Report on the investigation of

the grounding of

Astral

on Princessa Shoal,

East of Isle of Wight

10 March 2008

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This is a joint investigation report between MAIB and the Statens haverikommission - The Swedish Board of Accident Investigation (hereinafter referred to as SHK). The MAIB has taken the lead role pursuant to the IMO Code for the Investigation of Marine Casualties and Incidents (Resolution A.849(20))

Extract from

The United Kingdom Merchant Shipping

(Accident Reporting and Investigation)

Regulations 2005 – Regulation 5:

"The sole objective of the investigation of an accident under the Merchant Shipping (Accident Reporting and Investigation) Regulations 2005 shall be the prevention of future accidents through the ascertainment of its causes and circumstances. It shall not be the purpose of an investigation to determine liability nor, except so far as is necessary to achieve its objective, to apportion blame."

NOTE

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GLOSSARY OF ABBREVIATIONS AND ACRONYMS

2/ON	-	Second Officer - Navigation
2/OS	-	Second Officer - Safety
AB	-	Able bodied seaman
ADO	-	Automotive Diesel Oil
AMETIAP	-	Association of Marine Educational and Training Institutes Asia-Pacific Regions
ATSB	-	Australian Transport Safety Bureau
BA	-	British Admiralty
BTM	-	Bridge Team Management
BV	-	Bureau Veritas
CHA	-	Competent Harbour Authority
DCPSO	-	Duty Counter Pollution and Salvage Officer
DoC	-	ISM Document of Compliance
DPA	-	Designated Person Ashore
EBL	-	Electronic Bearing Line
ECDIS	-	Electronic Chart Display and Information System
ETV	-	Emergency Towing Vessel
GPS	-	Global Positioning System
IAMI	-	International Association of Marine Institutes
ICS	-	International Chamber of Shipping
ISF	-	International Shipping Federation
ISM	-	International Safety Management Code
kg	-	kilogram
kts	-	knots
Mb	-	Millibar
MCA	-	Maritime and Coastguard Agency
NI	-	Nautical Institute

nm	-	Nautical mile
m	-	metre
mm	-	millimetre
OCIMF	-	Oil Companies International Marine Forum
OOW	-	officer of the watch
OSM	-	OSM Group
QHM	-	Queen's Harbour Master
SHA	-	Statutory Harbour Authority
SIRE	-	Ship Inspection Report Programme (OCIMF)
SMA	-	The Swedish Maritime Administration (The Flag State authority)
SMC	-	ISM Safety Management Certificate
STCW95	-	International Convention on Standards of Training, Certification and Watchkeeping for Seafarers 1978 as amended
T	-	tonnes
UHF	-	Ultra High Frequency
UTC	-	Universal Co-ordinated Time
VHF	-	Very High Frequency
VRM	-	Variable Range Marker
VTS	-	Vessel Traffic Services
VTSO	-	Vessel Traffic Services' Officer
Cable	-	0.1 nautical mile – 185.2m
Navtex	-	Narrow band, direct printing system for transmission and reception of navigational and meteorological warnings
Shackle	-	90 feet or 27.7m of anchor cable

All times used in this report are UTC+1 hour unless otherwise stated

SYNOPSIS

On 10 March 2008, the Swedish registered tanker *Astral* dragged her anchor in severe weather and grounded on the Princessa Shoal, east of the Isle of Wight. *Astral* sustained indentations to her hull and extensive damage to her rudder and steering gear; there was no pollution and the vessel remained watertight.

Astral had anchored at the Nab Anchorage, 0.9 mile south of the Princessa shoal on 7 March to await a berth at Fawley Marine Terminal to discharge a cargo of diesel oil.

On 9 March, increasingly severe weather forecasts were received predicting gale force winds from the south. Later that evening the duty Vessel Traffic Services Officer (VTSO), monitoring the anchored vessels' positions by radar, advised all the vessels at anchor of the weather forecast and recommended that their engines should be available if required.

During the early morning of 10 March the weather deteriorated as the wind increased to southerly force 10. At 0650 *Astral* started to drag anchor to the north. The officer of the watch (OOW) alerted the master at 0710 and requested the main engines, which were on 10 minutes notice, to be made ready for use. The master arrived on the bridge 7 minutes after being called and dispatched the anchor party forward. The engines were available for use at 0721 and the master applied power ahead, however the vessel continued to drag northward and grounded on the Princessa Shoal at 0725. *Astral* continued to drag and drift northward until her anchor held at 0855. The vessel was taken under tow at 0958 by the tug *Anglian Earl.*

The managers of *Astral* have taken action to improve anchoring procedures on their vessels, and to conduct an additional pre-employment assessment of all officers recruited via manning agencies. The local harbour authorities have taken action to improve the information available to seafarers about the tenability of anchorages in their harbour areas and approaches.

Recommendations have been made to the operators, to conduct checks to ensure their staff are familiar with, and comply with, their new procedures; to the ICS and NI to bring the lessons from the accident to the attention of their members; and to the local harbour authorities to provide guidance to the VTSOs on the style and conduct of their communication, to reduce the possibility of misunderstanding by non-native English speakers.

Astral

SECTION 1 - FACTUAL INFORMATION

1.1 PARTICULARS OF *ASTRAL* AND ACCIDENT

Vessel details

Registered owner	:	Rederi AB Veritas Tankers
Manager(s)	:	Rederi AB Veritas Tankers
Port of registry	:	Donsö
Flag	:	Swedish
Type	:	IMO Type II chemical tanker and oil tanker
Built	:	2006
Classification society	:	Bureau Veritas
Construction	:	Steel – Ice class 1A
Length overall	:	129.75m
Gross tonnage	:	7,636
Engine power and/or type	:	4320kW: MAK 9M32C
Service speed	:	13.9 kts
Other relevant info	:	Single, variable pitch propeller. Fish tail rudder.

Accident details

Time and date	:	0725, 10 March 2008
Location of incident	:	50º 39.9N 001º 01.9W Princessa Shoal, east of the Isle of Wight
Persons on board	:	13
Injuries/fatalities	:	No injuries
Damage	:	Structural damage to rudder, steering gear and hull

1.2 NARRATIVE

1.2.1 Background

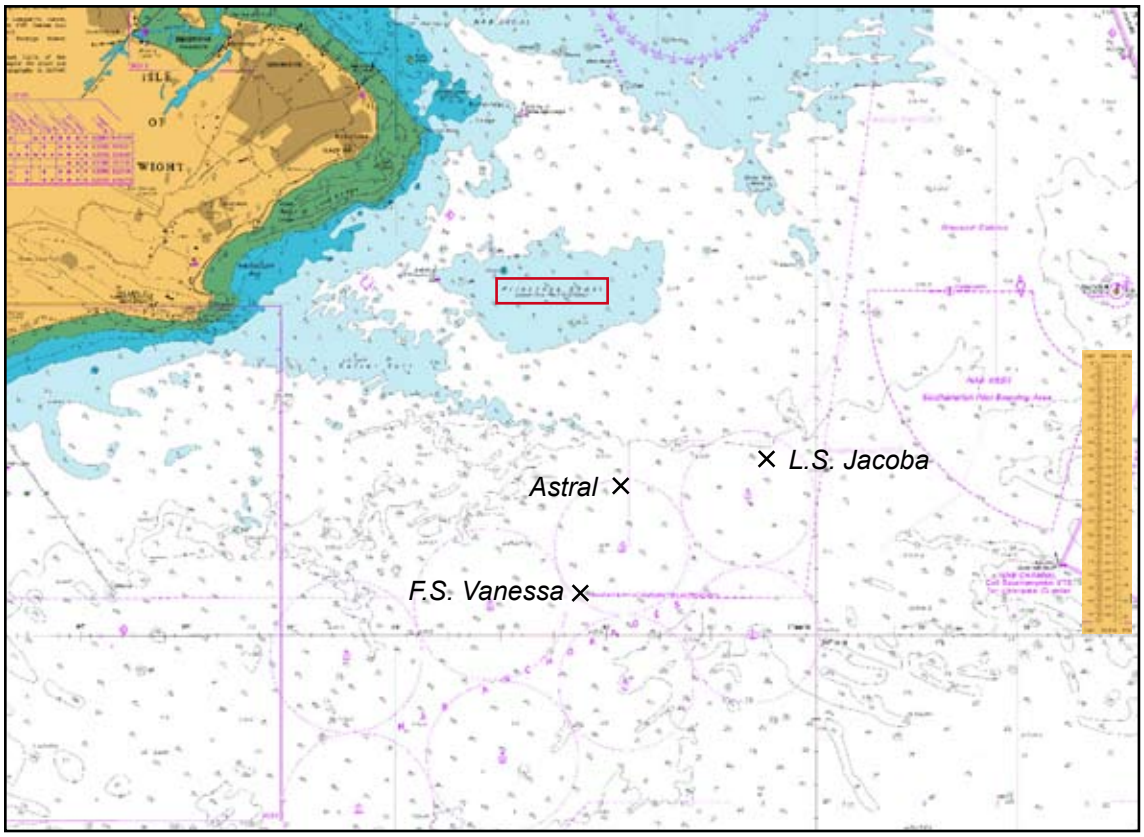
Astral departed from Oil Tanking Jetty No.3 in Amsterdam at 1615 on 6 March 2008, loaded with 9,800t of diesel oil (ADO10) for discharge at the Esso refinery at Fawley, Southampton Water. The voyage was made in moderate conditions with south-westerly Beaufort force 5-6 winds.

1.2.2 Anchoring

On 7 March, *Astral*'s master contacted Southampton Vessel Traffic Services (VTS) 3 hours prior to arrival at the pilot station and was advised by the Vessel Traffic Services' Officer (VTSO) that the berth was unavailable, probably until 13 March. As *Astral* approached the anchorage the master was advised to anchor at the Nab anchorage No.3, and that *Astral* might remain at anchor for several days until a berth became available.

There were two vessels at anchor nearby as *Astral* made her approach to the No.3 anchorage. The 143m long tanker *LS Jacoba*, which was also scheduled to berth at the Esso terminal, was already anchored in the adjacent Nab anchorage No.4. The chemical tanker *FS Vanessa* was at anchor south of the boundary of No.2 and No.3 anchorages **(Figure 1)**.

Figure 1



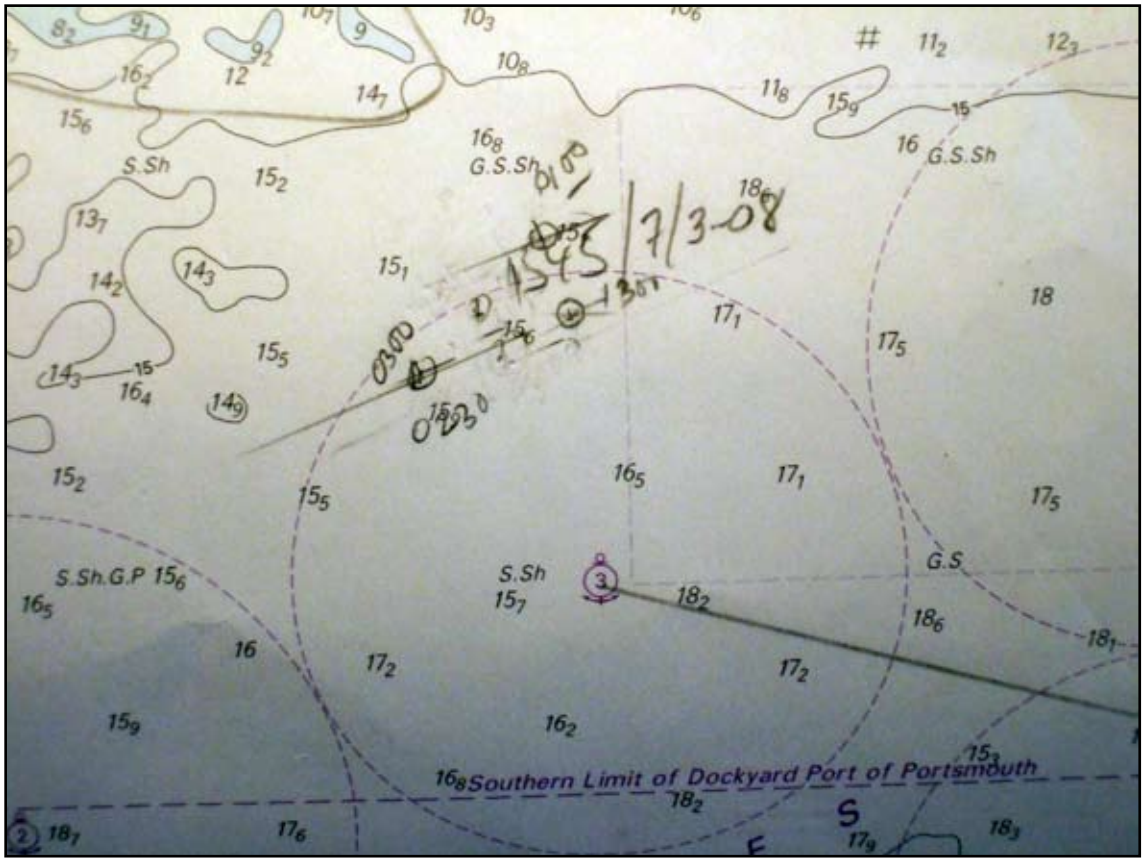
Position of anchored vessels when *Astral* dropped anchor at 1545, 7 March 2008

As *Astral* approached the Nab anchorage No.3 the second officer - safety (2/O S) handed over the bridge watch to the master, went forward with the anchor party and prepared the anchors for letting go, leaving the master and the helmsman on the bridge. The master decided to anchor to the north of the No.3 anchorage, due to the presence of *FS Vanessa*. At about 1545 the port anchor was dropped and 7 shackles of cable veered. The *FS Vanessa* weighed anchor and departed the anchorage, inbound to Southampton water at the same time.

