of the Muara Pantai. Gunung Padai, standing near the north end of a ridge located southward of the above hill, is 1,132 feet high and can be seen from the vicinity of Karang Malalungan. Gunung Simrut, 689 feet high and prominent, stands 2 miles inland in a position about 11 miles south by eastward of Gunung Samiroa.

Gunung Kegelberg and Saddle Mountain, located southward of the delta of the Sungai Sesajap, are prominent from the offing. Pegunungan Salinbatu and Pegunungan Bulungan, standing to the southwestward of the above delta, can usually be seen. Gunung Sekata, 1,476 feet high and prominent, is located 21½ miles westward of Lingkas.

ISLANDS.—The delta of the Sungai Sesajap is formed by a large number of islands, some of which are prominent from the offing. Pulau Tarakan, a large hilly island, rises to a height of 462 feet in its south part and has some high trees in its north part. A hill, 512 feet high, stands near the northwest end of the island. Pulau Menulun, located 1¾ miles southward of Pulau Tarakan, is very small, but has some high trees on it. Pulau Bunju is high and densely wooded. Patches of reddish rock are visible here and there on the shores of the island. Pulau Mandul has a hilly ridge attaining a height of 512 feet, but there are no sharp peaks.

It was reported (1963) that Pulau Tarakan and Pulau Bunju were good radar targets at distances, respectively, of 16 miles and 20 miles.

DEPTHS–DANGERS

10D–3 Between Tandjung Mangkalihat and Tandjung Batu, the 100-fathom curve lies up to 30 miles offshore and encloses numerous islands, reefs and dangers. Between the latter point and Tandjung Ahus, the same curve lies up to 35 miles off the islands lying in the estuary of the Sungai Sesajap.

MUARAS REEF, a large drying lagoon-type reef, lies well offshore in the southeast approach to the Sungai Berau. The reef is steep-to on all sides, except the south end, and has depths of over 100 fathoms close offshore.

PULAU SAMBIT, a small sandbank lying at the southeast end of the reef, is overgrown with low trees. A LIGHT is shown from a white iron framework, 102 feet high, on Pulau Sambit.

It was reported (1963) that Pulau Sambit light structure was a good radar target at a distance of 14 miles.

PULAU BALAMBANGAN, located about 2½ miles westward of Pulau Sambit, is somewhat higher and can be seen from a distance of 11 miles. Karang Gosungan, located near the north end of Muaras Reef, is a drying sandbank.

A reef, with a depth of 6 feet, lies close southward of Pulau Balambangan. Detached shoals, with depths of 2½ to 5 fathoms, lie up to 3½ miles southeastward of the southwest end of Muaras Reef.

ANCHORAGE can be taken in the areas southward of Pulau Balambangan and southwestward of Pulau Sambit.

PULAU MARATUA, a V-shaped atoll reef, lies in the east approach to the Sungai Berau. It consists mostly of thrown up coral. The highest part, 394 feet, is located about in the middle of the west side. In clear weather this part can be seen from a distance of 25 miles. Three islets and many scattered stones are found near the southeast end of the reef. Pulau Bakungan, the southernmost, is covered with small trees and is visible from a distance of 10 miles. Pulau Nunakan consists of bare coral, but is 20 to 30 feet high. Several small islets lie on the east side of the reef, to the southward of Tandjung Bahaba.

Pulau Maratua is steep-to and in many places broken through by the sea. Near the reef the bottom is coral, at some distance eastward it is of black sand, and to westward it is of mud. The main islands on the atoll are visited by native boats in search of birds' nests, camphor, ebony, rattan and trepang.

It was reported (1963) that Pulau Maratua was a good radar target at a distance of 23 miles.

ANCHORAGES.—An opening in the reef, located southward of Tandjung Bahaba, is suitable for vessels up to 170 feet in length. Such vessels, having local knowledge, can enter under favorable conditions of light. The outer part of the pass runs in a west-southwesterly direction and its inner part in a westerly direction. Depths of 9 to 12 fathoms are found in the entrance, decreasing to 4 fathoms off Tandjung Bahaba. The inner part of the opening is somewhat broader and deeper. Anchorage can be taken in 6 or 7 fathoms here. A short sea is sometimes experienced in the entrance. This is caused by the southeasterly current. Strong tidal currents are sometimes felt in the passage.

Anchorage can be taken westward of Tandjung Dewatta in 25 to 30 fathoms at a convenient distance from the reef. Westerly or northwesterly winds quickly raise a sea.

PULAU KAKABAN, a closed atoll lying southwest of Pulau Maratua, consists of raised coral reefs. Coconut trees stand along its coasts. The atoll attains a height of 295 feet near its south end. There are two settlements on the island, one on the west side and the other near the south coast. Each settlement is surrounded by a coconut plantation.

OFF-LYING SHOALS.—A shoal, with a least depth of 3¼ fathoms, lies about 21 miles eastward of the southeast end of Pulau Bunju. The position is approximate.

An 8½-fathom bank (position approximate) lies 37 miles eastward of the south end of Pulau Tarakan.

A 4¼-fathom shoal lies about 18¼ miles east-southeastward of the light structure on Tandjung Arang.

A 2¾-fathom patch (existence doubtful) is charted in position 21 miles east-northeastward of Tandjung Ahus.

A 3¾-fathom patch was reported (1962) to be located about 16 miles east-northeastward of the same point.

TIDES AND CURRENTS

10D–4 TIDES.—Diurnal and semidiurnal tides occur at Pulau Tandjung Buajabuaja from March through July. The greater range of the latter was 9 to 10 feet and the lesser 2 to 4 feet. Single tides ranged only 3 feet and 1 foot.

In the vincinity of Pulau Derawan, the tides are almost entirely semidiurnal. There is, however, a slight diurnal tide. In July and August the morning tide is higher and in November and December the evening tide is higher. Springs, which occur 2 or 3 days after full and new moon, rise 8 to 9 feet; neaps range 3 to 4 feet.

Semidiurnal tides occur in the delta of the Sungai Sesajap. Springs fall with full and change. There is a rise of 11 to 12 feet at springs and 3 to 4 feet at neaps.

CURRENTS.—Semidiurnal tidal currents occur off the various river mouths, along and near the 10-fathom curve.

Along the coast between Tandjung Mangkalihat and Tandjung Dumaring, the tidal currents are rather weak. A constant southeasterly current, occurs close under the Borneo coast between the former point and a position westward of the large Karang Besar.

In the broad area of the Celebes Sea, to the northward of Tandjung Mangkalihat, a constant southerly current of 1 knot to 1½ knots occurs. Northward of Karang Besar along and near the meridian of 118°30′ E. and to eastward there is a constant southerly current which bends to south-southeastward to the southward of Karang Malalungan. Close under the outer edge of Karang Besar, as well as along the south side of that reef, and along the reefs to the eastward, a constant south-southeasterly to southeast current occurs with an average rate of 1 knot. The rate sometimes decreases to ½ knot and sometimes increases to 2½ knots.

The current in the vicinity of Pulau Manimbora usually sets in a southeast to east-southeast direction. A rate of 2½ knots has been reported.

A southeast current flows on either side of Karang Malalungan; that on the east side of the reef is stronger than that on the west side. At times there is a counter current running northward along the west side of the reef. The ebb current, which flows out of the Muara Pantai in an east-southeasterly direction, sometimes is noticeable as far eastward as this reef.

The prevailing southeasterly current sets across and near the southeast end of Pulau Maratua. A strong northerly counter-current sometimes is felt along the southwest edge of the reef. The constant southeasterly current sometimes runs past Pulau Kakaban at a rate of 2½ knots.

The tidal currents, which flow in and out of the Sungai Berau, have some effect on the con-

stant southeasterly current as far eastward as Pulau Sangalakki. This constant current passes on both sides of the islet, but seldom at a rate of more than 1 knot. It should be noted that during high tide, as soon as Karang Buliulin is covered, a northerly counter-current occurs near the south end of this reef. Between Pulau Derawan and the coast, the flood current sets southward and the ebb northward. A tidal current of 2 knots has been experienced in Derawan Passage.

A constant south-southeasterly to southeasterly current is met with between the delta of the Sungai Berau and the delta of the Sungai Bulungan, outside of the reefs fringing the coast.

Offshore of Pulau Tarakan and Pulau Bunju, the current flows in a constant south-southwesterly or southwesterly direction at a rate of ½ knot during the flood tide and 2 knots with the ebb. Strong currents are experienced in the delta of the Sungai Sesajap. The out-goiug currents attain a rate of more than 3 knots after a heavy rainfall. Strong northeasterly and southeasterly sets have been experienced in making the approach. A constant southerly set occurs well offshore of the delta.

Eastward of Pulau Menulun, the flood current sets strongly to the northward and the ebb to the southward.

WINDS AND WEATHER

10D–5 Regular monsoons, as well as land and sea breezes, are less distinctly marked in the area covered by this part than in other parts of the Borneo Coast. Southerly winds prevail from July to October and northerly winds from December to May. The average directiou of the wiud in July is south-southeast during the daytime; in August, southeast; and in September, south-southwest. At nights, during these three months, the average direetion is south-southwest.

Slight variable winds with frequent calms occur in October and November and also in May and June.

The north monsoon is considered the wet season, and the south monsoon the dry season. Rains are abundant at all times and sudden squalls occur frequently. Cloudiness is more marked by day.

Iu the delta of the Sungai Sesajap, land and sea breezes are not noticeable aud there are no regular monsoons. Easterly and northeasterly winds are prevalent from December to April. Frequeut rain, squalls, and bad weather occur during these months. Westerly winds are more usual from July to October and are accompanied by frequent rain storms. The remaining months of the year are changeable. The rainfall is heavy, seldom a week passing without rain.

CAUTIONS

10D–6 There is very little reef discoloration due to the muddy river discharges. Vessels should keep well outside the 50-fathom curve in traversing this coast. Landmarks are few and the edge of the coastal bank is too steep-to to be found by soundings. For additional cautions, see section 10–4.

COASTAL FEATURES

10D–7 BETWEEN TANDJUNG MANGKALIHAT AND TANDJUNG GIRING GIRING, the coast is backed by mountains, fringed by a narrow steep-to reef, and indented by two small bays. The latter point is low, but is prominent from northward.

ISLANDS AND DANGERS.—A large circular bank, on which there are numerous reefs, shoals, and dangers, lies up to 9½ miles off the north part of this coast. A narrow, but very deep channel, separates this bank from the coast. Pulau Kaniungan-besar, at the south end of this bank, is wooded, the tree tops being 236 feet above water. The islet is surrounded by reefs on all sides, except the southwest where

a deep gully separates it from the coast. A settlement stands on the west side of the islet. Pulau Kaniungan-ketjil, to the northeastward, is small, low, and partly covered with pandamus trees.

ANCHORAGE can be taken in 6 or 7 fathoms, sand, off the west side of Pulau Kaniungan-ketjil. Some protection from northeasterly winds and sea is afforded.

TELUK SUMBANG, open to the northeastward, is fringed by a very narrow steep-to reef; the 100-fathom curve being nowhere more than ½ mile from the shore. Gunung Antu, located southeastward of the head of the bay, has been described in sec. 10D–1. ANCHORAGE can be taken off the mouth of a small stream in the southwest corner of the bay. There are some houses here.

TELUK SULEMAN is a narrow reef-fringed inlet, protected to the eastward by the before-mentioned circular bank. The south side of the entrance is formed by two narrow and high islands lying close to the shore. The reefs on each side of the entrance project far out, but there is a narrow entrance between with a depth of 5½ fathoms and a deep hole within with a depth of 23 fathoms. Small vessels with local knowledge can ANCHOR in 6 to 9 fathoms, mud. Entry should be made only at low water when the reefs can clearly be seen.

