

Additional chart coverage may be found in CATP2, Catalog of Nautical Charts.

SECTOR 3 — CHART INFORMATION

SECTOR 3

NORWAY—SOUTHEAST COAST—LANGESUNDSFJORDEN TO OSLOFJORDEN

Plan.—This sector describes the SE coast of Norway for a distance of about 21 miles between Langesundsfjorden and Helgerodtangen, the W entrance point of Oslofjorden. The descriptive sequence is from W to E and from the sea inland.

General Remarks

3.1 Between Langesundsfjorden and the entrance to Oslofjorden, about 21 miles NE, the coast is deeply indented.

Many islets and rocks lie up to 4 miles off and the depths are irregular.

3.2 Stavernsadlen (59°03'N., 9°58'E.), situated 7.5 miles ENE of Langesundstagen, rises to a height of 220m. The hill has a deep cleft in the middle which is most apparent from the SW. Lovesnyta, with a prominent rocky summit, rises to a height of 229m, located about 5 miles NNE of Stavernsadlen; it resembles a haystack.

Kjerringfjell (59°02'N., 10°12'E.), situated near the coast 8.5 miles ESE of Stavernsadlen, is 116m high, and appears steep on the W side with a gradual slope when seen from SW.

When seen from the SE, at a distance of 16 to 20 miles, it shows a deep cleft in the middle, just above the horizon.

The coastline in this area has several deepwater indentations; from W to E they are Langesundsfjorden, Larviksfjorden, Sandefjorden, Tonsbergfjorden, and Oslofjorden.

The principal ports are Langesund, Helgeroa, Brevik, Porsgrunn and Skien, in Langesundsfjorden, Stavern and Larvik in Larviksfjorden. Sandefjord lies at the head of Sandefjorden, and Tonsberg at the head of Tonsbergfjorden.

Offshore, the coastline is fronted by awash and submerged dangers which lie separated from the coast by comparatively open water between Larviksfjorden and Tonsbergfjorden. Two inner passages lead through the latter water area.

Langesundsfjorden

3.3 Langesundsfjorden (59°00'N., 9°48'E.), the general name of a series of deepwater inlets indenting the mainland, is entered between **Langesundstagen** (58°59'N., 9°45'E.) and Fugloya, a steep-to island 1.5 miles ESE.

Langesundsbukta, the body of water S of the entrance to Langesundsfjorden, is entered from the sea between the shoal area Steingrunnen and the dangers off-lying the mainland to the ESE.

Langesundfjorden extends for 12 miles. The entrance is divided into four channels by three large islands, Langoya, Geitroya, and Aroya. Dypingen Channel and Kaven Channel are the two main passages leading to Brevik.

Brevikfjorden, also locally known as Langesundfjorden, extends first NNW and then bifurcates at Brevik, continuing N into Eidangerfjorden and NW into Frierfjorden.

Brevikstrommen (59°03'N., 9°42'E.) is the narrow passage leading in a W direction and connecting the N end of

Brevikfjorden to the S end of Frierfjorden. Voldsfjorden is the NW continuation of Frierfjorden. The river Skienselva flows into the N part of Frierfjorden.

Dypingen Channel leads in a N direction through Dypingen, between Geitroya and Aroya, and NNW via Kjortingeng Channel (59°00.5'N., 9°46.5'E.) into Brevikfjorden. It then continues NW to Brevik.

Kaven Channel leads in an E direction into Helgerofjorden (58°59.5'N., 9°49.0'E.) and then NW through Haoyfjorden and Kavan. It continues W via Kalvsundet (59°02.6'N., 9°44.5'E.) and joins Brevikfjorden.

Kaven Channel also provides access to the adjacent inlets of Morjefjorden, Langangsfjorden, and Ormefjorden. The numerous islands lying between Kalven and Brevikfjorden are separated by passages available, for the most part, to small vessels with local knowledge.

3.4 The shores of Langesundsfjorden consist mostly of steep rocky beaches backed by low, undulating forested terrain with scattered patches of cultivated land. Neighboring hills rise in gentle slopes and alternate with flat land.

In the approach to Langesundbukta, the church in Langesund, a white structure with a tower and a slate roof, is conspicuous, especially in the SE approach from seaward.

The entrance to Langesundsfjorden itself is distinctive.

A radar scanner is situated at the W side of Fugloya and a light is shown from an islet lying close NNW of the N extremity of the island.

Langoytangen Light (58°59.5'N., 9°45.5'E.) is shown from a conspicuous tower on a house, 14m high, standing on the S end of Langoy.

Mejulen (58°57.7'N., 9°41.5'E.), a gray islet, lies on the W side of the entrance. It can be easily identified by a very conspicuous white marble stripe extending from its summit to the sea.

For information concerning the firing areas for the coast artillery, see Pub. 140 Sailing Directions (Planning Guide) for the North Atlantic Ocean, Baltic Sea, North Sea, and the Mediterranean Sea.

Ice.—Ice occurs throughout Langesundsfjorden during the winter months from January to April and forms first in those areas where current is weak, mainly in Langesundsfjorden, Ormefjorden, and the N part of Kalven. During severe winters, ice may form over the entire inlet N of its entrance and close all fairways to block shipping for a period of up to two months. Icebreaker service is available.

The port of Langesund, on the W side of the entrance to Langesundsfjorden, is generally ice free while Helgeroa, 3.25 miles E, becomes icebound. Brevik is beset by drift ice from Frierfjorden, which commonly freezes over. Skienselva, with its ports Porsgrunn and Skien, is rarely obstructed by ice.

3.5 Tides—Currents.—The reported current flow in Langesundsfjorden is led by fresh water discharge from the

ivers, tidal action, and meteorological influences on the water level in the Skagerrak. Surface currents are brackish to a depth of 1 to 2m, and commonly set seaward over a weak inbound current.

During extreme conditions, the outbound current can reach a velocity of 3 to 4 knots in the narrows between Brevikfjorden and Frierfjorden, while at Kjortingene, in the entrance to Langesundsfjorden, it still flows seaward with a rate of up to 1 knot. In exceptional cases, an inbound current can predominate, particularly during strong S winds.

River water discharged from the Skienselva sets S through Frierfjorden toward the islets Ringholmane and the mainland point **Saltbua** (59°05'N., 9°39'E.), where an eddy forms that sends a weak current N along the E side of the inlet.

The current from the river continues S and enters Brevikfjorden and sets strongly onto Sandoya where it divides.

The N branch flows into Eidangerfjorden and circulates counter clockwise at a velocity up to 3 knots; while the S branch continues seaward with a strong set onto the W side of the adjacent islands.

The current set during floods is particularly pronounced onto Langoy, in the narrow passage E of Langesund. The outbound current is generally weak on the W side of Dypingen and the seldom used Gamle Langesund, the two passages in the entrance to Langesundsfjorden. It becomes variable along the W side of Brerikfjorden, close off the buildings of Asvall, where it may even reverse and set N.

Currents are weakest in Kalven along the W side of the island Haoy. They are strong in the passage between Bjorkoy and Sikestoy, and run variable with the wind in Stoksund, the passage between Aroy and Stokoy.

Depths—Limitations.—The whole complex of fjords and channels lying within the general area of Langesundsfjorden is known collectively as Grenland Harbour. The Grenland Harbour Authority, based at Brevik, controls all shipping movements within the waters of the complex.