Astral anchored in a charted depth of 15.6m on a seabed of gravel, sand and shell. The maximum tidal range was 4.3m. *Astral*'s draught was 6.9m forward, 7.6m aft on arrival.

Once the anchor was brought up[1], the 2/OS returned to the bridge and took over the anchor watch from the master. The position of the ship was plotted on the paper chart when the second officer returned to the bridge **(Figure 2)**. The position of the anchor had not been established and the bridge swinging circle around the anchor position was not plotted at the time.

Figure 2



Extract of *Astral*'s chart showing plotted positions

[1] Said of a ship when she rides to her anchor after dropping it. C.W.T. Layton – Dictionary of Nautical Words and Terms

On arrival at the anchorage the range and bearing of Nab Tower was 070º by 3.2nm and the bearing was observed to change between 068º and 071º as the vessel swung to wind and tide **(Figure 1)**.

1.2.3 Events at anchor

The duty watch officers maintained an anchor watch alone on the bridge, with the watch AB available by UHF radio if required. While at anchor, until the evening prior to the accident, the wind remained between south and south-west and force 5 to 7. The Navtex 24 hour weather forecast issued by the Met Office at 0700 on 9 March, received on board *Astral* at 0844, stated:

> *Wight Portland – W5 to 7 to sev gale 9. Perhaps Storm 10 later. Mod or Rough incr very rough or high, shwrs then rain. Good becmg mod or poor.*

At 1045, following receipt of the forecast, the master increased the scope of the port anchor cable to 8 shackles in the water. At around 1930 the duty VTSO contacted *Astral* and advised the OOW of the forecast weather, and recommended that their engines be available if required. The VTSO contacted all vessels at anchor in the approaches to the Solent and relayed the same weather information and guidance to them.

The master considered the ship's position, 9 cables from the closest danger of the Princessa Shoal, with the chief officer, and they agreed that there was sufficient time to start the main engine, weigh anchor and safely depart should the vessel start to drag her anchor. The master briefed the officers in the mess room during the evening of 9 March, on the weather forecast, and informed both engineers that the engine should be ready to start if required.

Later that evening the master wrote in his Night Order Book **(Figure 3)**:

> *Check anchor position frequently. If dragging call master and duty engineer immediately. Listen CH12 and 16 all time. Have a good watch.*

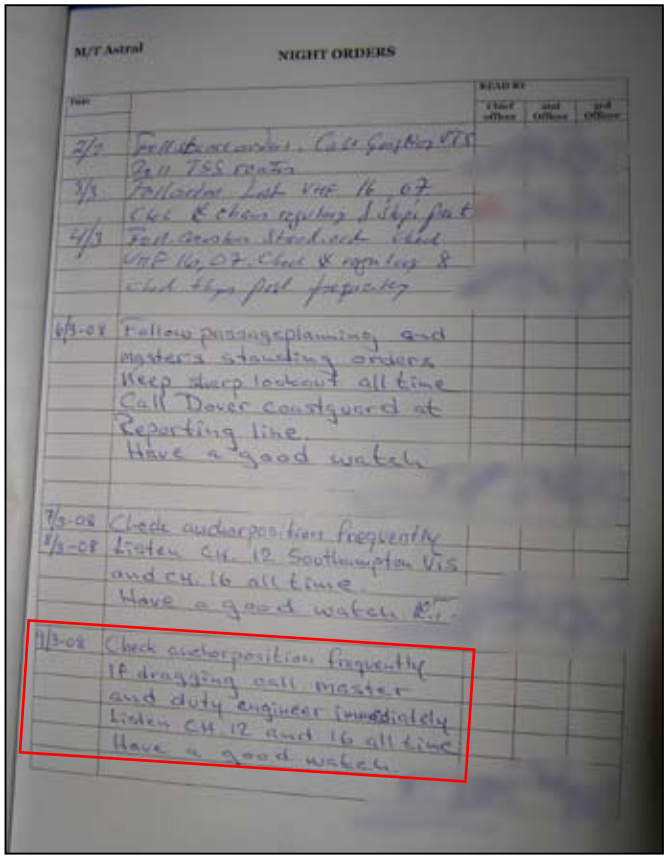
The chief officer handed over the watch to the 2/OS at midnight. Shortly after midnight a Navtex weather forecast was received **(Figure 4)** that predicted:

> *Southerly storm force 10 expected soon*.

The 2/OS acknowledged receipt of the forecast and placed it on the clip on the aft bulkhead of the bridge.

At around 0200 the master awoke and looked out of his cabin window at the weather conditions. He did not go to the bridge as he considered the weather conditions tolerable.

Figure 3



Astral Master's night-orders for 9 March 2008

Figure 4

Weather forecast received 0041 on 10 March

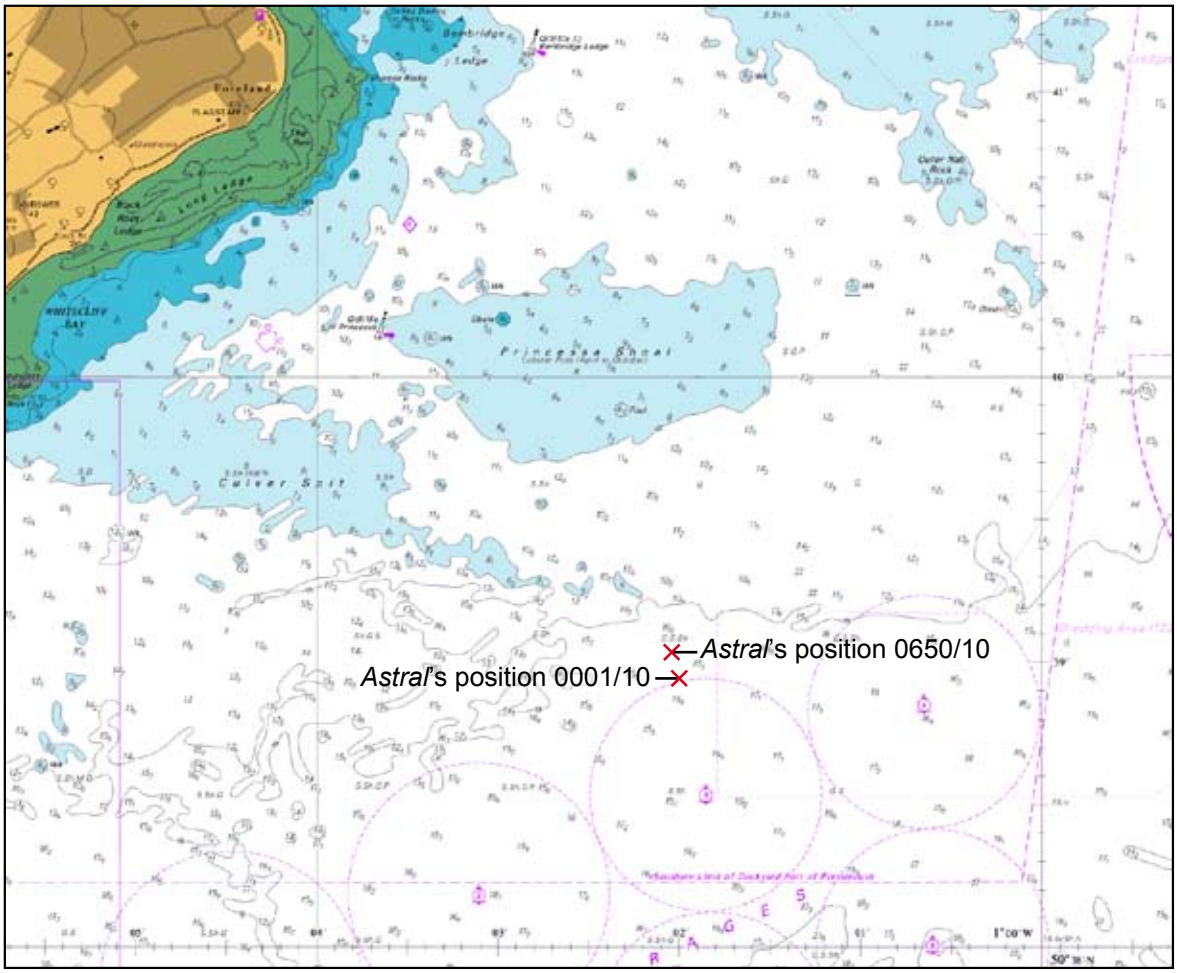
At 0300 on 10 March, the 2/OS handed over the watch to the second officer - navigator (2/ON), who acknowledged the master's night orders, noted the weather forecast, and then monitored the vessel's position on the starboard radar, recording the ship's position in the logbook each hour.

At 0600 the 2/ON recorded in the logbook the range and bearing of Nab Tower from the radar cursor as 070º x 3.42nm; the weather was recorded as south force 10 with very rough seas.

1.2.4 Events during dragging

At around 0650 on 10 March *Astral* started to drag her anchor **(Figure 5)**.

Figure 5



Astral's position at start of dragging anchor

At 0654 the master of the vessel *Alice*, now anchored to the west of *Astral*, notified VTS that *Alice* was dragging anchor, that her main engine was running, and that the vessel would depart the anchorage.

At 0703, *Astral*'s speed over the ground was 2 knots in a northerly direction towards Princessa shoal.

At 0704 the 2/ON observed the range and bearing of the Nab Tower from the radar cursor as 077º x 3.16nm **(Figure 6)**, and wrote this in the logbook as the 0700 position, but did not plot this on the chart. The 2/ON believed that the discrepancy between this position and his previous position was due to the cable stretching[2] in the deteriorating weather, moving the ship's position to the north.

At 0705 the duty VTSO called *Astral* by VHF radio channel 12 and asked the 2/ON if he was "happy with your position". The 2/ON replied that he would check the position, and reported the range and bearing of Nab Tower to VTS. The VTSO then asked "confirm you are not dragging", but no confirmation was given by the 2/ON.

At 0710 the 2/ON telephoned the master and told him the vessel was probably dragging, then contacted the first engineer, who was the duty engineer at the time, to advise him that the ship may be dragging anchor and to ask him to prepare the engine. The first engineer quickly dressed and went to the engine room.

At 0717 the master arrived on the bridge and expressed his surprise to the 2/ON as to how much the ship had moved out of position. The master immediately sent the 2/ON and the watch AB forward to prepare the anchor for heaving. The master then phoned the engine room to order the first engineer to start the main engine as soon as possible.

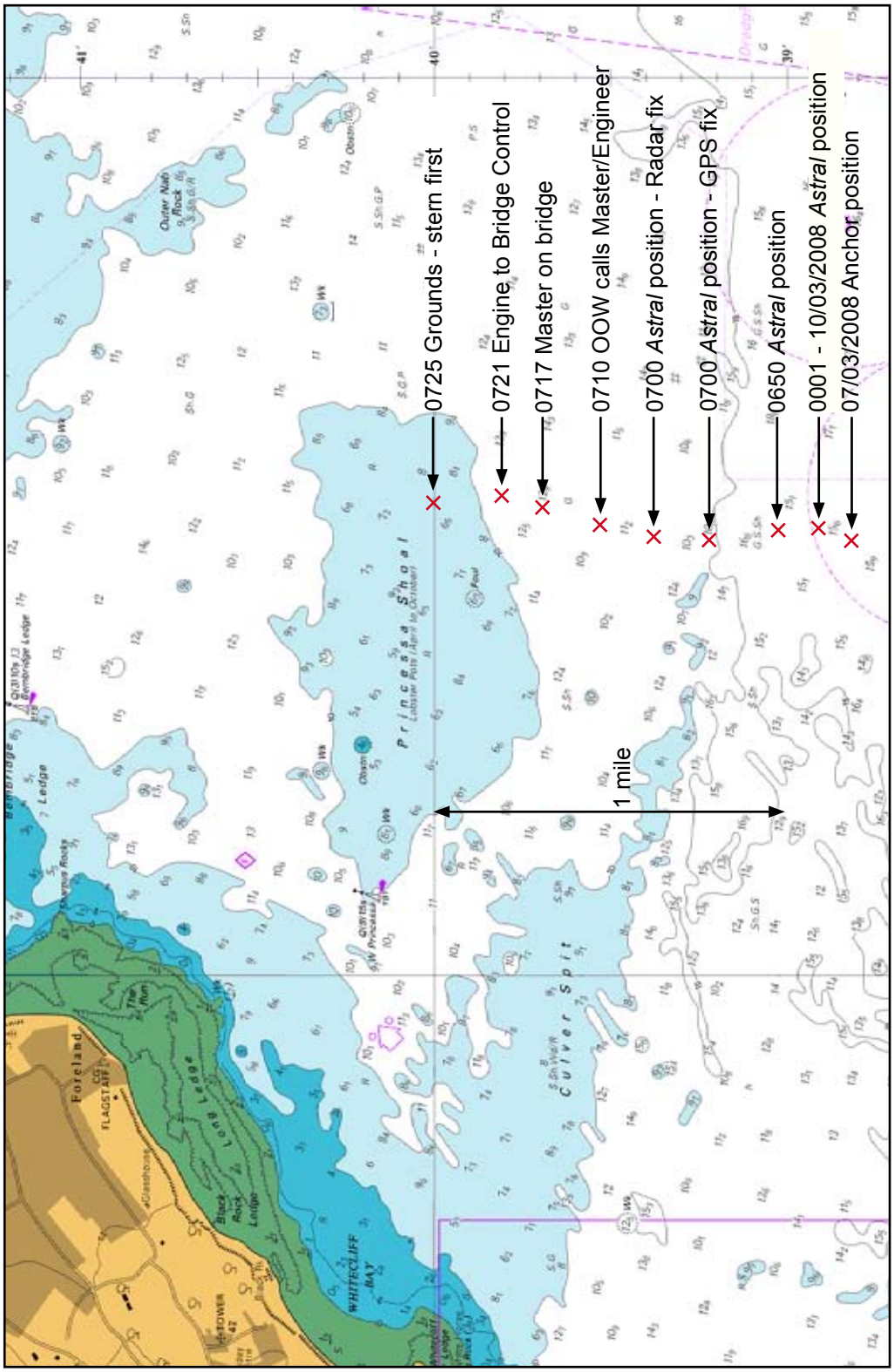
The engine needed to be blown over on air prior to starting, as it had not been recently started and was occasionally prone to cooling water collecting inside some of the cylinders. At 0720, *Astral*'s engine was started and both steering motors were running. The bow thrusters, usually fed by power provided by the shaft generator, could not be started as the shaft generator could not be synchronised with the main electrical distribution board.

