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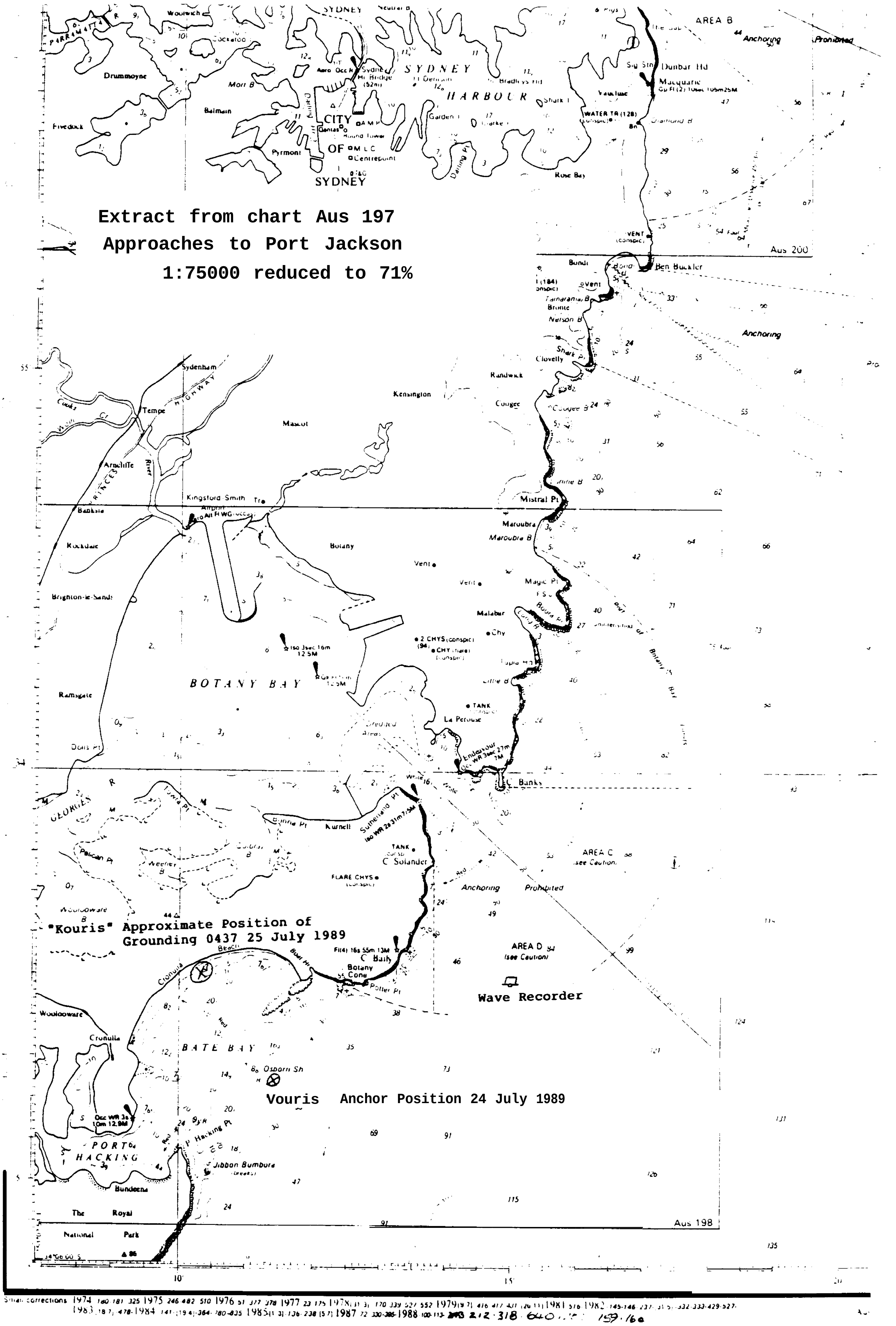
Extract from chart Aus 197
Approaches to Port Jackson
1:75000 reduced to 71%
"Kouris" Approximate Position of Grounding 0437 25 July 1989
Vouris Anchor Position 24 July 1989
Wave Recorder
SYDNEY HARBOUR
CITY OF SYDNEY
BOTANY BAY
BATE BAY
PORT HACKING
AREA B
AREA C
AREA D
Anchoring
Prohibited
Drummoyne
Balmain
Pyrmont
Fivedock
Dunbar Hd
Rose Bay
Vaucluse
Bondi
Ben Buckler
Bronte
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The Royal National Park
Aus 200
Aus 198

OUTLINE OF INCIDENT

At 1142 Eastern Standard Time (EST) on 24 1989 July the Cypriot flag liquefied gas carrier "Kouris" anchored off Bate Bay, New South Wales.

During the afternoon the westerly wind dropped to light airs. At about 2330 EST the wind began to freshen backing to a little east of south. At about 0315 EST on 25 July the officer of the watch reported to the Master that the ship was drifting. Initial attempts to start the engine failed and the second anchor was dropped. At about 0335 EST the ship grounded in shoal water near Merries Reef.

Driven by the wind and sea the "Kouris" was blown clear of the shoal water. Although the engines were available at about 0345 EST the rudder failed to operate. At approximately 0418 EST the ship grounded on Cronulla Beach and by 0436 it was apparent that the ship could not be freed by use of its engines at that time, and assistance was requested through Sydney Harbour Control.

The ship eventually refloated at 0315 EST on 27 July 1989 and berthed in Sydney late on 27 July to assess damage.

Captain C W Filor, Director Ship Operations, Department of Transport and Communications was appointed under the provisions of section 377A of the Navigation Act 1912 to conduct a preliminary investigation to determine the reasons for the grounding and to establish what actions the Master took to prevent pollution and to safeguard the lives of the crew. Captain M D O'Keeffe, of the Maritime Services Board also took part in the investigation.

PERSONS INTERVIEWED AND SOURCES OF INFORMATION

On 29 July 1989:		
Mr Reinhardt KALKA	Gas engineer	Coastal Motor Engineer's certificate
Mr Jerzy UCHANSKI	Radio officer	1st Class Radio Telegraphy certificate
Mr Jovito PITIGO	Boatswain	
Mr Ben CLAVANO	Seaman	
On 2 August 1989:		
Mr Heinrich TSCHEY	Chief Engineer	Marine Engineer certificate
Mr Joseph MANGILOG	Chief Mate	Chief Mate certificate
Mr Francisco TALENS	2nd Mate	2nd Mate's certificate
Captain Peter SCHLUCHTER	Master	Master Foreign Going certificate
On 4 August 1989:		
Mr Jesus GALERA	Engine room rating	
Mr Elmer CO	2nd Engineer	Chief Engineer's certificate
Captain Karl SCHIRLING	Superintendent Hartmann Schiffahrts GmbH & Co KG	

Supplementary questions were put to certain of the above in Sydney, Newcastle and Westernport.

Information was also taken from ship's records and log books. The ship had no automatic recording facilities such as course recorder, data log etc.

Weather information was taken from records held by the Bureau of Meteorology, and Kurnell refinery.

The Maritime Services Board, New South Wales provided the log sheets for South Head Signal Station and the log sheets and tape record of traffic on Channel 16 VHF monitored by Sydney Port Control. The computer print-out from the wave recording buoy in position 34° 02.6s 151° 15.0'E was provided by the Harbour Master Port Botany.

Sydney Radio provided records of weather traffic broadcast to shipping over the period 0000 hours 23 July to 0000 25 July.

Details of sea-bed geomorphology were provided by the Coastal Branch of the New South Wales Public Works Department.

UNITS OF MEASUREMENT

All times are given in Eastern Standard Time (EST)(UTC -10.00) unless otherwise stated. It should be noted that times used in the report are indicative only, as accurate times were not observed or noted from 0200 25 July onwards.

