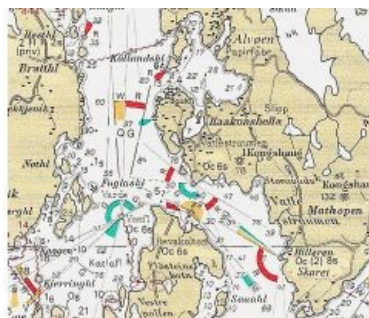


A CHARTMAKER'S RETROSPECT

The Rocknes Casualty 2004



The MV *Rocknes* (about 17,000 GRT (Gross Register Tons), draught approximately 10.5m, see Figure 1), en route from Eikefet, Norway to Emden, Germany, hit a shoal in Vattestraumen, Norway on 19 January 2004. The vessel carried a pilot from the Norwegian Coastal Administration (NCA). Soon after the grounding the ship capsized with the loss of 18 crew. 12 crew were rescued.

Norwegian Hydrographic Service (NHS) was blamed for not publishing its knowledge of a presumed new shoal in the Vattestraumen. Three subsequent lawsuits were necessary to establish a credible explanation of the accident's root causes. 10 years after the serious accident, it is appropriate to present to the hydrographic and maritime environments a unified and comprehensive picture of this incident. This may lead to a greater common understanding of the roles of the mariner and the hydrographic offices, the latter being responsible for charts and nautical publications, which are so important for safe navigation.

In this case, two Norwegian charts were involved. Firstly, the outdated paper chart no. 21 from 1941 that was based on surveys from 1926-1934 and later updated through standard mechanisms (see Figure 2). Secondly, the new official chart no. 21 from 2003 that was issued about one year before the accident. The publication of the new chart no. 21, see Figure 3, made the old chart no. 21 obsolete. The bathymetry of the Vattestraumen area in the new chart no. 21 is based on surveys from 1995-1997. The presentation of the information in areas with new surveys, utilises modern compilation and presentation techniques using, among others, depth curves (i.e. isobaths). A few days after the accident, the area around Revskolten was resurveyed by NHS. No discrepancies in this area were found. At the time of the accident the (new) chart no. 21 was the only official Norwegian chart of the Vattestraumen on this scale. It has been documented beyond any doubt that this chart was available at the bridge of MV *Rocknes* during her voyage.

Initial Investigations and Maritime Inquiry

A few days after the accident, rumours indicated that there was an unknown shoal in the Vattestraumen in the vicinity of Revskolten lighthouse and that this unpublished shoal was the cause of the accident. A representative of the Norwegian Pilots' Association (NPA) even maintained that there was a shoal slightly SW of the 29m sounding in the old chart. Fingers pointed without reservation directly at NHS and its employees. These premature explanations put forward through the media influenced NCA as well as NHS, straining the discussions on the accident between the management of NCA and the management of NHS.

The NHS management rapidly established an internal Ad Hoc Committee to analyse all aspects of NHS production routines regarding chart no. 21. NHS achieved 2003 ISO certification (NS-EN ISO 9001:2000) and emphasised that a systemic approach should be followed through analysing all relevant production routines together with verification of their application and final result with relevance to chart no. 21 in general and the area around Revskolten in particular. No discrepancies regarding NHS processes and products with relevance to the accident were found. In addition to the obligations according to the ISO certification, NHS has adopted the guidelines of TQM (Total Quality Management).

The Maritime Inquiry took place from 26 to 31 January 2004. 28 witnesses were heard. The pilot was the only surviving member of the bridge team that had 5 members. The pilot stated that his intention was to follow the recommended track given by the pilot's guide lines, see Figure 3, and maintained that he had achieved this, although slightly to starboard. No track record of the voyage was available at that time. The inquiry did not manage to reveal probable root causes of the accident. Differences between the pilot, the NCA and the NHS regarding the interpretation of charts and chart regime were observed. In the media, the alleged insufficient coordination and exchange of information between NCA and NHS was often quoted as an important cause of the accident.

The police carried out their own investigation in accordance with the Norwegian Criminal Code. The investigation concluded with a recommended indictment against NHS. The indictment was rejected by the public prosecutor.