At 0721 the VTSO again contacted *Astral,* as the control of the engine was transferred to the bridge, asking the master to confirm his intentions; the master replied that he had started his engine and he would proceed to sea. The master applied 38% pitch ahead which, in calm conditions, would have produced a speed through the water of around 5kts, aware that the engine had recently started and was not yet at the correct operating temperature. The master considered that dropping the second anchor would hinder, rather than help his current situation, by increasing the risk of fouling the anchors.

2 Stretching cable is the extension of the anchor cable along the seabed as the ship pulls the cable tight.

Reproduced from Admiralty Chart BA 2037 by permission of
the Controller of HMSO and the UK Hydrographic Office

Figure 6



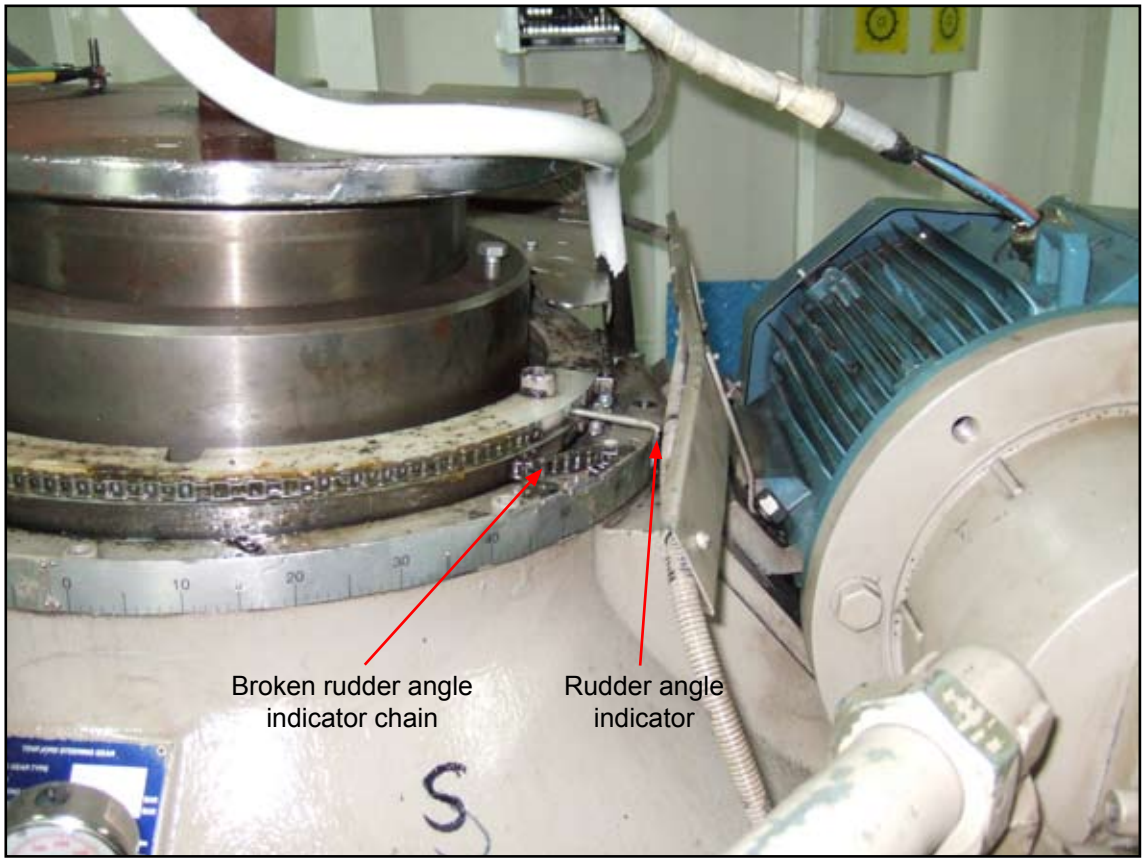
Positions of *Astral* during dragging

Astral's bow remained pointing to the south as the vessel dragged northward, taking seas over the bow as the vessel pitched and rolled moderately in the southerly seas and short swell. The waves steepened as the vessel entered the shallower water.

Astral grounded stern first at 0725 and again at 0726 in charted depths of between 6.5 and 8m **(Figure 6)**. At 0726, the master called VTS by VHF radio, stating that *Astral* was aground and requested tug assistance.

It was immediately apparent to the master that the vessel had lost steering and the rudder indicated hard over to starboard, an angle of 72º **(Figure 7)**. An inspection by the chief engineer showed substantial damage to the steering gear, the steering motor and the adjacent hull structure, with no water ingress evident. As the rudder angle indicator chain arrangement had been snapped by the impact it was not possible to identify the actual position of the rudder.

Figure 7



Damaged rudder indicator

The condition of ballast tanks was monitored remotely, and indicated that the vessel was watertight. The master then advised the Rederi AB Veritas Tankers' (Veritas) Designated Person Ashore (DPA) and directors of his situation.

1.2.5 Events after the initial grounding

Astral continued to drag anchor northwards over the Princessa Shoal, manoeuvring with engine only as the port anchor was slowly recovered. The wind was recorded at Bramble Bank, sheltered to the north of the Isle of Wight as gusting 62.5 kts from the south. At 0730 Solent Coastguard contacted *Astral* to co-ordinate assistance, and advised Queen's Harbour Master (QHM) Portsmouth of the incident. QHM Portsmouth dispatched the tug *Bustler* **(Figure 8)**, manned only for harbour towage, from within Portsmouth Harbour.

The off duty Emergency Towing Vessel (ETV) *Anglian Earl* **(Figure 8)** was anchored off Yarmouth Harbour in the western Solent, and Solent Coastguard requested its help in assisting *Astral*. The Port of Southampton's duty harbourmaster permitted *Anglian Earl* to transit the Solent area without a pilot on board. The Maritime and Coastguard Agency's (MCA) duty counter pollution and salvage officer (DCPSO) was kept informed throughout and co-ordinated the commercial contract between both vessels' operators.

At 0748 *Astral*'s port anchor was aweigh, with power now provided to the bow thrust unit from an additional auxiliary engine.

As *Astral* continued to drift northwards, east of the Bembridge ledge buoy, the master manoeuvred the ship with main engine and bow thruster, believing that the rudder was hard over to starboard.

At 0817 the port anchor was let go to 7 shackles on deck, and the vessel continued to drift northwards over the Nab Shoal, west of the New Grounds **(Figure 9)**. The rising spring tide prevented *Astral* from subsequently re-grounding. Bembridge lifeboat arrived on scene at 0820 and reported that there was no visible sign of pollution.

The coastal oil tanker *Rathrowan*, which was anchored in the Saint Helens Road anchorage, started her engines and prepared to weigh anchor as her master became aware of the approaching *Astral*.

At 0843 *Bustler* rendezvoused with *Astral* and stood by.

At 0855 *Astral*'s port anchor held at the north-west extremity of the New Grounds. *Anglian Earl* arrived at 0925, and with her own wire made fast to *Astral* at 0958. *Astral* weighed anchor and was taken in tow to the north east, clear of the bank, to await the arrival of a pilot and an additional tug. At 1045 the manual sounding of all *Astral*'s tanks was complete and the ship was confirmed as watertight.

The harbour pilot boarded at 1110 and the harbour tug *Lady Madeleine* was made fast aft at 1323. *Astral* was then towed through the Solent and Southampton water to berth alongside, with harbour tug assistance, at berth 40/41 in Southampton.

Image courtesy of FotoFlite

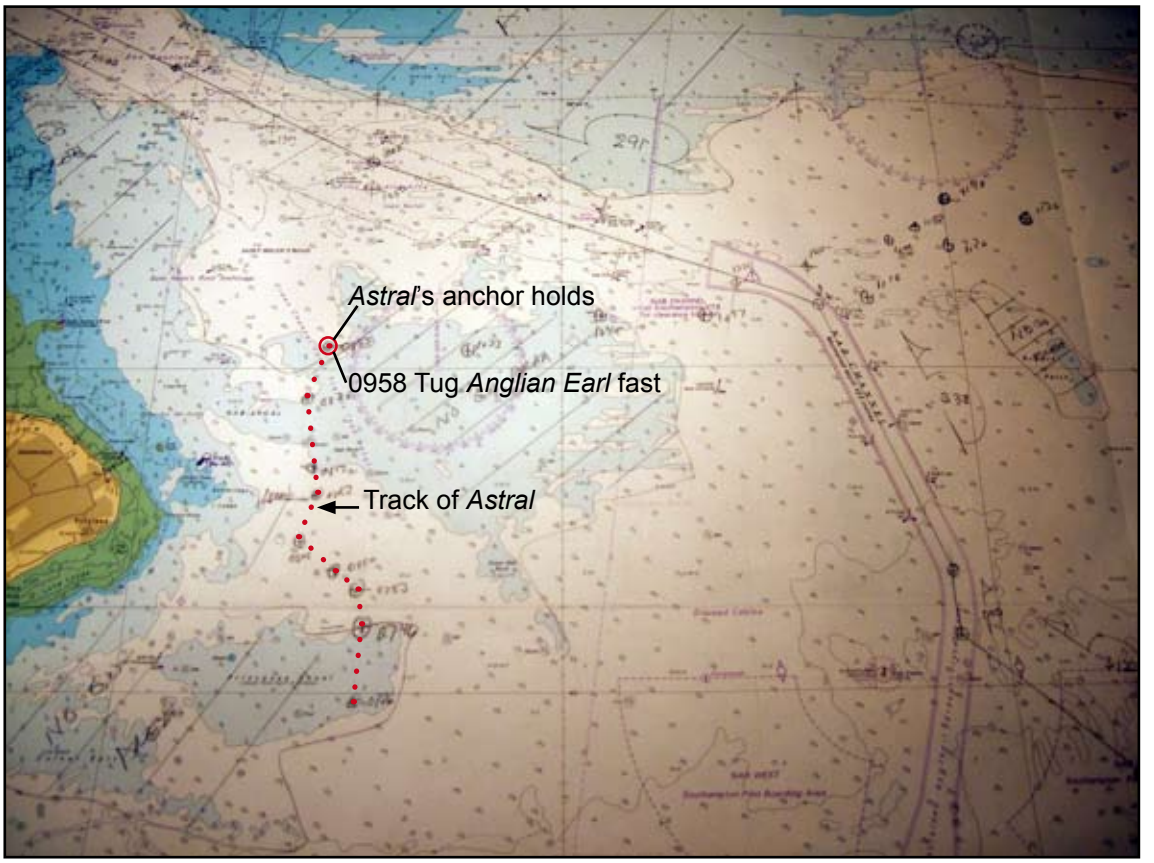
Tug *Bustler*

Image courtesy of FotoFlite

Anglian Earl

Reproduced from Admiralty Chart BA 2037 by permission of the Controller of HMSO and the UK Hydrographic Office

Figure 9



Copy of chart showing *Astral*'s positions following grounding

In accordance with Veritas' procedures, the master and senior officers were tested for drugs and alcohol when the vessel arrived alongside, with none detected.

Astral subsequently transferred to Fawley Marine Terminal to discharge her cargo and gas-free the tanks.

1.2.6 Other vessels

Of the four vessels anchored in the Nab anchorages 1-8 that night, only *Anemos 1*, south of *Astral*, remained at anchor through the night, both *Alice* and *Mare Adriacum* dragged anchor prior to *Astral*. Two other vessels, anchored at the Saint Helens anchorage, also dragged their anchors, and steamed clear of danger. All the vessels that dragged anchor communicated their plans and actions with VTS, on VHF channel 12.

1.3 SHIP DAMAGE

Extensive damage was caused to *Astral*'s fish tail rudder, which was cracked on both sides along 80% of its length. Her steering gear had been lifted vertically from its mountings and landed back on the mounting bolts, stripping the threads or shearing all the securing bolts. The steering gear room shell structure, shell

plating and frames were significantly damaged **(Figure 10)** as the rudder was thrust upwards. The rudder was removed and placed on deck before the vessel was towed to Denmark for repairs.

The Bureau Veritas (BV) Survey report in the Fredericia Shipyard in Denmark, between 27 March and 16 April noted that the vessel's bottom plating had severe indents and scratches in several places. Bottom plating, totalling around 84m^2 and damaged frames were replaced **(Figure 10)**.

There was no pollution and the ship remained watertight.

Figure 10

Damage to *Astral*

1.4 THE NAB ANCHORAGE

The Nab anchorage was developed by the Port of Southampton and the Dockyard Port of Portsmouth to manage the anchoring of waiting vessels, and to keep them from anchoring directly in the approaches to the pilot boarding position at the Nab Tower. Twelve designated anchoring positions, 8 inner and 4 outer anchorages **(Figure 11)**, are situated between 2.5 and 6.5nm south-west of Nab Tower in depths between 15 and 27m. Of the 8 inner anchorages, 1 lies entirely within, and 4 lie partially within the Dockyard Port of Portsmouth Statutory Harbour Area (SHA) **(Figure 5)**.