A local Traffic Separation Scheme has been established within the complex and incorporates Dypingen Channel and Kaven Channel (see paragraph 3.3).

The Grenland Harbour Sea-Traffic Center controls the use of these channels and allocates the traffic route to be followed by all vessels.

The maximum size of vessels accepted for transit through these sections of the channels are as follows:

1. Dybingen—Length 198.1m, beam 30.5m (beam with dangerous cargo 27.4m), draft 10.4m.
2. Kaven—Length 274.3m, beam 45.7m, draft 14.2m.
3. Brevikstrømmen—Length 198.1m, beam 30.5m (beam with dangerous cargo 27.4m), draft 9.9m.

3.6 Pilotage.—Pilotage is compulsory for nonmilitary vessels of 50 grt or over when navigating within the restricted area in Langesundsfjorden. Vessels should request pilotage from the Sea-Traffic Center, Brevik at least 24 hours in advance and confirm 2 hours before arrival at the boarding place. This station also provides pilots for Kragero.

Pilots can be contacted by VHF or telephone and board in position 58°56.6'N, 9°47.7'E.

Vessel Traffic System.—A Vessel Traffic System (VTS) has been established in the Grenland Harbour area. It is mandatory for vessels 50 grt and over navigating within the Langesundsfjorden restricted zone, which comprises the waters N of a line extending between Sasteinen (58°58.3'N., 9°42.7'E.) and Molen (58°58.7'N., 9°49.4'E.).

The VTS is managed by the Sea-Traffic Center at Brevik, which may be contacted on VHF channels 80, 16, 14, 13, and 12.

Vessels carrying dangerous cargoes should send an ETA at least 24 hours in advance. Such vessels include tankers carrying gas, chemicals, and cargo carried in bulk with a flash point below 23°C; and tankers in ballast but not gas-free.

All vessels should obtain clearance at least 1 hour in advance of entering the zone, or leaving a quay or anchorage within the area. The following details should be stated:

1. Vessel name and call sign.
2. Nationality and name of company.
3. Length, beam, and draft.
4. Height above surface.
5. GRT.
6. Port of destination.
7. Type of cargo.
8. Amount of dangerous cargo (tons).
9. ETA.
10. ETD.
11. Any further relevant information.

Vessels (underway, anchored, or moored) should maintain a continuous listening watch on VHF channel 16 and 80.

Vessels should obtain permission from the Sea-Traffic Center before anchoring and may be directed to a suitable anchorage.

Vessels should report to the Sea-Traffic Center at the following points, and supply the details as shown:

1. When entering the VTS zone:
 - a. Vessel name.
 - b. Time of passing zone limit.
 - c. ETA at quay or anchorage.
2. When arriving at a quay or anchorage:
 - a. Vessel name.
 - b. Time of arrival.
3. When leaving a quay or anchorage:
 - a. Vessel name.
 - b. Time of leaving.
 - c. ETA at zone limit.
4. When leaving the VTS zone:
 - a. Vessel name.
 - b. Time of passing zone limit.

Vessels should report any information as required by the VTS Center; on passing points previously defined by the Center; and in the event of any accident.

If a report cannot be made by VHF, the Sea-Traffic Center should be contacted by telephone or through Tjome (LGT).

If visibility is reduced to less than 1 mile, the Sea-Traffic Center will restrict the movement of vessels, especially those carrying dangerous cargoes.

Regulations.—Vessels over 500 grt, carrying liquefied gases, and vessels over 3,000 grt carrying dangerous cargo in bulk shall have tugs made fast during entry and exit and during

maneuvering to and from the quay, mooring, or anchorage in the zone.

Vessels carrying no dangerous cargo but which exceed either a length of 182.9m, a beam of 26.2m, or a draft of 9.9m shall have a tug made fast when underway in an area the S limit of which is a line extending 045°/245° through Gjermesholmen Light, and the N limit of which is a line extending 270° through Saltbuodden Light.

The Sea-Traffic Center can, when it is considered necessary for safety reasons, order any vessel to use a tug.

Pleasure craft and open boats shall as far as possible keep out of the way of large vessels in the traffic channels.

The speed limit within Langesund between Langoytangen (58°59.5'N., 9°45.5'E.) and Figgeskjaer Light, 1.4 miles NNW, is 5 knots.

The speed limit within Brevikfjorden between Figgeskjaer Light and Gjermundsholm Light, 2.3 miles NNW, is 8 knots.

The speed limit through Brevikstrømmen between Gjermundsholm Light and Flauodden Light, 1.5 miles WNW, is 5 knots.

Anchoring.—Vessels can anchor only when it is necessary. Before a vessel anchors consent should be obtained from the Sea-Traffic Center. The Center, for reasons of safety, can order a vessel to go to a designated anchorage. Generally, anchoring, with a few exceptions, takes place only in the following areas and positions:

Helgerofjorden:

A—0.6 nautical miles from Amlirogna Light on 060°.

B—0.4 nautical miles from Amlirogna Light on 046°.

Eidangerfjorden:

C—N of a line true E/W through the most southerly point of Orviktangen.

Friernaket:

D—1.1 nautical miles from Ringholmen Light on 192°.

E—1.1 nautical miles from Ringholmen Light on 207°.

F—0.7 nautical miles from Ringholmen Light on 219°.

G—0.9 nautical miles from Ringholmen Light on 226°.

Herrebukta:

H—0.7 nautical miles from Rafnes Quay No. 3, 125°.

I—0.4 nautical miles from Rafnes Quay No. 3, 125°.

3.7 Facilities.—The major ports and berths within the Grenland zone are as follows:

1. Langesund (59°00'N., 9°45'E.) is situated on the W side of the entrance to Langesundsfjorden.
2. Brevik (59°03'N., 9°43'E.) is situated near the head of Brevikfjorden, at the merging point of three fjords.
3. Porsgrunn (59°08'N., 9°39'E.) is situated at the mouth of Skienselva.
4. Skien (59°12'N., 9°38'E.) is situated at the head of Skienselva.
5. Asvall (59°02'N., 9°44'E.) is a fueling terminal.
6. Asdalstangen (59°05.0'N., 9°37.7'E.) serves a petrochemical plant.
7. Rafnes (59°06'N., 9°36'E.) serves a petro-chemical industrial area.
8. Heroya (59°07'N., 9°38'E.) is situated on the NE shore of Frierfjorden.

9. Skien Harbour Terminal (59°07.3'N., 9°33.8'E.) is situated on the N shore of the entrance to Volls fjorden.

3.8 Brevikfjorden (59°02'N., 9°44'E.), with Eidangerfjorden and its continuation N, is deep throughout and is mostly clear of off-lying dangers. It is subject to an outbound current which sets onto the W side of the various islands; this current may inconvenience shipping, particularly in the N part of the narrow channels leading from sea.

Asvall (59°02'N., 9°44'E.), on the SW side of the inlet, is the site of a ship building and repair yard. Eikstrand, 0.75 mile NNW, has alongside bunkering facilities for vessels up to 20,000 dwt.

Heistad (59°05'N., 9°42'E.), 1.75 miles within the entrance of Eidangerfjorden, is situated on the W shore. In Heistad there are berthing facilities at a concrete pier with depths of 4 to 7m alongside with a length of 33m. Eidangerfjorden is popular in the summer for boating.

Brevik Bridge, over the narrows joining Brevikfjorden with Frierfjorden, has a vertical clearance of 45m over a navigable width of 100m.