Several Reports Produced

The report from the regional office of the Norwegian Maritime Administration (NMA) did not present a conclusive analysis, but discussed various factors which may have influenced the voyage through Vatllestraumen. However, the report contained a plot that proved crucial to the further development: the actual track followed by MV *Rocknes* as recovered from the Electronic Chart System (ECS) on board. NMA also published a report stating that the ship had substandard stability due to the amount of cargo and ballast in addition to insufficient trimming of the cargo.

The report published by the Flag State (Antigua and Barbuda W.I.) dug deeper and pointed towards several important factors which may have caused the accident.

NCA published its report in November 2004. At the time of the publication, the plot showing the track followed by MV *Rocknes* was well known. The report contained no reference to the actual track. Regarding the navigation through Vatllestraumen, the report primarily discussed the recommended track as given by the pilot's guide lines. The chart regime was interpreted in an erroneous way, as shown below. The report recommended a merger between NHS and NCA, mainly due to presumed, insufficient coordination between the two organisations.

Recovery of the ECS

Fortunately, the ECS was rescued from the shipwreck and it was possible to read its content, see Figure 3. The figure shows a considerable deviation from the recommended track given by the pilot's guide lines leading to a too close passage of the Revskolten area. In addition, the ship was within the red sector of the Hilleren lighthouse. This ship, with a draught exceeding 10m, should not have crossed the 20m depth curves. Figure 3 shows that MV *Rocknes* was inside the 10m depth curve causing the grounding. Figure 4 shows an enlarged excerpt of the area around Revskolten lighthouse. Figure 5 shows a bathymetric model of the area around Revskolten lighthouse.

Chart Regime

A main point of discussion has been the interpretation of the chart regime in force at the time of the accident. A New Chart is defined in the regulations (at that time denoted Publication M4) given by the IHO (International Hydrographic Organization). NHS stated that the new chart no. 21 made the old chart no. 21 obsolete, a mechanism well known to the professional maritime community. The NtM (Notices to Mariners) refer exclusively to the New Chart after its publication. NCA and the NPA in particular stated that the old chart, may be kept valid using NtM. The obsolete chart no. 21 and the new chart no. 21 show differences of which the geodetic datum difference and differences related to bathymetry, coastline and positioning of objects important to navigation, are of highest significance (see Figures 2 and 3). The transformation of NtM to the old chart would obviously be an awkward and error prone process. The interpretation put forward by NCA and NPA may lead to dangerous situations and NHS warned against this.

Another statement put forward was that the new chart no. 21 should not contain information significant to navigation which was not previously published in NtM, interpreting the collection of relevant NtM as a 'preliminary chart'. This misunderstanding is caused by an erroneous mixture of the concepts New Chart/New Edition and Reprint. Of course, a New Chart contains a lot of information which is only effectively communicable using graphical presentation, i.e. a chart in paper or electronic form.

Claims against the Norwegian State

The first lawsuit took place in the Oslo District Court, from 2 February to 20 March 2009. The parties were the ship owner and several insurance companies versus the Norwegian State.

NHS maintained that the non-publication of its knowledge of the bathymetry obtained in 1995 and 1997 was caused by the proximity of this new information to the danger line of the old chart no. 21 and that the new information represented no additional danger to the mariner. Further to this, NHS stated that the area in question was located in the red sector of Hilleren lighthouse and very close to the dangerous area around Revskolten lighthouse. Finally, NHS explained that the new chart No. 21 was compiled and maintained to modern standards and that this chart was the only valid Norwegian official chart on this scale at the time of the accident. The claimant's inversion of the chart regime (i.e. making NtM the primary source and the chart the secondary) was rejected by NHS.

The documentation put before The District Court amounted to 8,400 pages. 31 witnesses were heard. The District Court decided that the State was responsible for 3.75% of the claim (approx. 545 million NOK in total), mainly due to the non-publishing of the NHS knowledge of the bathymetry around Revskolten. The existence of the New Chart almost one year before the accident did not according to the Court remedy the situation. Although the State's liability was a rather small fraction of the claim, the State disagreed with the main premises behind the judgement and the State appealed the District Court's judgement. The claimant also appealed the Court's judgement maintaining that the State should bear the whole liability for the accident.

The lawsuit in the Court of Appeal took place from 28 September to 25 November 2010. The documentation had increased to 12,700 pages. 39 witnesses were heard. A large amount of work within NHS was necessary to prepare for the court proceedings. The *Rocknes* case required a total of about 13 man-years within NHS.