Figure 11

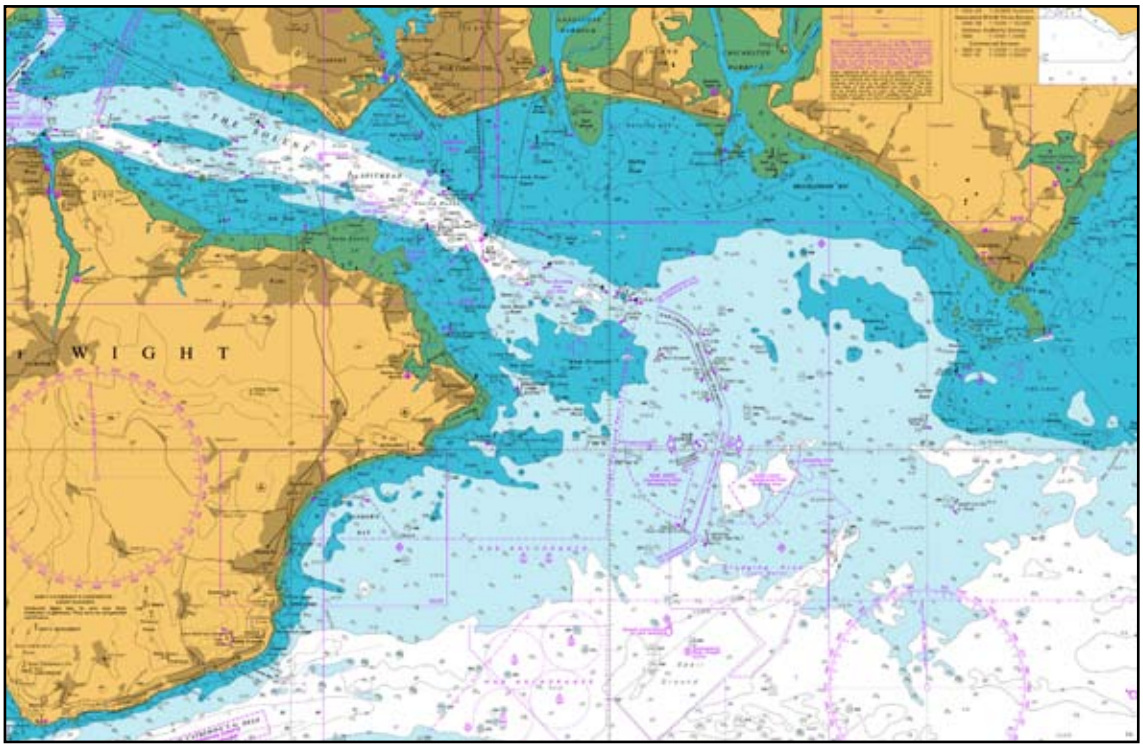


Chart showing overview of NAB anchorages

NAB anchorage No.3 has a minimum charted depth of 15.5m and is designated for use by vessels up to 250m in length.

Tankers arriving at Fawley Marine Terminal routinely anchor in the Nab anchorage waiting to berth, occasionally for several days during busy periods.

1.5 VESSEL TRAFFIC SYSTEM

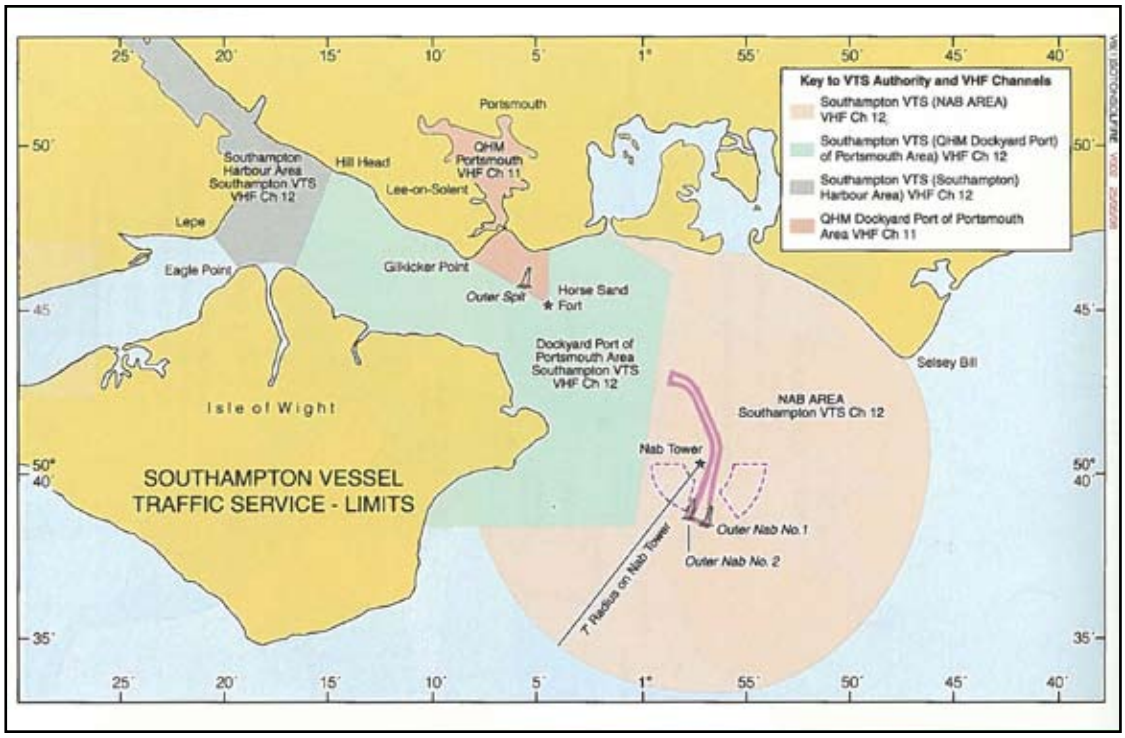
The eastern approaches to the Solent lie in the Dockyard Port of Portsmouth's SHA, but as the channel is primarily the approach to the Port of Southampton, following an agreement between the two ports, ABP Southampton is the VTS Authority and the competent harbour authority (CHA) for the area **(Figure 12)**.

Vessels at anchor within the Nab anchorage are monitored by Southampton VTS. The VTSO manually marks a circle around a target and visually monitors the target to identify when a vessel is dragging. When a vessel reported to be at anchor moves from the circle, the vessel is contacted by the VTSO and advised accordingly. The vessel's course and speed are tracked and can be relayed to the vessel.

1.6 PRINCESSA SHOAL

Princessa Shoal **(Figure 6)** lies 1nm east of the Isle of Wight shore line and 1nm north of the most northern Nab anchorages. Marked on its west side by the West Princessa Light-buoy, it has a least charted depth of 6.4m. The seabed is rock.

Figure 12



CHA areas

1.7 ENVIRONMENTAL DATA

1.7.1 Ship's weather forecasts

The Met Office sea area forecast for the 24 hours from 0500UTC Sunday 9 March 2008 for sea area Wight predicted:

> *Westerly 5 to 7 backing southerly 7, occasionally Gale 8, perhaps severe Gale 9 Later. Moderate or rough increasing very rough or high. Showers then rain. Good becoming moderate or poor.*

The Navtex weather forecast received on the bridge of *Astral* at 1800 on 9 March predicted *south west winds Force 8-9 later* for the Wight area.

The Navtex weather forecast received at 0041 on 10 March stated:

> *Southerly storm force 10 expected soon* **(Figure 4)**.

1.7.2 VTS weather forecast

The bespoke Met Office forecast received by the Port of Southampton VTS office for the Solent, Spithead, Southampton Water and the Docks issued at 0524 on 9 March **(Annex 1)** stated:

> *General situation : Showers will die out during the evening ahead of a front, which will bring heavy rain and gales, perhaps severe, to the Southampton area overnight and through tomorrow* [10th]

The forecast for 0700 on 10 March was for:

S'ly winds of 40 knots, gusting 60 knots.

Specifically from 1800 9 March to 0700 10 March:

Wind: Southwest force 3 or 4 (10 to 15 Kn) backing southerly force 7 to severe gale 9 (30 to 45kn gusts 45 to 60kn) tonight and veering southwest force 6 to gale 8 (25 to 30 kn gusts 35 to 45 kn) after dawn.

1.7.3 Actual weather

The weather recorded on board *Astral* showed that at midnight, prior to the accident, the weather was recorded as *cloudy, slight seas, good vis,* wind *ssw'ly force 5-6, barometer 1004mB.*

At 0400 the weather was recorded as *overcast sky, very rough seas, good vis, wind s'ly force 10, barometer 998.*

The wind recorded at the remote weather monitoring station at Bramble Bank in the Solent **(Annex 2)**, showed that at 0545 UTC, 0645 ship's time, the wind increased to 40kts with gusts of 48kts. It is likely that the wind speeds at the more exposed Nab anchorage were greater than those recorded at the monitoring station.

1.7.4 Tides

The spring tide had occurred the day before the accident, with the tide being one of the lowest predicted for the year.

Low water in the approaches to Bembridge harbour, Isle of Wight occurred at 0713 on 10 March with a predicted height of 0.6m above chart datum. A tidal surge caused by the low pressure weather system increased the height of low water by 0.9m above the expected tide providing 1.5m of tidal height at low water and 1.6m at the time of the grounding.

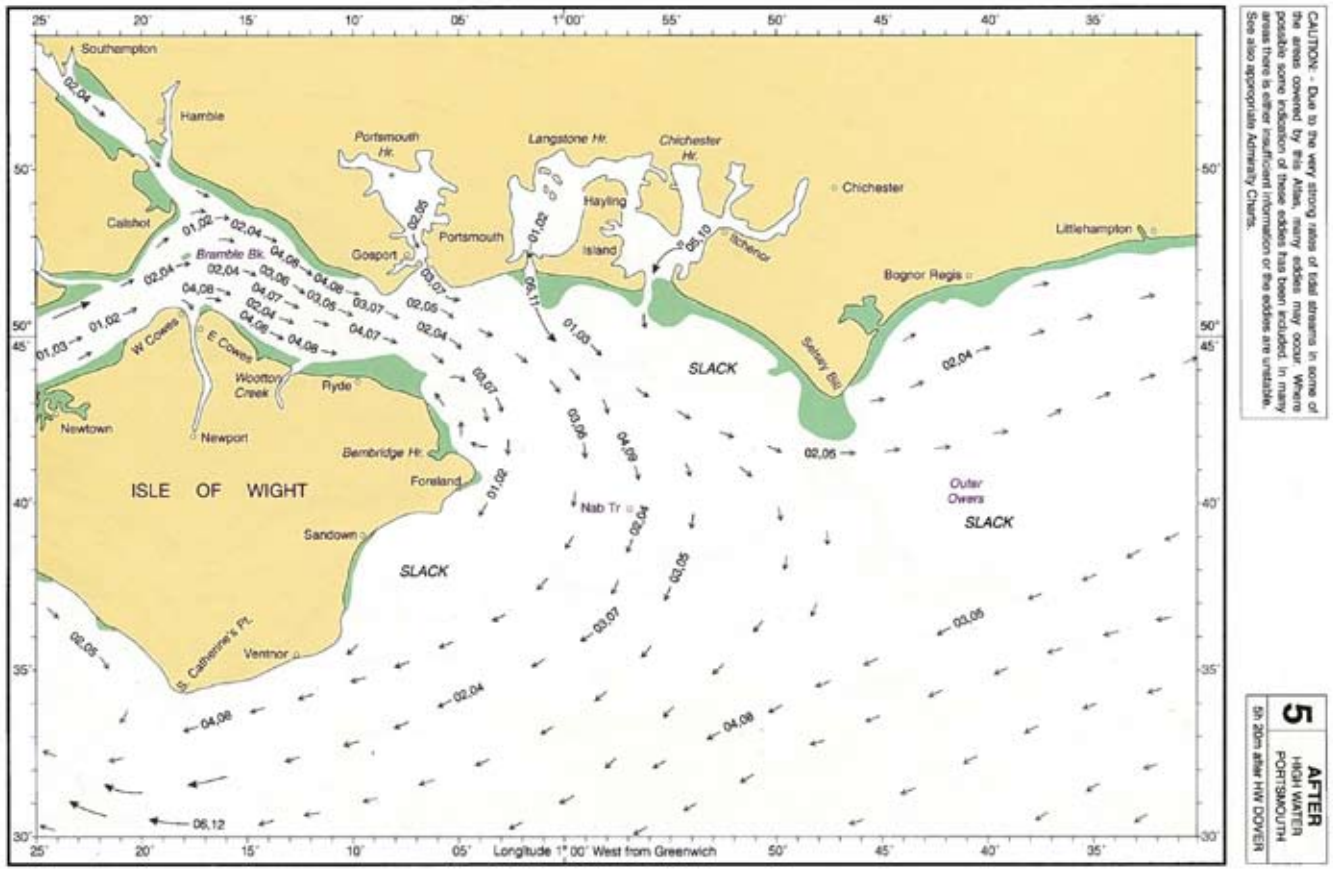
The Admiralty tidal stream atlas for The Solent and Adjacent Waters is shown for 0644 and 0744 on 10 March **(Figure 13)**. The tide can be seen to change from slack water to a NNE'ly flow of around 1kt at the time *Astral* started to drag anchor.