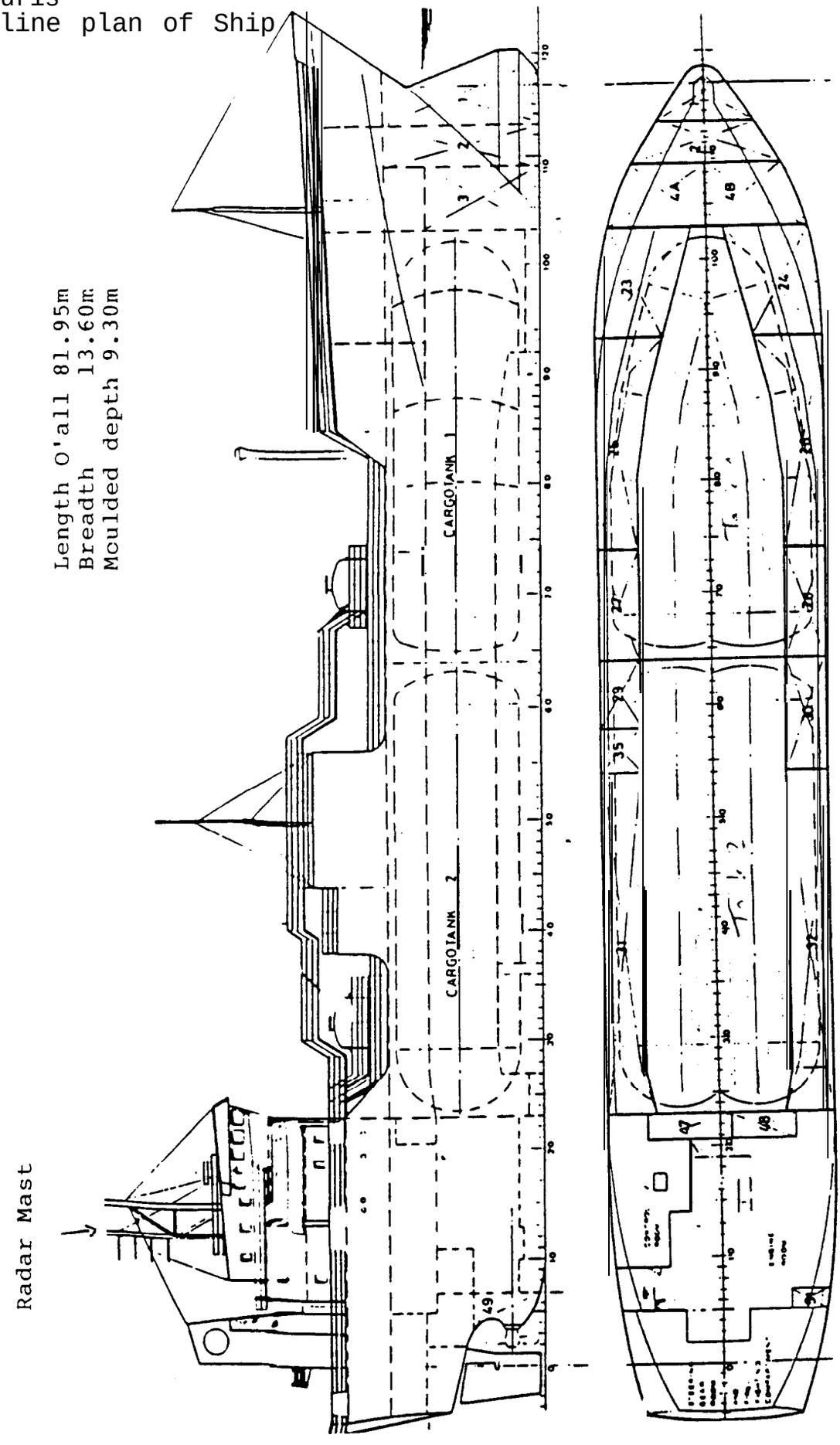
Distances are given in nautical miles and decimals of a nautical mile with metres in parenthesis where relevant.

Soundings and all other dimensions are given in metres.

Bearings are given in 360° notation relative to true north.

Other measurements are given in the accepted nomenclature.

"Kouris"
Outline plan of Ship



THE KOURIS - DESCRIPTION OF SHIP

The liquefied gas carrier "Kouris" was built at Makkum, the Netherlands and completed in November 1983. The ship is classed with Germanischer Lloyd Classification Society, has an overall length of 81.95 metres, a gross tonnage of 2935 and is powered by an MWM medium speed diesel engine developing 2473 kW, driving a single shaft and controllable pitch propeller, giving a speed of 14 knots (see attachment 11). The ship is classed to operate with an unmanned machinery space and is normally manoeuvred from the bridge. The ship, formerly the "Tasmanzee" was changed from the Netherlands Registry to the Cypriot flag in 1988 and the name changed to "Kouris".

The registered owners are the Maxine Shipping Company Limited of Limassol and the ship is operated on behalf of the owners by Hartmann Schiffahrts, of Leer, Federal Republic of Germany.

The "Kouris" is equipped with two stockless anchors each attached to 8 shackles of cable: two Sperry Mark 127 radars each with a 300mm diameter display; ELAC echo sounder with trace recorder and digital display reader; a JRC JLE-3500R Satellite Navigator; an XH 5120 Sait Electronics meteorological and Navigational warning receiver; Sailor VHF radio transceivers and 2182kHz watch keeping receiver. The Radio Room was equipped with an Inmarsat Standard "A" transceiver and a Sailor R/T, W/T receiver.

The relevant charts were found to be corrected to date. The ship carried the British Sailing Directions issued by the Hydrographer Royal Navy.

The "Kouris" is not fitted with a course recorder, propeller pitch recorder, engine room data log or any form of automatic recording device.

The "Kouris" carries a crew of 14 in accordance with a "Document of Safe Manning" issued by the Cypriot authorities. All the officers held certificates and endorsements in accordance with or in excess of the standard required for the size, area of operation and type of ship. The master and crew were engaged throuch a Cypriot crewing agency in Limassol; additionally the master, cnief engineer, gas engineer and radio officer were also company employees .

On 25 July 1989 the ship's complement was made up of a Swiss national as master, a chief engineer and gas engineer from the Federal Republic of Germany, a Polish radio officer, whilst the chief and second mates, the second engineer and the remainder of the crew were all nationals of the Republic of the Philippines.

The master, Captain Schluchter, joined the ship on 11 June 1989, it was his first command in the company, having joined the company in early June. He has 15 years experience in command, specialising in chemical tankers, but having experience also in oil tankers and gas carriers. This was his first voyage aboard the llKourisll. When the ship was at sea, the master kept a daytime sea watch, whilst in port or at anchor the chief and second mates worked a six hours on/six hours off routine.

The Chief Mate, Mr Mangilog, joined the ship in April for the first time, and since then he had been to Port Botany three or four times. He had been at sea since 1976. In 1983 he gained a certificate as "chief mate" and was promoted to chief mate in 1985, since when he had served on foreign flag ships under masters of foreign nationality. While at anchor and in port he kept the six to twelve watch in addition to his other duties.

The second mate, Mr Talens, had been at sea for about seven years and had been second mate for about three years. He joined the Kouris in December 1988 and since that time had served with three different masters aboard the ship. In port and at anchor he kept the twelve to six watch.

Mr Tschey had been chief engineer for about fifteen years mostly on small container and cargo ships. He joined the "Kouris" in January.

Mr Kalka, the gas engineer, had served three months on the "Kouris" and was the only officer that had served on the ship before, having served aboard for a total of eight months on previous tours of duty.

The second engineer, Mr Co, holds a Philippine license as chief engineer of any gross tonnage, issued in 1983. He had not sailed on the "Kouris" before.

The working language aboard was English.

SEQUENCE OF EVENTS

The "Kouris" arrived off Botany Bay on 21 July 1989, with a cargo of propane from Westernport. The ship anchored off Bate Bay at noon with Glaisher Light bearing approximately 253O by 1.9 miles. The vessel remained at anchor until a little before 2000 on the evening of 23 July when the vessel proceeded to the Bulk Liquid Berth, Botany Bay to discharge. The weather over this period had been good with winds from the SSW and NW force 2 (4-6 knots) to force 4 (11-16 knots). The "Kouris" had maintained its anchor position throughout the period.

The discharge of cargo went according to plan and was completed at 0540 on 24 July. The officers kept normal port routine with the second mate finishing his watch at 0600 when he went to bed. During the morning the ship took bunkers and stores. At about 0900 the second mate got up and tested the bridge equipment. The draught was recorded as 3.8 metres forward and 5.55 metres aft, giving a total displacement of 3307.7 tonnes. The pilot embarked and the "Kouris" left the berth at 1042 in order to gas free before returning to Port Botany to load a cargo of ethelyne for export.

At 1142 the ship anchored in approximately the same position as the previous day with 6 shackles on the starboard anchor in 25 metres of water. (Attachment 1) The ship's position was fixed by radar as Port Hacking Point bearing 235O and 1.4 miles distant, approximately 0.75 miles from the southern extreme of Merries Reef. The wind at the time was blowing off shore, being westerly and averaging about 14 knots. Predicted high water at Botany Bay was at 1235 with a height above datum of 1.5 metres.

The master and chief engineer arranged that lubricating oil, the fuel oil, gear oil and hydraulic pumps should be left running to ensure that the engine could be started within a few minutes of notice. The Master had issued oral orders to the two Mates on previous occasions with regard to maintaining anchor watches, instructing them that if conditions changed, such as swell direction or length, he was to be informed. He issued no specific orders for this particular anchorage.

The second and chief mates adopted their usual anchor watch routine. Both these officers understood that the engines were on the usual notice of readiness of 20 to 30 minutes. The two officers monitored channels 13 and 16 VHF. The gas engineer commenced inerting the tanks with nitrogen, the two deck officers were not involved in this operation. One other ship, the chemical carrier "Stolt Azalea",was also at anchor off Bate Bay, in a position about 0.35 miles SSW of the "Kouris's" position.

