Bundesstelle für Seeunfalluntersuchung
Federal Bureau of Maritime Casualty Investigation
Federal Higher Authority subordinated to the Ministry
of Transport, Building and Urban Affairs

Summary
Investigation Report 167/08

Serious marine casualty

Grounding of the MV PACIFIC CHALLENGER to the east of Oro Bay/Papua New Guinea on 9 April 2008

2 February 2009

www.bsu-bund.de

The investigation was conducted in conformity with the law to improve safety of shipping by investigating marine casualties and other incidents (Maritime Safety Investigation Law / Seesicherheits-Untersuchungs-Gesetz, SUG) of 16 June 2002.

According to this, the sole objective of the investigation is to prevent future accidents and malfunctions. The investigation does not serve to ascertain fault, liability or claims.

This report should not be used in court proceedings or proceedings of the Maritime Board. Reference is made to § 19 paragraph 4 of the SUG.

The German text shall prevail in the interpretation of the Investigation Report.

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At 09:06[1] on 9 April 2008, the 148-m-long container ship PACIFIC CHALLENGER ran on to an uncharted reef during its voyage from Rabaul / New Britain to Oro Bay / Papua New Guinea.
After the ship had been lightered by unloading of some containers, she was pulled clear with the aid of two tugs and taken to the Port of Lae on 27 April 2008.
There was no personal injury or environmental damage caused by the casualty event or the recovery measures.

[1] Local time = CET + 9 hrs

2 Scene of the accident

Type of event: Serious marine casualty
Date/time: 09.04.2008
Location: Papua New Guinea
Latitude/longitude: φ 08°24.574'S λ 148°59.223'E

Section from nautical chart 4604, Coral and Solomon Seas, British Admiralty Chart