1.8 MANNING

1.8.1 Structure

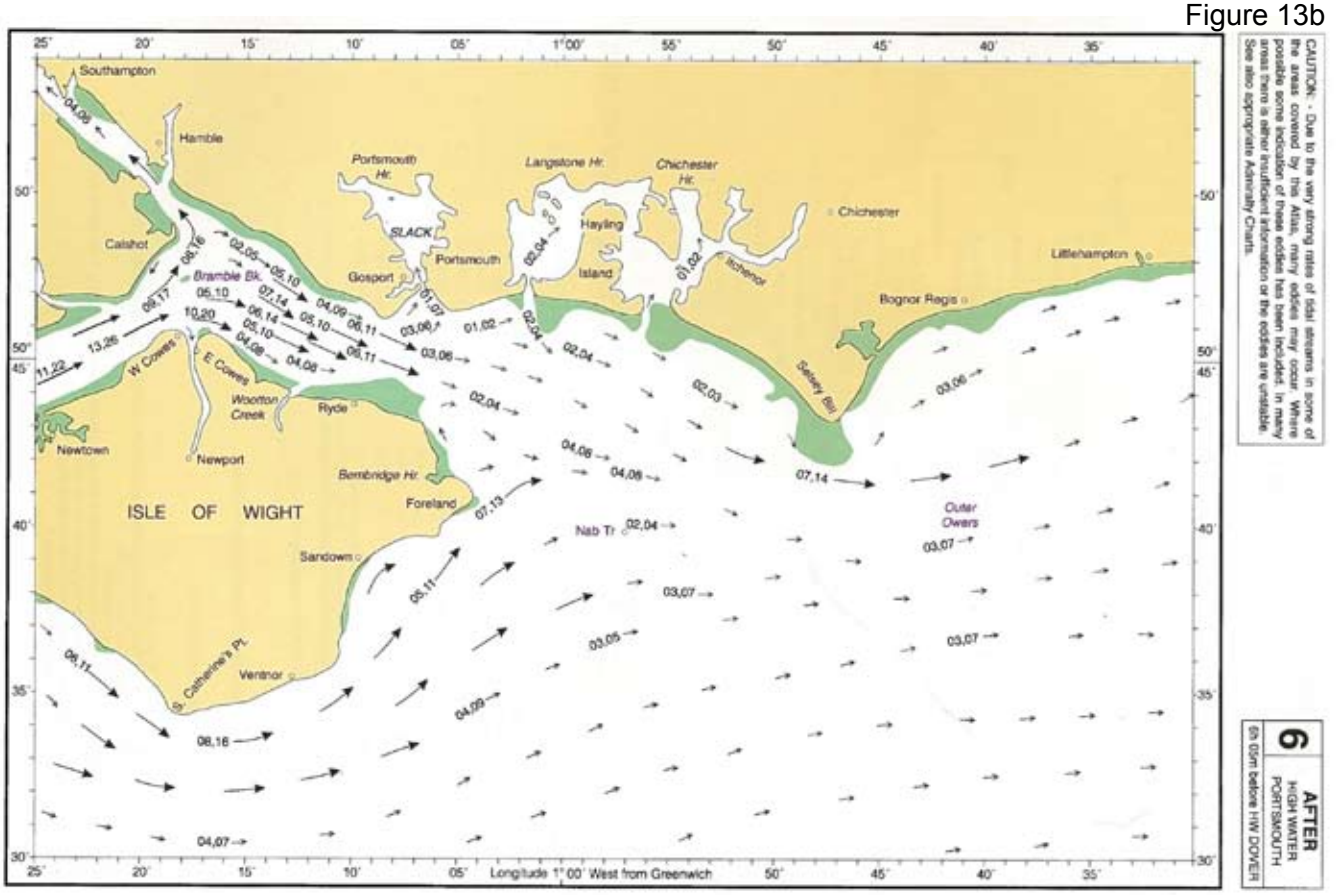
Astral, with a minimum manning requirement for 10, was manned by 13 crew. The senior officers were Swedish, with the exception of the first engineer, who was a Polish national. The junior officers and crew were Filipino. The master, chief engineer, chief officer and first engineer worked 4 weeks on, 4 weeks off, while the Filipino officers usually worked on board for 5 months. Veritas operated a zero tolerance policy on the consumption of alcohol on board its vessels.

Figure 13a



Tidal flow at 0644 (ship's time)

Figure 13b



Tidal flow at 0744 (ship's time)

As the Veritas fleet had expanded from two vessels to three, the employment and retention of suitably qualified officers had proved difficult and it was taking time to place desirable, permanently employed, officers on each of the company's vessels. On board *Astral*, the temporary 2/ON had been employed to fill a gap prior to the permanent officer returning to the vessel, the search for a third permanent second officer was ongoing.

1.8.2 Crew employment

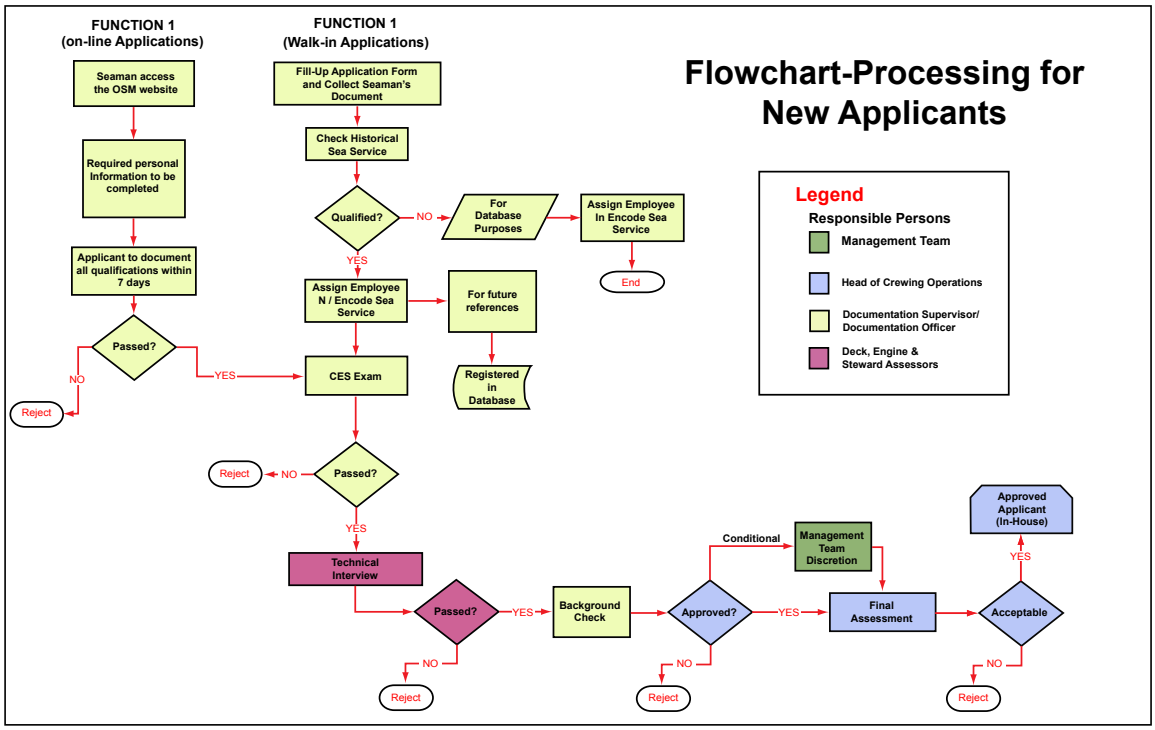
The European crew were employed directly by Veritas. The Filipino crew were employed through the manning agents OSM group (OSM).

OSM is an independent marine-services provider offering high-quality offshore and ship management and consultancy services as well as navigation and engineering solutions and financial planning. OSM is based in Norway and has offices in Sweden, Poland, Lithuania, Latvia, Croatia, Russia, Greece, Germany, Hong Kong, the Philippines, India, China, Singapore and USA[3].

1.8.3 OSM employment procedures

OSM's employment acceptance procedures are illustrated in the flow diagram shown at **Figure 14**.

Figure 14



OSM employment process

[3] www.osm.no

1.8.4 Training

Officers who were permanently employed by Veritas were provided with Bridge Team Management (BTM) training. While the master and chief officer had attended a BTM course, the 2/ON in temporary employment had not received this training. However, he had attended a Bridge Resource Management Course and Ship Simulator and Bridge Teamwork training in February 2000, with a previous employer.

Onboard training was provided by a Seagull training system which delivered specific computer based training for each rank. This training included instruction in the use of electronic charts and navigation for all deck officers.

1.8.5 Watchkeeping

The chief officer and two second officers kept the three bridge watches. They worked a slight variation on the 4 on 8 off system, in accordance with the company's Safety Management System (SMS) as detailed below.

Rank	Watch Times	Watch Times
Chief Officer	0800 -1200	2000 - 2400
Second Officer (Safety)	1200 -1700	2400 - 0300
Second Officer (Navigator)	1700 -2000	0300 - 0800

1.8.6 Deck officers

- **The master**

  The 49 year old master had been in rank for 8 years, the last 3 years with Veritas. When his previous employment had come to an end he had been headhunted by the managing director of Veritas as a suitable master. The master had served exclusively on smaller tankers during his 26 years at sea, mainly on the 2,907 GRT 1972 built *Dalanäs*. The master rejoined *Astral* in Amsterdam, a few days prior to the accident, when he took command following a half day handover from his predecessor.

  The master had been on leave for 4 weeks prior to joining. During his previous contract he had noted that the 2/ON, on watch at the time of the accident, required careful monitoring in some navigational duties, and spent time on the bridge with him when he perceived the need to assist the officer.

- **The previous master**

  The master of *Astral* prior to the vessel's departure from Amsterdam was not usually employed by Veritas and had been retained on a temporary basis. During his time on board *Astral* he maintained a "hands on" approach with the bridge team, remaining on the bridge whenever he felt it necessary to monitor the navigation of the ship.

- **The chief officer**

  The chief officer held an STCW II/2 certificate of competence and had 10 years experience on tankers; he joined Veritas in June 2007 as chief officer on board *Astral*.

- **The second officer (navigator)**

  The 2/ON, who was on watch at the time of the accident, held an STCW II/3 certificate of competence as a bridge watchkeeper. He had been employed on a temporary basis for 2 months while the vessel's permanent second officer took leave. He was the ship's navigator and was responsible for passage planning. This was his first contract as a second officer on tankers, having previously served as third officer on tankers and as a second officer on bulk carriers, trading primarily deep sea.

  During his time on board he had been assisted in his watchkeeping duties by the master and in his navigation and other duties by the 2/OS. His performance had been considered weak by the master on board at the time of the accident. The previous master had not considered it necessary to specifically supervise the 2/ON, but he routinely spent significant periods of time on the bridge with the officers. Both masters had provided assistance to the 2/ON during busy periods of watchkeeping. However, the incumbent master felt that any shortfalls in the performance of the officer were manageable, especially given that the 2/ON was due to be relieved shortly. In coming to this view, the master also took into account that a replacement for the 2/ON was unlikely to be provided ahead of the scheduled return to the vessel by the vessel's permanent 2/ON.

  The 2/ON was a light sleeper, who required around only 4 hours sleep per night.

  During the selection process conducted by OSM, the 2/ON was noted as giving a "very good" general impression during his interview in October 2007 and noted as being "re-hireable".

  Despite recording a "below average" score for intellect, the officer passed OSM's selection criteria for the position with Veritas due to his age being over 50. Had he been under 50 years old, an "average" score would have been required.

OSM's report on the 2/ON also noted that while he scored "average" in 17 of the 19 categories of "personality traits and characteristics", he scored low in the "relaxed" and "assertive" categories.

The selection process had also included:

- A Marlins International Shipping Federation (ISF) English Language Test for Seafarers in which he scored 76%
- A computer based test at Operational Level for an oil tanker deck officer in which he scored the following marks, achieving a Total Test Score of 57%
    - Cargo Handling - 65%
    - Control function - 50%
    - Fire Fighting - 50%
    - Navigation - 50%
    - Survival - 86%
- A psychological test and interpretation by an accredited clinic that included:
    - Sack's sentence completion test
    - Draw a person test
    - Intelligence Test (IQ)

- **Second officer (safety)**

  The officer, who was off watch at the time of the accident, had been on board for 4 months; his first contract with Veritas. He had 10 years experience working on tankers similar to *Astral*.

1.9 CONDUCT OF THE ANCHOR WATCH

1.9.1 Bridge equipment and passage planning

The bridge was fitted with a Furuno Integrated Bridge system. The electronic chart system was not an ECDIS, and a fully corrected paper chart folio was carried. Passage planning, berth to berth, was mainly carried out on the electronic chart and transferred to the paper charts. The anemometer was not working at the time of the accident.

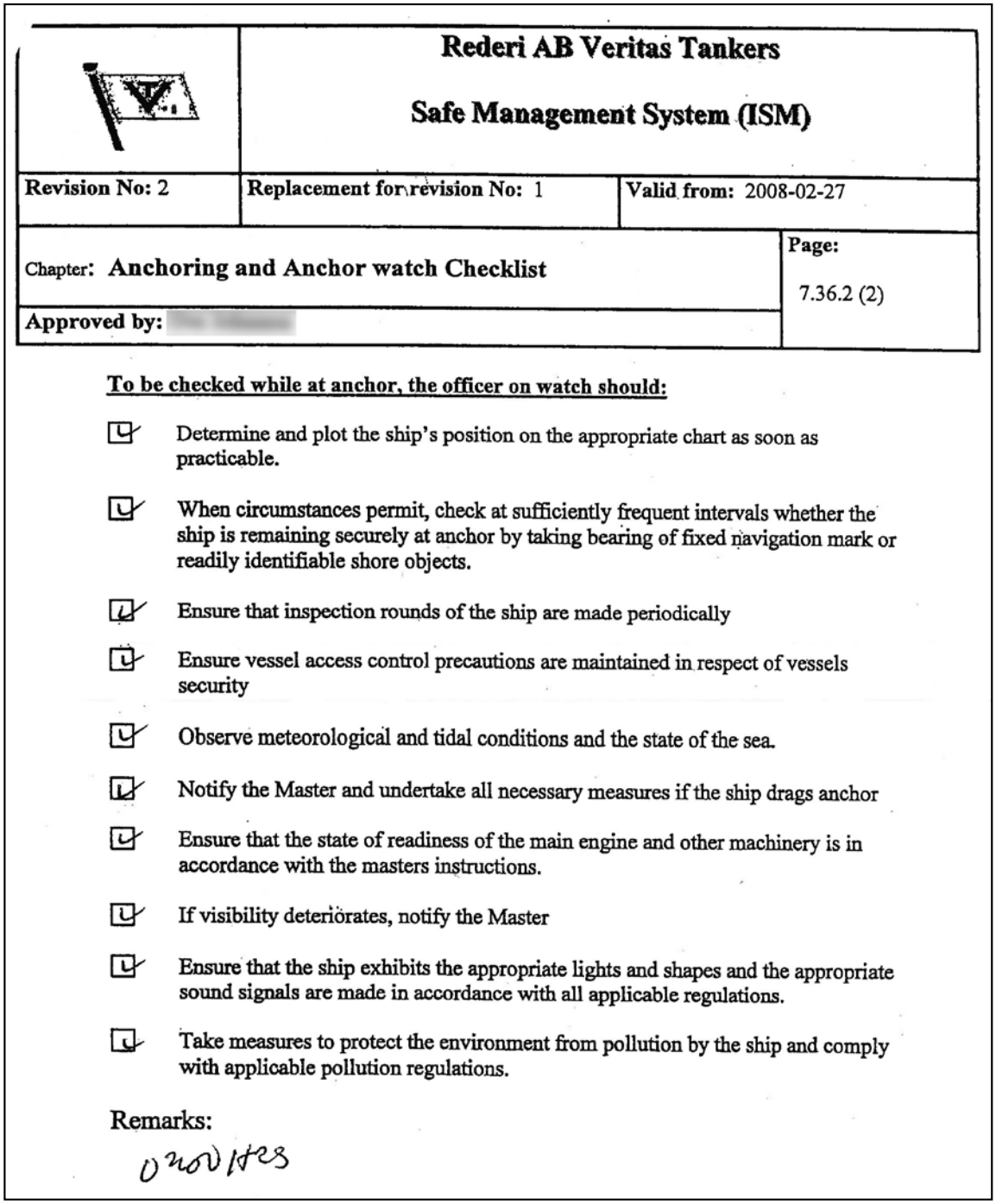
1.9.2 Anchor watchkeeping routine

Once at anchor, the routine followed by the OOWs on board *Astral*, was that the ship's position was to be monitored to determine whether the anchor had dragged. If the vessel dragged anchor, the master was to be informed, the

engine started, and the anchor recovered if necessary. The master had used this method previously and had successfully recovered a dragging anchor on several occasions in a range of weather conditions.