At 1200 hours the second officer took over the watch. He recalled checking the anchor position by radar with the point of land north east of Merries Reef bearing 017.5O and distance 1.27 miles. He maintained a watch on the position throughout the afternoon using radar on the six and twelve mile ranges. The ship's head during this period ranged from between south to south west, in winds recorded as southerly force 2 (4-6 knots).

The master recalled hearing a weather forecast at a time he put at 1400, which referred to low pressure which in his understanding would pass well to the south of the ship's position. He did not mention the bulletin to the second mate.

The anchor watch passed without incident. There was a domestic radio fixed to the wheelhouse deckhead tuned to local music programs, this was probably on during the afternoon watch. As it became dark the anchor lights and deck flood lights were switched on, as were also the lights in the wheelhouse.

The second mate recalled hearing a gale warning at about 1745, about fifteen minutes before he finished his watch. This would either have been the routine forecast broadcast at the routine time of 1748 through Sydney Radio (Annex 2), or the gale warning issued by the Bureau of Meteorology at noon and broadcast by Sydney radio at 1300 (0300 UTC) and rebroadcast at 1348,1548 and 1748 (Annex l), which read:

SITUATION= NOON 24TH
LOW 1OlOHPA 34.5S/152E MOVING NORTHEAST l0/15 KNOTS.
HIGH 1034HPA 46S/160E ALMOST STATIONARY

=FORECAST=
EAST TO NORTHEAST WINDS TO 35 KNOTS. ROUGH TO VERY ROUGH SEA
MODERATE TO HEAVY SWELL
WEATHER SYDNEY

He stated that his comprehension of the warning was limited, understanding only that strong winds were forecast for later in the night. He did not copy the warning down nor did he tell either the master or chief mate of the broadcast.

At 1800 the chief mate took over the anchor watch. The second mate entered the observed weather in the log book, noting the barometer at 1019 hPa,a temperature of 13OC and wind southerly force 2. Low water was predicted at approximately 1836 with a height of 0.5 metres above datum.

The chief mate stated that he monitored the VHF channels and maintained a check on the anchorage position by radar, using the six and three mile ranges. He did not take any visual cross bearings, or use any marks or lights in transit. One of the VHF sets was set to channel 13, monitoring harbour control and the other to channel 16; the domestic radio was tuned to a local music station. The chief mate could not recall hearing any weather forecasts issued through the Port Control.

He did recall monitoring possibly two weather bulletins, switching from VHF channel 16 to channel 67, though he could not recall the time. He did not write the forecast down, saying that he found the delivery of the forecast was "very quick" and all he could recall was mention of low pressure to the south. These could have been one of two renewed gale warnings issued by the Bureau of Meteorology Sydney and broadcast at 1900, repeated at 1912, and at 1948, repeated at 2148 and 2348. The bulletins he heard were apparently the same, or very similar, so he did not monitor further forecasts on channel 67.

The watch was generally uneventful. A seaman lookout was on the bridge throughout the watch and the gas engineer paid occasional visits to the bridge. The chief mate recalled that the ship's head throughout the watch varied from between south to south west, but could not recall the master visiting the bridge during the evening.

Captain Schluchter spent the afternoon mainly engaged in paper work connected with the discharge of the propane cargo and the loading of the next cargo, ethelyne. He had supper and watched television. He stated that at about 1930 he paid a visit to the bridge and everything appeared normal.

At about 2000 the master and chief engineer both stated that they had two or three beers together in the communal mess. The master recalled returning briefly to the bridge immediately before going to bed at about 2200. He left no written night orders or supplementary oral orders.

The chief engineer paid routine visits to the engine room throughout the evening. He stated that all pumps necessary for starting the engine at short notice were running and the engine temperature was maintained at 40 to 45OC. He paid his last visit to the engine room at about 2200, before going to bed.

At about 2355 the second mate arrived on the bridge to relieve the chief mate. He stated that he was well rested having gone to bed immediately after his supper, and that he was not on any medication and had had no alcohol. The chief mate mentioned the weather warning and told the second mate to be careful. The chief mate completed the log book intuiting that the anchor position was unchanged and recording the wind as variable force 4 (11-16 knots). High water was predicted for approximately 0400 with a height of 1.5 metres above datum.

The second mate recalled that the sea conditions were still good and the weather fine when he arrived on the bridge. He maintains that the domestic radio was turned off, or with the volume turned right down, though both the seaman lookout and the gas engineer recall music being played. The second mate could not recall hearing any weather bulletins at this time. He continued to monitor the ship's position relying on radar and he stated that could not recall seeing Glaisher Point or Cape Bailey lights visually. The wheelhouse doors were closed.

The gas engineer stated that he went to the bridge at frequent intervals. According to him the wind started to freshen before midnight, and some time 'between midnight and 0200 he was forced to stop inerting the ship because the sea water pump intake, situated at the turn of the bilge on the starboard side of the engine room, was losing suction with the roll of the ship. He did not inform the second mate that inerting operations had been suspended, as he considered that the second mate would not understand the reasons for doing so.

At about 0200 or a little after the second mate left the bridge and went to the master's cabin to tell him about the changed weather situation. The master, who preferred not to rely on telephones in such circumstances but rather direct reporting, acknowledged the report telling the second mate to inform him immediately should the ship begin to "drift".

According to the master's statement he put on a dressing gown, and rather than go to the bridge other than in his normal day clothes, went instead to the poop deck where he spent five to ten minutes observing the weather and sea. He noted that the ship was pitching more than at ten o'clock but at that time he detected no danger. As far as he could determine the ship was riding to the wind in a southerly direction. He stated that he then returned to bed.

The second mate continued to monitor the ship's position by radar and observed small variations in position, which he attributed to the yawing of the ship at anchor. He stated that he used the six and three mile ranges to check the position.

At about 0315 the second mate realised that the ship had moved approximately 3 cables (550 metres). He immediately went to the master's cabin and called him informing him that the ship was drifting. The master instructed the second mate to call the chief engineer. The chief mate was also called. On his way to the bridge the master passed the chief engineer's cabin and told him that he required the engines immediately.

The master and chief mate arrived on the bridge within a very short space of time. The master ordered the second mate and the seaman forward to stand by the anchors. The seaman went to call the Boatswain and within a few minutes all three were at the windlass on the forecastle. As soon as the chief mate arrived on the bridge he was ordered to fix the ship's position and he found that the point of land north of Merries Reef was then one mile distant. (Attachment 2)

The radio officer, whose cabin is adjacent to the bridge woke up, and realising through the noise and the ship's motion that something might be amiss went through the bridge to the radio room, informing the master that he was available.

The chief engineer stated that on arriving in the engine room he quickly checked and confirmed that all the pumps necessary for starting the engine were running and that air was available for starting the engines. He went to the engine local control, situated on the starboard forward end of the engine casing, and first turned the engines over on air with the indicator cocks open to purge any condensation. He stated that he closed the indicator cocks, started the engine, adjusted the running speed to 300 rpm by the local throttle and then pushed the control lever, at the side of the control block, to allow transfer to the engine control room, a necessary procedure before handing over control to the bridge. The engine had been running for about one minute when the emergency stop activated and the engine closed down, he immediately went to the engine control room (Attachment 3) to check which alarms were shown. He stated that a number of alarms were illuminated which he cancelled, before hurrying back into the machinery space to restart the engine. At this time the master rang the control room asking if the engine was ready.

The rolling, pitching and general movement of the ship by now was apparently so pronounced that, without being called, the second engineer, followed a short time later by the engine room rating, went to the engine room. The second engineer stated that he arrived in the engine room at about 0325. According to his account he saw the chief engineer at the throttle control ready to start the main engine, and that he went immediately to check the indicator valves. The chief engineer turned the engine over but the engine would not start. The second engineer confirmed that all the necessary pumps were running and then noticed that the "Emergency stop - Engine Overspeed Light", situated on the forward machinery space bulkhead close to the starting position, was illuminated. The second engineer maintained that he reset the alarm by pushing the button and an attempt was made to start the engine a second time, but that the air pressure was low at about 10 bars so they waited until the pressure reached 30 bars and attempted to start the engine again, but again the engine would not start.

Then, according to the second engineer, the chief engineer went to the control room for a short time, when he returned he started the engine, which was run at 300 rpm. The chief engineer then returned to the engine control room, but the engines failed soon after. The second engineer put the reason for the engine failure to the fact that the ship was already aground.

On the Bridge at approximately 0325 it could be seen that the ship was drifting beam on to a very strong southerly wind and the Master was certain that the starboard anchor chain had parted. He immediately ordered the port anchor to be dropped in a position with Port Hacking Point 225° by 1.5 miles. At about 0327 the port anchor was let go to 2 or 3 shackles in the water with Port Hacking Point 220° by 1.65 miles. The windlass gypsy continued to slip despite the brake being hardened up so the anchor stopper was applied. The second mate then radioed the bridge that he believed that the port anchor had carried away and the master ordered that the windlass be put in gear and the cable retrieved to see if the anchor was still attached. After a short period of heaving the end of chain came through the hawse pipe without the anchor attached. At a time put at 0328 the bridge was informed that the anchor cable had parted.