BETWEEN TANDJUNG GIRING GIRING (1°11′ N., 118°46′ E.) AND TANGJUNG KALINDAKKAN, the coast is low and swampy. The coast between the latter point and Tandjung Semuntai continues low and swampy, a great portion covering at high water. The coast between Tandjung Semuntai and Tandjung Dumaring is low and is intersected by a number of small streams. The latter point is high and rocky, being formed by a spur of the the coastal hills.

PULAU TANDJUNG BUAJA BUAJA, a rather large island, is separated from the coast by a narrow, reef-strewn channel. A small village, standing on the northwest end of the island, is built on piles; the houses being connected by foot bridges. The north and east sides of the island are fringed by a reef that dries to a distance of 2½ miles. Mangroves grow out upon the reef, so that the limits of the island are not easily defined. There is a large tree in the middle of the island. A BEACON, 16 feet high with a black truncated conical topmark, stands on the north extremity of the drying reef.

PULAU ULABAN, a small islet standing on the drying reef fringing the southeast side of the island, has a few huts on a white sandy beach. There is a grove of coconut trees on the islet. Two shoals of 3¼ fathoms, rock, are located 5 and 6 miles eastward of the islet. Several detached patches, with depths of 5 to 6 fathoms, lie in the immediate vicinity of these shoals.

PULAU MANIMBORA, a coral reef-fringed islet, is covered with coconut trees. A reef-strewn passage separates the islet from the drying reef fringing the northeast side of Pulau Tandjung Buaja Buaja. A deep passage leads northeastward and northward of the islet, between it and Warang Besar.

ANCHORAGE can be taken by vessels with local knowledge, about ¾ mile westward of the before-mentioned village. The approach should be made only at low water when the edges of the reefs can be clearly seen.

KARANG BESAR AND DANGERS TO EASTWARD AND SOUTHEASTWARD

10D–8 A bank, as defined by the 50-fathom curve, extends up to 28 miles offshore between Tandjung Giring Giring and Tandjung Dumaring. The large Karang Besar and other drying reefs form the north edge of this bank. Numerous detached reefs and shoals lie between these reefs and the circular bank enclosing the Kaniungan islands.

Taka Sangalan (1°19′ N., 118°46′ E.), a reef with a depth of less than 5 fathoms, has a small drying part on its southwest side. An iron BEACON, surmounted by a white ball, stands on the drying part of the reef. Two detached 5½-fathom patches are located 3 and 4 miles eastward of the beacon.

Taka Lintjang is a chain of reefs with deep water between them. A least depth of 2¾ fathoms is located 9 miles east by northward of Pulau Ulaban. A 2-foot patch lies about the same distance eastward of this islet. A 2½-fathom patch lies about midway between Taka Lintjang and Taka Sangalan. A 2¾-fathom patch, with a 5½-fathom patch about 1½ miles northeastward, lies about 9 miles east-northeastward of the above islet.

Pulau Bilangbilangan and Pulau Mataka are two wooded coral islets lying on the outer end of the north side of the large bank. Both islets are surrounded by a fringing reef which is narrow and steep-to on its northwest side. The islets, which are visible from a distance of 13 or 14 miles, are visited by fishermen in search of turtles' eggs. The fringing reef dries to a great extent and detached patches lie from ½ to 1 mile off its southeast side. The channel between the islets has depths of 5 to 9 fathoms in the fairway.

Karang Daengalahan, separated from Pulau Mataka by a channel with depths of 5 to 9 fathoms, is a rather large reef usually marked by discoloration when covered. A 2¾-fathom patch lies about 2 miles southward of this reef.

KARANG BESAR, separated from the coastal reef by a narrow, but deep, channel, is a drying reef of considerable extent. The north part of the reef is broken and some detached patches lie up to 2 miles seaward of its edge. Pulau Balikkukup, a small islet with trees visible 14 miles, lies on the southeast part of Karang Besar. A rock, which dries at low water, is located about 4 miles eastward of this small islet. This rock stands on the narrow ridge which connects Karang Besar with Karang Daengalahan. This ridge is very steep-to on its north side, with depths of over 100 fathoms lying close off its edge. Depths of 12 to 20 fathoms are found along its south edge.

A shoal, with a depth of 1½ fathoms, was reported to lie about 2½ miles northeastward of the north beacon on Karang Besar.

CAUTION.—The area between the Kaniungan islands and Karang Besar has very irregular depths. Most of the reefs dangerous to shipping lie close to a line joining Pulau Kaniungan-ketjil and Pulau Balikkukup, but east of the line are several patches with depths of 3¼ to 10 fathoms.

BEACONS.—A beacon with a white ball topmark marks the north side of Karang Besar; a similar beacon marks the east edge. A similar beacon stands on the southeast tip of the same reef. A privately maintained beacon stands on the southwest side of Karang Besar.

COASTAL FEATURES (CONTINUED)

10D–9 BETWEEN TANDJUNG DUMARING (1°38′ N., 118°10′ E.) AND TANDJUNG PERUPU, the coast has a uniform appearance. Its aspect has been described in section 10D–2. The latter point is low, but conspicuous. A small river flows out through two mouths, one entering the sea to southward and the other to westward of the point. The latter mouth has a small, wooded islet in its entrance.

BETWEEN TANDJUNG PERUPU AND TANDJUNG BATU, the coast is indented by the vast delta of the Sungai Berau. Between the latter point and Tandjung Karangtigau, the coast is low and sandy, and in some places marshy. A vast complex of reefs extends up to 9 miles off this coast.

DIRECTIONS

10D–10 Vessels not having local knowledge and those navigating during the night or in

thick weather should set course from a prudent position off Tandjung Mangkalihat so as to pass 2 miles or more eastward of the reef surrounding Pulau Bilangbilangan. If the weather is sufficiently clear, vessels may pass over the narrow ridge, between Pulau Mataka and Karang Daengalahan, in depths of 5½ to 9 fathoms.

Vessels with local knowledge can pass eastward of Pulau Kaniungan-ketjil and Taka Sangalan and thence eastward of Karang Besar, between it and the drying rock located 4 miles eastward of Pulau Balikkukup.

Vessels bound for the passage between Karang Besar and the coastal reef may pass eastward of Pulau Kaniungan-ketjil, westward of Taka Sangalan and Taka Lintjang, close northeastward of the reef surrounding Pulau Manimbora, and thence in midchannel through the passage. An inner route leads between the bank surrounding the Kaniungan islands and the coast and thence outside the 6-fathom curve to the position eastward and northeastward of the reef surrounding Pulau Manimbora. These passages should only be attempted by vessels with local knowledge and then only under the most favorable conditions due to the numerous detached dangers in this area.

ISLANDS AND DANGERS IN APPROACH TO SUNGAI BERAU

10D–11 Muaras Reef, Pulau Maratua, and Pulau Kakahan, the outer dangers, have been described in section 10D–3.

Karang Malalungan (1°55′ N., 118°27′ E.), a triangular-shaped reef that dries at low water, is steep-to on all but its south side. A LIGHT is shown from a red iron beacon, 26 feet high, on the north end of the reef.

Pulau Sangalakki, located 7 miles southwestward of Pulau Kakaban (sec. 10D–3), is a small coral islet. The islet is fringed by a steep-to reef, covered with trees, and visible 14 miles.

A chain of reefs, steep-to on their northeast side, extends about 32 miles northwestward from a position about 3 miles west-southwestward of Pulau Sangalakki.

Karang Buliulin, a large drying reef, forms the south end of the above chain. The south end of this reef should not be approached too closely with a rising tide, for as soon as the reef covers, a countercurrent sets northward toward and over it. The south point of the reef can be cleared by keeping on the range, the north point of Pulau Kakaban in line with the southeast end of Pulau Sangalakki, bearing 057°.

Pulau Samama is a tree-covered islet standing on a drying reef. The islet is almost entirely covered at high water and has a small detached part, about 400 yards northward, which appears as a separate islet. The high trees on Pulau Samama are visible for 12 miles.

Karang Pinaka, separated from the reef surrounding Pulau Samama by a channel with a least depth of 1¾ fathoms, appears as a white sandy bank and is completely covered at high water springs.

Karang Masimbung, separated from Karang Pinaka by a channel with a least depth of 1¾ fathoms, is a large reef, the greater part of which dries at low water.

Karang Tababinga, separated from the northwest side of Karang Masimbung by a deep and clear passage, seldom dries. The passage is navigable when the reefs are seen, particularly at low water. Shoal depths, as defined by the 10-fathom curve, project ¾ mile northwestward from the northwest side of the visible edge of the reef. A shoal, with a least depth of 1¼ fathoms, lies about 9 miles westward of Pulau Samama.

PULAU DERAWAN (2°17′ N., 118°14′ E.) is a low, cultivated coral island with a few tall trees, visible 15 miles. Derawan Passage is the channel southward of the reef enclosing this island and is used by vessels approaching the mouth of the Sungai Berau from eastward. The passage between the north edge of the

island reef and the coral flats southeastward of Pulau Pandjang, should only be entered near low water, when the reefs are well in sight and with the sun behind. ANCHORAGE can be taken in either channel in 24 fathoms. Because of the prevailing winds, from November to May, vessels should anchor in Derawan Passage. During all other months, vessels should anchor in the north passage. Tides and currents in this area are described in section 10D–4. Pilotage or other assistance can be obtained by request to the resident chief.

BEACONS—DERAWAN PASSAGE is marked on the north side by a black screw pile beacon, located on the south side of the reef fringing the south side of Pulau Derawan. A black iron beacon stands on the north side of Karang Tababinga.

PULAU PANDJANG, covered with vegetation and visible 16 miles, stands on the southeast side of a vast complex of reefs that front the coast to a distance of 9 miles northeastward of Tandjung Batu. A large portion is flooded at high water. A small rocky islet lies off the northwest side of the island. The large reef enclosing Pulau Pandjang dries over a great part at low water and can usually be seen.

Rabu Rabu, a small wooded islet, is partly flooded at high water. Some tall trees standing on it are visible 14 miles. This islet stands near the middle of the vast complex of reefs.

DELTA OF SUNGAI BERAU AND SUNGAI BERAU

10D–12 TANDJUNG PERUPU (1°47′ N., 118°04′ E.), the south point of the delta, is low, but conspicuous. The aspect of the coastal mountains is described in section 10D–2.

GENERAL REMARKS

10D–13 An extensive estuary, formed by many islands, lies between Tandjung Perupu and Tandjung Batu. The islands are, for the most part, are low and have no prominent features. The delta channels between the islands are suitable only for small vessels with local knowledge. The principal channel of approach leads through Muara Guntung and thence through the upper reaches of the Muara Garura and Muara Tidung. There are also navigable approaches through Muara Pantai and Muara Tidung. These, however are seldom used.

Gunung Padai and the dome-shaped Gunung Samiroa serve as useful marks in approaching the delta. They are described in section 10D–2. The former bearing 280° leads to a position east-southeastward of the outer light buoy. Tandjung Birai, the north entrance point of the Muara Pantai, is covered with somewhat isolated tall trees which stand out from the dense vegetation.

DEPTHS

10D–14 The least depth in Muara Guntung, the principal approach channel, and up to the bar near Sokan was about 12 feet. Sokan is located on the south side of the entrance of the main river, near the junction of the Muara Pantai and the Muara Tidung. This depth can be carried upriver as far as Teluk Bajor, about 20 miles upriver of Sokan.

Normally at high water additional depths of 6 feet, 5 feet, and 3 feet are met with in Muara Guntung, on the bar near Sokan, and off Tandjung Redeb, respectively. At spring tides the corresponding additional figures are 9 feet, 9 feet, and 5 feet, respectively.

Muara Pantai has a depth of 3 fathoms and over in its outer part, but is extremely narrow within, and has depths of 6 to 7 feet over its inner bars. Muara Tidung has a depth of 8½ feet, but is unmarked and seldom used.

TIDES AND TIDAL CURRENTS

10D–15 In the Sungai Berau, the ebb and flood currents run for 7 and 5 hours, respectively. The former commences ½ hour after high water and the latter ½ hour after low

water. The ebb has a rate of about 3 knots at springs and 1½ knots at neaps. The flood has a rate of 2 knots at springs and 1 knot at neaps.