Each OOW monitored the vessel's position by two methods of their choosing, in compliance with the company and master's instructions. An *anchoring and anchor watch* checklist was completed during each watch **(Figure 15)**, and each OOW noted the range and bearing to Nab Tower in the bridge logbook each hour.

Figure 15



Rederi AB Veritas Tankers

Safe Management System (ISM)

Revision No: 2	**Replacement for revision No:** 1	**Valid from:** 2008-02-27
Chapter: **Anchoring and Anchor watch Checklist**		**Page:** 7.36.2 (2)
Approved by: [redacted]		

To be checked while at anchor, the officer on watch should:

- ☑ Determine and plot the ship's position on the appropriate chart as soon as practicable.
- ☑ When circumstances permit, check at sufficiently frequent intervals whether the ship is remaining securely at anchor by taking bearing of fixed navigation mark or readily identifiable shore objects.
- ☑ Ensure that inspection rounds of the ship are made periodically
- ☑ Ensure vessel access control precautions are maintained in respect of vessels security
- ☑ Observe meteorological and tidal conditions and the state of the sea.
- ☑ Notify the Master and undertake all necessary measures if the ship drags anchor
- ☑ Ensure that the state of readiness of the main engine and other machinery is in accordance with the masters instructions.
- ☑ If visibility deteriorates, notify the Master
- ☑ Ensure that the ship exhibits the appropriate lights and shapes and the appropriate sound signals are made in accordance with all applicable regulations.
- ☑ Take measures to protect the environment from pollution by the ship and comply with applicable pollution regulations.

Remarks:

0200 1823

The chief officer monitored the vessel's position history by reference to the electronic chart radar range and bearing of Nab Tower using the Variable Range Marker (VRM) and Electronic Bearing Line (EBL), and by occasionally plotting the ship's position on the paper chart. He also set the GPS anchor drag alarm on the vessel's position at the start of his watches.

The 2/OS also used the electronic chart to monitor the ship's position, and plotted *Astral*'s position on the paper chart. He also monitored the radar range and bearing of Nab Tower using the VRM and EBL.

The 2/ON monitored the vessel's position by noting the range and bearing of Nab Tower by the radar cursor, and visually monitored the GPS position. He did not plot the ship's position on the chart. **Figure 16** shows the radar display used by the 2/ON, showing the position of the cursor and the relative position of the VRM, EBL and the Nab Tower as the vessel drags anchor until the time the 2/ON calls the master and duty engineer.

None of the bridge watchkeepers had plotted a bridge swinging circle on the chart, and no clearing bearings or ranges had been established. The GPS anchor drag alarm had been set at 1 cable from the vessel's position when used, rather than at the anchor position.

1.9.3 Anchors and cables

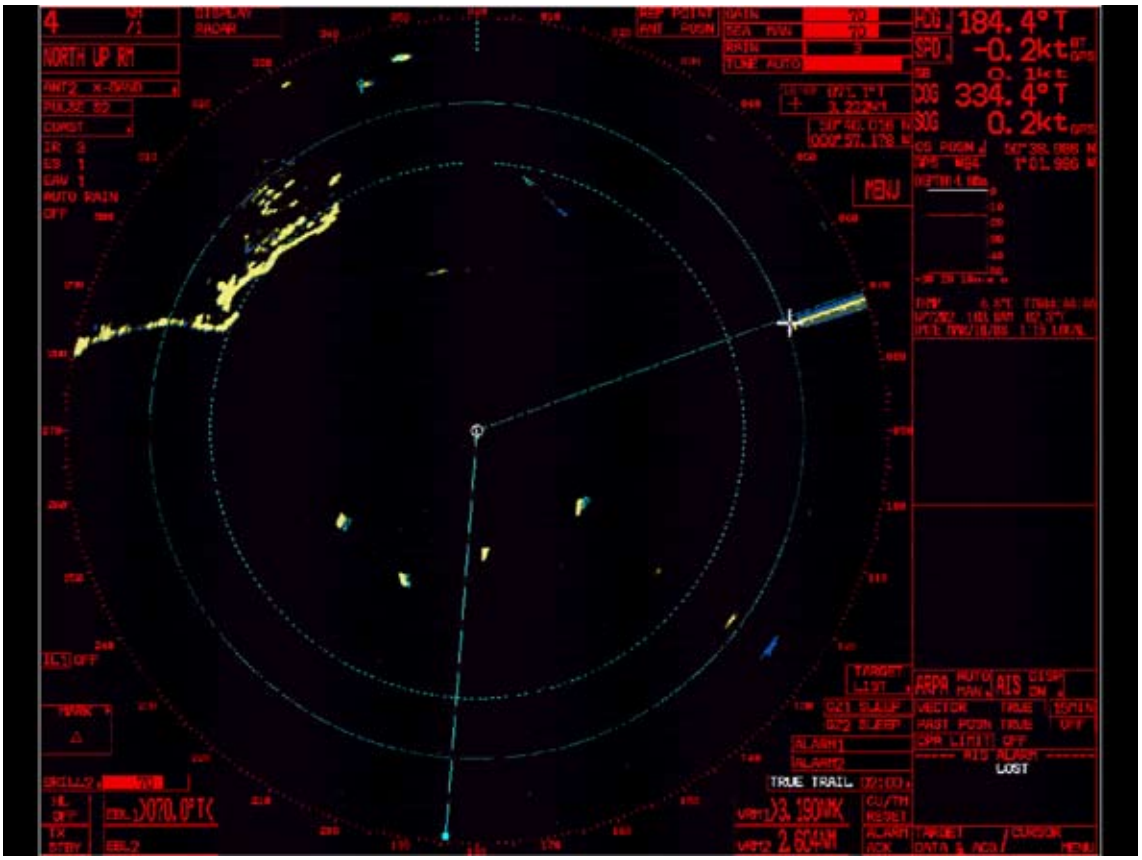
Astral was fitted with two Bureau Veritas (BV) approved 4050kg M Spek anchors, with 56mm common stud link chain. Nine shackles of cable were carried on the starboard side, and 10 shackles on the port side.

1.9.4 IACS requirements

The International Association of Classification Societies (IACS) *Requirements concerning mooring, anchoring and towing* **(Annex 3)** states:

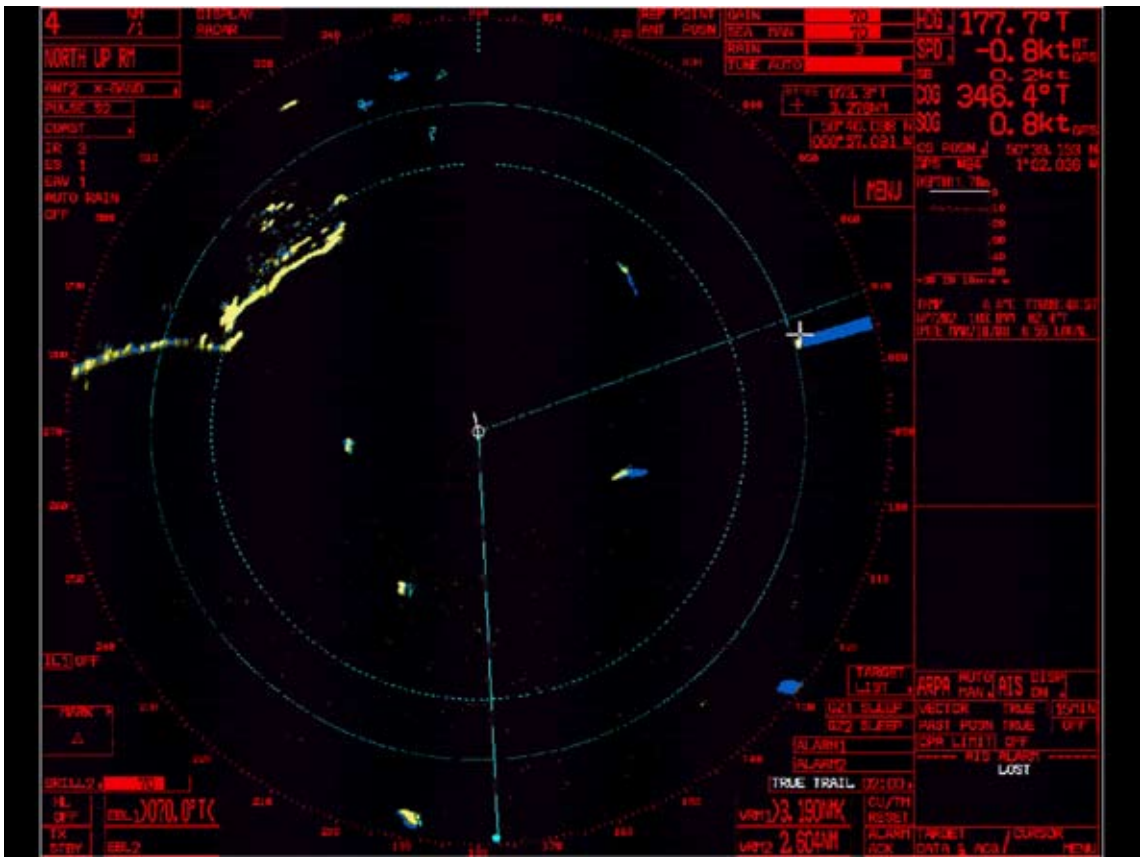
> *The anchoring equipment required herewith is intended for temporary mooring of a vessel within a harbour or sheltered area when the vessel is awaiting berth, tide, etc.*
>
> *The equipment is therefore not designed to hold a ship off fully exposed coasts in rough weather or to stop a ship which is moving or drifting. In this condition the loads on the anchoring equipment increase to such a degree that its components may be damaged or lost owing to the high energy forces generated, particularly in large ships.*
>
> *The anchoring equipment presently required herewith is designed to hold a ship in good holding ground in conditions such as to avoid dragging of the anchor. In poor holding ground the holding power of the anchor will be reduced.*

Figure 16a



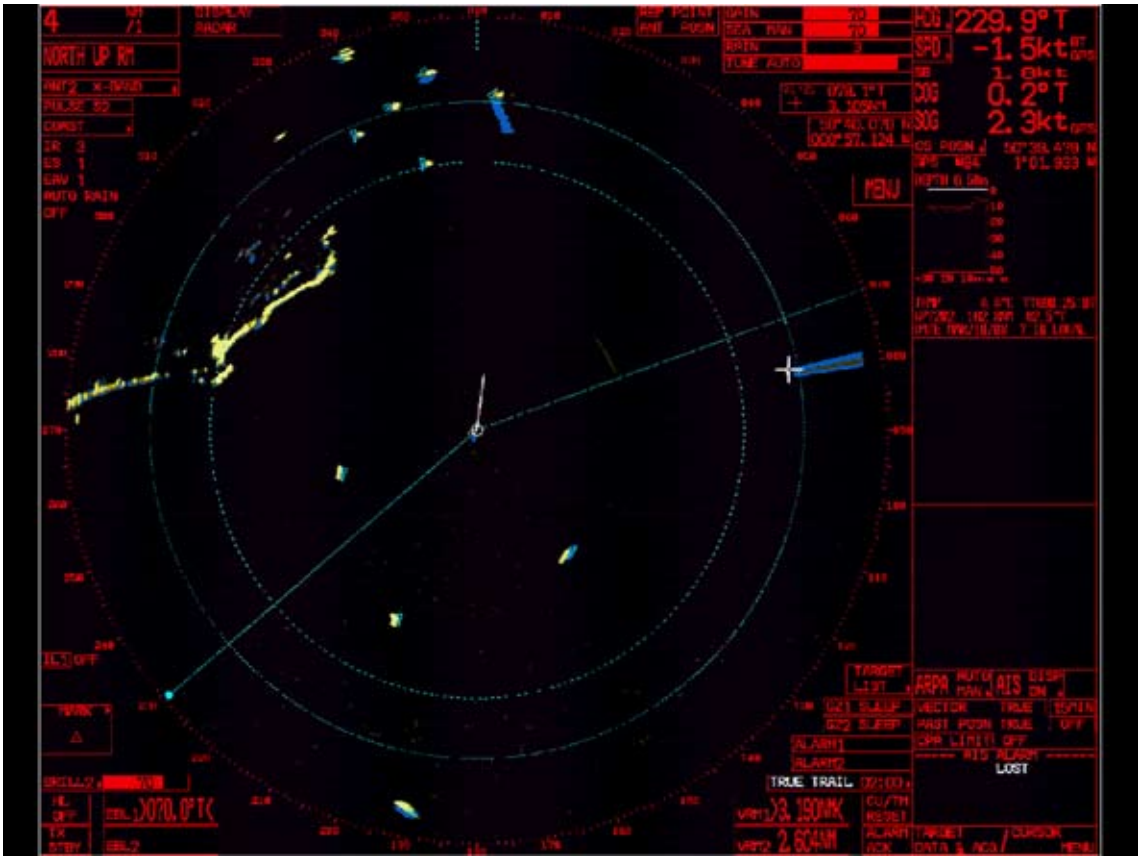
At anchor

Figure 16b



Astral starts to drag anchor at 0655

Figure 16c



Watch officer calls master at 0710

1.9.5 Guidance on anchoring

The ICS Bridge procedures guide states that:

> *On anchoring, a fix on the drop position should be made and the ship's swinging circle ascertained, based on the length of cable in use….*
>
> *The master should be immediately notified if the ship drags her anchor, and if sea conditions or visibility deteriorate.*

MGN 315(M), issued by the Maritime and Coastguard Agency (MCA) gives information and guidance on the keeping and maintenance of a safe navigational watch in accordance with the requirements of STCW 95. It states that while at anchor:

> *The OOW shall determine and plot the vessel's position on the appropriate chart as soon as practicable.*

Further guidance is provided in seamanship text books and extensively in the Admiralty Manual of Navigation, Volume 1, which provides an example of best practice for establishing an anchor watch. A copy of the relevant section is at **Annex 4**.