At 0330 the master ordered the "general alarm" sounded and that lifeboats should be prepared. The engine room rating left the machinery space and mustered with the rest of the crew at boat stations. At approximately 0335 the ship grounded in shoal water close to Merries Reef.

Between about 0320 and 0335 the master made a number of calls to the engine room to try and find out how soon the engines would be ready. The chief engineer answered, or was called to the phone on each occasion. At no time did any of the individuals on the bridge hear the engine start. The chief engineer stated that at some time shortly before the ship first grounded the engine was started for the second time, but it again closed down automatically when transferring control from the machinery space to the engine room control room.

At about or a little after the time the chief engineer started the engine for a second time he felt the ship come into contact with the ground.

At about 0338 the vessel cleared the shoal water off Merries Reef. Shortly afterwards the engine was started successfully and at 0345 control was switched to bridge manoeuvring. The chief mate however, reported that the rudder indicator showed 150 of starboard helm. The rudder could not be moved from the bridge, the master rang the engine room control room, and the chief and second engineers went to the steering flat to try and operate the rudder from the solenoids at the emergency steering position. By this time all crew who were not involved on the bridge or in the engine room were at their boat stations.

By 0350 it was obvious that the rudder could not be moved and the master used the engines as best he could in an attempt to stop the vessel from being driven ashore and to manoeuvre the ship to safe water. The ship was at this time about 0.37 miles (680 metres) from Cronulla beach heading 310°. A radar fix was obtained with Port Hacking Point bearing 202° and distance 2.2. miles.

At 0418 the ship made first contact with Cronulla Beach and the engines were put full astern in an attempt to free the ship. The ship's head was still 310°. At 0436 the vessel was fast aground on Cronulla Beach heading 320° and a VHF radio messages was broadcast to Sydney Port Control asking for tug assistance.

At 0454 the master rang "Finished with Engines".

The log of the lookout station South Head records the first message from "Kouris" at 0438 advising that the ship was dragging anchor followed a minute later by a message that the ship was aground. The Sydney Port Control has the time of the grounding as 0440, followed by an entry for 0525 that the tug "Woona" was underway and that the Botany Bay Authorities had been informed.

When the "Kouris" grounded all ballast tanks were already full and the ship had some 300 tonnes of heavy fuel oil aboard. The Master was therefore unable to take on any more ballast to keep the ship firmly on the ground to minimise movement the ship. The master directed that all crew should stay aboard the ship.

When the "Woona" arrived a little after 0800 a rocket line was fired to the ttKouristl and subsequently the ship's insurance wire was secured. In attempting to pull the "Kouris" clear the insurance wire parted at 1006 and in a subsequent attempt to secure a towing line the "Woona" also grounded. The tugs "Wonga" and "Manly Cove" were despatched to assist. At 1610 25 July a line from the "Manly Cove" was passed to the "Kouris" with the purpose of keeping the ship's stern into the wind, to prevent the gas carrier broaching to.

All ballast and fuel oil tanks were sounded from time to time, and it was established that no ballast or oil was being lost, although the engine room had been breached.

The inerting of the tanks, suspended at 0215 on 25 July was resumed and completed that morning, in order to make the ship safe from risk of fire and/or explosion.

The Port Authorities set up a command post on Cronulla Beach and elements of the National Plan to combat pollution at sea were put on notice of stand by.

The ship refloated at 0345 27 July and after changing from an inert atmosphere in the cargo tanks to a gas free atmosphere the ship berthed in Sydney late that evening, to assess the damage.

The ship subsequently sailed from Sydney to Newcastle where temporary repairs were made in Newcastle dry dock.

The attempt to salvage the "Kouris" is outside the terms of reference of this report.

WEATHER 24-25 JULY

The record of weather conditions experienced in the region of Port Botany and Sydney have been taken from wind speed and direction readings as recorded by "Dines" anemograph at Mascot (Kingsford Smith) Airport and the Kurnell oil refinery, and from log book observations at South Head lookout station.

The trace from both the Airport, approximately 7 miles from Bate Bay, and Kurnell, approximately 3.5 miles, show almost identical wind force and direction patterns. For the purposes of this investigation' the Mascot airport trace has been used, as calibration of the equipment is recorded, and also Kurnell refinery is more sheltered from southerly winds.

When the "Kouris" anchored at 1142 24 July the wind was from the north west averaging about 14 knots with the occasional gust of 22 knots. From midday the wind strength began to drop and by mid afternoon the conditions were calm and remained so until approximately 2020 when a westerly breeze set in for the next three hours, averaging about six knots.

At approximately 2330 the wind backed 90° to become southerly or east of south and began to increase in strength. At midnight, when the second mate took over the watch, the wind both at Mascot and at Kurnell had increased to average of over 20 knots with gusts over 30 knots.

Between midnight and 0200 the wind averaged about 25 knots from the south with the occasional gusts to 37 knots: at about 0216 a gust of 41 knots was recorded. From about 0250 to 0400 the general strength of the wind increased, and while the average strength rose only marginally the strength of the gusts became more extreme with frequent gusts of more than 40 knots and at 0318 a gust of 50 knots was recorded. (Attachment 4) After 0500 the general intensity of the wind abated but strong gusting winds persisted into the afternoon of 25 July.

The Port of Botany maintains an off shore wave/swell buoy which records average and maximum height of waves and average period wave in ten minute periods. (Attachments 5 & 6) The buoy, in position 34° 02.6'S 151° 15.0'E, is situated 3.16 miles from,the anchorage position of the "Kouris". The record of wave height and period reflects the change in wind conditions experienced. When the ship anchored at 1142 the average swell height was approximately 1.15 metres with maximum height of under 2 metres. From 1545 onwards the swell height started to increase so that from 1900 to 2330 the average swell height was in the region of two metres with peaks of 3 and sometimes 4 metres. The wave period increased also. From 2330 onwards the swell height increased rapidly to average more than 3 metres with peaks of between 5 and 7 metres. Between 0310 and 0320 25 July the average swell height was 4.22 metres with maximum swell heights of 7 metres.

The South Head Look-Out station, manned by officers of the Maritime Services Board, records the wind and weather conditions for each hour. The log book for 25 July shows that at 0000 hours the wind was westerly at 13 knots with showers and poor visibility. At 0010 a specific entry was made under "remarks" noting southerly winds at 35 knots, there-after to 0500 hourly observations were recorded as south (south southeast at 0200) 30 to 40 knots with showers or rain and poor visibility.

Between 1500 23 July and 0630 25 July the Sydney Bureau of Meteorology issued nine separate strong wind or gale warnings for New South Wales coastal waters. These warnings were broadcast to shipping through Sydney Radio on VHF channel 16 and medium frequency radio, and repeated routinely as is usual for weather and navigation warnings (Appendices). The Bureau also issued seven ocean forecasts over this period, which also were broadcast by VHF and MF telephony and radio telegraphy.

During the night of 24/25 July three ships were anchored to the north of Sydney Harbour off Long Reef. At 0240 one of the ships weighed anchor and put to sea. At 0320 the Hong Kong registered bulk carrier "Broompark" reported to Sydney Port Control that the ship was dragging anchor. Subsequently the ship reported that it was having difficulty starting its engines and that there was another ship, the Korean registered "Captain Bougainville", dragging anchor from the south towards the "Broompark". Both these ships eventually weighed anchor and put to sea without mishap. The master of the "Captain Bougainville" reported that while at anchor his ship was rolling l0° to 15° and was pitching heavily into head seas and swell.

The tanker "Stolt Azalea" also anchored off Bate Bay noted protest 1 with regard to the weather conditions experienced that night. At 0000 25 July the officer of the watch aboard the "Stolt Azalea" recorded the wind as southerly force 8 (34-40 knots), in the ship's log book. At 0400 the estimation of the wind force was entered as force 9 (41-47 knots). At 0700 it was observed that the ship was dragging anchor. At 0825 the master decided to put to sea and the anchor was weighed at 0905. Damage was observed to the deck plating in the area of the chain stopper and it was observed that one anchor fluke was missing.

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1 A protest is a declaration, made before a notary public, by the master of a ship when damage may have been caused to his ship or the cargo. The object is to record promptly and in an authentic form the circumstances under which the damage occurred.

OBSERVATIONS AND ANALYSIS

INTRODUCTION

The "Kouris" had been boarded on three occasions by surveyors of the Department of Transport and Communications since April 1988. On 27 April and 8 October 1988 inspections, known as Port State Control inspections, were carried out under the provisions of the Safety of Life at Sea Convention 1974. Also on 8 October and again on 19 November Tanker Surveillance inspections were completed under a voluntary scheme conducted in Australian ports. None of these inspections had revealed any deficiency of significance.