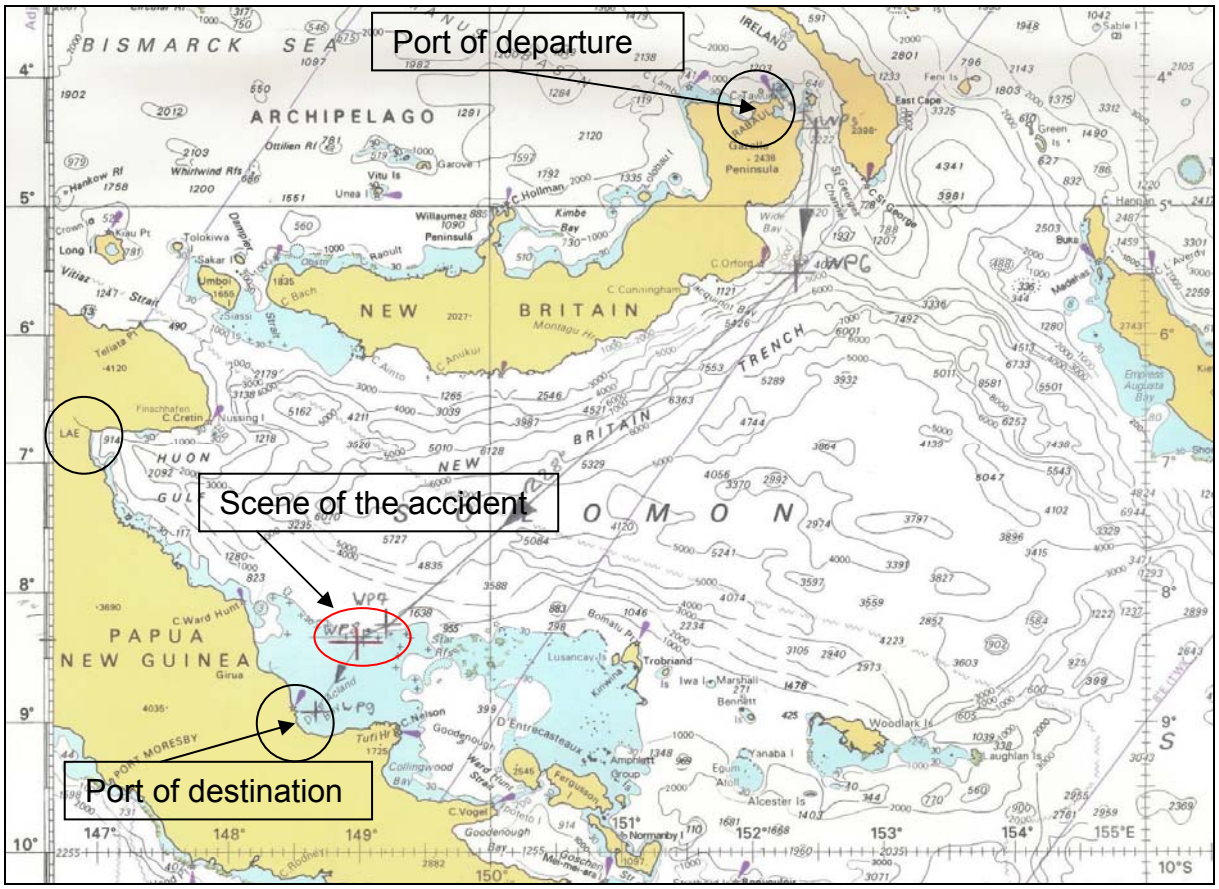


Figure 1: Coral and Solomon Seas nautical chart

3 Vessel particulars

3.1 Photo

Figure 2: Photograph of the vessel

3.2 Data

Name of the vessel:	PACIFIC CHALLENGER
Type of vessel:	Container ship
Nationality/flag:	German
Port of registry:	Hamburg
IMO number:	9265586
Call sign:	DCMB2
Vessel operator:	Carsten Rehder Schiffsmakler und Reederei GmbH & Co. KG
Year built:	2003
Shipyard:	Lingling Shipyard, Nanjing
Classification society:	Det Norske Veritas
Length overall:	147.87 m
Breadth overall:	23.55 m
Gross tonnage:	9966
Deadweight:	13858 t
Draught at time of accident:	7.90 m
Engine rating:	9730 kW
Main engine:	MAN 7 L 58/64
(Service) speed:	19 kts
Number of crew:	19

4 Course of the accident and investigation

4.1 Course of the voyage

After accepting a new charter, the vessel was on its first voyage from Rabaul / New Britain to Oro Bay / Papua New Guinea, which meant that the waters were new to both the shipping company and the crew. All necessary and available current nautical publications were carried on board the vessel. No electronic chart system had been installed. The vessel was manned by a sufficient and qualified crew. No equipment deficiency or fatigue was identified.
The charterer, which also operates in the relevant sea area with its own tonnage, passed on the drawings below, including distances, to the shipping company in several emails:

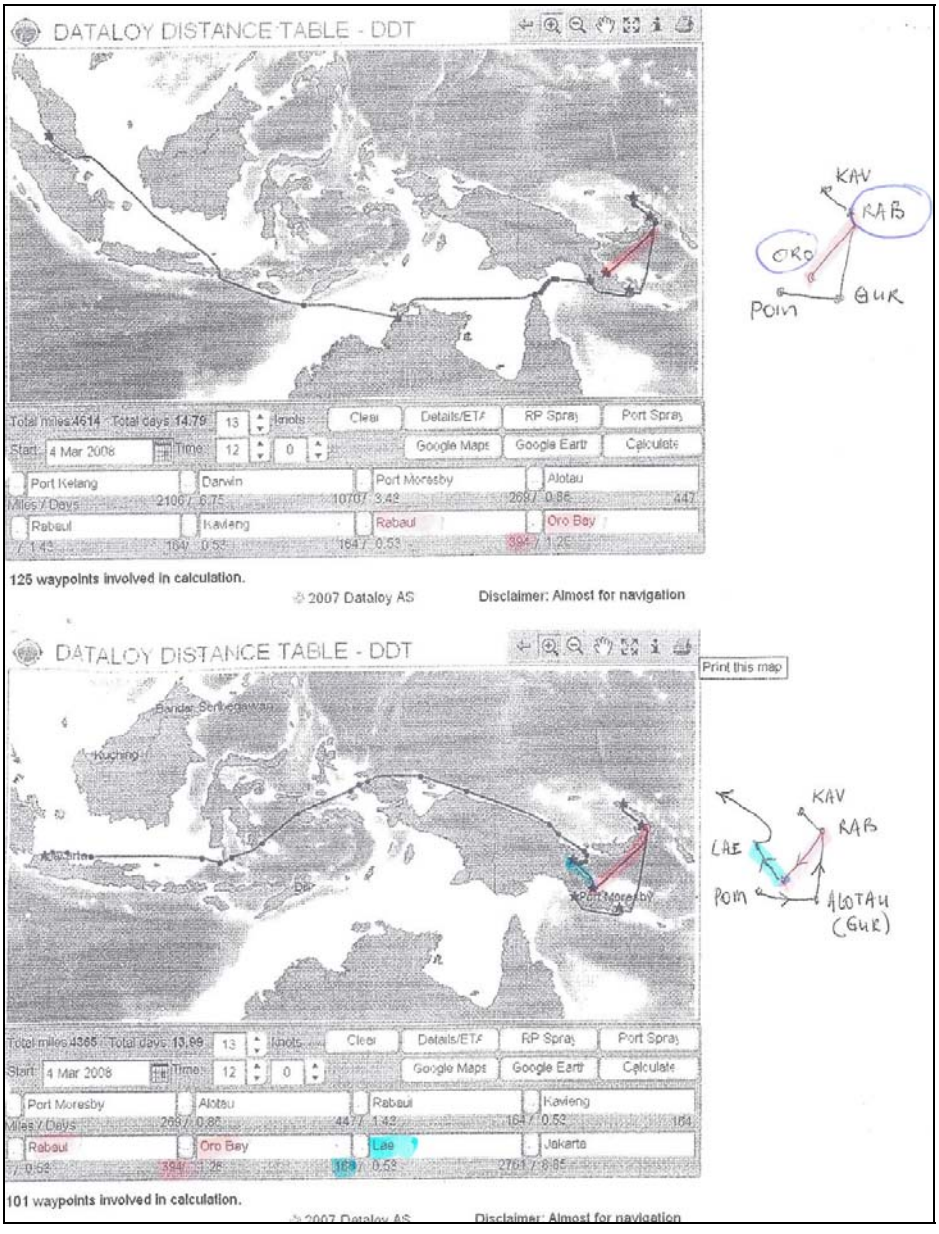


Figure 3: Distance data from the charterer

The distance between Rabaul and Oro Bay was specified in this correspondence as 394 nm and from Oro Bay along the NE coast of Papua New Guinea to the Port of Lae as 166 nm.

On the PACIFIC CHALLENGER, voyage planning is carried out by the second officer. Courses and waypoints are entered on the nautical charts and then copied into an Excel file "PassagePlan". The entered courses, waypoints and the passage plan are checked and signed off by the master. The distance between Rabaul and Oro Bay, which had been calculated in this way by the second officer, was 398.58 nm and was therefore slightly longer than the pre-determined distance of 394 nm. When the vessel was departing from Rabaul, the coastal pilot, when asked by the second officer, also informed him that the voyage route was OK.
The vessel is not equipped with an electronic chart system. The Australian nautical chart AUS 520 to the smallest scale was used for navigation. The second officer had drawn safety circles on this chart to mark the indicated areas of shallow water/coral reefs.