These court proceedings were far more penetrating with regard to the root causes of the accident. The Court's inspection of the Vatllestraumen obtained during two sailings proved very valuable to the Court's understanding of the accident. One sailing was done with a smaller ship following the track of MV *Rocknes*, the other with the reconstructed and improved MV *Rocknes* (called MV *Nordnes*). First-hand witnesses accustomed to observing ships' normal sailings through Vatllestraumen, described their observations of MV *Rocknes* when entering Vatllestraumen.

The Court concluded after its proceedings that the State was not liable, i.e. neither NHS nor NCA were to be blamed or had in any way contributed to the accident.

About half of the claimants (among others, 6 of the in total 13 insurance companies from the Court of Appeal) appealed to the Supreme Court. This appeal was rejected. The judgement of the Court of Appeal was final, about 7.5 years after the accident.

The Probable Root Causes

The Court stated that erroneous navigation by the bridge team is the most probable main cause of the accident.

Insufficient visibility from the bridge, insufficient/sub-standard stability, difficult manoeuvring characteristics, insufficient BRM (Bridge Resource Management) and influence of the currents are factors which may have contributed to the erroneous navigation. The bridge team, including the pilot, did not have a proper understanding of the ship's position and dangers in the area. They did not detect the deviation from the intended track in time, which in turn prevented them from taking proper actions. The chart and the chart regime bear no liability in this case.

See Figure 6 for an illustration of the voyage of the MV *Rocknes* through Váttestraumen reconstructed from the ECS using an air photo of the sound.

Lessons Learned as seen from NHS

The detailed and penetrating analyses of all aspects of the case, internal as well as through the court proceedings, revealed potential improvements of NHS processes and products. These were thoroughly analysed and the relevant production processes were reviewed and amended as necessary. An important lesson learned was that more effort should be dedicated to obtain full consistency, precision and completeness of all published information, through NtM, the charts or otherwise. Such information should nevertheless be easy to understand for the mariner, who often has to perceive the information under less favourable work conditions.

Although hydrographic offices intend to present information in the charts in a consistent and perceivable way, it may be demanding for the navigator to comprehend the information. NHS learned during this case (among others, from statements from witnesses) that the ability of several navigators and pilots to interpret the charts was less than optimal. A chart covering shallow and narrow waters should of course be minutely studied as part of the planning process prior to the voyage. This is well known to the professional navigator. The relevant depth curves should be interpreted as danger curves for the actual ship and certainly not interpreted loosely as 'portrayal information' of the bottom topography. NHS and other hydrographic offices should take measures, among others, in collaboration with maritime schools and with the maritime community in general in order to enhance competence in chart interpretation. The challenge is more or less the same regardless of whether the chart in question is in electronic form or is a traditional paper chart.

Organisational and Interinstitutional Issues

Especially during the early phases, there was substantial media pressure. NHS decided that the organisation should not contribute to the speculations and the public hunt for a scapegoat. Only facts related to the NHS area of responsibility and competence were released by NHS. The handling of media was exclusively taken care of by the director and his deputy. All information released was thoroughly checked. These measures ensured that the information released was consistent and in accordance with the communication strategy. Possible lawsuits were seen in the horizon and this observation had a strong impact on the works. It may be said that the low profile media strategy created a vacuum which could be utilised by others with less constructive objectives. These interests may then grow into the said vacuum contributing to partial irrational public communication. NHS was well aware of this danger. Nevertheless, NHS felt that the real issues around the accident would probably be settled in the court rooms and not in the media. The efforts were gradually directed towards the envisaged lawsuits.

An important aspect is the integrity of the organisation. When facing a situation like this where the products and services of a hydrographic office may play a role, the situation should be met with an open mind. It is of great importance to maintain the openness and frankness of the organisation ensuring that all relevant aspects surface properly, whether beneficial to the organisation or not. It is very important that the actions taken by the management are consistent with this strategy. There is no contradiction between these objectives and the chosen media strategy.

When NHS realised that the ship owners, insurance companies, etc. would probably initiate lawsuits against the Norwegian State, NHS sought high quality judicial assistance. This advisory service was very useful and proved to be crucial throughout the more than 7- year long process. The lawyers were fast learners grasping the many complexities of the various disciplines relevant to this case.

