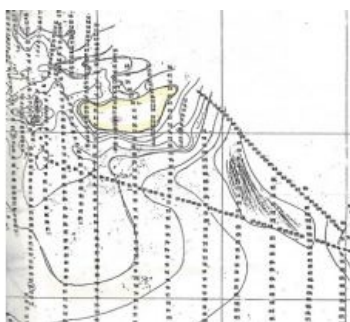


# THE CONSEQUENCES OF NEGLECTING HYDROGRAPHIC STANDARDS

## Grounding of the Queen Elizabeth 2



The famous Cunard cruise liner *Queen Elizabeth 2* (QE2) grounded at 21:58 on August 7, 1992 off the coast of Martha's Vineyard and the state of Rhode Island. Although a 39-foot shoal had been discovered during surveys in 1939, hydrographic standards were not adhered to and the shoal was not investigated properly until after the grounding; it was then discovered that the shoal was

actually at a depth of 30 feet. Aware that the ship was drawing in excess of 32 feet of water, the pilot of the QE2 would have avoided this area had the true facts been known.

The uncharted shoal is the focus of this article, as it had very serious consequences for all Hydrographic Offices (HO) throughout the world. SOLAS (the International Convention for the Safety of Life at Sea) requires signatory countries to provide current and safe nautical charts to ensure maritime safety. Local HOs must ensure that old surveys meet modern standards and that modern surveys follow old and well-established practices.

### Lazy Holidaymakers

On the last day of a five-day cruise to Halifax (Canada), the *Queen Elizabeth 2* (Figure 1) had spent the afternoon anchored in the shallow passage just north of Vineyard Haven on the island of Martha's Vineyard (Figure 2). The ship's crew had taken a large number of the cruise passengers ashore for a land excursion. All the passengers were due back by 6 p.m. that afternoon, as the ship had to be in New York Harbor that evening. The holidaymakers were late getting back onboard and the ship weighed anchor quickly to make up for lost time.

### View Larger Map

Due to the shallowness of the passage, the ship navigated slowly down through the channel to the north and east of Vineyard Sound. The pilot set a course of 240° to take the ship clear of the Torpedo Range in Rhode Island Sound and Block Island. Once clear of the dangers and with the captain's permission, he increased the cruise liner's speed to over 20 knots in an effort to reach New York Harbor as scheduled. However, at 21:58 the ship ran aground on an uncharted shoal. This shoal lies 2.2 nautical miles south-south-west of the light on Cuttyhunk Island at 41°22.1'N, 70°57.7'W (shown in Figure 2).

### Shoal Detection

This area was surveyed in 1939 by the US Coast and Geodetic Survey (CGS), the predecessor to the National Oceanic and Atmospheric Administration (NOAA). The ship *Lydonia*, under the command of Raymond P. Eyman, conducted the survey. A smooth sheet (a hard copy record of the data) was produced at a scale of 1:40,000, equivalent to 1.82 inches to the nautical mile. Primary sounding lines were run over the area of interest at spacings of 1,500 feet or 0.25 nautical miles. A copy of a small portion of the smooth sheet is shown in Figure 3 below. All qualified hydrographers will immediately see that the six main sounding lines very clearly indicate a shoaling area.

### Development Failure

In the case of appreciable shoaling such as this, there are certain rules and regulations about how this information must be addressed. Development should have included decreasing the spacing of the sounding lines run by a launch from the survey vessel *Lydonia* in 1939. The 39-foot shoal in question was found on one of the 1939 main sounding lines, between two soundings of 52 feet to the south and 50 feet to the north. This 'tweener' (the extra sounding squeezed in) indicates the important realisation of the critical nature of this shallow

depth by the surveyors.

Additional fieldwork should have been carried out at the time in the form of a series of closely spaced sounding lines to fully develop this area. Further leadline verification for depth and bottom characteristics was also required, according to the US CGS Hydrographic Manual in force at the time. Further information should have been gathered using a wire drag, as suggested for other areas on the sheet in the commanding officer's season report.

## US CGS Standards

I quote mandatory standards and requirements from the 1931 US CGS Hydrographic Manual, as well as the instructions written for the surveys in 1936 and 1938. The US CGS Hydrographic Manual of 1931 states:

"... this manual is issued for the purpose of giving the general requirements of the United States Coast and Geodetic Survey for the execution of hydrographic surveys and to describe the equipment and methods used for hydrographic work."

The instructions continue:

"... such indications [of shoaling] should be emphasized on the boat sheet as soon as noted, by ringing with a red pencil or other means, and a careful and complete examination to develop the bottom thoroughly and to determine the least depth shall be made, regardless of any prearranged system of lines."

It is also stated that:

"... the primary duty of the hydrographer is not the mechanical operation of running sounding lines but is properly to develop the area being surveyed. For the development of shoal indications... the methods generally used for surveys should be modified as may be necessary to secure a complete and economical development of the feature under examination."

Under the general title of 'Development of shoals', the manual also states:

"... development of all shoal indications is one of the most essential details of hydrographic work. In order that all sounding indicating possible shoals may be noted... Shoals should be developed by a closely spaced system of cross lines to determine the high points, which may be examined further by drifting over them and feeling them out with a lead."

The standards and requirements that the government neglected included: (1) the failure to develop the 39-foot sounding discovered on 7 September 1939, and (2) the failure to carry out additional field work in the area of the 39-foot sounding, although recommendations to do so were made by Division of Charts and specified within the manual as mandatory.

## Rude survey

The facts indicate that the grounding of the *QE2* in Vineyard Sound on 7 August 1992 was caused by the deficiencies in the hydrographic practices of the government. Subsequent hydrographic surveys were carried out in the general area over the following years to correct and add additional information. However, the shoal area was never surveyed again until 10 August 1992, a few days after the *QE2* grounding. The NOAA ship *Rude* (under the command of lieutenant commander Perugini) determined that the area around the 39-foot shoal found in 1939 was actually a 30-foot shoal; this shoal and other shoals in the area all showed signs of being stuck by the hull of the *QE2*.

HOs no longer carry out surveys to accommodate a specific size of ship, but aim to provide a complete description of water depths, shoals and earth shapes. With modern sweep systems, 100% bottom coverage is possible. However, shoals will still require closer examination to determine least depth.

## Court Decision

It is important to draw attention to the investigative thoroughness required to determine potential dangers. Lack of resources or time cannot justify shoddy workmanship and poor attention to established practices. NOAA had an opportunity to investigate and determine the least depth of this shoal in 1939, 1949, 1959, 1969, 1979 and 1989. However, it was not until the grounding of the *QE2* in 1992, costing USD20 million in damage, that the task was completed and the 30-foot shoal was charted correctly. If this information had been available, the pilot of the *QE2* would have avoided this area. Cunard brought a civil action case for damages against the Government of the USA for USD50 million and a trial was held in the New York State District Court in November 1997. However, the court exonerated the Government of any culpability regarding this grounding and the uncharted shoal, a decision that many will consider to be unsupported by the facts.