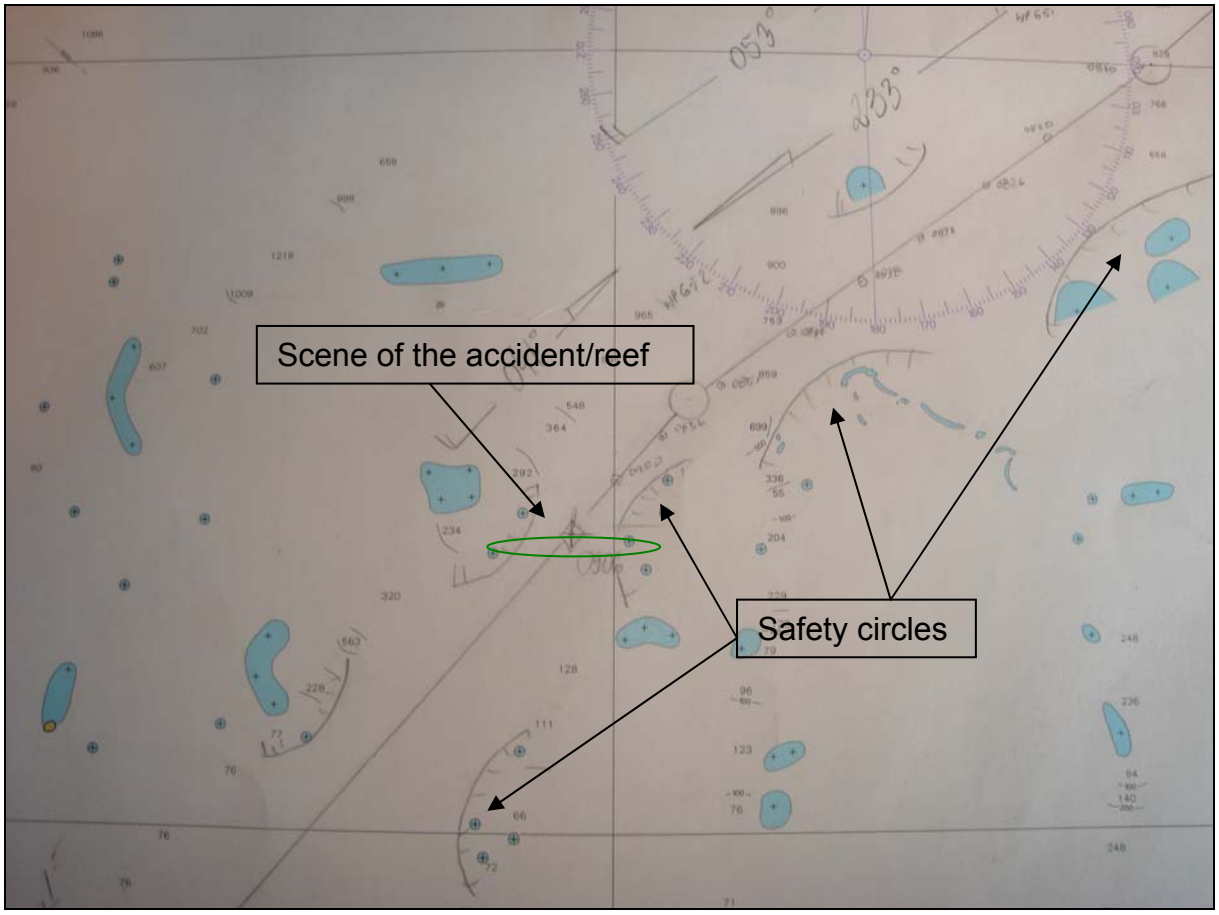


Figure 4: Chart section from on board

On the morning of 9 April 2008, the third officer was on watch duty. The master, standing on port side, also additionally kept lookout. All charted shallows were identified abeam. The vessel was sailing at a speed of 15 kts on a course of 233°, which was subsequently changed to 221° over ground. (The already plotted

outbound courses 041° and 053° can be seen on the chart section in Fig. 4.) Around 09:00, an uncharted reef across the course line was, due to the heading into the sun, only spotted late. Despite immediate adjustment of the propeller to a reverse pitch, the ship ran virtually “non-braked” on to the reef. The grounding of the vessel went smoothly, everything remained upright and no other damage was detected.

Figure 5: Reef from above

(Source: shipping company)

All tanks were immediately checked and endeavours were made to come clear again under the vessel's own steam but were unsuccessful. It was only after the ship had been lightered by unloading of some containers that she was pulled clear again with the aid of tugs and hauled to the Port of Lae on 27 April 2008. At a shipyard in China, the double bottom was subsequently completely replaced up to around midship.

4.2 Sailing Directions

The Admiralty Sailing Directions, Pacific Island Pilot, Volume I, Chapter 1, Coral banks 1.7 contains the following warning:

Mariners are warned of the risk involved, particularly to deep-draught vessels, in crossing oceanic banks in the area covered by this volume. Many of the banks are imperfectly surveyed; the area is also subject to seismic and volcanic activity which could cause shoals to build up even on those banks which have been well surveyed. It has been reported by hydrographic departments that mariners navigating in these areas in relatively high speed deep draught vessels should be aware of the danger of their vessels contacting coral pinnacles, that are not detectable by eye, thereby causing significant underwater damage, with the vessel being clear in deep water before headway has been lost.