Between the outer and inner buoys in the outer part of Muara Guntung, the tidal currents flow in the direction of the channel; between the inner buoy and the narrow entrance northward of the east end of Pulau Guntung, the flood sets west-northwestward and the ebb east-southeastward.

TIDE GAUGES, marked in feet, stand in the vicinity of the bar at Sokan, and at Tandjung Baru. At the latter place, which is about 1 mile upriver of the dredged channel through Hadji Bank, there is a tide gauge which shows the depth in the channel on the south side of this bank.

NAVIGATIONAL AIDS

10D–16 The outer buoy of the Muara Pantai, located about 11 miles east-southeastward of Tandjung Buasin, is conical in shape, painted in red and white stripes with a red St. Andrew's cross topmark. It is moored on the north side of the channel.

The outer channel of Muara Guntung is marked by several buoys. The outer buoy is conical in shape, painted in black and white stripes, with a St. Andrew's cross topmark, and moored about 12¾ miles eastward of Tandjung Birai. (Reported missing, 1962.)

BEACONS.—A beacon with a red ball surmounted by a red cylinder stands about 5½ miles east-southeastward of Tandjung Birai. A beacon with a white ball surmounted by a red cylinder is located about 10 miles eastward of the same point. A beacon stands on the east end of Pulau Guntung.

CAUTIONS

10D–17 There is very little discoloration due to the murky waters in the delta of the Sungai Berau, and there are few prominent land features. Vessels approaching the delta should stay well outside the 10-fathom curve until the sea buoys or beacons have been identified.

CHANNELS

10D–18 MUARA PANTAI, the south channel, is comparatively deep in its outer part, but is seldom used owing to its less favorable conditions further in. The outer channel is 12 miles long and partly marked. Between the inner entrance points, Tandjung Buasin and Tandjung Birai, the channel narrows to 600 yards and takes a westerly direction for 12 miles, turns northward with a tortuous course for another 10 miles to its intersection with the Muara Tidung and Sungai Berau, northwestward of Pulau Sodang-ketjil. Two bars, with depths of 6 or 7 feet, are found in this stretch. Vessels with a draft of 13 feet can reach these bars, but must wait for high water before attempting to cross them.

MUARA GUNTUNG, the recommended channel, is hard to identify from the offing. The outer part of the channel is marked by buoys and is about 12½ miles long. The entrance is between the east end of Pulau Guntung and the flats close northward. Thence the narrow channel leads between the north side of this island and the south side of Pulau Lalawan. It is only 200 yards wide in places. The upper reach leads between the west side of the latter island and the east side of Pulau Sodang-besar to its intersection with the Muara Tidung. Here the channel turns westward and lies close off the north or left bank for about 3 miles or until abreast the east end of Pulau Baru.

Pulau Baru, about ¾ mile long, is a narrow, wooded islet lying close off the north side of Pulau Telassau. The fairway, abreast this islet, passes southward of a rock located about in midriver. Depths of 1 foot to 2 feet are found over the rock.

From abreast the west end of Pulau Baru the fairway lies about 400 yards from the north or left bank until a position with the west end of

Pulau Telassau bearing 180° is reached. Sokan Bar lies westward of this position.

BEACONS OR BUOYS are established in the inner part of Muara Guntung, between Pulau Guntung and Pulau Lalawan, and in the upper reach between the latter island and Pulau Sodang-besar, and in the channel between the north entrance of Muara Garura and Sokan Bar. The narrow part of the channel, southward of the before-mentioned rock, and the channel cut through Sokan Bar are marked by beacons and buoys. A number of the beacons are fitted with reflectors, green or white on starboard, and red or white on port side of the channel.

MUARA TIDUNG.—Tandjung Ulingan, the north entrance point, is a sandy point, surrounded by swampy land. It is rather prominent from eastward. A village, with a coconut plantation near by, stands near the point. The outer part of the channel is unmarked, subject to change, and is very seldom used. A depth of 8 1/2 feet is reported on the bar. The inner part of the channel, westward of its junction with the Muara Garura, is described with Muara Guntung.

SUNGAI BERAU

10D-19 The main river, westward of Sokan Bar, trends in a general westerly direction for 15 miles to Tandjung Redeb where it divides into two rivers, the Sungai Makam, continuing in a westerly direction, and the Sungai Kelai, trending in a southerly direction.

DANGERS.—A shallow flat, that nearly dries, blocks the channel at a position about 7 miles upriver of Sokan Bar. Here the navigable channel leads through Kleine Kali, which passes eastward and southward of Pulau Sapinang-besar. This channel is very narrow and winding, but small vessels with local knowledge can pass on it.

BUOYS.—The navigable channel between Sokan and Tandjung Redeb is marked by buoys or beacons.

CURRENT.—The current often sets toward the government pier at Tandjung Redeb.

TRAFFIC SIGNALS are shown at Tandjung Redeb.

ANCHORAGE.—Vessels not going alongside should anchor near the right bank, off a mosque, in order to leave the channel clear.

TANDJUNG REDEB (2°10′ N., 117°29′ E.)

10D-20 TANDJUNG REDEB, a river port of some importance, stands at the junction of the main river with the Sungai Makam and the Sungai Kelai. There is a lively trade in jungle produce. The residence of a government official stands on the right bank of the Sungai Makam. There is a flagstaff at the residence. The customs house is located 100 yards north-northeastward of the flagstaff.

WHARVES.—The Government Wharf, located near the customs house, has a depth of 16 feet alongside and is about 160 feet long. There are some smaller wharves at this junction, near a large house with a zinc roof.

SUPPLIES.—Provisions can be obtained in small quantities. Coal can be obtained by lighter at the roadstead.

COMMUNICATIONS.—Tandjung Redeb is a port of call for coastal and river steamers. The port is connected to the general telegraph system.

SUNGAI MAKAM AND SUNGAI KELAI

1D-21 SUNGAI MAKAM is navigable by small vessels with local knowledge as far as the junction with the Sungai Sidung, 22 miles upriver of Tandjung Redeb. Depths of 12 to 13 feet can be carried. The tidal rise at the junction is 6 to 7 feet; high water occurs 2 to 3 hours later than at Tandjung Redeb.

TELUK BAJUR is a coal-loading place. The settlement is on the right bank of the Sungai Makam, about 5 miles upriver of Tandjung Redeb. Current signals are shown here.

WHARVES.—Commercial Wharf has a berthing length of 900 feet, with depths of 24 to 30 feet alongside. Cement Wharf is 315 feet long with a depth of 27 feet alongside. The coal berth, 100 feet long, has depths of 21 to 23 feet alongside. Salt Jetty, POL

Jetty, and Ammo Jetty have faces of 30 feet, 36 feet and 10 feet, with depths, respectively, of 20 feet, 19 feet, and 25 feet alongside.

Vessels approaching the wharves on slack water or during flood tide must turn in the river and then approach the wharves as closely parallel as possible.

SUPPLIES.—Water is available.

MEDICAL.—There is a doctor at the settlement.

SUNGAI KELAI is navigable for small vessels with a draft of 10 feet. The currents are strong and the river is filled with dangers. Local knowledge is required.

DIRECTIONS

10D-22 Small vessels, having local knowledge, usually proceed through the outer channel of Muara Guntung. A careful watch for the current should be kept. Such vessels should pass about 90 yards off the east point of Pulau Guntung. Thence the right bank is held at about 110 yards to abreast a small inlet, 1 1/2 miles upriver. Thence the beacons give sufficient guidance.

The south bar of the Muara Garura is passed with the beacon on the southeast end of Pulau Sodang-besar directly ahead on a course of 303°. Outward-bound vessels may steer 123° with the small grove on the north mouth of the Sungai Sesajap ahead in order to pass this bar. Thence the beacons and buoys in Muara Garura give sufficient guidance.

Vessels should follow the left bank of the upper section of the Muara Tidung in passing from abreast the northwest end of Pulau Lalawan to Sokan Bar. When the beacon on the north side of Pulau Telassau bears 180°, vessels should haul over to the south or right bank and pass through the marked channel northward of Pulau Baru. Thence vessels should pass through the beaconed channel leading across Sokan Bar and into the Sungai Berau.

COASTAL FEATURES (CONTINUED)

10D-23 BETWEEN TANDJUNG BATU (2° 18′ N., 118° 05′ E.) and TANDJUNG SEPIKAT, the coast is low and for the most part covered with causarina trees and backed by hilly land. Between the latter point and Pulau Dua, the coast is intersected by the vast delta of the Sungai Kajan (Bulungan). There is a somewhat noticeable point near the settlement of Datumakuta, which stands at the mouth of a small stream; here the forests are displaced by rice fields. Tandjung Tanahkuning is the only rocky point in this area.

On the near approach to the delta of the Sungai Kajan, Pulau Baru, covered with tall trees and located off the northwest end of Pulau Pekin, can be seen over the low Pulau Mening. Pulau Makapan has some tall trees on its north side. Pulau Dua has some high vegetation on it.

Vessels approaching the delta from southward can see the isolated square-topped Gunung Surawan and Pegunungan Njapa. The latter has three lofty summits of about equal height. To the southwestward Gunung Zadelberg and Gunung Kegelberg are prominent. To the westward Pegunungan Bulungan and Pegunungan Salinkata are visible.

DEPTHS AND DANGERS.—The vast chain of reefs fronting Tandjung Batu have been described in section 10D-11. The 3-fathom curve fronting the delta lies up to 12 1/2 miles off the islands forming the delta. Outside this curve, the water deepens rapidly to depths of over 10 fathoms. Within the 50-fathom curve, the bottom is of mud; outside it is of black sand and toward the 100-fathom curve the black sand is mixed with small shells and coral.

Balik Taba, separated from the northwest end of the reef surrounding Pulau Pandjang (sec. 10D-11) by a wide channel with a 1 3/4-fathom patch in its midpart, has a depth of 3 fathoms in its north part and dries in its south part. An iron screw BEACON with a black truncated cone stands on the east edge of the reef.

Several reefs with depths of less than 1-fathom lie within the 10-fathom curve fronting the coast between Tandjung Tanahkuning and the settlement of Datumakuta.

DELTA CHANNELS OF SUNGAI KAJAN (BULUNGAN)

10D-24 MUARA SELOR, the southernmost channel, has depths of 6 or 7 feet over the outer bar. The channel is unmarked and can only be used by small vessels with local knowledge at high water. Muara Klambu, Muara Biwan, and Muara Pekin, the middle channels, have depths of only 3 feet and can be used only by small craft with local knowledge.

Muara Makapan, the northernmost channel, is the only channel of importance to shipping in the delta. It is connected to the main river by the Sungai Temenggah and with the Sungai Salimbatu by the Sungai Kubil. The Sungai Temenggah is very narrow and winding. A bar of hard ground, having a depth of 6½ feet, is found at its junction with the main river. It is reported that there is a bar channel with a depth of 12 feet here.

Near Tandjung Selor (2°49′ N., 117°22′ E.), the Sungai Kajan, which rises in the mountains far inland, divides into 3 main branches, connected by many cross channels thus forming a considerable delta with low shores. Trusan Bulungan, a connecting channel, connects this junction with the Sungai Salimbatu to northward.

SUBMARINE CABLES.—Telephone cables are laid across the river at Tandjung Selor. The landing places are marked by notice boards.

DEPTHS.—Vessels of 11 feet draft can reach Tandjung Selor via the Muara Makapan, Sungai Temenggah and Sungai Kejan at all times. Such vessels must, however, wait for high tide before crossing the bar off the south end of the Sungai Temenggah. Vessels drawing 13 feet, from 4 days before to 4 days after springs, can reach the above port. Depths of 10 to 15 feet are found in the roadstead at Tandjung Selor.

It has been reported that considerable shoaling has taken place in the delta area. Only small vessels with local knowledge should attempt to enter any of the channels.