On inspection by the investigating officers the "Kouris" was found to be well maintained. The remaining anchor cable was visually inspected and it was found that both cables had parted at stud links, the starboard cable some 21 metres from the anchor, and the port cable approximately 16 metres from the anchor. The end stud links on each cable showed no undue wear down and did not appear distorted in any way. The remainder of the cable appeared to be in good condition. The chain locker was dry with a minimum amount of mud in the bottom. The windlass appeared to be well maintained.

Extensive bottom damage had been sustained by the ship with major damage to the rudder and one blade of the propeller. There was no apparent damage however, to the internal tanks or their supports.

All interviews were conducted in English, all those interviewed appeared to co-operate fully with the inquiry, and except for the reservations noted below the interviewees appeared to answer the questions fully and frankly. The various times quoted can be taken as approximate only as all those interviewed were uncertain of times and there was no independent record of time.

The investigators did however note, a number of discrepancies. The chief mate "could not remember" the master visiting the bridge during the evening watch of 24 July. The second mate's recollection that the radio was either turned off or the volume turned right down at and after 0000 25 July was contrary to the recollection of the seaman lookout and the gas engineer. It is quite normal to have a domestic radio on under such circumstances and the investigators only concern was that the volume of music may have been such that the VHF and MF receivers could not be heard. The second engineer's description of the attempts to start the engine is apparently at variance with the chief engineer's statement. He was also unsure of times, however his general description of events appears to be logical.

These discrepancies may be put down to possible language difficulties and nervousness at the unfamiliar circumstances of the investigation. However the investigators are cautious of taking sections of individuals' accounts at face value.

The officers and crew of the "Kouris" had been involved in the discharge routine of the ship. This would have involved the master and officers in prolonged hours of duty. The second mate stated that he went to bed immediately after his evening meal, and felt well rested when he relieved the chief mate at a little before midnight. Both the master and chief engineer had time in which to rest after the ship anchored.

THE ANCHORAGE AND THE ANCHOR WATCH

The tidal conditions in Bate Bay have been considered and any effect as a factor in this investigation is considered to be minimal.

The sailing directions for the local area states that Bate Bay ".. is exposed and of no use as an anchorage." The "Kouris" however anchored outside the bay on a sandy bottom to the east of a line between Port Hacking Point and Cape Bailey in an area recommended to Captain Schluchter by the previous master.

The anchorage off Bate Bay is relatively sheltered from winds between north, through west to south southwest and is probably no better or worse than any other open anchorage on the New South Wales Coast. Surveys by the Public Works Department of New South Wales, Coastal Branch, reveals the sea bed as being mostly sand but with extensive areas of rock shelf extending from Merries Reef seaward about 800 metres and toward Osborn Shoal. Osborn Shoal is also a rock shelf. Between the extremities of the rock shelves off Merries Reef and Osborn Shoal there is a gap of about 300 metres, which also has rock outcrops.(Attachment 7) The nautical chart of the area, Aus 198 "Botany Bay and Port Hacking" on a scale of 1:25000, shows the symbol for rock around the peripheries of Merries Reef and running southwest. It also shows Osborn shoal as a rock outcrop.(Attachment 1)

When the ship anchored the westerly wind was blowing off shore at about 15 knots. Under these conditions the anchorage was safe. Approximately six shackles (165 metres) of the eight shackles available on the starboard anchor were used. This put the ship's bridge between 190 metres and 215 metres from the position of the anchor.

Both Officers maintained a watch on the anchor position by radar alone, they did not use any transit marks or visual bearings. The ship was just under 1.5 miles from Port Hacking Point and just over a mile from the point of land north east of Merries Reef used by the second mate to fix the ship's position. The best range to keep a close watch on the ship's position would have been the 1.5 mile range, or failing that, the 3 mile range.

In his first interview the second mate stated that he used the six and twelve mile ranges to maintain a check on the anchor position. At a subsequent interview he stated that during the morning of 25 July he used the 3 and 6 mile ranges. Radar range is measured from the centre of the screen and therefore on a radar screen of 300mm diameter, when on the six mile range each mile corresponds to 25 mm of radius, and the movement of the ship over 1 cable (185 metres) would correspond to 2.5 mm, and on the three mile range 5 mm.

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2 Australia Pilot Volume II, Sixth Edition 1982 , HMSO

Given the proximity of Cronulla it is highly probable that at least one set of transit marks were available by day and night. The ship was also equipped with bridge wing repeaters and both Glaisher Point and Cape Bailey lights were visible as dedicated navigation aids as well as other prominent features and lights within Cronulla. The bridge wing repeaters were not used.

The "Kouris" was equipped with two Hall stockless bower anchors each of approximately 2.130 tonnes, each attached to 8 shackles (220 metres) of 40 millimetre diameter high tensile steel (K2) stud chain with a nominal breaking load of 91.00 tonnes, linked by Kenter joining shackles. The "Kouris" anchored in approximately 25 metres of water on a sand holding ground with approximately 165 metres of cable between the hawse pipe and the anchor. The position of the anchor was approximately 300 metres from the rock shelf extending from Merries Reef. The British Admiralty recommends that in such a depth of water six shackles (165m) of mild steel cable or eight shackles of "K2" cable should be used, being lighter for any given strength3. Assuming a vertical distance from the hawse pipe to the sea bed of 32 metres, when the cable was "up and down" the ship's bridge would have been some 195 metres from the actual anchor position, and when the chain was bar tight the distance from the bridge to the anchor would increase by 29 metres to approximately 220 metres. (Attachment 8) In such a depth of water the anchor cable would make an angle of about ll° to the horizontal, reducing the holding power by approximately 55%.4

Sand is considered a good holding ground. The "Kouris's" anchor should have had an approximate holdin power of 8.5 tonnes on hard sand, educed to 4.7 tonnes by the 11° angle made by the taut cable.

Allowing for the trim of the ship and deflection of the wind by the forecastle with the ship lying head to wind, the windage area of the "Kouris" is estimated as approximately 100 square metres . A 36 knot wind would exert a steady horizontal thrust of about 2.2 tonnes, while a 50 knot wind would exert about 4.2 tonnes6. Ships however move at anchor, most significantly yaw and sway, increasing the windage from the minimum. With the wind 30° on the bow, the effective windage on the "Kouris" would be increased by a factor of 4.5 resulting in a horizontal thrust of 18.7 tonnes in 50 knots of wind. With both ends of the cable immovably fixed, such a force in a wind gust could exert a shock load five times the steady load, and exceeding the nominal breaking strain of 91.4 tonnes.

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3. Admiralty Manual of Seamanship, Vol III (1964), p.289, HMSO
4. Ibid, p 290
5. Admiralty Manual to Seamanship, Vol II, (1967), p.335, HMSO
6. Australian Standard 1170.2-1989 "Minimum design loads on structures: Wind Loads", p.23

It is not practicable to determine exactly where in Bate Bay or when the starboard anchor parted. Assuming that the starboard anchor had been embedded in sand, it is probable that the anchor broke free during a gust and was then dragged until it fouled on the rock shelf extending from Merries Reef. (Attachment 9) Once the anchor fouled on rock, with the anchor stopper in place and the vessel moving at 2 to 3 knots, the cable would come under stress in excess of its breaking strain. When the port anchor was let go the second mate applied the anchor stopper as the windlass gypsy brake was slipping, indicating that the anchor had taken snagged, placing a similar strain on the port cable, causing it to part also. (Attachment 10)

Another possibility is that the cables were weakened in the length of the first shackle. This could arise from fatigue or a weakness in the chain where the stud link may be displaced, possibly through extensive use in mooring, and the breaking strain was reduced below the nominal breaking strain of 91.4 tonnes. There was no indication of such fatigue, nor evidence that the anchors were used extensively in this way. The condition of the cable locker was such that corrosion or some other cause would not seem probable. The cable had not been surveyed since the ship was new. Being a "new ship" within the classification society rules no cable survey was necessary until the second compulsory dry docking in 1993. Bearing in mind the damage reported by the "Stolt Azalea" (p15) cable fatigue is not considered to be the probable cause for the cable parting.

Once the anchors had parted Captain Schluchter was wholly reliant upon the proper operations of the engine and rudder. After the "Kouris" had come into contact with Merries reef with the consequent loss of rudder control the Captain Schluchter's only theoretical option was to put the engines at full speed astern and hope that the ship would come up with its stern into the wind and clear the bay. No criticism is made that he did not do this but rather attempted to manoeuvre the ship using the engines. The decision on the best course of action in those circumstances and under those conditions could only be made at the time.

WEATHER AND SEA CONDITIONS

While the strong wind warnings referred to an area south of Bate Bay both the Coastal and Ocean warnings were for areas adjacent to the Bate Bay and deteriorating weather conditions could have been expected. Perhaps more importantly the fact that the wind would back if the low pressure moved north of Bate Bay should have been realised and a particular effort should have been made to obtain up to date weather information. This could have been done by using the radio. officer to take scheduled weather broadcasts by wireless telegraphy or by careful monitoring of Sydney Radio.