Sailing into Papua New Guinean ports should be carried out via so-called preferred routes. These identified sailing routes have not been verified in accordance with IMO/IHO standards but do offer relative accuracy. To reach the Port of Oro Bay, route 6.240, coming from the north, runs past Cape Ward Hunt and then parallel to the coast.

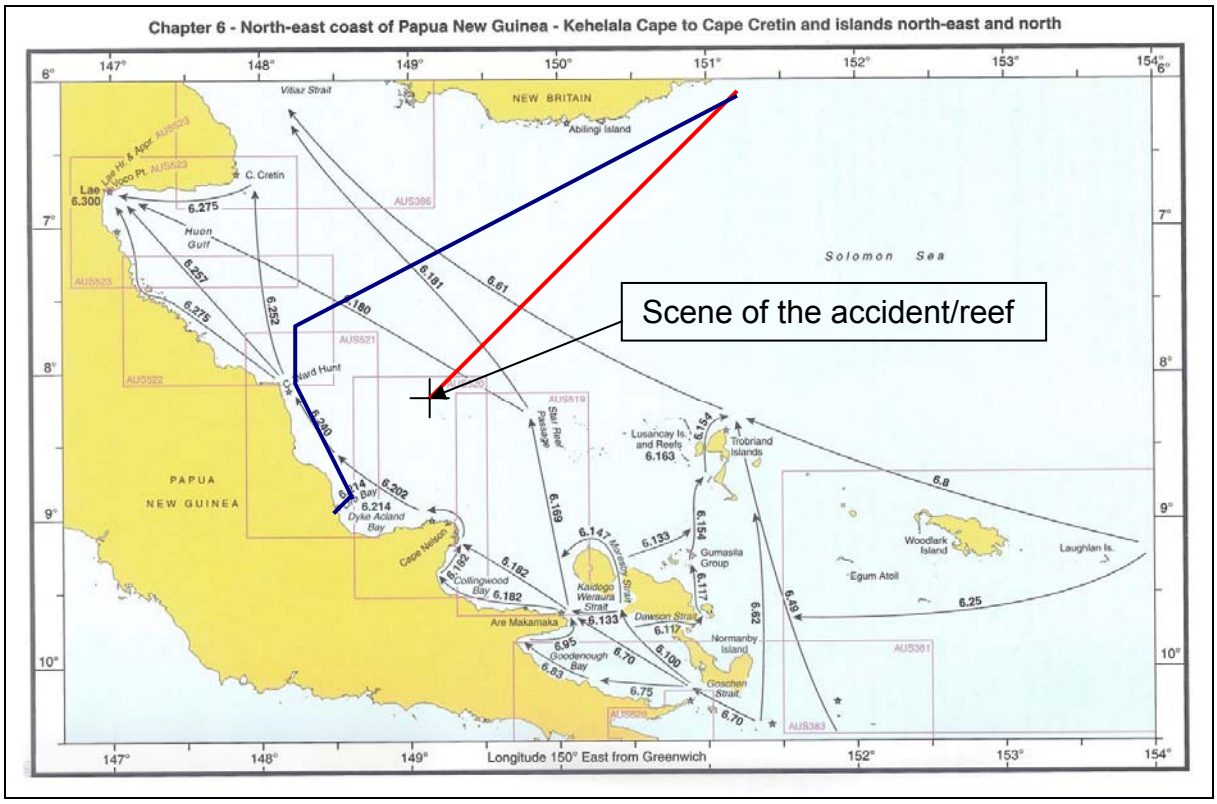


Figure 6: Section from Sailing Directions

General information according to the Sailing Directions on the preferred route specifies:

Area Covered

The area covered in this section includes the preferred route through the surveyed areas along the NE coast of Papua New Guinea between Cape Nelson (9°05´S 149° 15´E) and Cape Ward Hunt (8°04´S 148°08´E), together with the anchorages and harbours on the coast, including the port of Oro Bay. This section is arranged as follows: Dyke Acland Bay (6.202), Oro Bay (6.214), Cap Endaiadere to Cape Ward Hunt (6.240).

Depths

Many reefs, shoals and shallow patches, some of which either break or are awash, obstruct the waters to seaward of the recommended track between Cape Nelson and Cape Ward Hunt. The positions of these dangers can best be seen on the chart.