TIDES AND CURRENTS.—Tides are mixed, but mostly of a semidiurnal nature. When the moon's declination is low, the diurnal tide is not noticeable. The semidiurnal tide has springs 2 days after full and change and has a rise of 7½ feet. Neaps fall at the same interval after the quarters and have a rise of 3 feet at high water.

During diurnal tides, springs occur 1 day after the moon's greatest declination and have a rise of 2 feet at high water. Neaps occur at the same interval before 0° declination with a very neglible rise.

The highest springs occur in March and September, as the moon's declination falls about 3 days after full and change. The water then rises about 2 feet above ordinary springs. The lowest are in January and July under the same circumstances.

At Tandjung Selor, the springs rise 6 or 7 feet. During the October and May freshets, the rise may be 6 feet higher and cover the surrounding land.

TIDE AND CURRENT SIGNALS are displayed from the government pier at Tandjung Selor by day, and, when a ship is expected, by night.

Signal (Night)	Signal (Day)	Signification
3 White lights, horizontally displayed.	Cone, point up, above a cylinder, above a cone, point down.	Slack water.
3 White lights in the form of a triangle, point up.	Cone, point up, above a cylinder.	Flood tide.
	Cylinder, below which are two cones, points up.	Strong flood.
3 White lights in shape of triangle, point down.	Cylinder, below which is a cone, point down.	Ebb tide.
	Cylinder, below which are 2 cones, points down.	Strong ebb.

NOTE.—Day signals are colored red or black according to whether the background viewed from approaching ships is dark or light.

TIDAL CURRENTS.—In the delta, the tidal currents are almost entirely of a semidiurnal nature with the flood running for an average of 5½ hours and the ebb for an average of 7 hours. At high water, the tide and the current changes at about the same moment. The flood current begins about 1 hour after low water. The greatest rate occurs when the water is at mean level. It may attain a rate of 2 knots. During the May and October freshets, this rate may be changed.

The flood current in the outer part of the mouth of the Sungai Makapan sets toward the west-northwestward and the ebb in an opposite direction. In the Sungai Temenggah the ebb runs toward the north and occurs 1 hour later than in the Muara Makapan. The flood, which runs in the opposite direction, occurs at about the same time as in the Sungai Makapan.

In the Sungai Kajan, at the crossing 1½ miles northward of Tandjung Selor, the ebb reaches its greatest rate at about the time of low water, with a rate of 2 knots at springs and 1½ knots at neaps. This information may be considerably altered during the May and October freshets.

NAVIGATIONAL AID.—A beacon, with a ball topmark, is located on a drying bank, about 8½ miles east-northeastward of Pulau Makapan.

DIRECTIONS.—Vessels coming from the vicinity of Tandjung Mangkalihat should follow the directions given in section 10D–10 and thence pass in midchannel between Pulau Sangalakki (sec. 10D–11) and Pulau Kakaban (sec. 10D–3). These two islands are visible from distances of 14 and 23 miles, respectively. Vessels thence pass northeastward of the beforementioned vast complex of reefs fronting Tandjung Batu. Vessels can also pass eastward of Muaras Reef and Pulau Maratua.

Vessels coming from the delta of the Sungai Berau should pass southward of Pulau Sangalakki and thence between that island and Pulau Kakaban as described above. Vessels with local knowledge can use Derawan Passage (sec. 10D–11).

Muara Makapan, the only suitable entrance of the Sungai Kajan, should only be attempted by small vessels with local knowledge.

Pilots can be obtained at Linkas (sec. 10D–33).

TANDJUNG SELOR (2°50′ N., 117°22′ E.)

10D–25 TANDJUNG SELOR, a river port of some importance, is the residence of a government official. The Sultan of Bulungan resides at Tandjung Pelas on the opposite bank of the river. There are coal mines in this area.

PIERS.—There are three piers; the government pier has 13 feet alongside, the other two, 12 feet.

SUPPLIES are difficult to obtain.

COMMUNICATIONS.—River and coastal steamers call at Tandjung Selor. The settlement is connected with the general telegraph system.

DELTA CHANNELS OF SUNGAI SESAJAP

10D–26 BETWEEN PULAU DUA (3°04′ N., 117°37′ E.) AND TANDJUNG AHUS, the coast is intersected by the vast delta of the Sungai Sesajap which is formed by a large number of small islands, between which three main passages give access to the sea. The coast, northwestward of Pulau Dua, is indented by a large, shoal bay. Muara Salimbatu, a shoal and unmarked channel, leads through the south part of this bay into the Sungai Salimbatu. An unmarked channel, the Muara Sekata, leads through the south side of the inner part of the bay into the Sungai Sekata. The channel can be navigated by vessels of 12 feet draft for a distance of about 6 miles.

The three principal mouths, the Muara Batagau, Muara Sebawang, and Muara Serban lead into the Sesajap Selatan, Sesajap Tengah and Sesajap Utara, respectively. The latter lead into the Sungai Sesajap at a position north-

(5963) **INDONESIA—Borneo—East coast—Bunju approaches—Buoy information.**—No. 3 black buoy (3°26.0′ N., 117°51.7′ E. approx.), previously reported relocated, has been reestablished in its charted position.

(Supersedes N.M. 11(1512) 1965.)

(N.M. 41/65.)

(B.P.I. 35(269), Djakarta, 1965.)
H.O. Chart 6183.
H.O. Pub. 72, 1962, page 389.

(5800) **INDONESIA—Borneo—East coast—Sungai Sesajap and approaches—Buoy information.**—1. Buoys have been established as follows; distances and bearings from Tg. Arang Light (3°27.2′ N., 117°51.9′ E. approx.):

(*a*) Conical red buoy with red cylindrical topmark about 3.85 miles 249°.

(*b*) Buoy No. 1, painted black with white diamond topmark, about 4.53 miles 263°.

(*c*) Buoy No. 3, painted black and white checkers and showing a *Fl. 5 sec.* light, about 8.37 miles 265°.

(*d*) Buoy No. 2, painted red and white checkers and showing a *Gp. Fl. R. (2) 7.5 sec.* light, about 11.3 miles 274°20′.

2. Buoys have been established as follows; distances and bearings from the beacon (3°37.2′ N., 117°25.8′ E. approx.).

(*a*) Buoy No. 5, painted black and white checkers showing a *Gp. Fl. (2) 7.5 sec.* light, about 8.3 miles 120°.

(*b*) Buoy No. 4, painted red and white checkers showing a *Fl. R. 6 sec.* light, about 5.8 miles 121°.

(*c*) Buoy No. 7, painted black and white checkers showing a *Fl. 4 sec.* light, about 10.6 miles 264°45′.

3. The front range beacon on the southeast point of Tembagan Island will be relocated as follows; distance and bearing from the beacon in (2):

(*a*) About 7.4 miles 106°10′.

(*b*) Rear beacon about 0.1 mile 241° from (3*a*).

4. Buoy No. 9, painted black and showing a *Fl. 5 sec.* light has been established in 3°38.1′ N., 117°05.8′ E. (approx.).

(N.M. 40/65.)

(B.P.I. 33(254), 34(260), Djakarta, 1965.)

H.O. Chart **6183(1–3)**.

H.O. Pub. 72, 1962, pages **389–393.**

SEE SHORT CORRECTIONS

ward of the northwest end of Pulau Bangkudulis-besar.

LANDMARKS–ISLANDS.—The coast is low and flat; the only recognizable points from seaward being Pulau Menulun, Pulau Tarakan, Pulau Bunju, and the hills on Pulau Mandul. These have been previously described in section 10D–2. A war memorial, located northwestward of Linkas is reported to be a good landmark. A conspicuous gas flame is located about 1 mile northward of the south end of Pulau Bunju. Another conspicuous gas flame was reported (1962) in the vicinity of the one above and that the flame from these two was seen at a distance of 30 miles. There are oil drillings on the island.

A small islet, having some fairly high trees on it, is located 3 miles southward of Pulau Menulun. It serves as a good landmark for vessels approaching the Muara Salimbatu.

DEPTHS AND DANGERS.—The off-lying shoals fronting the delta are described in section 10D–3. The 10-fathom curve lies up to 18 miles off the islands that form the delta. From Tandjung Batu and Pulau Manulun, this curve runs in an easterly direction for 15 miles and then turns sharply to the north and south, leaving a deep channel between. This channel leads to the oil port of Linkas. A dangerous wreck lies about 16 miles east-southeastward of Tandjung Batu.

Numerous mudbanks, reefs, and detached dangers lie within the 10-fathom curve. Pulau Menulun is surrounded by a drying reef. The northwest part of the reef is detached. Deep channels lead northward and southward of this reef.

Depths of 5 feet and less lie within 1 mile southward of Tandjung Arang, and from this depth similar depths extend almost 4 miles northwestward along the coast of Pulau Bunju.

Johanna Reef, with a least depth of 3 feet, is located on the south side of the entrance channel leading to the pipeline berth at the southwest end of Pulau Bunju. The reef is steep-to and does not show discoloration.

Kruigs (Kruys) Reef, a 2¼-fathom patch located about 3½ miles east-southeastward of the southeast end of Pulau Bunju, is not marked by discoloration, but occasionally a few ripples are seen over it.

TIDES AND CURRENTS

10D–27 Tides and currents in this area are described in section 10D–4. A current of 4 knots has been observed in Tarakan Roadstead.

WINDS AND WEATHER

10D–28 Winds and weather conditions in this area are described in section 10D–5. During strong onshore winds it is unsafe to berth at the piers.

NAVIGATIONAL AIDS

10D–29 BUOYS.—A mooring buoy, painted black and marked "Pilot Tarakan" in white letters, is moored about 15 miles eastward of Tandjung Batu, northward of the approach range line.

A lighted buoy, painted in red and white stripes and equipped with a radar reflector, is moored 15½ miles eastward of Tandjung Batu, approximately on the approach range.

A lighted fairway buoy, painted in red and white stripes, is moored a little less than 6 miles east-southeastward of Tandjung Arang.

A buoy, painted red with a truncated cone topmark, is moored on the northeast side of a 4-fathom shoal, located about 4½ miles southeastward of Tandjung Arang.

A lighted buoy, painted black, is moored about 2 miles south-southeastward of Tandjung Arang. A black conical buoy, with a cone topmark, point up, having green reflecting material, is moored about 1 1/5 miles southward of Tandjung Arang.

Some lighted and unlighted buoys mark some detached shoals that lie in Tarakan Roadstead.

BEACONS.—Beacons mark the southeast edge of the shore reef that fringes Tandjung Batu. A black beacon, having a topmark of

two cones, points up, stands on the south edge of the reef, about 1,700 yards southeastward of Pulau Menulum. A black beacon with a topmark of two cones, points up, marks Kruigs Reef and a red beacon with a cone topmark, point up, marks the west end of Johanna Reef.

LIGHTS.—A light is shown from an iron framework beacon, 26 feet high, standing on the edge of the reef fringing Tandjung Mengatju.

A light is shown from Tandjung Arang.

RANGE LIGHTS.—The front light of a range is shown from a 33-foot iron framework beacon standing on a detached reef, about 2 miles west-southwestward of Tandjung Batu. The rear light is shown from a similar structure, 49 feet high, standing 1,000 yards 267° from the front lighted beacon. The front beacon is painted in red and white stripes. These lights in range indicate the approach channel to Tarakan Roadstead.

Range lights are shown for approaching the piers at Linkas. The front light is located on the southeast corner of the south pier, and the rear light is located 885 yards 347½° from the front light.

CAUTIONS

10D–30 Less water than charted was reported (1956) to exist in an area extending in a eral north and south direction between a position 14 miles southeastward of Pulau Bunju and a position about 25 miles northeastward of the same island.

Caution should be used in navigating the channel between Pulau Tarakan and Pulau Menulun, as vessels are liable to be set toward the reefs at low water.

Because of obstructions. vessels are cautioned not to navigate in the area northward of the parallel of 3°17′15″ N. in Tarakan Road.