1.10 THE SHIP OWNER AND MANAGER

1.10.1 Rederi AB Veritas Tankers

Originally founded in 1926, Rederi AB Veritas tankers (Veritas) is a family owned shipping company with its origin in the bunkering trade based in Donsö, Sweden. Veritas owned and operated three similar sized product tankers that traded mainly in the Baltic and North Sea. *Astoria*, built for Veritas in 1999, and *Astina,* purchased in 2006 were both on long term time charter to Finnish Neste. *Astral*, purchased 6 months after completion in April 2007, was time chartered to Clearlake Shipping.

1.10.2 Organisation

Veritas' headquarters is situated on the Swedish Island of Donsö. The managing director, who is a master mariner, is the grandson of the company's founder. He is the DPA and is responsible for the company ISM and Vetting. The managing director's brother is the deputy managing director and the crew manager. Also in the office of six managers was a master mariner, who assisted with auditing, acted as relief master on occasions, and who had recently re-written the company's SMS.

1.10.3 Veritas procedures

The company's re-written SMS was implemented during the early part of 2007.

The Veritas 'Night Order Book' contained the *Veritas Safety of Navigation Policy*, signed by the managing director **(Annex 5)**, which stated that:

> *While masters bear the ultimate responsibility, the safety of navigation policy requires all officers and crew members to prevent situations arising, which may endanger those onboard the ship, her cargo, or the environment.*

A separate document, the company's *Shore Management Bridge Standing Orders* **(Annex 5)**, with regard to anchoring stated:

> *A proper bridge watch shall be maintained by a certified Deck Officer when the ship is at anchor.*
>
> *The ship's position shall be fixed at the time of anchoring and checked frequently thereafter. The swinging circle of the ship is to be charted, centred on the position of the anchor. Particular attention is to be paid to the ship's movements during the change of tidal direction and changes in weather conditions. The master is to be informed immediately if there is any suspicion that the ship is dragging anchor or if the charted position falls outside the charted swinging circle.*

A copy of the *Shore Management Bridge Standing Orders* was contained in the Night Order Book, the ship's copy of which was signed as being acknowledged by the master and OOWs.

The overarching SMS manual provided an additional procedure for *watchkeeping at anchor* **(Annex 5)** stating that the:

Officer of the watch checks the following:

- *Position with more than one means of fixing method*
- *Anchor shapes and lights*
- *Movement of other anchored ships in relation to own ship*
- *Weather sea and tide*
- *VHF channel 16 and other channels for the actual traffic area and telex*

1.10.4 Veritas internal audits

Internal reviews of the SMS were carried out annually in accordance with the ISM Code, by the managing director or the deputy auditor, the office-based master. The most recent audit was completed on 27 October 2007.

The SMS review process required the company's internal auditor to establish the following:

Have all the present bridge officers read and signed the Master's standing orders and company bridge standing orders?

The current master and the on leave chief officer had not signed the Company Bridge Standing Orders, and a corrective action was raised to add this requirement to the handover checklist for each officer on board.

An Internal Navigation Review, with the auditor on board, was carried out on 11 October 2007 during which no observations were made regarding *Astral*'s anchoring procedures.

1.10.5 OCIMF SIRE programme

The Oil Companies International Marine Forum's (OCIMF) 6-monthly Revised Ship Inspection Report (SIRE) Programme was carried out by Preem Petroleum AB on 4 May 2007, with no navigational deficiencies noted.

1.10.6 Swedish Maritime Authority

The ISM Document of Compliance (DoC) and Safety Management Certificate (SMC) were issued by the Swedish Maritime Authority; the vessel's SMC was issued on 2 November 2007.

1.11 PREVIOUS ACCIDENTS

1.11.1 *Pasha Bulker*

The Australian Transport Safety Bureau Report[4] investigated the grounding of *Pasha Bulker*. The main conclusions of the report are summarised as follows.

On 23 May 2007 the Panamanian Registered bulk carrier *Pasha Bulker* anchored along with more than 50 other bulk carriers to await berthing to load coal in Newcastle, on the east coast of Australia. At midday on 7 June the master veered more cable on receipt of a gale warning. During that evening seven ships put to sea. At midnight, the first of 49 ships at anchor started to drag its anchor as the weather deteriorated and the wind increased to gale force, with 8m seas, onto the lee shore of Nobbys beach.

At 0625 on 24 May, *Pasha Bulker* started to drag anchor and the master decided to weigh anchor. Once underway, in 45kt winds, the master tried to turn the ship away from the coast, but was unable to control the turn. The master then turned towards the coast, only 8 cables away, and with insufficient sea room to complete the turn, and with significant leeway, the vessel grounded.

The ATSB investigation found that the majority of masters expected to receive stronger guidance from the VTS operator as to when the anchorage was no longer tenable. The report also concluded that the highest level of good seamanship was shown by those masters who weighed anchor on the receipt of gale warnings, rather than those who waited for the weather conditions to deteriorate or wait for the ship to drag her anchor in gale force conditions.

1.11.2 *Young Lady*

On 26 June 2007, the 105,000 tonnes deadweight crude oil tanker *Young Lady* dragged her anchor in Tees Bay, in a wind speed in excess of 40kts and a heavy swell. The master decided to weigh anchor and depart, but during the operation the windlass hydraulic motor exploded and the cable ran out to the bitter end. The vessel dragged her anchor for an hour, during which the anchor flukes temporarily snagged a gas pipeline, until she passed over a shoal patch and the anchor held. The pipeline was out of action for over 2 months.

The MAIB investigation found that the master was aware that the anchorage was not recommended in the forecast conditions, and the decision to remain at anchor was inappropriate.

The snagging of a gas pipeline as *Young Lady* dragged her anchor in gale force winds showed again the reliance on anchors and anchor equipment, in conditions for which the equipment was neither intended, nor approved. When

[4] ATSB Marine occurrence Investigation No.243.

the equipment failed in these conditions the master found himself unable to recover, or slip, the anchor and was therefore heavily restricted in his ability to manoeuvre.

1.11.3 Statistics

The MAIB database shows that since 1992 there have been 21 accidents in United Kingdom territorial waters involving merchant vessels of over 500 gross tons dragging their anchor and subsequently grounding. Weather conditions contributed to 19 of these accidents, the anchoring position was relevant to 16, and in 7 cases the engines were not ready when needed.

SECTION 2 - ANALYSIS

2.1 AIM

The purpose of the analysis is to determine the contributory causes and circumstances of the accident as a basis for making recommendations to prevent similar accidents occurring in the future.

2.2 FATIGUE

The 2/ON indicated a moderate chance of fatigue mainly due to his own inability to sleep when the opportunity to do so was provided. There is no evidence that fatigue was a significant factor in this accident.

2.3 ANCHORING PROCEDURES

2.3.1 Master's anchorage selection

Prior to arrival in the approaches to the Solent, the master had been advised by VTS that Nab anchorage No.3 was available. The master accepted the anchorage and headed for the position. Although only a recommended anchorage, the master did not challenge the allocation, nor did he see any reason at the time to do so. The master chose to anchor to the north of the centre of No.3 anchorage, positioning *Astral* closer to the closest danger of Princessa Shoal, to increase the distance between *Astral* and FS *Vanessa*, which was anchored nearby. The master could have waited for FS *Vanessa*, which was in the process of weighing anchor, to depart the anchorage, or discussed an alternative anchorage with the VTSO. In electing to anchor towards the edge of the recommended anchorage, the master reduced the distance between his vessel and the nearest hazard.

2.3.2 Bridge procedures during anchoring

When *Astral* anchored, the master was on the bridge with the helmsman. The master conned and navigated to the anchor position by himself, and ordered the anchor to be dropped when he was content that *Astral* was clear of the other anchored vessel. *Astral*'s position was not plotted until after 7 shackles of cable had been veered, the anchor position was not determined, and no bridge swinging circle was produced.

2.3.3 Position monitoring at anchor

Over the 2½ days *Astral* was at anchor, each of the three watch officers monitored the ship's position in their own way. No set procedure, instructions from the master, or best practice as to how they should identify the anchor was dragging were established. During the period between *Astral* anchoring and the accident, none of the watchkeepers attempted to determine the anchor position or draw a bridge swinging circle. Consequently, while their fixing methods varied in effectiveness, all relied on noticing an unusual amount of lateral movement to alert them to the possibility the vessel was dragging.

The 2/ON, who was on watch at the time *Astral*'s anchor dragged, was monitoring the position of the vessel solely by radar, observing and recording the range and bearing of Nab Tower as indicated by the cursor display on the radar. This method did not alert him when *Astral* started to drag anchor, with the consequence that valuable time was lost which could have been used to get the ship underway.

Had a bridge swinging circle been established[5], limiting danger lines and ranges could have been set to alert the OOW that the vessel had dragged its anchor once the defined limits were exceeded.

2.4 RESPONSE TO THE DETERIORATING WEATHER

2.4.1 Response to the weather forecast

On 10 March, as the weather forecast deteriorated, the master directed that another shackle of cable be veered. Later that day, on receipt of the gale warning and advice from the VTSO, the master and chief officer reviewed the situation, and the master concluded that the ship's position continued to be appropriate. The master considered that he had taken sufficient action by veering an additional shackle of cable and checking that the duty engineer was aware of the need to start the main engine quickly if required.

The master was of the opinion that if the vessel dragged anchor, he would have sufficient time to start *Astral*'s engine, recover the anchor and manoeuvre the vessel from the danger. The master's previous experience, primarily on vessels smaller than *Astral*, had shown this procedure to be effective. The success of his plan relied on the early detection of dragging, prompt engine availability, sufficient sea room to the nearest danger and the ability of the anchor windlass to recover the anchor in time.

2.4.2 Night orders

The master was aware the weather forecast predicted gale force and possibly storm force winds overnight, although at the time of writing his night orders the weather remained moderate.

In writing his night orders, the master only considered the requirement to act should *Astral* begin to drag her anchor, and he did not include other limiting criteria that could have assisted him in making the decision to depart the anchorage earlier than he did. Specifically, the master could have included in his night orders a requirement for the OOW to inform him if:

- The wind speed increased or the weather deteriorated beyond certain levels.
- Worsening weather forecasts were received.

[5] The Admiralty Manual of Navigation Volume 1, 2008 edition, provides guidance on anchoring and the use of safety swinging circles. An extract is at Annex 4.

- The vessel departed from its bridge swinging circle.
- Specified bearings and/or ranges exceeded pre-defined limits.
- Other vessels nearby dragged anchor, or departed due to heavy weather.

The OOWs did not call the master, notwithstanding receipt of a NAVTEX weather forecast at 0041 on 10 March which predicted a southerly storm force 10 “soon”, the advent of worsening weather conditions, or the incidence of several vessels dragging their anchors in the adjacent anchorages.

A more detailed set of night orders might have prompted the OOWs to inform the master as soon as it became clear that the weather conditions were likely to deteriorate. However, it is surprising that the potential severity of the situation was not appreciated by the OOWs and the master called to the bridge despite the absence of orders to do so.

2.4.3 Main Engine Readiness

The master considered that with the duty engineer resting in his cabin, the time taken to start the engine would be sufficient, provided that he was advised early of the dragging anchor. However, this calculation did not allow for any delay in detecting the vessel was dragging, the potential rate of drift given the proximity of danger, and any delays that could occur starting the engine and, subsequently, recovering the anchor.

Had the main engine been running or been at immediate readiness, and therefore available to the master 10 minutes earlier, it is possible the grounding could have been averted.

2.4.4 Reliance on anchoring equipment

The master’s confidence in *Astral*’s anchor system was influenced by his previous experience in smaller vessels. Had he been fully aware of the IACS guidance that anchoring equipment is not suitable for gale force conditions on an exposed lee shore, he might have chosen differently. Specifically, he was expecting the anchor to hold in conditions above its designed limits and, should it drag, for the windlass to be able to recover it in those conditions.

Had the master elected to depart the anchorage on receipt of the gale warning, or when the weather conditions started to deteriorate during the early hours of 10 March, *Astral* would have been well clear of the lee shore in good time. Specifically, she would have been underway before heavy weather made recovering or slipping the anchor difficult.