A second bridge, with a vertical clearance of 50m over a navigable width of 150m, connects Blekkebaken and Roparberget, about 0.6 mile WNW of Brevik bridge.

3.9 Frierfjorden (59°06'N., 9°37'E.), the NW continuation of Brevikfjorden is irregularly shaped and has a length of 5 miles with a width between 0.5 to 1.5 miles.

It has two distinct parts, the lower part extends NW to a line joining **Saltbua** (59°05'N., 9°39'E.), on the E side, with Asdalstangen, and the upper part being the waters farther N.

The S part of Frierfjorden is comparatively narrow and steep-to on its E side; the W side shoals and is considerably fouled. The upper part opens out to a broad roomy basin and provides access to Skienselva and Volls fjorden, a small encumbered fjord opening off the NW part of Frierfjorden. Volls fjorden is available to small vessels with good local knowledge.

Range lights, 60m apart, are shown from Lauvoyane, a peninsula extending SW from the NE side of Volls fjord, 0.15 mile NW of Kjeoy. A light is shown from the W side of Kjeoy.

Skien Harbor Terminal (59°07.3'N., 9°33.8'E.) is situated at Slevik, on Lauvoyane, at the entrance to Volls fjorden. There are two concrete quays at the terminal, one 135m long and the other 165m long, each with a depth of 11m alongside. The quays are separated by a ro-ro loading ramp, 30m wide, with a depth of 13.3m alongside. Vessels up to 40,000 dwt, 182m in length, 25.9m beam, and 9.9m draft can be accommodated.

Directions.—The range lights on Lauvoyane, in line bearing about 309°, leads through the entrance to Volls fjorden towards Skien Harbor Terminal, passing between Kjeoy and a 7m shoal marked by a spar buoy, situated 137m SW.

Smoke and fumes rising from the factory on the E side of the entrance to Skienselva often restrict visibility, particularly with N winds, for vessels navigating Frierfjorden between Saltbua and the entrance to the river, about 3 miles NNW.

3.10 Ombornes (59°03'N., 9°40'E.), on the S side of the entrance to Frierfjorden, fronts on a water area which has anchorage for small vessels in 9 to 20m, in a position between

the islet Steinholmen and the dangers off-lying the W part of Ombornes.

Finndal, 0.6 mile WSW of Ombornes, has anchorage for moderate size vessels in 11 to 17m; this anchorage is preferred to Ombornes.

Surtebogen, a small lumber exporting community 1.25 miles NNW of Finndal, fronts on a shelving cove which has good anchorage for small vessels in 7 to 12m.

3.11 Skienselva (59°08'N., 9°38'E.), entered from the N part of Frierfjorden, extends 1.75 miles NE to Porsgrunn then 4 miles NNW to Skien; there is considerable traffic in the river. The fairway is dredged to 10.5m in the entrance to Skienselva and to 9.1m to Kolatangundet.

The entire area along Skienselva that covers Frierfjord and Skien is densely built-up.

State pilots also serve as harbor pilots. They are stationed at Porsgrunn; request for one should be made in good time.

A speed limit of 6 knots is in force in the river. Inward bound vessels should give way to outward bound vessels leaving with the strong outgoing flow.

The current in Skienselva is always outbound at varying rates. The tide is almost unnoticeable. During spring floods or after heavy rain storms, the current at the narrows close S of Skien and at Porsgrunn, can reach to speeds of 7 to 8 knots.

This occurs particularly after violent rainfall or with melting ice and snow during spring.

A bascule bridge spanning Skienselva at Porsgrunn is operated day and night. The fairway through the bridge is 40m wide. It is equipped with radar and VHF radio.

Powered vessels proceeding upstream to pass through the Porsgrunn bridge, blow sound signal on the whistle, one long and two short blasts when in a position abreast the floating drydock, situated about 570m downstream from the bridge.

The bridge will answer with a green light indicating to proceed; a red light indicating to wait; or several red lights indicating the bridge is unable to open. During poor visibility the slow striking of a bell indicates to proceed; the continuous ringing of a bell indicates to wait, and the continuous sounding of an electric horn indicates the bridge is unable to open.

Powered vessels over 43m long, proceeding downstream and intending to pass through the bridge, send sound signal on the whistle (one long and one short blast) when in a position abreast the technical school about 0.7 mile upstream from the bridge, and once again when in the river bend at Molhaugen.

The bridge will answer with signals and meanings described above, with the exception that the red light will indicate to proceed with caution.

There are three overhead cables spanning Skienselva close within its entrance; they have a vertical clearance of 45m.

A bridge, with a vertical clearance of 27m, spans Skienselva in the vicinity of **Kjorbekk** (59°11'N., 9°38'E.).

3.12 Langesund (59°00'N., 9°45'E.) is situated on the W shore of Langesundsfjorden; it has a canning factory and fish processing plants. The harbor is formed between the mainland and the island Langoy, which lies about 183m offshore. Currents generally set seaward and ice is seldom a hindrance. Berthing facilities extend along the mainland side of the harbor. The quays have depths of 3.9 to 6.4m alongside.

The deepest berth is the North berth at the Harbor terminal and has a length of 80m with depths of 6.4 to 7.3m alongside. This berth has a cargo ramp and ro-ro ramp. There are 19 other berths in the port.

Harbor pilotage is available but not compulsory. Vessels arriving without a designated mooring or anchorage, and vessels subject to quarantine, anchor in a position N of the church, on the W side of the fairway in 10 to 17m depth.

Inside Langoysundet to Figgeskjaer, powered vessels are required to proceed at a speed not exceeding 5 knots.

Storm warning signals are displayed from a mast in the S part of Langesund, a black ball by day and a fixed red light at night, when winds of 28 to 55 knots are expected, from unknown direction.

Small vessels anchor in a position, clear of the submarine cables, S of the church in depths of 10 to 17m, sand and mud.

Small vessels may also anchor in the quarantine anchorage.

Vessels steer in mid-channel when making their approach to the anchorages.

3.13 Helgeroa (59°00'N., 9°51'E.) is a small mainland community within the E side of the entrance to Langesundsfjorden. It has a small harbor in the NE corner of the cove, formed by two moles, dredged to a depth of 3.5m; it is icebound in the winter.

The coastal bight fronting Helgeroa has good anchorage for large vessels in 14 to 17m in a position N of the reef fringed rock Ubetskjaer, or preferably, in 23 to 28m, fine sand, SSW of the rock.

In the approach to Helgeroa, vessels pass in mid-channel between Fugloyskadden and Vestrebaane, off the SW extremity of Aroy, and then pass between Amlirogen, on the S, and a 13m below-water rock, 0.3 mile NNW, then steer for the preferred anchorage. Submarine cables exist SE from Lammoy to the S shore of the cove at Helgora and to Amlirogna, an islet close off the S entrance point of the cove.

Amlirogna Light is shown from the N end of that islet. A radar aerial is situated near the light. Submarine cables are laid between Lammoybaen Light and Amlirogna Light and from the E side of Stokkoy to a position 0.25 mile SW of Helgeroa.

Brevik (59°03'N., 9°43'E.)

World Port Index No. 23660

3.14 Brevik stands on the mainland and Sylteroya, an island connected to the mainland by a causeway, at the junction of Brevikfjorden and Eidangerfjorden. Stathelle, on the S side of the confluence of Brevikfjorden and Frierfjorden, has a harbor area administratively separate from Brevik.