ANCHORAGES

10D–31 TARAKAN ROAD affords safe anchorage in 5½ to 8 fathoms off the piers. Due to floating trees, strong currents, and heavy squalls, it is advisable to veer a fair amount of chain. Vessels bunkering, anchor about 1½ miles from the oil or commercial pier. Vessels loading logs anchor from 1 to 2 miles offshore, in front of the Marine pier.

Anchorage can be taken in 8 fathoms, about 1¾ miles west-southwestward of Tandjung Arang, but caution is necessary in order to avoid the 4½-fathom patch northward of this position.

A submerged oil-loading berth is located close northwestward of Tandjung Arang. A red BUOY is moored in the vicinity of the seaward end. The least depth in the channel leading to this berth is 36 feet.

DIRECTIONS

10D–32 Vessels approaching the delta channels of the Sungai Sesajap should remain outside the 10-fathom curve until they have ascertained their position. Vessels approaching from northeastward or eastward are cautioned to avoid the 3¼-fathom shoal, located about 21 miles eastward of the southeast end of Pulau Bunju. (See section 10D–3.) Vessels are further cautioned that the banks do not discolor and that soundings give little indication of the approach to the steep edges of the banks. Strong northeasterly or southeasterly sets may be experienced.

The approach channel to Linkas and Muara Batagau, passing between Pulau Menulun and Pulau Tarakan, is well marked. In 1946 the channel southward of the former islet was closed to navigation. Pilotage is required.

The approach channel leading to the submerged oil-loading berth, located close northwestward of Tandjung Arang, is marked and oil company pilots are available. Vessels from eastward should steer for the southwest side of Pulau Bunju on a bearing of 302°, passing between Kruigs Reef and Johanna Reef. When the east side of the island bears about 328°, the course can be shaped more to the westward taking care not to approach the south point of Pulau Bunju within a distance of 1½ miles. Berthing pilots are used to moor tankers off the

seaward end of the submerged oil-loading berth. This is usually done during the ebb current. Pilots remain on board during loading operations.

PILOTAGE

10D-33 PILOTAGE is compulsory for merchant ships. Requests for pilots should be made by radio, 24 hours before ETA at the outer buoy. This message, which should be addressed to the harbor master, should include the vessels draft. The sea pilots are always on duty. The pilot vessel is stationed about 15 miles eastward of Tandjung Batu. These pilots have lists of ports declared infected by the government. If arriving from a clean port, vessels can enter at once; if not they must hoist the quarantine flag and undergo inspection. The sea pilots conduct vessels as far as a position off the piers at Linkas where the berthing pilots take over. Berthing pilots work only from 0700 to 1800 hours. Vessels may sail up to 2130 hours.

Pilot signals are shown at Linkas. A red light over a white light denotes that a pilot is not available. A vessel must anchor when a black ball is displayed on the south pier.

Pilots for the submerged oil-loading berth at Pulau Bunju are arranged through the oil company which desires at least 4 days notice.

LINKAS (3°17′ N., 117°35′ E.)

10D-34 LINKAS, is the shipping place for the oil fields on Pulau Tarakan. Tarakan, the headquarters of an oil refinery, is located about 2 miles inland and is connected to Linkas by a good road. Some lumber is exported. Linkas is the seat of a government official.

PIERS.—There are four T-head piers, each with a width of 15 feet. The T-heads stand about 16 feet above water at MLWS. The largest ship to berth had a length of 560 feet.

The north pier is about 350 yards long. The length along the T-head is about 50 feet, with depths of 13 feet in the approaches. The largest vessels are said to be able to moor from about 300 feet upstream to about 300 feet downstream from the T-head. This pier was reported to be in disrepair (1962)

The south pier is about 500 yards long. The length along the T-head is about 450 feet with a depth, subject to silting, of 11 feet (1962) alongside.

The middle pier, extending 55 yards, had (1962) a least depth of 34 feet alongside its 210-foot T-head. This pier was in a weak condition in 1960.

A small pontoon wharf, in disrepair (1962), is used by boats and is located close northward of this pier.

CARGO INFORMATION.—A 2-ton and a 5-ton crane are available at the north pier. A crane of 3-ton capacity is available on the middle pier. A 10-ton mobile caterpillar crane and a fork lift are available. Harbor launches and lighters are available. There is covered storage facilities.

PROVISIONS AND SUPPLIES are obtainable in limited quantities.

FUEL.—Gasoline, fuel oil, and diesel oil can be obtained in unlimited quantities by gravity feed, at a rate of 80 to 100 tons per hour.

WATER is obtainable in limited quantities, and should be treated before using. It is supplied by pipeline laid onto the piers. A maximum of 50 tons of drinking water and 100 tons of boiler water per visit is allowed.

REPAIRS of a minor nature can be made.

COMMUNICATION.—Tankers and coastal vessels call at Linkas. Weekly air service by seaplane to Djakarta is maintained. A radio station (reported as inoperable in 1960) is located at Tarakan.

MEDICAL.—There are two hospitals with ambulance service available. Provisional medical pratique must be obtained in advance of calling.

SESAJAP SELATAN

10D-35 SESAJAP SELATAN can be approached through the channel leading to Linkas and Muara Batagau or through the channel leading southward of Pulau Bunju.

The former channel leads through Muara Batagau and between Pulau Pajau and Pulau Tarakan. Pulau Pajau, covered with small marsh palms and vegetation, is reported to be a good radar target at a distance of 9 miles. Pulau Sadau, a high islet surrounded by a reef, lies on the east side of the narrow part of the channel. The channel between this islet and Pulau Tarakan is shoal at its north end.

Thence the channel passes northward of Pulau Pajau and southward of Pulau Bandkudulis-besar. It then curves around the west side of the latter island and unites with the main river. Four small islets are located off the south side of the same island. A considerable mud bank lines the south shore of the channel. A number of waterways intersect this shore. The Sungai Teladan, which is entered southward of Tandjung Tiram, has a width of about 750 yards, and a depth of 3¾ to 5 fathoms, as far as the junction of the Sungai Bukit Pondak, 4 miles upstream. Coastal vessels sometimes proceed as far as this junction.

NOTE.—In 1947 Muara Batagau, northward of 3°17′15″ N., was closed to navigation.

Sesajap Selatan can be entered through the passage northward of Pulau Tarakan (sec. 10D–36) or through the channel leading to the oil-loading berth, located close northwestward of Tandjung Arang (sec. 10D–32). From abreast Tandjung Djuata, the Tarakan shore must be held closely so as to keep clear of the bank extending out from the east shore of Pulau Bangkudulis-besar.

SESAJAP TENGAH

10D–36 SESAJAP TENGAH flows between Pulau Tibi and Pulau Bangkudulis-besar, and thence between the latter island and Pulau Bangkudulis-ketjil to the junction with the main river.

From the position about 1½ miles southward of the south end of Pulau Bunju (sec. 10D–32), vessels should steer 270° until the west side of that island bears 360°. Thence vessels should steer direct for Tandjung Tibi, passing southward of the dangers lying between Pulau Tibi and Pulau Bunju. Caution is necessary in order to avoid a 3-fathom patch which lies close northward of the latter track in a position about 3½ miles west-southwestward of the south point of Pulau Bunju.

Vessels with local knowledge can proceed between Johanna Reef and Adat Reef, passing northward of the extensive bank projecting eastward from Pulau Tarakan.

A midchannel course should be steered when the passage between Pulau Tibi and Pulau Tarakan is entirely open, making for the entrance of the Sesajap Tengah when just westward of Djuata Hill. The west entrance point should be steered for, being careful to clear the bank fronting the east side of Pulau Bangkudulis-besar and the bank fronting the mouth of the Sungai Tibi. A midchannel course should then be steered until abreast of the islands lying southward of Pulau Bangkudulis-ketjil, when the south shore is closed. A 3-fathom patch lies close off the southwest end of the above island. Vessels should cross over here and pass between the patch and the island. Thence vessels pass eastward and northward of Pulau Bahap and over the bar, with a least depth of 2½ fathoms, and into the main river.

SESAJAP UTARA

10D–37 SESAJAP UTARA is divided into two mouths by Pulau Baru. Muara Sebawang, the south mouth, is entered between this island and the banks extending southeastward, on the north, and Pulau Tibi, on the south. Muara Serban flows between Pulau Baru and Pulau Bangkudulis-ketjil, on the south, and Pulau Mandul, Pulau Tembangan, and the main coast, on the north. A large bank, that extends eastward from the east side of Pulau Mandul, forms the north side of the outer part of Muara Serban.

Muara Serban unites with the Sesajap Utara through the narrow, but deep, passage between Pulau Tembangan and Pulau Baru. A bank with a least depth of 2¾ fathoms fronts the east end of this passage. The east entrance of the passage has depths of less than 2 fathoms. The entrance channel is marked by a pair of beacons in range 241°, located on the southeast end of Pulau Tembangan.

After its junction with the Muara Sebawang and Muara Serban, near the west end of Pulau Baru, Sesajap Utara closes the north shore, passing northward of Pulau Tipus. Abreast the north extremity of Pulau Bangkudulisketjil, the channel crosses over and leads along the north shore of that island, between it and Pulau Tiga. Thence the channel leads northward of Pulau Bahap and over the bar, with a least depth of 2½ fathoms, and into the main river. Beacons mark the channel of the Sesajap Utara.

DIRECTIONS.—Vessels may approach the Muara Sebawang through the channel leading about 1½ miles southward of the south end of Pulau Bunju (sec. 10D–32) and thence through the approach channels leading to the Sesajap Tengah (sec. 10D–36). When the south high point on the east coast of Pulau Tarakan is closed behind the middle point of the coast, a course of 008° is made good, passing between the bank projecting eastward from Pulau Tibi and the southern of the banks between that island and Pulau Bunju. Vessels thence turn into the Muara Sebawang when open and steer a midchannel course, first keeping over toward the Pulau Tibi shore and thence crossing over to the Pulau Baru shore, when clear of the bank that extends from the west side of Pulau Batok.

When Pulau Tiga is wholly open from Pulau Bangkudulis-ketjil, cross over to the south shore, passing southward of Pulau Tiga and northward of Pulau Bahap, and thence across the bar with a depth of 2½ fathoms leading into the main river.

Vessels may approach the Muara Serban by keeping outside the 10-fathom curve until the north point of Pulau Bunju is identifiable. Thence a course of 270° should be steered with that point ahead. The course should be altered to 278° when the south point of the island bears 223°. Depths of 3 to 3¾ fathoms are found along this range. When abreast the north point of Pulau Bunju, make good a course of 263°. When abreast the east point of Pulau Baru, the course should be altered to 272°, making for the narrow channel between Pulau Baru and Pulau Tembangan when it is open. The bar over the entrance of this channel has a depth of 2¾ fathoms. The remainder of the narrow channel is clear. The south side of the channel must be held at the west entrance of the narrow channel. Thence vessels cross over to the north shore of the Sesajap Utara and proceed as described in the preceding paragraph.

SUNGAI SESAJAP

10D–38 SUNGAI SESAJAP is formed by several streams rising in the mountains of central Borneo. The principal villages on the river are Sesajap Lama and Sesajap Baru. The river is rather wide, deep, and mostly clear. Just above its junction with the delta channels, Pulau Belanak (3°37′ N., 117°11′ E.) lies under the right bank with a drying bank northward. Farther upriver are Pulau Sesajap and Pulau Sapunti. Numerous islets and banks lie in the bends, farther upriver.

Depths of 3 to 9 fathoms are found in the river as far as Sesajap. The channel at the entrance leads along the left bank, thence between Pulau Sesajap and Pulau Sapunti and thence across to the right bank and thence following the curves and avoiding points as usual in most rivers.

SUNGAI SEMBAKUNG

10D–39 SUNGAI SEMBAKUNG, just northward of Muara Serban, reaches the sea by

two branches. The north branch, which flows out northward of Pulau Mandul, is fronted by a shallow, unmarked bank and is suitable only for small craft with local knowledge.