If following the recommendation according to the Sailing Directions, the route (blue route) would be approx. 70 nm longer than the direct route (red route).

4.3 Nautical charts

Paper charts and electronic charts is only as good as the material on which they are based. In line with INT standards, nautical charts contain basics overviews, which provide information about the surveys on which the chart is based. The international

standard describes two possible ways of arranging basics overviews. Firstly, there are overviews that show the date and the method of surveying. And secondly, another possibility is using overviews indicating the zones of confidence (ZOC diagram).
It is not possible to determine from the available Australian nautical chart material when the sea areas were surveyed. However, on the nautical charts are spaces marked with notes about uncharted areas. The ZOC diagram legend also contains an overview and table of the accuracy of the positions and bearings:

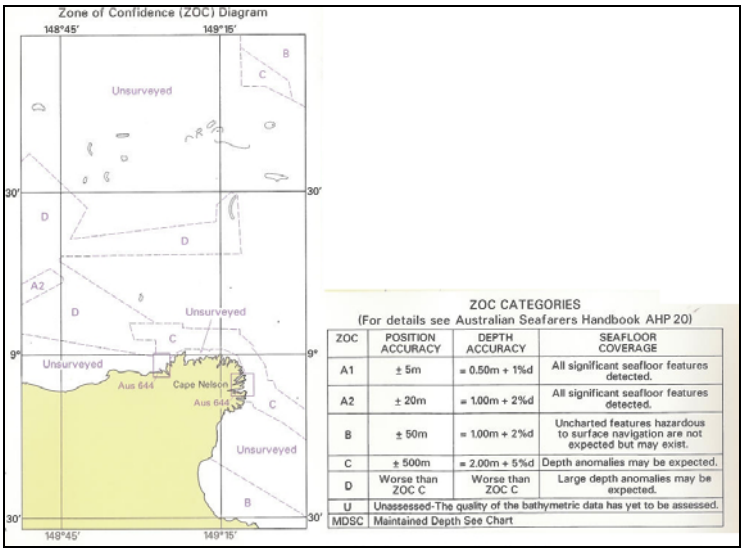


Figure 7: ZOC diagram from nautical chart AUS 521

It is difficult to make out the precise boundaries of the unsurveyed area at first glance, so the area is therefore highlighted in red below:

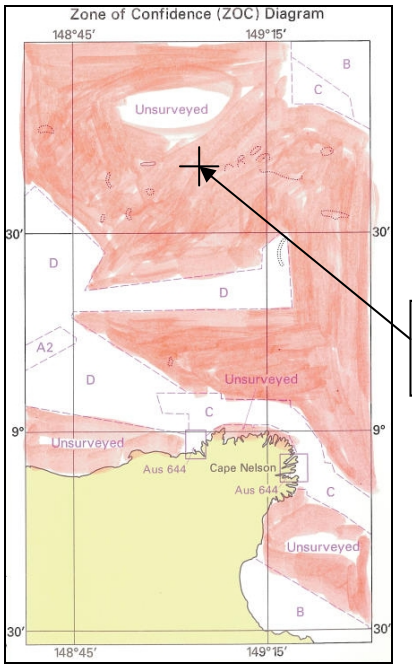


Figure 8: ZOC from nautical chart AUS 521

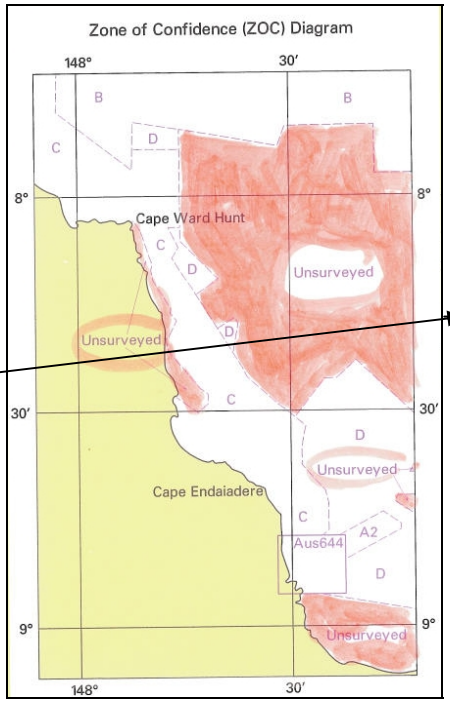


Figure 9: ZOC from nautical chart AUS 520

Scene of the accident/reef

In the case of the recommended route 6.240, coming from the north, then at Cape Ward Hunt along the coast to Oro Bay, the vessel would end up, in the worst case scenario, in zone "C". This is an area of sea described as:

> Sea Area not completely surveyed,
> depth anomalies may be expected;
> position inaccuracy: +/- 500 m,
> depth inaccuracy: 2m + 5% of the water depth

The chosen direct route to Oro Bay goes through zone "D" and zone "U" (UNASSESSED), which is defined as follows: "The quality of bathymetric data[2] has yet to be assessed."

The sea area in front of Oro Bay, which is indicated as "unsurveyed" on the nautical charts, is partially shown with depth specifications. During this investigation, it was not possible to determine when surveying was carried out and who surveyed the depths.

4.4 More recent surveys

Following the marine casualty, a correction was made to the nautical chart for the area. In addition to the reef hit by the PACIFIC CHALLENGER, a large number of shallows, reefs and rocks have now been charted or recharted more accurately.

[2] Depth measurements/cartography of the seabed

On 30 October 2008 (week 44), the Notices to Mariners relating to the Admiralty Charts and Publications included the following information and nautical chart corrections:

II

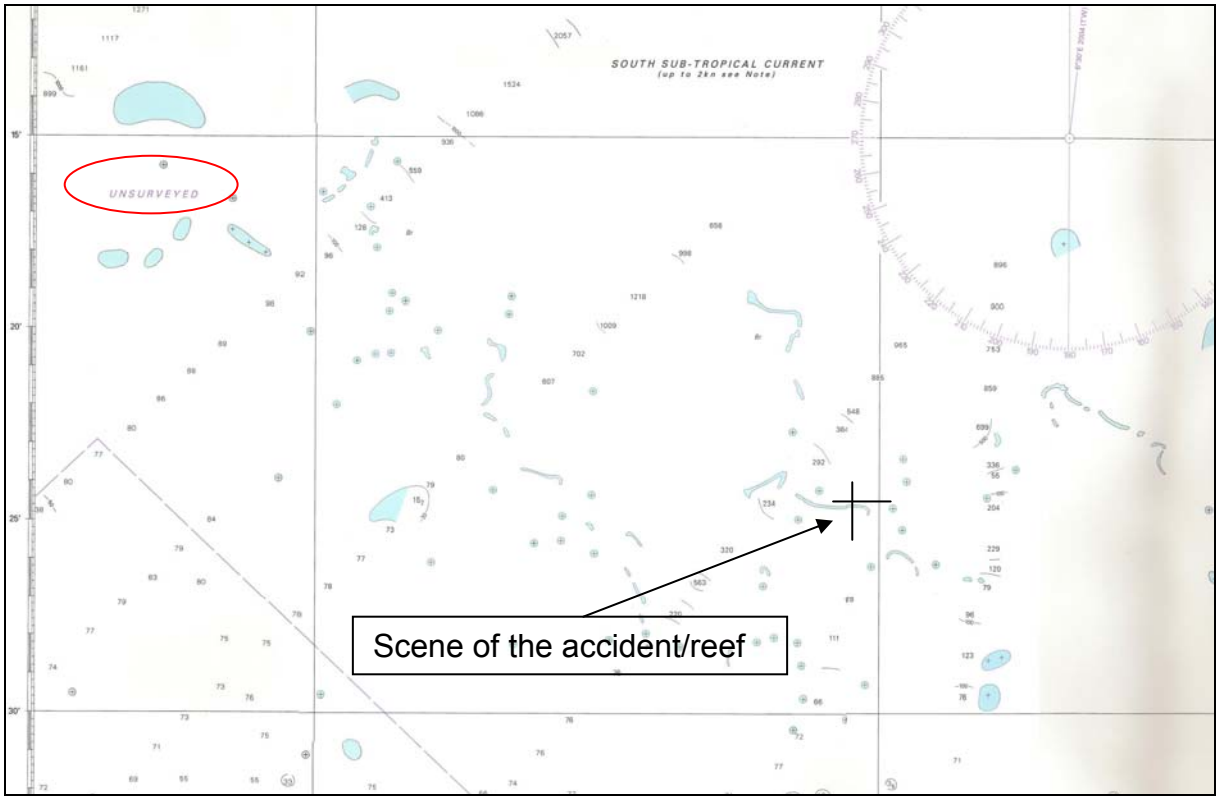
5863 PAPUA NEW GUINEA - Solomon Sea - Dyke Ackland Bay Northwards - Danger lines. Rocks. Reefs.