The port includes facilities at Dalbukta, 0.5 mile NNW, which handles dry bulk and general cargo. Local industries are cement, ice cream, tinware, and shipbuilding. The main organization of Grenland Harbor Board is located in Brevik.

A ferry operates from the port.

Ice drifting out from Frierfjorden is seldom a problem; an icebreaker is available.

Depths—Limitations.—The harbor is well sheltered and accessible at all times of the year. Cargo vessels up to 167m in

length and 9.7m draft, and tankers up to 182m in length and 9m draft can be accommodated.

The port extends along the SE shore of the peninsula. Brevik, Dalsbukta, and Trosvika form the main berthing areas. There are also berths for ro-ro vessels and ferries.

There are 17 quays at Brevik. The largest is 116m long and has depths of 7.1 to 10.6m alongside.

There are 7 berths at Dalsbukta. The largest, a bulk quay, is situated on the W side of Eidangerfjord. It is 227m long and has depths of 10.3 to 17m alongside.

At Trosvika, the deepest berth is 31m long and has depths of 7.6 to 17m alongside. The longest is 100m long and has depths of 4.6 to 5.8m alongside.

There is also a new coal terminal quay, 200m long, with a depth of 15m alongside. Vessels up to 275m in length and 14.2m draft can be handled.

Pilotage.—Pilotage is compulsory for commercial vessels of 50grt and over. For further information concerning pilotage and VTS procedures, see paragraph 3.06.

Porsgrunn (59°08'N., 9°39'E.)

World Port Index No. 23670

3.15 Porsgrunn is a well-populated industrial community at the entrance to Skienselva. It lies principally on the E bank of the river and has facilities on the river for smaller vessels and deepwater facilities for larger vessels alongside Heroya, an artificially constructed island lies 1 mile SW of Porsgrunn, forms Norway's largest industrial complex.

The port which includes Heroya, handles dry bulk, petroleum, other liquid bulk, and dry cargo. Local industries include engineering works, magnesium, electro-metals, ceramic goods, and porcelain.

Depths—Limitations.—The principal deep-water quays at Porsgrunn are:

1. On the SW face of Heroya, is a quay 560m long, with depths alongside from 9.8 to 13.9m.
2. On the NW face of Heroya, 0.3 mile E of the Torsberg lightstructure, is a quay 383m long, with depths alongside from 5.5 to 11.7m.
3. On the NW face of Heroya, 0.4 mile NE of the Torsberg lightstructure, is a quay 174m and a special quay for bulk loading.

There are numerous other quays on both sides of Skienselva as far as Borgestad, on the E side of the river 1.25 miles N of the bridge. The principal general cargo berths are Dypvanskaya, with a length of 245m and a depth of 9.5m; Krankaia, with a length of 230m and a depth of 8m; and Tangenkaia, with a length of 200m, capable of taking vessels up to 100,000 dwt.

A bascule bridge, with a horizontal clearance of 40m, crosses Skienselva at Porsgrunn.

Pilotage.—Pilotage is compulsory for commercial vessels of 50grt and over. For further information concerning pilotage and VTS procedures, see paragraph 3.6.

Regulations.—Watch is kept on the bridge by day and night. Vessels which have requested passage through the bridge should keep listening watch on VHF until they have passed clear of the bridge.

Requests for bridge passage for inbound vessels should be made immediately after entering Torsbergrenna and for outbound vessels immediately after passing Borgestad.

Inbound vessels, which are not equipped with VHF, should sound one long blast followed by two short blasts and outbound vessels should sound one long blast followed by one short blast.

The following signals are made from the bridge:

1. Red light on the N bridgehead indicates that the bridge is closed to traffic.
2. Green light on the N bridgehead indicates that the bridge is open for traffic.
3. Red revolving light on the warehouse on the E wharf means that difficulties are being experienced with the bridge bascules and that outbound vessels should not pass the E wharf until this light is extinguished.

Anchorage.—Vessels without berth assignment, or subject to quarantine, anchor on the comparatively shoal area S of Heroya in 21 to 29m, mud, good holding ground. Harbor pilots are stationed here.

Skien (59°12'N., 9°38'E.)

World Port Index No. 23680

3.16 Skien, one of the oldest trade centers in Norway, lies about 6 miles above the mouth of the Skienselva at the head of ocean going navigation. Its principal industry is wood processing.

The port handles container and general cargo, particularly wood products.

Depths—Limitations.—About 2 miles SE of Skien, an overhead cable, with a vertical clearance of 37m, spans the harbor. Menstad Bridge spans the harbor at Skien and has a vertical clearance of 27m over a channel width of 40m.

There are 30 berths lining the banks of the river for 2 miles above the bridge. The railway wharf is the largest. It is 300m long with depths of 6.7 to 11.9m alongside. Vessels up to 85m in length, 14m beam, and 5m draft can be accommodated. Such vessels must be able to pass under the bridge.

Skien Harbor Terminal (59°07.3'N., 9°33.8'E.) provides a deep-water facility. It is situated at Slevik, on the N shore of the entrance to Volls fjorden. For details, see paragraph 3.10.

Aspect.—The entire area along the river, including Skien, is densely built-up and backed by hills. A conspicuous church, with two high spires, stands on a hill in the town, to the N of the river.

Pilotage.—Pilotage is compulsory for commercial vessels of 50grt and over. For further information concerning pilotage and VTS procedures, see paragraph 3.6.

Haoy (59°01'N., 9°50'E.) is indented on its SW side by encumbered, sheltered coves N and S of the peninsula Narrholmen, situated 0.75 mile NNW of its S extremity.

Slepevika, the S cove, has anchorage for small vessels with local knowledge in a depth of 8m off the N side of an islet. Jordsbukta, the N cove, has good anchorage E of the islet Danmarksholmen, in 13m, sand and mud; vessels pass S of the islet to the anchorage.

Torsbukta (59°03'N., 9°44'E.), a small rock-encumbered bay on the S side of Sandoya, about 2 miles NW of Haoy, has anchorage for small vessels, with local knowledge, in 6 to 18m. The approach is made through Kalvsundet, a passage formed between Sandoya and Bjorkoy.

3.17 Morjefjorden (59°01'N., 9°50'E.) is entered between Terneholmen and the S end of Haoy 0.5 mile NW. Reierbaen, about 0.3 mile NNW of Terneholmen, has a depth of 5.7m. The inlet is steep-to along its W side and is mostly clear in the S part but is narrow in the N.

Submarine cables are laid across Morjefjorden at the entrance and 1.75 miles N of Teineholmen; also from the head of the fjord S for 0.6 mile, then E to the shore. An overhead cable, which spans the fjord 2 miles N of Teineholmen, has a vertical clearance of 19m.

Tveidal, a granite exporting community on the mainland, is commonly approached from the S through the channel between the islands and the mainland.

Vrangsundbukta, a deepwater bay on the NE side of Haoy, has anchorage for small vessels in 21 to 45m; a rock covering 6.8m is situated NE of the anchorage.

Morjefjorden may be approached from the S by following the directions for entering Helgeroa, and then proceeding NNE to pass in mid-channel between Terneholmen and Haoy and continue N in mid-channel.

Langangsfjorden (59°04'N., 9°48'E.) is the deepwater inlet extending N about 4 miles from its entrance WNW of Haoy. The fjord is entered between Anestein, which lies about 91m off the NW extremity of Haoy, and the islet Veaholmen lying 0.35 mile NW. The fjord is entered from Kalven.