The south branch flows into the Muara Serban via the connecting channels of Trusan Gelagan and Muara Ledung. Vessels with a draft of 12 feet can ascend the river to a distance of 35 miles to the village of Sembakung.

TANDJUNG AHUS (3°48′ N., 117°50′ E.) is low, flat, and covered with short trees. The Borneo coast, northward of Tandjung Ahus, is described in H.O. Pub. 71.

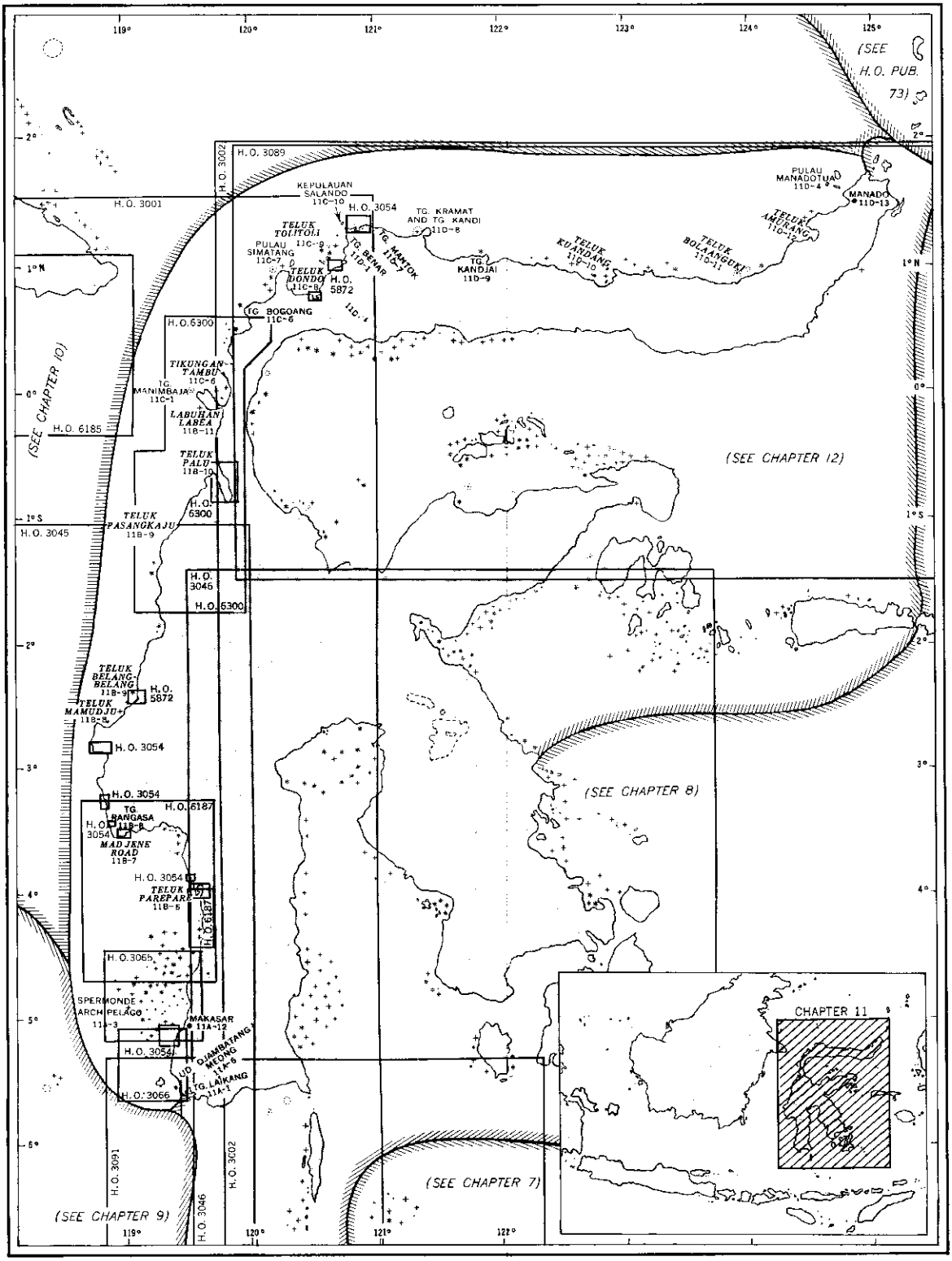


Chart limits shown are of the best scale charts issued to naval vessels by the U.S. Navy Hydrographic Office.
Numbers refer to the section in the text describing a designated locality.

SEE SHORT CORRECTIONS

CHAPTER 11

WEST AND NORTH COASTS OF CELEBES

Part A. West Coast-Tandjung Laikang to Tandjung Tonrangang.
Part B. Tandjung Tonrangang to Tandjung Manimbaja.
Part C. Tandjung Manimbaja to Tandjung Benar (Stroomen Kaap).
Part D. North Coast-Tandjung Benar to Tandjung Utara.

PLAN.—This chapter describes the west coast of Celebes from Tandjung Laikang to Tandjung Benar, including the Spermonde Archipelago, and the north coast of Celebes from Tandjung Benar to Tandjung Utara. The coastal description is from south to north and west to east.

Chapter 10 should be consulted in regards to Makasir Strait—the extent, weather, tides and tidal currents.

GENERAL REMARKS

11–1 The best known and by far the most important of the Celebes peninsulas is the southwestern, or that which has Makasar Strait to the west and Teluk Bone to the east. A chain of mountains runs through this, as through the other peninsulas, and has toward its south extremity Gunung Lompobatang, about 9,500 feet high, and near the north end of the peninsula are the Pegunungan Latimodjong, which reach a height of 11,286 feet.

The northern peninsula is about 400 miles in length and nowhere exceeds 60 miles in breadth. A range of mountains runs through it, the general height being about 2,000 feet, while some peaks rise to over 6,000 feet. The whole of the peninsula is rugged and mountainous. The northeast extremity makes up a fertile and highly cultivated district, the capital of which is Manado. A considerable portion of this district is a plateau from 2,500 to 3,000 feet above the sea, with mountains rising to 6,000 feet or more.

The only port of importance along these coasts is Makasar near the southwest extremity of the southwest peninsula. It is the chief shipping point for the Celebes and Moluccas.

WINDS—WEATHER

11–2 See section 10–2 for winds and weather conditions along the west coast of the Celebes and in Makasar Strait.

In the Celebes Sea the south monsoon prevails from the second half of May to, and including September, and a north-northeast monsoon from December to April, but neither have great constancy or great force. The south monsoon can beat into the Celebes Sea at the isthmus of Kwandang with force 4 or 5. Near the Celebes coast the land and sea breezes have an influence on the monsoons so that the south monsoon is more constant and stronger there by night, while the north-northeast monsoon is stronger by day. April and October are the months of the change of the monsoon. In general the monsoons have a more characteristic course toward the east.

Rain falls all year around, though not in great quantities. The most rain falls in January, the least in September. Further east-

ward the contrast between seasons is greater. Hard squalls are relatively rare, but, however, reach the north coast of the Celebes, particularly when the south monsoon is at its strongest and the land breeze is paired with hard squalls and thunderstorms.

In addition during the north monsoon the hard wind called Barat, the force of which rises to 7, and which, because of the accompanying state of the sea and surf, make communication with the shore at the open roadsteads of north Celebes temporarily impossible. November and December are the months in which the Barat is most common.

CURRENTS—TIDAL CURRENTS

11–3 See section 10–3 for currents along the west coast of Celebes and in Makasar Strait.

Little is known of the currents along the north coast of the Celebes as no systematic observations have been made. From numerous previous reports received, the currents along this coast appear to be irregular and fairly strong, especially between Tandjung Benar and Manado. In the month of June, during the first quarter of the moon, a current with a rate of 2½ to 3 knots was observed setting onto the coast in an east-southeasterly direction.

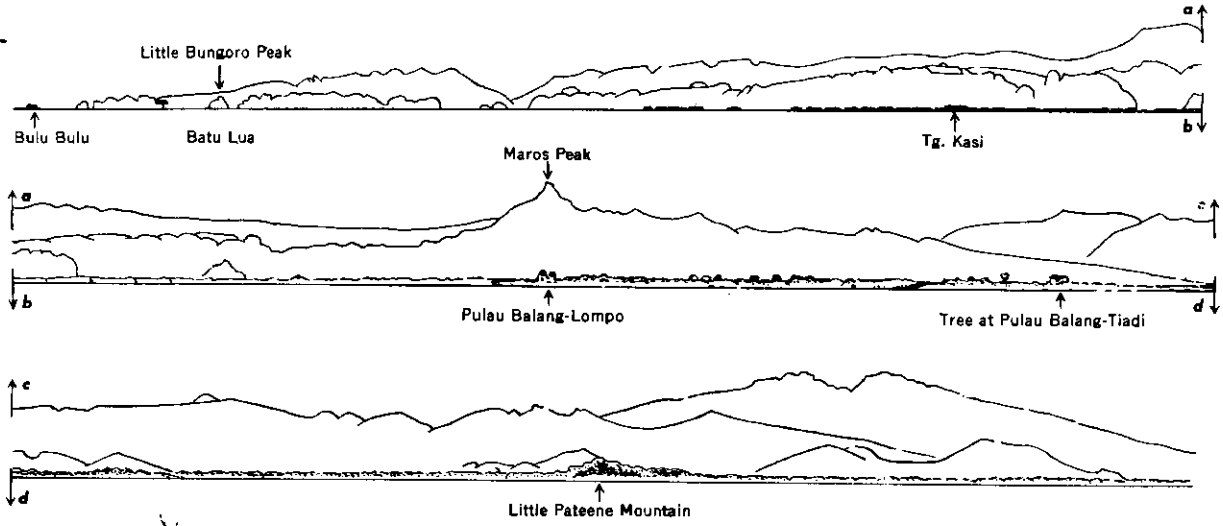
Tides along the north coast of the Celebes are of a mixed character, but are predominently semidiurnal.

PART A. WEST COAST—TANDJUNG LAIKANG TO TANDJUNG TONRANGANG

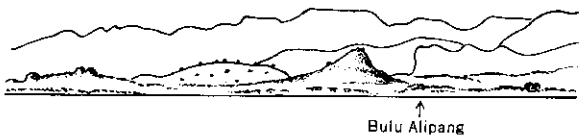
11A–1 TANDJUNG LAIKANG (5°37′ S., 119°27′ E.) is low and not conspicuous, but at a point, 2 miles northwestward, are two dark colored rocks which show well against the sandy shore.