The top management of NHS followed the case closely. After the analyses and clarification of the possible role of NHS processes, products and services, the Ad Hoc group was disbanded. The subsequent comprehensive preparations for the upcoming lawsuits were carried out by NHS employees having relevant expertise. A small group at management level coordinated these works to ensure quality and consistency. The collaboration with the attorney general (this office takes care of civilian lawsuits where government bodies are involved) was taken care of by this group. In addition, important analyses were done by external consultants, among others, on stability, visibility from the bridge, chart interpretation, current conditions and human factors. All of these were of high value during the proceedings of the Court of Appeal.

Several years of experience with an operational quality system had previously been accumulated throughout the entire organisation. The experience and competence accumulated from a number of investigations and analyses of deviations and accidents, proved to be crucial to our case, because this enabled NHS to do the analyses rapidly, efficiently and without prejudice or conjectures. The importance of an operational quality system together with skilled employees in a situation such as this can hardly be overestimated, because this ensured reliable, objective analyses of which outcomes are based on facts. Regarding the analysis of the production of chart no. 21, it was essential that the various production steps were traceable and well documented. Within a comprehensive digital production system, it is important that the bookkeeping of the various production steps is in first class order.

NCA and NHS were deeply involved in the investigations of the accident and in the subsequent lawsuits. NCA and NHS have collaborated closely for decades to the benefits of the mariner. The early phases caused NHS to believe that NCA was influenced by the NPA which sought to protect the pilot, the only surviving member of the bridge team. As NHS, after the analyses of the Ad Hoc group, suspected that the root causes of the accident were closely linked to a navigation error, the discussions between the two organisations became difficult. The NCA report of November 2004, written under the guidance of its general director of that time, enhanced the difficulties considerably and was fuel for the claimant. However, the management of both organisations decided shortly after the accident that 'business as usual'

should be observed independent of the discussions and outcome of the *Rocknes* case. This was actually achieved which is to the credit of both organisations.

When several institutions are involved with different areas of responsibility but share common interfaces, it is of utmost importance that the top managements keep the communication channels open and rational from day one. Even when substantial challenges prevail, openness and frankness should be observed supporting the integrity of participating organisations.

Conclusions

The NHS work on the *Rocknes* case has contributed to significant improvements of the NHS quality system, processes and products. This has been beneficial to the mariner and contributes to enhancing safety when sailing in Norwegian waters. A specific example of improvements as a result of the *Rocknes* accident is an agreement between the NHS and the NCA regarding pilots' access to ENC (Electronic Navigational Chart). This agreement provides all Norwegian pilots continuous access to the complete and fully updated Norwegian ENC portfolio. All ENCs can be viewed at all times by the pilots from their personal laptop with ECDIS (Electronic Chart Display Information System) software.

It is beyond any doubt that without proper traceability and documentation, necessary and reliable facts for the analyses would be difficult to establish. The subsequent analyses would in turn be defective and in general less suitable for revealing possible roles of NHS's products and services regarding the accident.

The *Rocknes* accident could have been avoided by proper ship management and by prudent navigation and manoeuvring. Detailed planning, including, among others, thorough analyses of all available nautical documents, high-quality BRM together with proper inclusion of the pilot into the bridge team and establishment of a common and well understood passage plan for the actual voyage, are measures that contribute to ensuring a safe voyage.

Acknowledgements

The *Rocknes* accident was one disaster too many. 10 years after the accident, our thoughts go to the 18 deceased crew members, to their relatives and to others who experienced the accident up close and/or sought to minimise its consequences. The substantial efforts by the employees of NCA and NHS and cooperating consultants to determine the accident's causes together with the strategic and judicial counselling provided by the attorney general are highly appreciated.

More Information

- Bergen Tingrett, Case no.: 04-00001 B/02, *Maritime Inquiry*, January 31, 2004
- Borgarting Court of Appeal: Judgement, Case No.: 09-163221ASD-BORG/03; January 11, 2011; Unofficial translation
- *Hydro International*, News: Rocknes Claims Appeal Dismissed, May 2011
- Lusk, B. M., 2009. MV Rocknes: Laying the Blame. *Hydro International* November 2009, Volume 13, Number 09
- Oslo District Court: Claim for compensation following a shipwreck; Case no.: 04-016361TVI-OTIR/04; 08-011585 TVI-OTIR/04; 04-011882 TVI-OTIR/04; May 29, 2009; Unofficial translation
- Smit, A. W., 2009. The 2004 Rocknes Drama. *Hydro International* April 2009, Volume 13, Number 03