The recommended passage is along the W side, W of the islands that lie in about the middle of the fjord and are oriented in a N to S direction; but pass E of the rocks situated about 1 mile N of the islands. Anchorage is available throughout the inlet where the depths are convenient.

Ornefjorden (59°03'N., 9°45'E.), the N continuation of Kalven, is entered between Hestholmen and Sandoya, about 0.2 mile W; it has deep water but is encumbered by many islets and rocks. A pipeline is laid across the fjord at its entrance.

Ormer (59°04'N., 9°44'E.), a small community at the head of the fjord, fronts on a water area which has anchorage in 25m, mud. Small vessels with local knowledge intending to transit Ornefjorden, then pass between the dangers off-lying Sandoya and the islet Hestholmen, then close off the SE extremity of Lovoy.

Vessels should pass between Lortholmen, 0.5 mile N of Hestholmen, and a 9.4m below-water rock close W, where they continue in mid-channel to pass between Bakstebordholmen and the mainland to the W.

3.18 The coastline between Langesundsbukta and the W entrance point of Tonsbergfjorden about 16 miles ENE is deeply indented. Many islets and rocks lie up to 4 miles offshore and the depths are irregular. Inland the low-lying hilly terrain, as far as Larviksfjorden, consists primarily of barren light gray stone backed by dark stands of trees. When seen

from a distance offshore they tend to merge and produce an impression of monotonous uniformity.

3.19 Nevlunghamn (58°58'N., 9°52'E.), a small fishing community, lies on the E side of the hilly peninsula forming the SE entrance to Langesundsfjorden. It fronts on a harbor within a small cove which affords anchorage in depths up to 31m, sand. The cove is exposed to swells during strong S and E winds.

Tvistein (58°56'N., 9°56'E.), marked by a light and racon, is the farthest SE of several groupings of islets which partially shelter Nevlunghamn from the sea. Napa, 2 miles WNW of Tvistein, lies on the S part of foul ground extending S from the above cove; it is marked by a beacon.

There are four channels giving access to Nevlunghamn from seaward. The inner harbor is largely shallow and dredged to a depth nowhere exceeding 3.5m.

Mauresund, the channel farthest SW, is entered SE of **Sauesundshaken** (58°56'N., 9°51'E.), an 8m shoal about 1 mile NW of Napa, and SE of Mauresundbaen, about 0.2 mile NE. A course of 030°, with the light at Nevlunghamn ahead, will clear the above shoals and lead between Oddaneskjaera and the mainland. Svartskjaerbaen, awash, should be passed on the W side as should Brattbaen, awash, 0.2 mile NE.

When abeam Brattbaen vessels should direct their course to the E so as to pass S and E of Humlesekk, and then proceed to their destination. Small vessels with local knowledge may pass W of Humlesekk.

Hummerbakkfjorden (58°58'N., 9°56'E.), a deep, narrow mainland inlet about 2 miles E of Nevlunghamn, is entered from the E approach to Nevlunghamn. The W side is steep-to, the E side is foul and the head is filled with a drying flat.

There is indifferent anchorage in the fjord, exposed to S winds, in a depth of 9m, about 0.5 mile within the entrance.

3.20 Larviksfjorden (59°01'N., 10°04'E.), a deep inlet relatively free of dangers, extends about 4.5 miles N from its entrance which lies between Rakkebaane on the W and Svennerholmene, a small group of low-lying rocky islets on the E. Rakkebaane, which extends 2 miles SSE from the mainland, is marked on its SE extremity by a light-buoy. This is an extensive shoal area with depths of less than 1m.

Dypeskaten (58°57'N., 10°08'E.), a shoal patch with a least charted depth of 15m, is located 1.25 miles SW of the light on Svenner; it is marked in the S part by a buoy.

Viksfjorden, 1.5 miles within the entrance, and the river Langen 1.5 miles farther N open off the E side of Larviksfjorden; Farriselva flows into the head of the bay.

Stavern close within the W side of the entrance and Lavvik at the head, are the principal shipping centers within Larviksfjorden.

Currents off the entrance to Larviksfjorden generally set W and may reach such a velocity that when flowing over Rakkebaane they are able to submerge the buoys marking **Muleberget** (58°57'N., 10°02'E.) and Herregardsbaen, which lies 0.75 mile NNE; in heavy seas this entire shoal area is covered by breakers.

Within the entrance to Larviksfjorden currents commonly set seaward through the inlet at rates which vary with the amount

of water discharged into the inlet as well as the weather conditions in the Skagerrak.

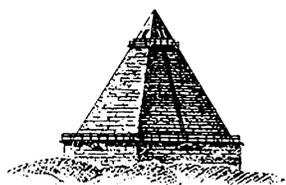
A coast artillery firing area as well as a sea and air target firing area overlap in the seaward approaches to Larviksfjorden and serve gunnery exercises at Rakke.

The first is a five-mile square rectangle while the second is the sector of a circle centered at Rakke with radii extending 10.75 miles seaward and passing, respectively, through the lights on Tvistein and Svenner.

Firing exercise warnings are issued locally and/or by patrol craft which may be present.

Vessels navigating in the vicinity of Larviksfjorden will find **Molleberget** (58°59'N., 10°01'E.), 1 mile SW of the light at Stavern, a useful landmark due to its contrasting barren gray color with the surrounding forest area.

Hoppoy, on the E side of the fjord, 2.5 miles ENE of Stavern, is a conspicuous islet with two hummocks; the E hummock has a conspicuously abrupt slope on the E side.



LARVIKSFJORDEN W SIDE—SEAMEN'S MEMORIAL

3.21 Pilotage.—Pilotage is compulsory for non-military vessels of 50 grt or over when navigating within the restricted area comprising all of Larviksfjorden and its seaward approaches. Vessels must have on board an authorized pilot or, should weather conditions preclude this, must follow directions from an accompanying pilot vessel until the pilot can be boarded.

Pilots embark from a pilot vessel on station about 3 miles SW of the light on Svenner, and serve an area extending from Langesundsfjorden to Tonsbergfjorden. Pilots are stationed at Stavern. The pilot station and pilot vessel are equipped with VHF and radiotelephone equipment. Vessels advise ETA 24 hours in advance and confirm the time 2 hours before arrival. Vessels may contact the pilot vessel on VHF channel 16.

Directions.—Vessels making their approach from the W keep about 3 miles offshore in order to clear Rakkebaane, and steer N only after the E side of **Ramsholmen** (59°00'N., 10°04'E.) has come in range 353° with Lovesnyta, which rises 8 miles N; then they steer through the inlet in mid-channel.

Vessels make their approach from the E pass S of Dypeskatan and steer into Larviksfjorden only after Tjolling Church has been sighted between the two hummocks on Hoppoy bearing 004°; thereafter they then continue in mid-channel.

3.22 Svenner (58°58'N., 10°09'E.), on the E side of the approach to Larviksfjorden, a community adjacent to the light station on the islet Korpekollen, fronts on a small sand bottomed harbor along the E side of the islet.

Vessels make their approach from the S on the E islet. A large white spot with a black circle around it has been painted on a rock inside the bay.

Vessels keep awash rocks on the port hand and steer for the white spot, which is kept open from the E side of Korpekollen.