The routine weather bulletin broadcast at 1148, as opposed to specific strong wind or gale warnings, forecast southerly winds at 30 knots by morning for the Sydney area with increasing sea and swell height. The next scheduled bulletin at 1748 forecast similar conditions.

Before undertaking a voyage the second mate should have completed and ticked all items on a presailing check list, as required by German regulations, by which the ship board routine was managed, including a declaration which stated in English that:

"latest weather reports available".

These weather forecasts would normally be provided by the radio officer. On this occasion the check list was not completed and neither the radio officer, nor any other officer, provided a weather forecast.

The above observations are somewhat academic as no proper attempt was made to record, analyse or consider any weather forecast at any time on 24 or the early hours of 25 July.

The second mate called the master at about 0200 25 July when he became concerned at the freshening wind. The master stated that he observed the weather from the poop deck and he considered that there was no reason to be concerned. The anemograph reading from Mascot Airport shows a lull in the wind between approximately 0208 to 0216 with wind gusts of 31 to 28 knots maximum. Between 0200 and 0220 the wave heights was about 4.25 metres with a maximum height in this period of between 4.77 and 5.39 metres following maxima of 6.81 in the previous hour. The average wave height had increased by 1.5 to 2.3 metres from the time he went to bed at 2200 24 July. The wind gusts and wave height increased in intensity thereafter, but the second mate followed his instructions literally and despite worsening conditions only called the master when the vessel started to drift. It should be noted that during the hours of darkness neither officer went to the bridge wing and both the bridge wing doors remained closed; it is possible that the worsening conditions, particularly after 0200, were not fully appreciated by the second mate.

The investigating officers accept that Captain Schluchter considered his reasons for not going to the bridge as valid, however had he gone to the bridge and discussed the situation more fully he may have realised that the ship was now riding at anchor to a lee shore, in deteriorating wind and sea conditions. In a subsequent submission the master stated that he had in fact given more explicit instructions than those stated at the original interview. What ever the exact words used the investigators are satisfied that the second mate understood what his duties were.

It would be total hindsight to suggest that Captain Schluchter should have put to sea at 0200, but the changed conditions were such that a reassessment of the situation should have been undertaken.

Forecasting of weather is never precise but given the total information availaole it was possible to anticipate a shift in the wind and a deterioration in the weather. The information was not such that any extreme winds were certain but sufficient to put an experienced mariner on guard.

ENGINES

At interview the master stated that it was arranged that all auxiliary machinery required for starting the engine within a time frame of about five minutes should be kept running. The chief engineer stated that he considered the engine to be on normal notice of readiness of half an hour, but the necessary auxiliary machinery was kept running for an almost immediate start as a precaution. As far as the two deck officers were concerned the engines were on the normal notice of between 20 minutes and half an hour, but in fact the engine was apparently on virtually instant stand by.

When called at about 0315 the chief engineer went straight to the engine room and prepared to start the engine. He purged the cylinders, turning the engine on air. The other two engineering staff went to the engine room some minutes later without being called, the motion of the ship being such that it was sufficient to cause concern.

There are discrepancies in the account of events given by the chief and second engineer. The chief engineer maintained that the engine was started and run at 300 rpm on two occasions but failed when the control was switched from local to control room operation. The chief engineer estimated that it took about five minutes from the time of arriving in the engine room to the time he attempted to switch control from local operation to control room operation. It is probable that the first attempt to start the engine did not occur before 0325, followed by an attempted restart after 0330. The chief engineer recalled feeling contact with the ground shortly after the engine was started for the second time.

The second engineer stated that from the time he arrived in the engine room several attempts were made to start the engine. When the first attempt failed he saw that the "Emergency Stop - Overspeed" alarm was showing a red light, which he reset. The chief engineer made a further attempt to start the engine but the air pressure at this time was 10 bars and he had to wait until the pressure increased to 30 bars. The next attempt also failed, and following this the chief engineer went to the control room briefly and when he returned the engine was started successfully, but only ran for a few minutes.

The chief engineer maintained that on his initial inspection there was sufficient air in the bottle, which previous tests showed sufficient capacity for 12 starts. It could not be established how much air was contained in the bottle before the first attempt to start the engine at about 0325 on 25 July. The investigators are satisfied that there was sufficient air pressure to turn the engine at he first attempt.

The chief engineer subsequently submitted that the compressor for the air start bottle was on stand by at all times and that should the pressure in the bottle drop below a predetermined level the compressor would cut in automatically. He felt that it was unlikely that the air pressure was in fact 10 bars as recalled by the second engineer. The air pressure for the air start bottle is maintained by a compressor which automatically cuts in when the bottle pressure falls to 20 bars. The minimum air pressure required to start the engine is 12 bars. The air start bottle does have a line leading to a rec,cing valve which in turn supplies air for the control system. The control system however has its own compressor and air from the start bottle is only used when the control compressor is out of commission. There is no evidence that air pressure could have been lost through the control system.

On 23 August extensive trials were conducted to attempt to simulate the circumstances under which the engines failed. These trials were supervised by the Department of Transport and Communication's Senior Marine Surveyor in Newcastle and assisted by a fellow surveyor. Every combination of control commands, with the exception of the "Emergency stop - Overspeed Alarm unit were tested and no combination resulted in the engine stalling. The engine design was such that a series of safety interlocks protected the engine from any overload and maintained the engine speed at an appropriate level.

There would appear to be five possible explanations with regard to the engine failure:

(i) an intermittent electronic fault that had not appeared previously
(ii) the first failure was due to an electronic malfunction and by the time the second attempt was made the ship's propeller had already fouled Merries Reef
(iii) the "Emergency Stop- Overspeed control" was operative without the Chief Engineer noticing the warning light
(iv) there was insufficient air pressure to start the engine
(v) a combination of the above.

The discrepancy between the second engineer's account of starting the engine and that of the chief engineer can be explained if the chief engineer started the engine soon after arriving in the machinery space at about 0320. It is possible that the second engineer and the engine room rating had not reached the engine room by the time the chief engineer made the first attempt to start the engine. Although the air pressure for starting the engine was probably above 20 bars when the first attempt was made to start the engine, it is possible that the air pressure had fallen as recalled by the second engineer by the time the second attempt was made to start the engine.

Given the circumstances of the "Kouris" at that time, the ship's movement and the urgency of the moment, it is quite possible that either or both air pressure and the overspeed alarm was overlooked.

It is apparent that the failure of the rudder reported at about 0350 was caused by contact with the sea bed in the shoal water off Merries Reef.

SHIP ORGANISATION AND WATCHKEEPING

While the working language aboard was English, the ship used log books common to ships of the Federal Republic of Germany. The column headings in the deck and engine room log books at the time of the incident were in both English and German. The instructions in the preface to the log book were however in German only with no English translation. The preface contains extracts from Regulations relevant to the log book, details of entries to be made, matters relevant to the engine installation and engine room log book, other relevant laws and conventions and the recording of births and deaths. The two previous log books covering the period 1 January to 3 July were also in the same format. The Filipino officers could not understand oral or written German.

It was stated that ships managed by Hartmann Schiffahrts, including the "Kouris" normally carried log books with an English preface containing extracts from the Safety of Life at Sea Convention, the Collision Regulations, Load Line Convention, Standard of Training Certification and Watchkeeping Convention and space for Owner's/Master's supplementary orders. This form of log book was supplied immediately the owners realised that the "Kouris was not carrying such a log book.

Neither Captain Schluchter nor, according to the two mates, the previous two masters of the "Kouris" had issued standing orders or kept any specific night order book. Neither of the two Mates had seen or signed any- standing orders or procedural guidelines under previous Masters, nor had they seen an English preface containing standing orders, aboard the "Kouris". The Company had not issued any specific written standing orders to the ship, however masters were interviewed on taking command and informed and advised of any developments or requirements by circular letter.

Captain Schluchter had issued oral orders and both officers stated that they understood their duties. These verbal orders were supplemented by night orders either written on the chart, loose paper, or delivered orally.

It appeared to the investigating officers that the ship was operated by the master, chief engineer and gas engineer and the chief mate could not be considered a "second in command". The junior officers (including the chief mate and second engineer) and crew fulfilled only routine roles. In the opinion of the investigating officers this was due to the difference in nationality and that the common language aboard was not the native language of any of those aboard, circumstances under which the chief mate had served since 1985. In the emergency that arose the master, and to a degree the chief engineer, appeared to consider that they had to act alone, and could not rely on any support. There was a failure of general communication from the master down and from the officers up, and, in this instance specifically in regard to engine readiness, the gas freeing operation, weather reports and the weather situation.

The chief and second mate, despite their years served at sea, appeared to lack the level of experience expected. Neither seemed concerned to obtain and update weather forecasts, despite being in an exposed anchorage. Their reliance on radar only to monitor the ship's position when anchored relatively close to shoal water, and their failure to use transit marks, which would give the quickest indication of the ship dragging anchor or drifting, also suggests an ignorance of practical seamanship skills.