Source: Australian Notice 17/841/08

Chart Aus 520 [*previous update 4083/08*] WGS84 DATUM

Insert the accompanying block, showing amendments to danger lines, rocks and reefs, centred on: 8° 21′·80S., 148° 42′·70E.

This notice is based on information of the Australian Hydrographic Service dated 29 August 2008. The nautical chart AUS 520, corrected according to Admiralty Notice to Mariners week 44/08 (2008-4083), shows the area now differently to the nautical chart according to Figure 4 on page 9:



Despite this resurvey, the area is still marked as **"UNSURVEYED"**.

5 Summary

There are still sea areas around the world that have not been surveyed or not fully surveyed in accordance with IHO[3] standards. These include the relevant coral reef area off the coast of Papua New Guinea. In addition, there are also old or imprecise surveys for some sea areas. An example for this is the German Bight, nautical chart no. 1045, where there are parts of the area that were last surveyed in 1938. However, the age of the survey alone is not a reliable indication of the survey accuracy of the relevant chart content. The chart legend in particular and the Sailing Directions for the area should also be taken into consideration.

If, for example, contour lines are only marked intermittently on nautical charts, the representation of depths in this area should therefore be assumed unreliable.

It is essential to navigate using the latest and best-possible chart material and always with the necessary caution. When navigating in unknown waters, especially when deviating from the main shipping routes, voyage planning must always account for the possibility of non-applicable or outdated information. In such cases, it is then necessary to pay special attention when executing and monitoring the voyage.

The international geodetic reference system, World Geodetic System WGS 84, deviates in some cases considerably from older regional geodetic reference systems. However, a clear reference system for a nautical chart cannot always be determined, particularly if outdated basic material does not contain relevant information. Moreover, the positions fixed using satellite navigation are often more accurate than the charted soundings, which are, in some cases, based on outdated chart material. It is in low-traffic areas in particular that there are sometimes no suitable marine surveys available. The likelihood of coming across unknown danger spots is highest outside of frequently sailed waters.

On board the vessel, all available navigational aids should always be consulted for position-fixing purposes. Planning data from third parties, e.g. charterers, and unofficial chart material, should not be used for navigation.

This also applies to navigation with the aid of an electronic chart. In this case too, the available chart material is only as good as the data on which it is based. In particular, if no official ENC[4] has been issued yet, the data must be critically scrutinised. It may be that only raster nautical charts that correspond to the scanned paper charts with the same information content are available for a sea area. Regardless of the data material available, there is still the same need for caution when planning, executing and monitoring a voyage. In order to ensure the necessary caution is taken when using an electronic chart, the master and the nautical officers must be fully familiarised with the nautical chart system used on board. In the course of the ongoing discussions in the MSC[5] of the IMO on the mandatory requirements for seagoing vessels to be equipped with ECDIS[6], the IHO agreed the action plan to

[3] IHO = International Hydrographic Organization
[4] ENC = Electronic Nautical Chart
[5] MSC = Maritime Safety Committee
[6] ECDIS = Electronic Chart Display and Information System

make ENCs available for the top 800 ports and the routes between them by 2010. However, even then, voyage planning, executing and monitoring would not be carried out by a nautical chart system, but rather always by the crew. The nautical chart system is a valuable tool but can only perform its full functionality if the crew has had the appropriate training.

6 Sources

- Determinations of the BSU
- Written statements
  - Vessel's command
  - Shipping company / owner
  - Classification society
- Nautical charts and ship data:
  Federal Maritime and Hydrographic Agency / Bundesamt für Seeschifffahrt und Hydrographie (BSH)