COAST—GENERAL

11A–2 The coast between Tandjung Laikang and Makasar, about 28 miles northward, is low with few noticeable landmarks. Northward of Makasar the coast continues northward for about 65 miles to Teluk Parepare and has several landmarks: Maros, a peak about 25 miles northeastward of Makasar, is really a double peak, but when seen from the southwest and



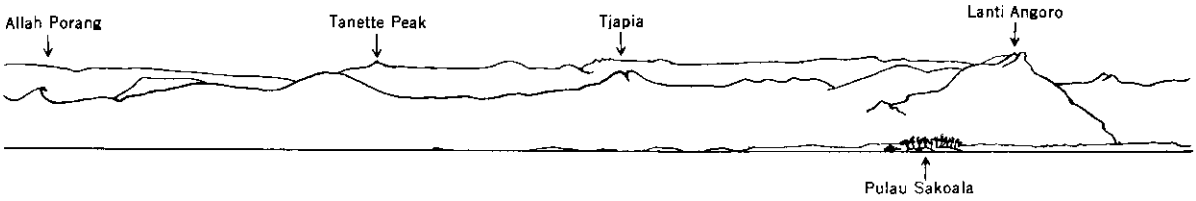
WEST COAST OF CELEBES, MAROS PEAK IN RANGE WITH LURI LOMPO, 071°



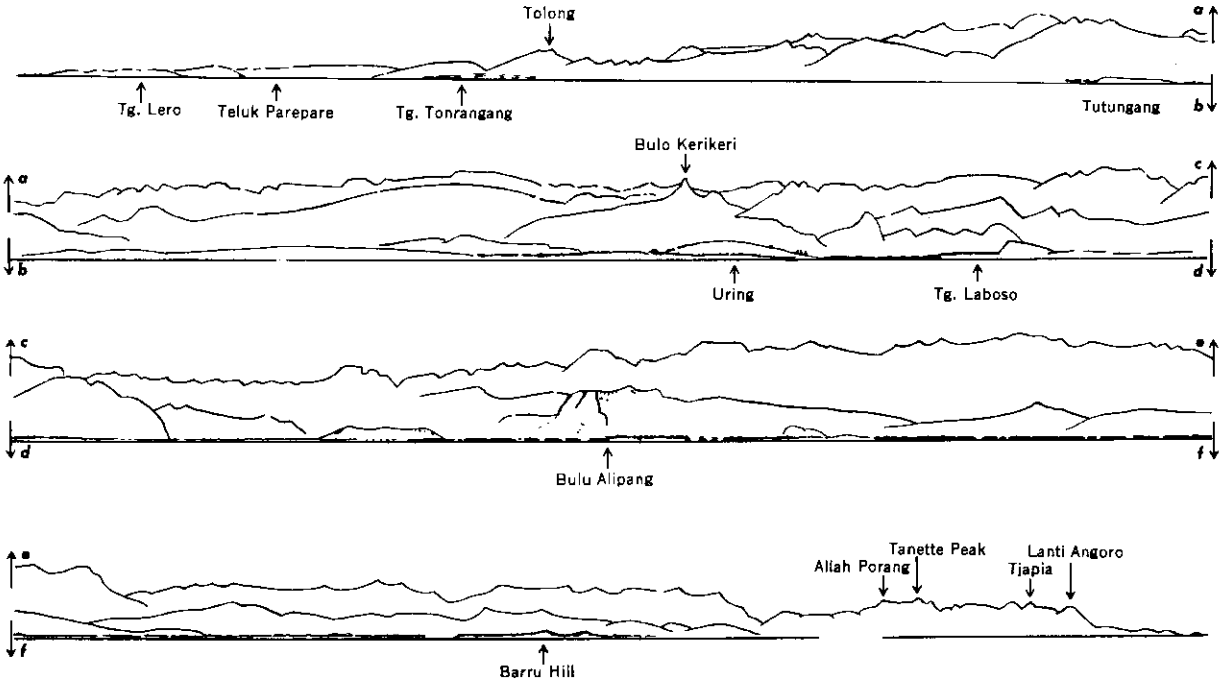
GUNUNG LADJARI (BARRU HILL) 3½ MILES, 024°

west to northwest appears only as a solitary peak. With clear weather this peak and the second mountain chain to the northward of it are the only important navigational landmarks of importance while entering the Western Channel. Lanti Angoro (4°39′ S., 119°38′ E.) has three summits, the two western being marked on the chart; Tjapia has two peaks close together; Tanette, 1,673 feet high, is very sharp and conspicuous. Allah Porang has a blunt, steep summit.

Gunung Ladjari (Barru Hill) about 9 miles farther northward and ½ mile from the coast, is very conspicuous from the southward. Alipang, about 7 miles to the north-northeastward, has four small peaks close together, the west slopes being very steep, but it is not very clearly defined against the higher land behind. Keri Keri, 6½ miles farther northward, is the most conspicuous conical summit of the Nepo range.



TANETTE PEAK 12 MILES, 068°



MAKASAR STRAIT, NORTH ENTRANCE, NORTH CHANNEL, TO MAKASAR TANETTE PEAK 152°

Tollong, southward of Teluk Parepare, is a very conspicuous hill, with gradual slopes on the northwest side and steep on the east and southwest sides.

DEPTHS—DANGERS

11A–3 SPERMONDE ARCHIPELAGO.—This great area of coral banks, rocks, and banks stands on a flat off the southwest side of Celebes, which with the 100-fathom curve extends northwestward from Tandjung Laikang about 25 miles, irregularly northward for 70 miles, then turns abruptly east and again joins the coast in latitude 4°20′ S. The north and northwest edges of these banks are still imperfectly known. The islands are generally planted with coconut trees and form good marks. In clear weather the hills of Celebes are seen far off, Maros, northeastward of Makasar, being very conspicuous.

Northward of latitude 5°10′ S. the usual raised ridge immediately within the 100-fathom curve is very pronounced and in many places rises above the level of the sea. Southward of that parallel the ridge is lower and more broken, so that only in two parts is there danger to crossing vessels, but a reliable chart is essential to safety.

The formation of the innumerable little islands and reefs makes it extremely dangerous to venture outside the three usual and frequented channels which will be discussed with the description of the passages through the Spermonde Archipelago (sec. 11A–8).

The only known danger outside the 100-fathom curve in this part is TAKA BAKANG (4°58′ S., 118°32′ E.). It is about 2 miles long in a northwest direction and 1½ miles broad and dries, with the exception of a part at the west end. It is steep-to, with very deep water around, and being composed of dark coral is indistinguishable at high water. At low water the area that dries is visible about 5 miles.

WINDS—WEATHER

11A–4 In the Spermonde Archipelago a Southeast and Northwest Monsoon prevails. The former sets in about the latter half of April, reaches its full force in May, and continues till September or the beginning of October. The average direction of the wind during these months is southeasterly, but the direction and force are considerably influenced by the land and sea breezes. At night the wind veers around more to the eastward; in the daytime a southwesterly sea breeze is frequent, setting in about 11 a.m. and lasting till sunset.

In July, August, and September the mountain wind is met with. The approach of these squalls, which usually come in the forenoon, is generally marked by a heavy sky and the land becoming very indistinct.

In October the wind varies from southwest to southeast in the daytime; at night from southeast to east. In November it is very changeable, coming from all points. In December, January, February, and March the Northwest Monsoon prevails, but blows with less force than the Southeast Monsoon, especially at night when opposed to the land breezes.

TIDES—TIDAL CURRENTS

11A–5 See section 10–3 for currents in Makasar Strait.

Within the Spermonde Archipelago there is in practice no tidal current. According to the state of weather a current toward the north or toward the south may be expected.

COASTAL FEATURES—LANDMARKS

11A–6 BETWEEN TANDJUNG LAIKANG AND UDJUNG DJAMBATANG I MEONG the coast is monotonously grown up with tall trees that grow close down to the water; the hill ridge inland is not wooded. Batu Galingang, a rock awash at low water, lies about 400 yards westward of Udjung Djambatang I Meong.

Taka Luwara, a small sand and coral patch of 4¼ fathoms, lies with its shoalest part about 5¼ miles westward of Tandjung Laikang. Manrantusang, of similar depth, lies 4½ miles to the northward of the above mentioned patch in the middle of the south entrance of Tana Keke Strait.

TANA KEKE STRAIT.—This strait, bounded, on the east side by the Celebes coast between Tandjung Djambatang I Meong and Udjung Parapa, on the west side by Pulau Tanakeke, is about 5 miles broad at the south entrance, though partly blocked by Manrantusang. The north entrance is about 1½ miles broad between the reefs on either side. The depths in the strait vary from 6 to 16 fathoms. Malambeang, a bank consisting of one large shoal with a least depth of 8 feet and numerous smaller ones, lies on the east side of the strait to the southward of Udjung Parapa and 1¾ miles offshore.

PULAU TANAKEKE is a low island, thickly overgrown, with some taller trees on the south side and an isolated clump on the northeast point. On the southwest side is a shoal bay with an islet at the entrance and a very conspicuous tree, the tallest on the island, on the west shore. A great part of the coastal reef is covered with brushwood so that the extremities of the island can only be determined at a short distance, and the island itself is not visible farther than 10 or 11 miles.

In the daytime the strait is the usual route for vessels to and from the south channel of Makasar, going to or coming from the Flores Sea or from east Celebes. At night the channel westward of Pulau Tanakeke is preferred.

There are no definite time relations between the turn of the horizontal and vertical water movements. The prevailing wind is the most important factor.

PULAU BAULUANG is separated from the northwest side of Pulau Tanakeke by a partly examined channel about 1 mile wide with a least depth of 7¾ fathoms, and from Satanga on the north by a narrow, shallow passage. On the middle of the east coast of Pulau Bauluang is a conspicuous isolated tree.

Pulau Dajangdajangan lies 2¾ miles to the northwestward of Satanga, with a channel of 12 to 19 fathoms between, frequently used by vessels approaching Makasar from southwestward. The island is almost surrounded by a drying reef extending 400 to 600 yards on the south and west sides and is steep-to.

A LIGHT is shown from the southeast point of Pulau Dajangdajangan.

BETWEEN UDJUNG PARAPA AND THE DELTA OF THE DJENE BERANG, about 16 miles northward, there are few landmarks along the coast until close to Makasar. SANRABENGI, a small island covered with coconut palms lying on the coastal reef about 6 miles northward of Udjung Parapa, is a good landmark from the north and south, but from westward it is difficult to distinguish from the coast behind. The coastal reef dries ⅓ mile westward from the island.

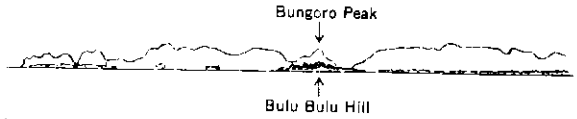
TAKA BUBUJANG, a round stony patch 200 yards in diameter, with a least depth of 3½ fathoms, lies ½ mile west-northwestward of the ward of the delta of Djene Berang.

TAKA PINDJING, a small reef of 1¼ fathoms, lies ½ mile west-northwestward of the delta of Djene Berang.

11A–7 THE CELEBES COAST SOUTH OF PULAU PANIKIANG (4°21′ S., 119°36′ E.) To Makasar and abreast the North Passage (sec. 11A–11) is of no importance for navigation. For the principal landmarks for this part of the coast see section 11A–2. South of Pulau Panikiang the coast is low and broken by numerable rivers, which are of no importance for general navigation as far as Sungai Segeri about 18 miles southward.

Tandjung Tua, about 8 miles south-southwestward of Sungai Segeri is low and inconspicuous. Northward of this point the 10-

fathom curve runs out to about 5 miles from the coast. The islands and shoals within are too numerous to be described.



BUNGORO PEAK IN RANGE WITH BULU BULU 051°

Between Tandjung Tua and Tandjung Kasi, about 12¼ miles southward, several rivers empty into the sea. BULU BULU, a wooded hill with high trees, stands on the coast about 4 miles southward of Tandjung Tua and can be seen from a distance of 12 miles, appearing as an island, the surrounding lowland not being visible. To the northeastward a mountain range extends in an easterly direction to 4 miles from the coast. There is an isolated, pointed summit almost in the middle of the ridge. Binanga Sangkarang, 4½ miles northward of Tandjung Kasi, is one of the largest and deepest rivers on this part of the coast. The 3-fathoms curve lies about 1 mile off the coast except off Binanga Sangkarang, where it extends about 2 miles.

TANDJUNG KASI is the north entrance of a small, shallow river, which is marked by a coconut grove. Kuri Tjadi and Kuri Lompo, about 4 miles southward, are two rocky islets separated from the coast by creeks. On the west coast of Kuri Tjadi are two conspicuous trees. Another tall conspicuous tree stands on the north point of Kuri Lompo. Immediately northward of Kuri Lompo is the delta of the Sungai Maros. PATEENE, a sharp, conical summit on which stands a conspicuous tree, lies about 2½ miles southeastward of the above rocky islets.

Between Kuri Tjadi and Makasar the 3-fathom curve lies from 1½ to 2 miles from the shore, with a foul ground inside. A large number of the reefs or rocks dry at low water and are covered with tall grass. The coast along this stretch is low and swampy, except at the north entrance point of the Djene Tello, where there is a slight rising.