Borestadbukta (59°01'N., 10°03'E.), a shoal water bay on the W side of Larviksfjorden, has anchorage for moderate sized vessels in 8 to 13m, with the mainland point Robergodden bearing 339° and with the awash rock Risoykalven in range 127° with the light at Svenner.

Agnes, close N of Borestadbukta, has limited berthing facilities with 4.5 to 6m alongside.

Holen (59°02'N., 10°04'E.), a small community on the E side of Larviksfjorden, fronts on a water area which is formed between the mainland and the islet Oteroy; it has anchorage for small vessels in 21m, clay. There is a speed limit of 5 knots in Ostre Holen N of Oteroy Light.

There is an anchorage charted in Jordebukta, close S of Robergodden, in a depth of 40 to 57m.

3.23 Stavern (59°00'N., 10°02'E.) (World Port Index No. 23690) a small harbor stands on the W side of the entrance to Larviksfjorden; it is a well known and frequented vacation resort. Some local fishing is carried on and there is some industry. Currents generally set S through the harbor and with an onshore storm there is a good deal of current in the S harbor. A small boat harbor is situated in the N harbor. There is a general purpose quay about 80m long with a depth of 4.6m.

Pilotage.—Pilots are stationed at Stavern 3 miles WNW of Svenner and on **Hvasser** (59°05'N., 10°27'E.). The pilot station at Stavern maintains watch from 0900 to 2000 daily. At other times pilot requests should be made through the Hvasser or Langesund pilot stations.

Anchorage.—Anchorage for small vessels is available in 11 to 15m, good holding ground of clay, in a position close N of the islet Vadholmen.

Vessels preferably anchor in the E or SW part of the harbor, where they lie outside the fairway and are sheltered from onshore storms which, nevertheless, send in a considerable sea, particularly in the S part of the harbor.

Submarine cables from Vadholmen lead S of the anchorages. Anchorage is also available at Jordebukta, 1.25 miles NNW of Borestadbukta.

Vessels, intending to enter Stavern from the S, proceed so as to pass E of Rakkebaane, then between Stavernsodden and the submerged dangers off-lying the islet group.

Trefotholmene, where they haul to starboard and, steering for the white, slate roofed Larvik church on a heading of about 354°, proceed into the harbor.

Vessels, intending to proceed from Larviksfjorden through the NE entrance to Stavern, steer so as to pass NW of the 1m below-water rock Risoybaen, then SE of the 1m below-water rock of Fluskjera, then on to their destination.



PORT OF LARVIK

STAVERNESODDEN (DISUSED LIGHTHOUSE)
(58°59.2'N., 10°03.4'E.)**Larvik (59°03'N., 10°02'E.)**

World Port Index No. 23700

3.24 Larvik, a well populated metropolis and industrial center lies at the head of Larviksfjorden. The principal part of the community lies N of the rocky headland

Tollerodden, while the lesser part of Torstrand, lies to the SE. The harbor area comprises all the waters N of a line joining Steinsnes with Robergodden, and serves as the home port of a considerable merchant fleet.

Ice only forms during long cold spells; the harbor is then kept open by icebreakers.

Depths—Limitations.—Several principal berths are at Larvik. Vestre Revkai, a 118m long concrete quay with a depth alongside from 8.8 to 9.9m has a ro-ro ramp 14m wide at the SW end of the quay and a depth alongside of 8.8m.

Kanalkaia Nord, a 335m long concrete quay has a depth alongside from 5.7 to 10.8m. The quay is connected to a railway wheel tanker up to 25,000 dwt with a draft of 9.7m can be accommodated.

Treschow-Fritzoes Kai is a concrete quay mainly for wood pulp. The depth alongside ranges from 5 to 6.3m. The W side of the quay is 50m long with a depth of 5m alongside.

Pilotage.—Vessels approaching from sea request pilots 24 hours in advance and confirm arrival 2 hours in advance, via VHF channel 16. Departing vessels give 4 hours notice during working hours.

When the pilot station is closed pilots embark and disembark at Faerder or Langesund pilot stations.

Inside of a line drawn from the Revhaken mole E across to Rodberget in the W, all vessels are to proceed at a speed less than 5 knots.

Anchorage.—Vessels preferably anchor in depths of up to 29m, good holding ground, within Tenvikbukta, the W part of Larvik harbor, where they ride clear of the fairway and are less exposed to winds from the S and SW.

Vessels measuring up to 22,000 grt moor off the entrance to Farriselva and make their stem fast to Treschow-Fritzoe, a quay close SW of the river mouth with depths of 4.9 to 6.4m alongside.

Vessels subject to quarantine anchor in 7 to 42m within the cove off Jordfallet.

Vessels should take care not to anchor at Jordfallen, on the W side of the harbor 0.4 mile SSW of the mouth of Farriselva, owing to a sewer pipeline.

3.25 Sandefjorden (59°05'N., 10°15'E.), lying about 6 miles ENE of Larviksfjorden, is an elongated inlet entered 3 miles N of Rauer; it extends 5.5 miles N to Sandefjord.

The fairway is deep but is narrowed in several places by above and below water dangers that lie off either side of the inlet. The surrounding terrain is low-lying and rolling but **Kvernberget** (59°04'N., 10°16'E.) is a prominent bare brownish hill on a small peninsula on the E side of the fjord, 2 miles within the entrance.

Offshore the inlet is fronted by a scattering of dangers extending from **Svennerholme** (58°58'N., 10°09'E.) E through the light gray, low-lying and bare rocky islets of Rauer to **Sydostgrunden** (58°59'N., 10°19'E.), a shoal, rocky patch, frequently marked by breakers, about 6 miles ENE.

Mefjorden, close E of Sandefjorden, is a much encumbered inlet surrounded by comparatively low-lying terrain, which is remarkable as it rises steeply from the sea. Vegetation is sparse on the E side of the fjord but somewhat more luxuriant on the W side where coniferous forest is found.

The finger of land separating Mefjorden and Sandefjorden is dark gray in color, low lying, rocky, and relatively bare. The current in Mefjorden is usually not noticed but it easily freezes over in winter.

Currents outside Sandefjorden are influenced by wind conditions farther out in the Skagerrak. Commonly they set W and can reach a velocity of 3 to 4 knots, particularly in the W part of the mainland and the off-lying dangers between Svennerholmene and Sydostgrunden, but at times they may shift such that the set inshore of these dangers is opposite that offshore. Currents inside Sandefjorden are negligible.

Pilotage.—Pilotage is reported compulsory for nonmilitary vessels of 50 grt or over when navigating within this restricted area.

Pilots may be embarked from the pilot vessel on station about 2 miles SW of Svenner Lighthouse. See above under Larviksfjorden pilotage.

Caution.—A coast artillery firing area lies in the approaches to Sandefjorden and Mefjorden. It includes the seaward approaches to Tonsbergfjorden and extends offshore for a distance of 7 miles. Firing exercise warnings are issued locally and/or by patrol craft which may be present.

When the **Rakke Gunnery Range** (58°58.8'N., 10°02.3'E.) is active, vessels entering Larviksfjorden should communicate with the patrol boat on the firing range.

Two inner passages leading from Larviksfjorden to Sandefjorden and farther E to Tonsbergfjorden, lie within the area between the mainland and the off-lying dangers between Svennerholmene and Sydostgrunden. Batleia, the innermost passage, is commonly used by small coastal vessels with local knowledge; it lies close along the mainland shore.

Skipsleia, the outermost passage, lies about 1 to 1.5 miles offshore and is used by larger vessels, with local knowledge; the water is deeper and the fairway is not as intricate.