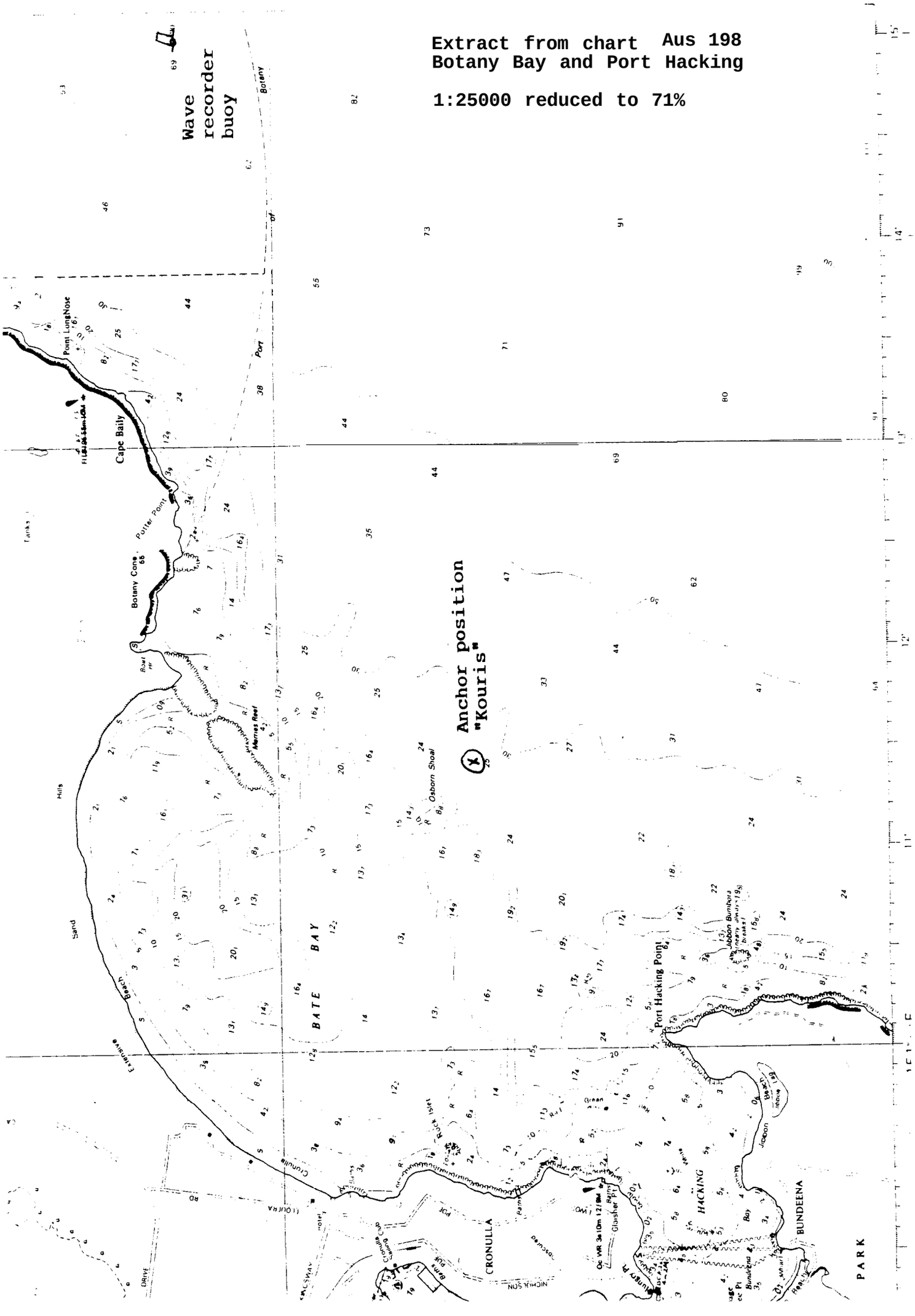
FINDINGS

The Cypriot liquefied gas carrier "Kouris" came into heavy bottom contact in shoal water off Merries Reef at about 0335 on 25 July 1989, disabling the ship's rudder and sustaining extensive bottom damage. Through being unable to steer and manoeuvre normally as a result of the rudder damage the ship grounded on Cronulla Beach at approximately 0438. The cause of the contact with Merries Reef and the subsequent grounding are as follows:

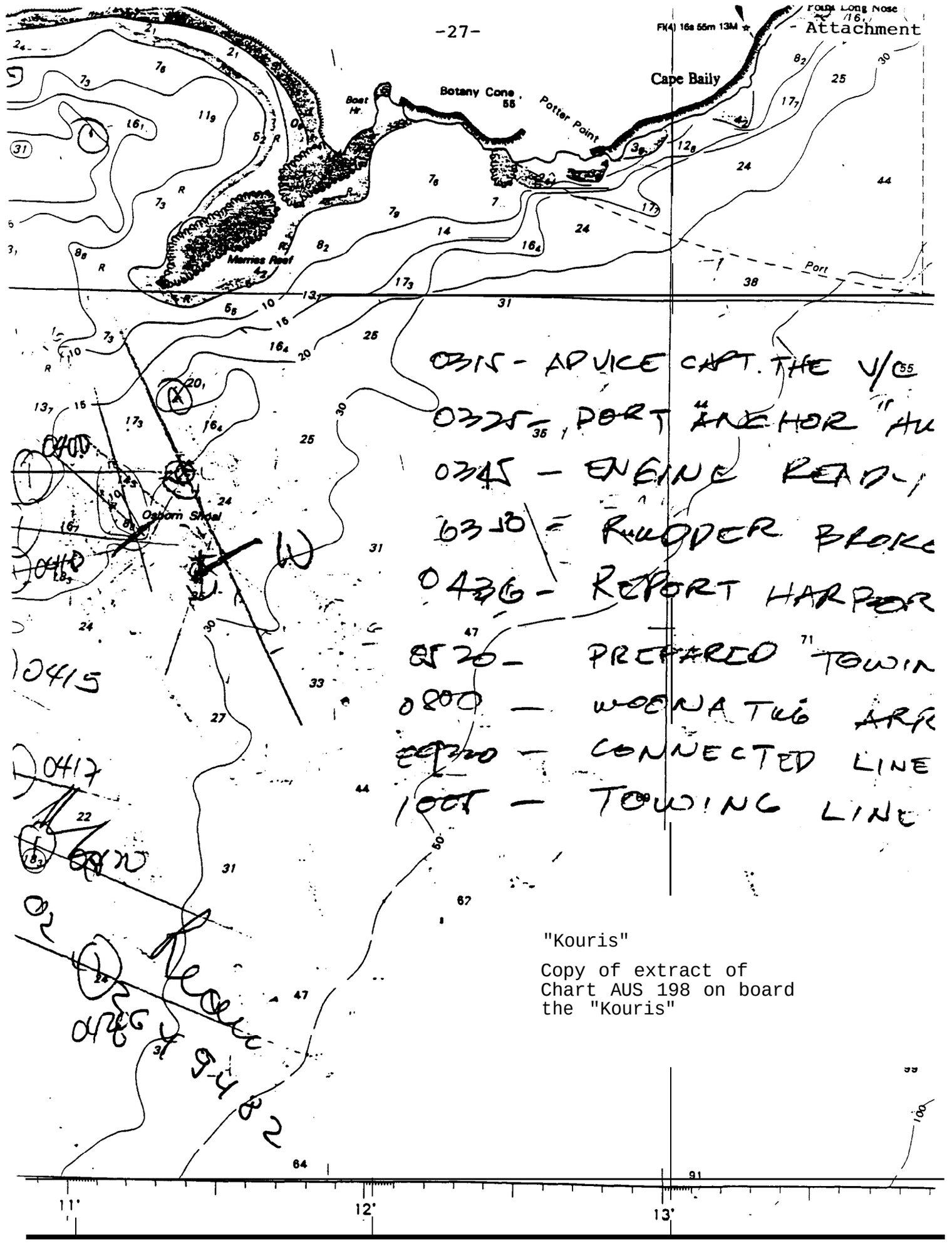
1. the starboard anchor carried away under a shock load in excess of its nominal breaking load.
2. the failure to maintain the engine in a running condition when first started between approximately 0325 and 0330; this failure may have been due to either:
   (a) an intermittent failure in the engine control system, or:
   (b) human error in failing to recognise the need to cancel the "Emergency Stop - Engine Overspeed" control and/or ensure sufficient air supply to start the engine.
3. the failure of the port anchor cable at approximately 0327 through the sudden load put on a short scope of cable when the cable stopper was applied with between 2 and 3 shackles paid out in approximately 20 metres of water.