It is MAIB’s experience, following the investigation of *Young Lady*, reinforced by the findings of ATSB’s *Pasha Bulker* investigation, that masters are either unaware of their anchor system limitations, or choose to ignore them in the hope the anchor will hold. Should their confidence prove unfounded, and their

vessel drag, these masters are potentially risking the lives of the crew charged with operating on the exposed foredeck to recover the anchor, and face the possibility that, should anything else go wrong, there is a real risk of their vessel stranding.

2.5 PERFORMANCE OF THE 2/ON ON WATCH

2.5.1 Recruitment of the 2/ON

Veritas had engaged the 2/ON through the OSM manning agency recruitment system. OSM had conducted its normal recruitment screening process, but had also made allowances for the officer's age and, through this dispensation had deemed him suitable for the post offered by Veritas. Following the 2/ON's endorsement by OSM, Veritas undertook no confirmatory checks that could have identified potential weaknesses in his performance, particularly his experience and aptitude for operations in the coastal waters of the Baltic and North Sea.

A better awareness of the recruiting agency's procedures could have alerted the company to the need to impose stricter recruiting criteria, or to conduct their own validation checks on potential officers.

2.5.2 Monitoring of the 2/ON

The 2/ON's performance had been closely monitored by the master at the time of the accident, and by his predecessor. Both regarded the 2/ON as a "deep sea" officer, experienced on larger vessels, but whose performance was weak and required monitoring and assistance when navigating in confined waters. Knowing that the 2/ON was on board for a limited time, until the permanent officer could rejoin *Astral*, the master was prepared for the officer to remain on board, but to monitor his performance closely.

Although the master had found it necessary to assist and monitor the 2/ON during sea watches, the same level of supervision was not provided at anchor and he had not, therefore, identified that the officer was not effective in conducting an anchor watch.

2.5.3 Conduct of the anchor watch

The 2/ON was monitoring *Astral*'s position using the radar EBL and VRM to observe the range and bearing of Nab Tower, which he was recording in the log. The 0700 range and bearing differed significantly from the previous record, but while the 2/ON convinced himself that this was because the cable was stretching, he did not plot the vessel's position to check this was the case. Had he done so, the discrepancy with the previous fix would have been immediately evident.

As the weather deteriorated, the two vessels closest to *Astral* dragged anchor. This did not alert the 2/ON to the significance or the vulnerability of *Astral*'s situation. The 2/ON did not, and was not required to, increase the vessel's readiness as the situation around him deteriorated.

When the VTSO called *Astral* by VHF to check the OOW was happy with the vessel's position, the 2/ON was not alerted to the possibility that the vessel was dragging, nor that he should be concerned. Believing that he needed to be "sure" that the vessel was dragging before calling the master, the OOW gave no answer when the VTSO called *Astral* again to request confirmation the vessel was not dragging. The 2/ON's uncertainty and lack of appreciation of the proximity of danger resulted in him delaying his call to the master, and then the duty engineer, until 20 minutes after the vessel started to drag anchor. By then, *Astral* was moving at over 2 kts and had covered half the distance between the initial anchor position and the Princessa Shoal.

2.6 EMERGENCY RESPONSE

The master arrived on the bridge 7 minutes after he was called, believing that he would be unable to take action until the main engine was running. When he did arrive, he was surprised to see how far the ship was out of position. By delaying his arrival on the bridge, the master denied himself time in which to assess the situation and consider his options. Consequently, once the engine was available, the master set only sufficient power to take the weight off the cable, and he did not consider increasing the engine power sufficiently to make ground away from Princessa Shoal.

After sending the OOW and the watch AB forward to recover the anchor, the master was left alone on the bridge. Additional personnel were subsequently informally called to the bridge. However, without an effective handover and with limited assistance, the master was unable simultaneously to monitor the vessel's position, manoeuvre it effectively, check the height of tide, respond to VHF traffic, and take charge of the situation. Specifically, he hoped that the vessel would pass over the bank as he recovered the anchor, and had not realised that at Low Water Springs the depth of water was limited. He therefore did not take sufficient action to prevent *Astral* grounding, 35 minutes after starting to drag anchor.

Had the master arrived on the bridge earlier, he would have been better able to assimilate the vessel's situation. He might then have used the general alarm to summon additional officers to the bridge quickly and warned the remaining crew of the developing emergency. He could also have used the time to better acquaint himself with the proximity of danger, and detail others to carry out essential tasks. Then, once the main engine became available, had power been increased sufficiently to drive the vessel ahead and away from danger, even at this late stage, the grounding could have been prevented.

Thirty five minutes elapsed between *Astral* starting to drag anchor and her grounding. In this period, the OOW took 20 minutes to appreciate the situation, alert the master and initiate engine readiness. The engine starting process and transfer to the bridge took the anticipated 11 minutes, leaving the master only 4 minutes to attempt to avoid grounding once engine power was provided.

The emergency response was ineffective. Although the failure to detect the dragging early on, and the time taken to start the main engine had eroded most of the safety margin, the grounding could have been prevented by decisive action once the engine was available. The master's delay in arriving on the bridge and, without assistance, his becoming overwhelmed such that his manoeuvring was ineffective, removed the remaining margin and the vessel grounded.

2.7 SAFETY MANAGEMENT

2.7.1 Safety management system

The Veritas SMS included *Company Shore Management Bridge Standing Orders* which stated that a *swinging circle of the ship is to be charted, centred on the position of the anchor*. However, this was not common practice on board, and the managers ashore did not consider it necessary. Conversely, a section in the company's SMS manual entitled *watchkeeping at anchor* only required the ship's position to be plotted. The anchor checklist, completed by the watch officers, which was copied from the ICS Bridge Procedures Guide, referred to the less onerous SMS manual requirements, and it was these instructions the master and officers chose to adhere to.

Notwithstanding improvements made during the company's 2007 re-write of the SMS, these conflicting instructions had not been detected and resolved.

2.7.2 Auditing

ISM and Navigational Audits had been carried out by one of the company's ex masters. However, the procedure for 'navigation at anchor' was not fully checked, so the audits had not detected that *Astral*'s master and OOWs were following the less onerous anchoring procedure in the SMS manual rather than the more robust requirements of the *Shore Management Bridge Standing Orders*.

2.8 VTS

2.8.1 Allocation of anchorage

The Nab anchorages at the approaches to the Solent are provided for use by waiting vessels. Although advised by VTS, there is no requirement for vessels to accept the given anchorage or to remain there. The master did not question the proposed anchorage, and during the vessel's stay there had been time to re-anchor or leave had he believed the weather forecast made *Astral*'s position untenable.

2.8.2 Information flow and advice

Once the weather forecast began to deteriorate, the VTSO called all vessels which were anchored in the area and advised them of the forecast and the need to have their engines available if required. The VTS also provided all vessels in its area with updated weather forecasts as they became available.

On the morning of the accident, the VTSO's enquiries into *Astral*'s circumstances were delivered in a conventional, but understated manner. While the inference of the VTSO's language would normally be understandable to a native English speaker, the implications of the operator's questioning were not recognised by the Filipino 2/ON, and vital minutes were lost before he took effective action.

During the investigation, it had been apparent that many foreign mariners expect VTS operators to use clear, plain language in their communications. This finding is consistent with that of ATSB's *Pasha Bulker* report. In this case, the terminology suggested in the IALA VTS Manual (2008) Chapter 17 would likely have stimulated the 2/ON with a more rapid and positive response, e.g *"WARNING vessel Astral, VTS radar indicates you are dragging your anchor. Check your condition and confirm your intentions."*

2.8.3 Control of the anchorage

While most of Nab anchorage No.3 lies outside Portsmouth harbour limits, *Astral* had anchored within these limits, the pilotage of which is controlled by ABP Southampton as VTS Authority and CHA for the area. Both SHAs and CHAs often have extensive powers for controlling navigation in their areas. However, they are often reluctant to order vessels to leave an anchorage, even if the weather forecast indicates the anchorage could become untenable, to avoid potential liability issues should a vessel get into difficulties after leaving. In most harbour areas, the responsibility to decide whether to sail or stay at anchor therefore remains with the master, but the SHA or CHA will provide such advice and guidance as it can.

Ultimately, masters are responsible for the safety of their vessels. However, harbour authorities should ensure that masters are fully alert to the dangers they may face within the CHA's waters and approaches.

2.9 KNOWLEDGE AND AWARENESS OF SAFE ANCHORING PROCEDURES

In conducting their risk assessments, harbour authorities and others are reliant on masters taking effective responsibility for the safety of their vessels.

In this accident, none of the four vessels occupying the Nab anchorage got underway before the weather deteriorated, and three subsequently dragged their anchors with *Astral* grounding. In all of the *Pasha Bulker*, *Young Lady* and *Astral* accidents, the masters elected to remain at anchor, off a lee shore with poor or moderate holding ground, and only get underway once their vessels were dragging anchor. In this, they showed a fundamental lack of understanding of the limitations of their vessel's anchoring systems, the forces and dynamics involved, and the practices of good seamanship.

In this accident, there was also an absence of basic navigational practices by *Astral*'s deck officers, which were essential to ensure that any dragging was detected in sufficient time for remedial action to be taken.

This accident, following closely on from the *Pasha Bulker* and *Young Lady* accidents, would indicate the possibility of an absence of knowledge among many deck officers in the seamanship and navigation procedure required for safe anchoring.

SECTION 3 - CONCLUSIONS

3.1 SAFETY ISSUES DIRECTLY CONTRIBUTING TO THE ACCIDENT WHICH HAVE RESULTED IN RECOMMENDATIONS

- The watchkeepers were unable to determine with any accuracy whether *Astral* was dragging her anchor, because the position of the anchor had not been obtained when the vessel anchored, and a bridge swinging circle had not been generated. [2.3.2]
- In the absence of clear instructions, the watchkeepers were left to choose their own methods for monitoring the ship's position, some of which were ineffective. [2.3.3]
- In electing to remain at anchor, the master did not take account of the limitations of the vessel's anchor system, nor the difficulties he would face recovering the anchor in bad weather if the anchor dragged. [2.4]
- In choosing not to get underway until the vessel dragged anchor, the master did not allow sufficient margin for the rate of drift, the time it would take for the OOW to detect the anchor dragging, or for the main engine to become available. [2.4, 2.5]
- The 2/ON's performance had been identified as weak, and while he had been appropriately supervised when the vessel was on passage, this supervision had ceased to be effective when the vessel had anchored. [2.5]
- Had the master arrived on the bridge earlier, he would have been better able to absorb the vessel's situation, and could have used the main engine more effectively once it became available. [2.6]
- As a consequence of not using the general alarm to rouse the crew, the master was alone on the bridge immediately before the vessel grounded, and was unable to cope effectively with the developing situation. [2.6]
- Veritas' audits had not detected that anchoring practice on board *Astral* fell well short of the *Shore Management Bridge Standing Orders* requirements in the company's SMS, or that these orders conflicted with the instructions in the SMS manual. [2.7]
- Nab No. 3 anchorage was appropriate when *Astral* anchored, but was not suitable during storm force winds from the south. [2.4, 2.5, 2.8.1]
- While the VTS operator's language was understandable to a native English speaker, the implications of the operator's questioning were not recognised by the second officer, and vital minutes were lost before he took effective action. [2.8.2]

- This accident, following closely on from the *Pasha Bulker* and *Young Lady* accidents, would indicate the possibility of an absence of knowledge among many deck officers of the seamanship and navigation procedures required for safe anchoring. [2.9]

3.2 OTHER SAFETY ISSUES IDENTIFIED DURING THE INVESTIGATION ALSO LEADING TO RECOMMENDATIONS

- Masters of vessels at anchor in the Nab Anchorage were not provided with all the available information required to assess the tenability of the anchorage in southerly gale force winds.[2.8.2]

SECTION 4 - ACTION TAKEN

4.1.1 **Veritas Tankers** has:

- Introduced procedures to monitor the effective use of bridge swinging circles during their annual navigation reviews.
- Introduced written procedures recommending that masters depart anchorages prior to the onset of heavy weather that may make the anchorage untenable **(Annex 6)**.
- Introduced new procedures to interview all officers, in addition to the manning agency requirements, prior to their employment.

4.1.2 **ABP Southampton and QHM Portsmouth** have:

- Improved the information and guidance available to mariners on charts and publications as to the tenability of anchorages within their harbour authority and approaches.

4.1.3 **MAIB** has:

- Published a Safety Flyer on best anchoring practice for dissemination by the International Chamber of Shipping and the Nautical Institute to circulate to their members.

SECTION 5 - RECOMMENDATIONS

The International Chamber of Shipping and **the Nautical Institute** are recommended to:

2009/102 Circulate the MAIB's Safety Flyer on anchoring procedures to all their members.

Associated British Ports Southampton and **Queen's Harbour Master Portsmouth** are recommended to:

2009/103 Provide guidance to their VTSOs on the language and terminology used, particularly to non English speakers, in communicating with ships' masters and officers to minimise the possibility of misunderstanding or confusion and, where appropriate, to issue masters with clear instructions.

Rederi AB Veritas Tankers is recommended to:

2009/104 Review its SMS instructions and enhance its auditing procedures to ensure that masters and ships' officers:

- Are provided with, and are familiar with, correct and clear anchoring procedures.
- Understand the limitations of their vessel's anchoring systems.
- Understand the company's emergency response procedures and are implementing these plans effectively.

International Association of Marine Institutes and **Association of Marine Educational and Training Institutes Asia-Pacific Regions** are recommended to:

2009/105 Encourage their members providing training to deck officers, to conduct a full review of the study programmes delivered to ensure that deck officers gain effective instruction on:

- Navigation planning for anchoring, including the construction of swinging circles, holding ground, and position monitoring while at anchor.
- The strengths, weaknesses and limitations of vessels' anchoring systems.
- Command considerations for safe anchoring, including wind and tide effects, yawing, when to depart an anchorage and actions to take to prevent dragging, and to take when dragging is detected.

Marine Accident Investigation Branch
Statens haverikommission
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