SVENNER LIGHTHOUSE (58°58.1'N., 10°09.1'E)

3.26 Ula (59°01'N., 10°11'E.), a small mainland community midway between Larviksfjorden and Sandefjorden, fronts on a snug inner harbor entered from an outer harbor. It is open to winds from the S. The outer harbor has an indifferent anchorage for small vessels with local knowledge in about 18m. The anchorage is close off the steep-to NW side of an islet on the E side of the harbor. Vessels may approach from either Batleia or from Skipsleia.

Kjerringvik (59°02'N., 10°14'E.), on the W side of the entrance to Sandefjorden, is a good calm harbor for small vessels, with swinging room. During storms at sea, however, there can be current in the harbor. There are mooring rings N of the jetty on the NW side of Fornet, where it is best for smaller vessels. The anchorage W of the islet Ostre Kjerringdmen is in a depth of 14 to 15m, sand.

Vessels should make their approach from the SE and pass between Koksundbaen, to port, and Kjerkebaen about 0.1 mile NNE, then through Koksundet, a narrow channel between the islets Ostre and Vestre Kjerringholmen.

Spervikbukta (59°04'N., 10°14'E.), a bay 1.75 miles N of Kjerringvik, has anchorage for small vessels in 7m, clay.

Such vessels can also anchor 0.3 mile W of Asneset Light, in the channel W of the chain of islets which extend S from Trangsholmen, but a submarine cable exists between the N islet of Tredelene and the W shore close to the S of this anchorage; the bottom is mud at these anchorages.

Larger vessels can only obtain anchorage in any part of the fjord N of Asneset, in depths from 6 to 31m.

A submarine cable is laid across the fjord 0.9 mile NNW of Asneset Light.

Nordre Tredelen (59°06'N., 10°14'E.), an islet on the W side of the approaches to the inner part of Sandefjorden, has anchorage for small vessels with local knowledge in 9m, clay, in an elongated deepwater pool between its W side and the mainland opposite. Vessels make their approach either N or S of the islet.

3.27 Sandefjord (59°08'N., 10°14'E.) (World Port Index No. 23710), at the head of Sandefjorden, is the center of a large merchant fleet and significant industry. The consulates of Denmark, The Federal Republic of Germany, and Sweden are

located in the town. The harbor district lies N of a straight line drawn from the N end of Asneslandet, W between Trangsholmen and the skerry N of it, and joins the S end of Thoroya. There are no currents worthy of mention in the fjord.

The harbor is ice free except with long cold periods, but a channel is kept open by ice breakers. Pilotage is compulsory.

Between Asneset to Framnes, 1.25 miles N, there is a speed limit of 7 knots and N of Framnes one of 5 knots.

There are two quays on the E side of Toroya, an island situated 0.2 mile NNW of Trangsholmen; the N quay is 146m long, with depths from 10.9 to 17.8m alongside.

The Harbor Authority has three projecting quays, Berth Nos. 1, 2, and 3 up to 92m in length on the NW side; the two outer quays, has Berths Nos. 4 and 5 with depths of 6m alongside except at their N ends, the inner quay has depths of less than 5m alongside.

Vera Fabrikker, situated on the E side of the harbor 0.5 mile NNE of **Trangsholmen** (59°06'N., 10°15'E.) has two quays; Berths Nos. 6 and 7, of which the larger is 80m in length with depths of 6m alongside.

Vessels seeking anchorage in Mefjorden should follow the directions for small vessels, with local knowledge, previously described.

Espeholmen (59°04'N., 10°18'E.), an islet on the E side of the inlet, 0.7 mile N of Lyngholmen, has anchorage on its E side in 14m, clay.

Tossen, an islet about midway inside Mefjorden, has anchorage on its W side in 14m, clay.

Ormestadvika (59°06'N., 10°16'E.), a coastal indentation on the W side of Mefjorden near the head, has anchorage in 20m, mud, in a position sheltered from all weather.

Tonsbergfjorden

3.28 Tonsbergfjorden (59°05'N., 10°22'E.), entered between the E entrance point of Mefjorden and Skatangen, the SW extremity of the island Tjome, about 3 miles E, extends about 14 miles N. It is formed by a peninsula of the mainland on the W side and by the islands Tjome and Notteroy on the E.

It is encumbered in its seaward approaches by a myriad of scattered dangers and in its middle reaches it is choked by several mid-lying islands, many islets and a large number of awash and submerged dangers, restricting deep passages.

Tonsberg lies at the head of the inlet; it may be approached from sea or from Oslofjorden by way of Vrengen or the passage N of Notteroy.

Vestfjorden, the narrowed N part of Tonsbergfjorden, extends from the mainland point **Traelsodden** (59°13'N., 10°22'E.) to Tonsberg, about 3 miles distant N.

Depths in the several passages leading to the head of Tonsbergfjorden are generally quite adequate for ocean going vessels. The maximum draft for using the W approach from sea is 6.4m and for the E approach from Oslofjorden through Husoysund is 5.5m.

Tides—Currents.—Currents are somewhat uncertain in both direction and velocity in that they tend to fluctuate under the influence of the "Solgangsbris," a natural, mostly summertime, phenomenon in which the wind blows from the direction of the sun and consequently shifts in direction as the

sun travels from horizon to horizon. Ice commonly forms in Vestfjorden and the passage N of Notteroy.

The approach to Tonsberg from Oslofjorden is always kept open by icebreakers, while the approach through Tonsbergfjorden in general becomes icebound.

Aspect.—Useful landmarks in the seaward approach to Tonsbergfjorden are **Toras** (59°04'N., 10°25'E.), a hill 56m in the S part of Tjome, which appears as two hills side by side, and a radio tower marked by obstruction lights about 0.2 mile NW of Toras. The church in the village of Tjome, 2.5 miles NNW of Toras, because of its gray color easily blends in with the land, but from Tonsberg Tonne the spire, as a rule, is clearly distinguished against the sky.

Tokeneskollen, about 3 miles NNW of Tjome church, a 57m high round hill in the SW extremity of Notteroy, is especially conspicuous from the SW. A restricted area, in which navigation is controlled by regulation, includes all of Tonsbergfjorden, with its approaches from the sea and Oslofjorden, shoreward of a line joining Svenner Light with **Faerder Light** (59°02'N., 10°32'E.).

A coast artillery firing area fronts the seaward approaches to Tonsbergfjorden.

Pilotage.—Pilotage is compulsory for non-military vessels of 50 grt or over when navigating within this restricted area.

Pilots may be embarked from the pilot vessel on station either about 2 miles SW of Svenner light or about 3 miles NNE of Faerder Light.

Harbor pilots from Tonsberg take over from sea pilots in Vestfjorden or at Hvsoyflaket off the SE end of Hvsoysund.

Caution.—Vessels, in making their approach from sea, are recommended to fix their position accurately before entering Tonsbergfjorden and, during periods of storms, are in particular cautioned not to enter unnecessarily unless they are sure their intended track lies clear of the many submerged dangers which, marked by breakers during such weather conditions, encumber the free transit of the entrance to the inlet.

3.29 Haoya and Veierland lie on either side of two deepwater channels joining Tonsbergfjorden W passage with Tonsbergfjorden E passage. The N channel, with a least charted depth of 10m, leads between Haoya and the mid-lying islets Haholmene. The S channel, with a least charted depth of 18m, leads between Haholmene and the 2.5m below-water rocky patch Haholmgrunnen.