11A–8 PASSAGES TO MAKASAR THROUGH THE SPERMONDE ARCHIPELAGO—NAVIGATIONAL AIDS.—Besides the previously described south route to Makasar there are three other passages through the Spermonde Archipelago. This area is too full of dangers to navigation to be fully described here, and for details the latest charts should be consulted. The most prominent features in the below routes are described.

In 1960 the passage used to Makasar is a swept channel with a length of about 23 miles and a minimum breadth of about 820 yards. This channel is marked by buoys, some lighted and equipped with radar reflectors, which are painted in accordance with the International System of Buoyage.

The channel is entered between Bone Malondjo, a shoal lying about 11½ miles north-northwestward of Pulau Djangdajangan (sec. 11A–6), and Sangkarang, another shoal lying about 3 miles farther northwestward. Outer Light Buoy, painted in red and white vertical stripes and equipped with a radar reflector, is moored about 3¼ miles west-northwestward of Bone Malondjo. Vessels should pass close southward of the Outer Light Buoy. The recommended track then leads in an east-northeasterly direction for about 9½ miles to a position southward of the light buoy equipped with a radar reflector moored close off the south edge of Bone Pute. The track then leads northeastward for about 5½ miles, passing close aboard the light buoy moored about 1½ miles northward of Kudingareng Lompo. Thence the recommended track leads eastward to Makasar as shown on H.O. Chart 3066.

11A–9 WESTERN PASSAGE.—Approaching the western passage to Makasar from northward or northwestward, the high trees on Langkai (5°02′ S., 119°05′ E.) must not bear southward of 137° until the leading marks for one of the channels past Lanjukang are seen.

On the edge of the bank the bottom may frequently be seen in 10 fathoms, and a westerly current will cause heavy ripplings having the appearance of breakers.

CAUTION.—Vessels with drafts in excess of 16 feet are advised to avoid the use of this passage unless possessing local knowledge.

The channel north of Lanjukang runs in an east-northeasterly direction, with depths of 20 fathoms and the channel south of Lanjukang is close along the coastal reef extending from the south side of the island and has depths of 5¼ to 14 fathoms.

With clear visibility, and when passing northward of Lanjukang, the distant island of Sarappo, with a very high tree, offers some guidance.

Entering the channel south of Lanjukang the leading mark, the highest tree of Pulau Badi, behind Pulau Lumulumu, bearing 084°, is kept until Bontomanai (sec. 8D–2) bears 131° just open northward of Kudingareng Lompo, then making good that course. The tree on Pulau Badi comes in sight about 1 mile outside the edge of the bank and appears as a small point above the horizon. In case Bontomanai cannot be seen, it is advisable to keep a little to the southward of this course until after the east point of Langkai bears 180°, as the current sets to the northward.

If entering the channel north of Lanjukang, this island can be rounded when its west point bears 180°, steering for Bontomanai when bearing 131°. During very clear weather and when the Celebes shore can be seen, Maros (sec. 11A–2) in range with the south side of Pulau Lumulumu is a good mark for rounding Lanjukang.

When the high tree on Sarappo comes in range with the east side of Pulau Lumulumu, bearing 028°, bring the high tree on Langkai astern on the bearing 290°, steering between Siborong and Batunai Balo, where the channel is only 1,600 yards wide. Pulau Kudingarengkeke will quickly come in sight, and the north sides of this island and Pulau Samalona in range, on the bearing 110°, may be steered for until the north point of Kudingareng Lompo bears 142°, course then being altered to 124°.

Pulau Kudingarengkeke and Pulau Samalona are visible 6 and 12 miles, respectively.

When Pulau Barang-keke is in range with Pulau Kudingarengkeke, or Kudingareng Lompo bears 180°, course may be altered for the anchorage.

11A–10. HOVEN OR NORTHWEST PASSAGE—PULAU KAPOPOSANG (4°42′ S., 118°57′ E.) is long, narrow, and planted with coconut trees; on the east side a few casuarina trees rise above the others and from northward give the appearance of two islands. The coastal reef, which dries in many places, is steep-to, and generally is shown by surf.

A LIGHT is shown from the west point of Pulau Kapoposang. In 1957 the light structure projected about 16 feet above the surrounding coconut trees.

The usual entrance for deep draft vessels is southwestward of Pulau Kapoposang with the north point of Papandangang in line with the south point of Pulau Kondongbali, bearing 089½°. When the west point of Pulau Kapoposang bears 000°, alter course to 112° passing southwestward of Papandangang.

The channel eastward of Papandangang, with depts of 4½ to 6 fathoms, passes about 500 yards eastward of the BEACON with a white ball topmark marking its east side. When the west point of Pulau Kapoposang comes in range with the north side of Papandangang, bearing 306°, this mark must be kept astern until the drying sandflat on the reef extending northwestward from Pulau Tambakula is in range with Pulau Parmangangang, when course is altered to 112°.

When Pulau Kondongbali is in range with Pulau Tambankulu, bearing 000°, alter course to 119° for Sarappo. This course leads to the narrowest part of the passage, between Taka Tengah Tengah on the south side, and a reef of 2¾ fathoms on the north side, the distance

being 1,600 yards. When the opening between Pulau Kondongbali and Pulau Tambakulu bears 319°, astern, make good a course of 139° until Sarappo bears 090°, course then being altered to 146°; Pulau Kondongbali and Pulau Tambakulu disappear from sight here.

Between Taka Tengah Tengah and Pulau Lumulumu, on the west side of the channel, are numerous reefs, nearly always visible by discolored water; Kassi, a reef that partly dries, is marked by a BEACON with a white ball topmark. On the east side are three reefs lying from 2½ to 7 miles northwestward of Sarappo; the northwesternmost is marked by a BEACON with a black truncated cone; the other two dry. A 5-fathom patch lies 3½ miles westward of Sarappo. Further southeastward on the east side of the channel are Bone Bonea, 4½ fathoms, and Taka Pulu Badi, a part of which is always above water, with a BEACON with a black truncated cone on its southwest side.

When Pulau Lumulumu is in range with Lanjukang, bearing 268°, steer for Pulau Samalona in range with the south point of Pulau Barang-keke on the bearing 150°; Pulau Badi is left to the eastward and Bone Tambung to the westward. When the white stone BEACON with a black horizontal band on Gosong Barimbaringang comes in range with the south side of Pulau Barang-lompo alter course to 126°, steering between Pulau Barang-lompo and Pulau Barang-keke. If the white stone beacon cannot be seen because of strong sunlight, then Pateene (sec. 11A–7) in range with the south side of Pulau Barang-lompo serves as a good mark.

11A–11 NORTHERN PASSAGE.—Making for this passage from northwest, the edge of the bank on which the Spermonde Archipelago lies must not be approached unless a reliable position has been obtained from the Celebes coast to the northward. The most distinctive mountains on the Celebes coast for fixing the ship's position are listed in section 11A–2.

The least depths in this passage are 3 and 3⅓ fathoms lying about 2 miles northward and close eastward, respectively, of Pulau Sabutung (4°45′ S., 119°26′ E.). Another 3⅓-fathom patch lies about 1 mile southward of Gosong Barimbaringang.

The CURRENT does not offer any difficulties except in the south part of this passage, from a position about 7½ miles northward of Makasar southward. The current seldom exceeds 1 knot.

From a position about ½ mile eastward of the white BEACON with a ball topmark on the east side of Tomisa, a reef lying westward of Pulau Panikiang (sec. 11A–7), making good a course of 197° will lead eastward of Labutung, marked by the WRECK of the steamship Bromo which stands on the north side of this reef and is visible 11 miles. When abreast Labutung, and the thickly wooded Pulau Puteanging under the Celebes coast bears 104°, alter course to 212°, passing eastward of the white stone BEACON with a horizontal black band on Bugi Manila (Batu Lola). When the palm-covered Sakoala bears 130°, or Tanette (sec. 11A–2) bears 088°, Laja, a wooded island about 4 miles southward of Pulau Sabutung, will come in sight, and the BEACON with two white balls on Batu Luar, about 2½ miles northward of Pulau Sabutung, must be kept in range with the west side of this islet on the course 185°.

The black BEACONS, each with a white band, on the west side of Taka Tallu and the drying reef west of Satando will then come in range bearing 174°; this mark leads through the shoalest water in this passage, and eastward of the beacon on Batu Luar. When abreast the south point of Pulau Sabutung, course is altered to about 180° to leave the BEACON with the white ball on the coastal reef of Banko Bankoang to the westward and the BEACON on the reef west of Satando close to the eastward. The channel between this reef and Banko Bankoang,

a low island with a group of high coconut palms on the northeast side, is only about 400 yards wide, but the reefs on either side are steep-to.

When through this narrow channel, the northeast point of Banko Bankoang will come in range with the west side of Pulau Sabutung, bearing 341°. This mark must be kept astern until the black beacon on the west reef of Taka Tallu bears about 181°. Sapuli bearing 000°, well open eastward of Satando astern, will pass about 600 yards eastward of the southernmost reef of Batu Tello. The BEACON on Taka Tallu lies about 45 yards inside the west point of the reef and may be left about 400 yards to the eastward in depths of 7 to 10 fathoms, then brought in range with Sapuli astern until the black BEACON with a white band on Batu Lua (4°59′ S., 119°27′ E.) is sighted.

It is advisable to steer close to the beacon on Batu Lua and pass northwestward of it on a southwesterly course. Bunga Eidja, a 5-foot patch and only visible by discolored water under favorable circumstances, lies about ¾ mile northwestward of Batu Lua.

The beacon on Batu Lua having been rounded, it may be brought astern, bearing 032°, to pass westward of the 3-fathom curve off Batu Mandang, and steering toward the BEACON on Gosong Barimbaringang, when it bears 182°, keeping it just on the starboard bow. Balangtjadi must be kept well open westward of Mauang astern. The least depth will be 4 fathoms.

The beacon on Gosong Barimbaringang may be passed at 600 yards distant, and when bearing about west alter course to 210°, with the conspicuous clump of palms on Tandjung Kasi (sec. 11A–7) just on the port quarter. Past Gosong Barimbaringang the depths gradually decrease to 4 fathoms over a ridge of mud and sand extending from the Celebes coast. When Bone Malalaja is abeam, alter course to about 202°, passing eastward of Gosong Trabanusu and Gosong Panjoa in depths of 6 to 11 fathoms; thence steer for the roadstead.

MAKASAR (5°08′ S., 119°24′ E.)

11A–12 The port of Makasar is the principal outlet for the products of southern Celebes and transhipment port for goods to and from the Maluccas. Makasar is a first class port (sec. 1–22) and its chief export is copra in bulk.

The approaches to the port through the Spermonde Archipelago (sec. 11A–8) are deep but encumbered with islands and reefs. The HARBOR LIMITS are charted.

WINDS—WEATHER

11A–13 In the approach to Makasar during the east monsoon the sea breeze sets in about 10 a.m., and often blows with considerable strength from the south-southwest to southwest. The land wind is less strong and comes off the land between 6 and 7 p.m. from south-southeast to east and is often strongest about sunrise. In the west monsoon, which sets in about December with squalls and much rain, the wind is from west to north-northwest; the land breeze is seldom felt and then only from a direction southward of east. (See appendix for Climatological Table.)

TIDES—TIDAL CURRENTS

11A–14 The tide at Makasar is almost purely diurnal when the moon's greatest declination falls 4 days after the quarters, and semidiurnal, though with frequently a smaller range about the second half of March and September, when full and change is 4 days before 0° moon's declination.

The diurnal tide has high water on January 1, April 1, July 1, and October 1. Springs occur one day after the moon's greatest declination, with a rise of 3 feet about the second half of June and December and 2½ feet about the second half of March and September. Neaps fall one day after 0° moon's declination, with a rise of about ½ foot about the second half of June and December and imperceptible about the second half of March and April.

Semidiurnal springs fall 2½ days before full and change, with a rise of about 1¼ feet.