A wreck is located close SW of Haholmene in an approximate position of 59°10'N, 10°20'E..

Submarine pipelines are located about 0.5 mile SE of Haholmene joining Veierland and Notteroy.

A 7.6m rock lies close off Haoya in an approximate position of 59°11'N, 10°21'E..

Vessels, having cleared Haoya, steer for Vestfjorden and proceed so as to pass E of the submerged rock close SE of the mainland point Traelsodden, then W of Kausen light and SE of the 1.3m below-water rock Verjoedynga, where they transit Verjoysundet and continue on in mid-channel through Vestfjorden to the NW entrance to Tonsberg harbor.

Verjoysundet (59°13'N., 10°23'E.), on the E side of Verjoy, is dredged to a depth of 8.4m, but is only 91m wide. The

passage NW of the N end of Verjoy is dredged to a depth of 8.5m and is 91m wide; each side of the passage is marked by spar buoys. A beacon is situated 0.5 mile NNE of Traelsodden and another beacon 46m ENE of Furuodden Light.

The E approach to Tonsbergfjorden and the passage N is only suitable for small vessels with local knowledge.

Tjomebaen (59°01'N., 10°25'E.), 4 miles SE of Tonsberg Tonne, is the farthest seaward awash danger in the E side approach to Tonsbergfjorden; it is a black low-lying rock, and when viewed from the S seems to merge with the background at a distant of 2 miles or greater. A beacon stands on Osskjaer, a small islet 5m high 2 miles NW of Tjomebaen; the beacon on Mefjaera stands 0.9 mile farther NNW. The principal channel through Tonsbergfjorden is approached W of Sydostgrunnen and along the E side of the inlet.

Tallakshamm (59°05'N., 10°19'E.), a spacious but shallow bight near the W entrance point of the fjord, has anchorage for small vessels in about 6m sand, poor holding ground. Vessels approach the anchorage from the NE.

Lahellefjorden (59°08'N., 10°18'E.), a bay encumbered by dangers has anchorage for small vessels in 7m in a position close S of Trondskjaer.

Natholmen (59°07'N., 10°20'E.), a reef fringed islet in the entrance to Lahellefjorden, has anchorage off its E side for large vessels in 17 to 20m.

Verkholmen and **Sanholmen** (59°09'N., 10°20'E.), two islets in the middle reaches of Tonsbergfjorden, lie N and S of a deepwater pool which has good anchorage, for moderate sized vessels, in 9 to 12m.

Melsomvik (59°13'N., 10°21'E.) has anchorage for small vessels in depths up to 20m loose clay. At the village of Melsomvik there is a quay 19m long with depths of 6.5 to 8m alongside.

3.30 Tjomekjaela (59°08'N., 10°23'E.), a narrow passage on the E side of Tonsbergfjorden, has roomy anchorage for small vessels in 15 to 20m, clay, in a position S of the islet Ostre Vakerholmen.

Ronningen (59°09'N., 10°22'E.), a small community on the E side of the island Veierland, fronts on a water area which has anchorage for moderate sized vessels in about 20m.

Vrengen (59°10'N., 10°25'E.), the throughway between Tjome and Notteroy, is a deepwater passage which, almost closed by a coastal bank in its middle reaches, is available to small vessels with local knowledge in transit between Tonsbergfjorden and Oslofjorden.

The fairway has several sharp turns and a width of only 137m in the channel between Notteroy, to the N, and a 5m below-water rock of Sundenebaen, to the S.

Kjopmannskjaer, near the W entrance to Vrengen, is a small community and fish oil refinery which serves as an outpost for Tonsberg when access to that port is closed by ice.

Currents are generally quite strong in Vrengen and commonly set to the W when the current in Oslofjorden is to the S. Winds are variable.

A fixed highway bridge with a vertical clearance of 33m spans Vrengen 0.5 mile within the W entrance; a fixed red light

is shown from its center; another bridge, with a clearance of 28m, spans the channel close N.

Power driven vessels when navigating Vrengen between Bjomehodet and a line joining Gryteskjaerbaen and Sjostrand, are required to proceed at a speed no greater than 5 knots, and warning by sound signal must be made.

Anchorage.—The cove close W of Bjomehodet has good anchorage for small vessels in 12m, mud. The cove on the S side Vrengen, S of Bjomehodet has good anchorage for small vessels in a depth of 17 to 18m, mud.

Sevika, N of the bridge, has good anchorage for moderate sized vessels in 7 to 9m; vessels make their approach so as to clear the dangers in the entrance.

Tonsberg (59°16'N., 10°25'E.)

World Port Index No. 23720

3.31 Tonsberg is located at the head of Tonsbergfjorden. It is a busy harbor with significant shipping and industry.

The principal exports are timber products, rock, industrial and agricultural products.

The principal imports are coke, salt, iron and hemp. The harbor area extends from Vestfjorden E to Husoyflaket, a basin in the W margin of Oslofjorden. The harbor has a E and W entrance. Vessels up to 30,000 grt with a draft of 5.5m can enter the E entrance and 7.3m can enter the W entrance.

A bascule bridge spans the E entrance with a horizontal clearance of 26.8m and a depth of 6.7m. Opening of the bridge can be arranged by contacting the bridge on VHF channel 12.

Submarine cables and a water pipeline crosses the channel close N and S of the bridge.

Tides—Currents.—Currents are irregular and tend to shift with the wind. Ice generally forms in Vestfjorden between mid-December until the early part of April, but is opened when needed.

A lane through the ice is kept open between Husoysund, Traela, and Tonsberg Channel.

Depths—Limitations.—A channel has been dredged from Vestfjorden to the inner harbor with a minimum depth of 7.6m. Tonsberg Canal has a least charted depth of 6.5m in mid-channel. The port has a quay with a total length of 225m with depths alongside of 6 to 8m. On the NE side of the canal is a quay close SE of the bridge with a length of 217m and depths alongside of 5 to 7m.

The port also has three cargo piers with lengths of 70, 80 and 200m. A ro-ro berth is also available which can accommodate vessels with a draft of 7m.

Pilotage.—Pilotage is compulsory and available from Ferder Pilot Station.

Signals.—Vessels wishing to transit Tonsberg Kanal should sound one long and two short blasts on the whistle or contact the bridge on VHF.

Traffic signals are exhibited from the watch tower on the bridge for traffic in each direction.

A green light means canal is open for passage; bridge can be opened.

A red light means canal is not clear, and the bridge is not open to traffic in the direction of the light.

Red and green lights together means the canal is open to traffic to the wharves, but the bridge is closed to passage.

Gauges are erected on the bridge piers to indicate the vertical clearance under the bridge when closed.

Anchorage.—Vessels subject to quarantine anchor either in Vestfjorden off Ramberg or on Husoyflaket.

Vessels without berth assignment anchor either in the inner harbor or in Traela.

Husoyflaket (59°14'N., 10°29'E.), just outside Tonsberg harbor E limit, has a roomy and sheltered anchorage for large vessels in 24 to 26m, mud and clay.

Smaller vessels within the anchorage are troubled by winds from the E and SE.

Husoysund, just inside Tonsberg harbor E limit, has good anchorage in its E part where vessels commonly moor with their stem made fast either to the islet Jer soy or the small island Husoy. Vessels of all sizes often lie in the anchorage during lay-up or repairs.