Other factors contributing to the grounding were

4. The failure by the Master, Chief Officer and Second Officer to obtain weather forecasts and strong wind and gale warnings.
5. The failure of the Master at 0200 25 July to appreciate the significance of the wind shift and that the ship was anchored to a lee shore.
6. The general lack of communication and understanding of responsibility by the officers aboard.
7. Captain Schluchter used six shackles of cable rather than the eight shackles theoretically required in 25 metres of water. Had he used eight shackles he would have used the total length of cable available to him and had none in reserve. The investigating officers are satisfied that the use of six shackles under the conditions prevailing on the afternoon of 24 July was reasonable.
8. In not allowing the crew to leave the ship Captain Schluchter reduced the risk of injury to the crew and ensured that the ship had sufficient crew when the llKourislW refloated.
9. In completing the inerting operation of the cargo tanks the risk of fire or explosion was minimised, thus protecting life and property.

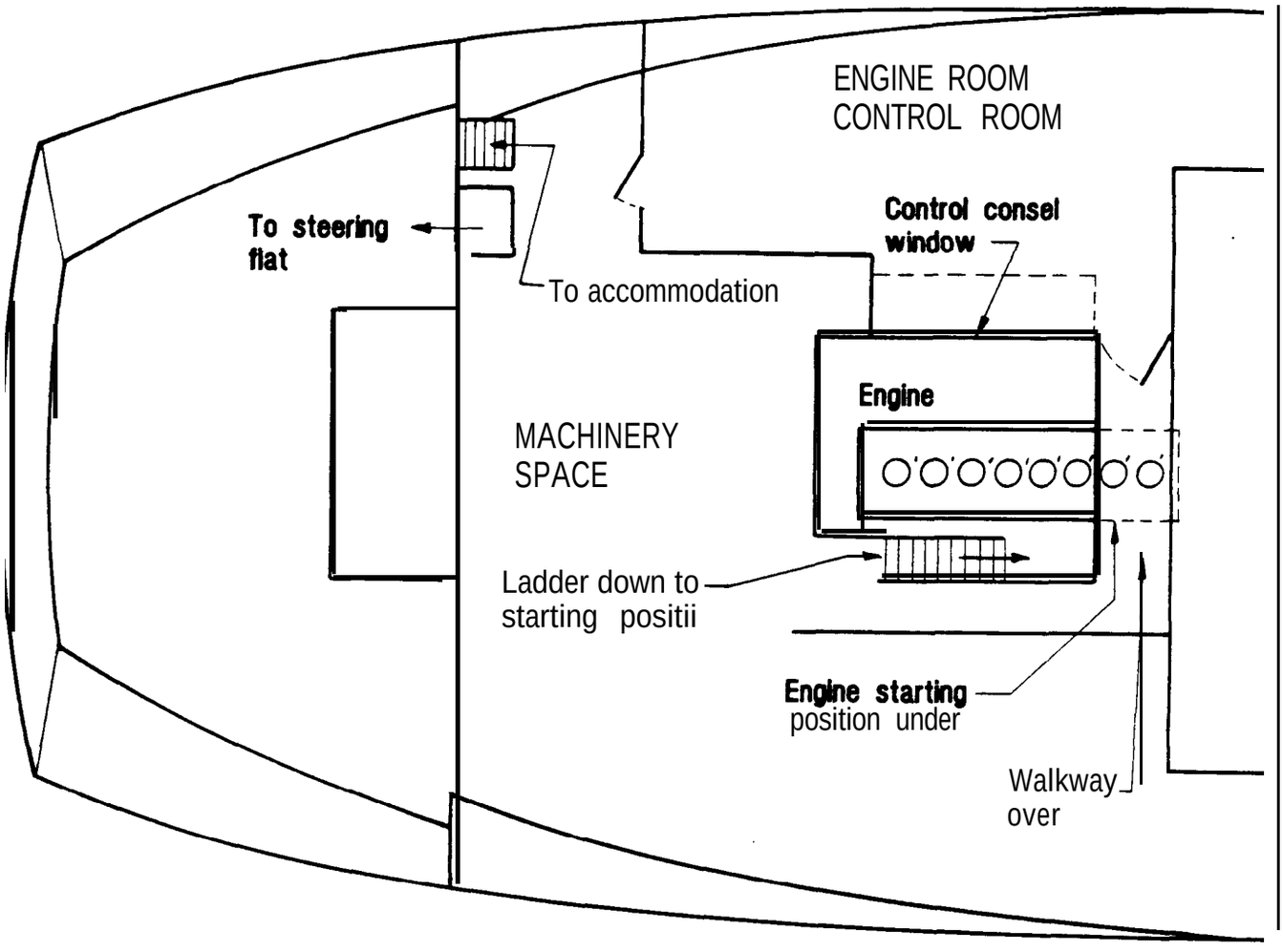

Extract from chart Aus 198
Botany Bay and Port Hacking
1:25000 reduced to 71%
Wave recorder buoy
Anchor position "Kouris"
Point Lung Nose
Cape Baily
Potter Point
Botany Cone
Osborn Shoal
Port Hacking Point
BATE BAY
CRONULLA
HACKING
BUNDEENA
PARK

- Attachment



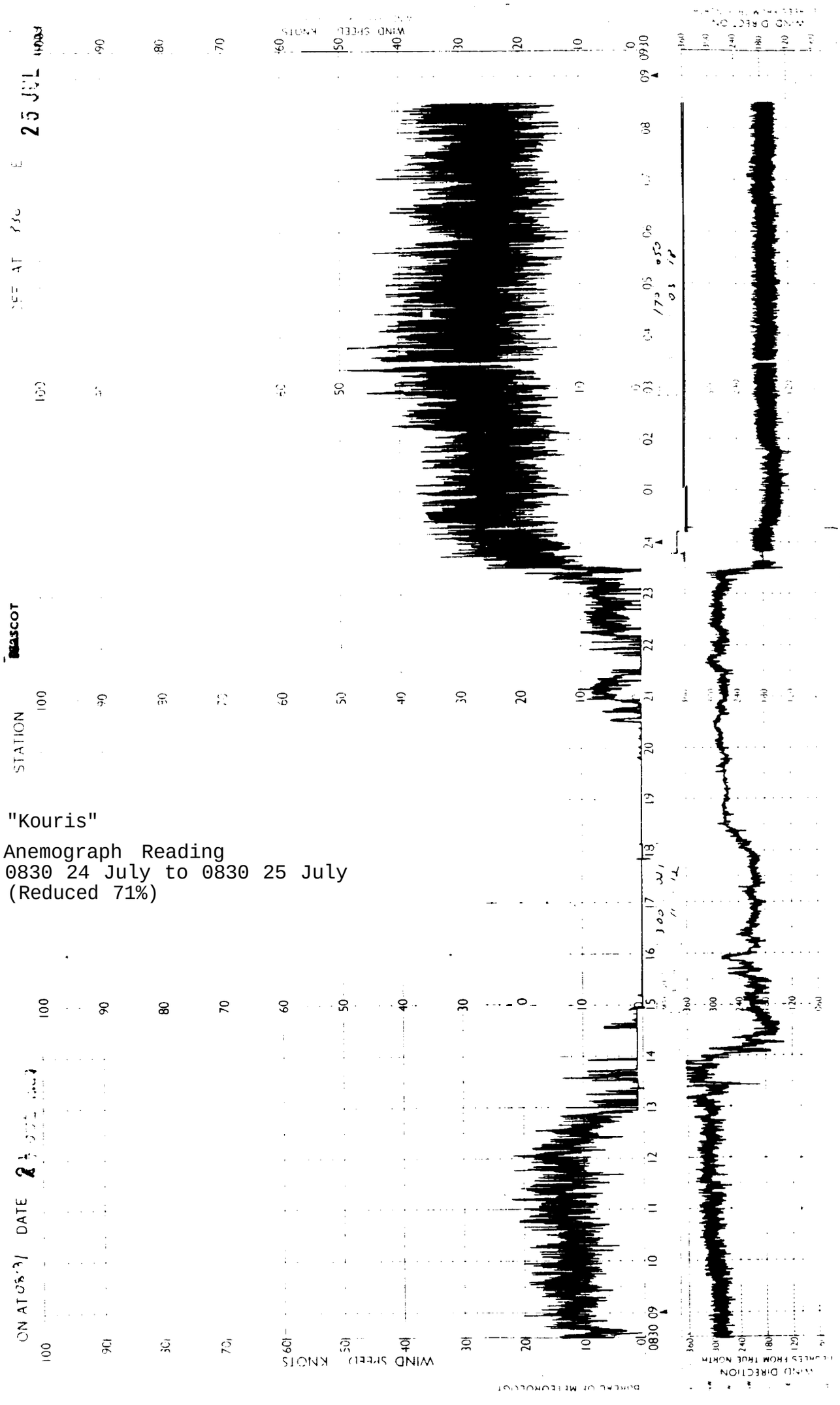
orn, Hydrographer R.A.N.

"KOURIS"



SCHEMATIC DRAWING OF ENGINE ROOM

(Scale **=MOO -** approx **)**



"Kouris"

Anemograph Reading
0830 24 July to 0830 25 July
(Reduced 71%)

ATTACHMENT 5

BOTANY PORT APPROACH WAVE RECORDER BUOY

Offshore Buoy Pos'n 34° 02.6'S 151° 15.0'E

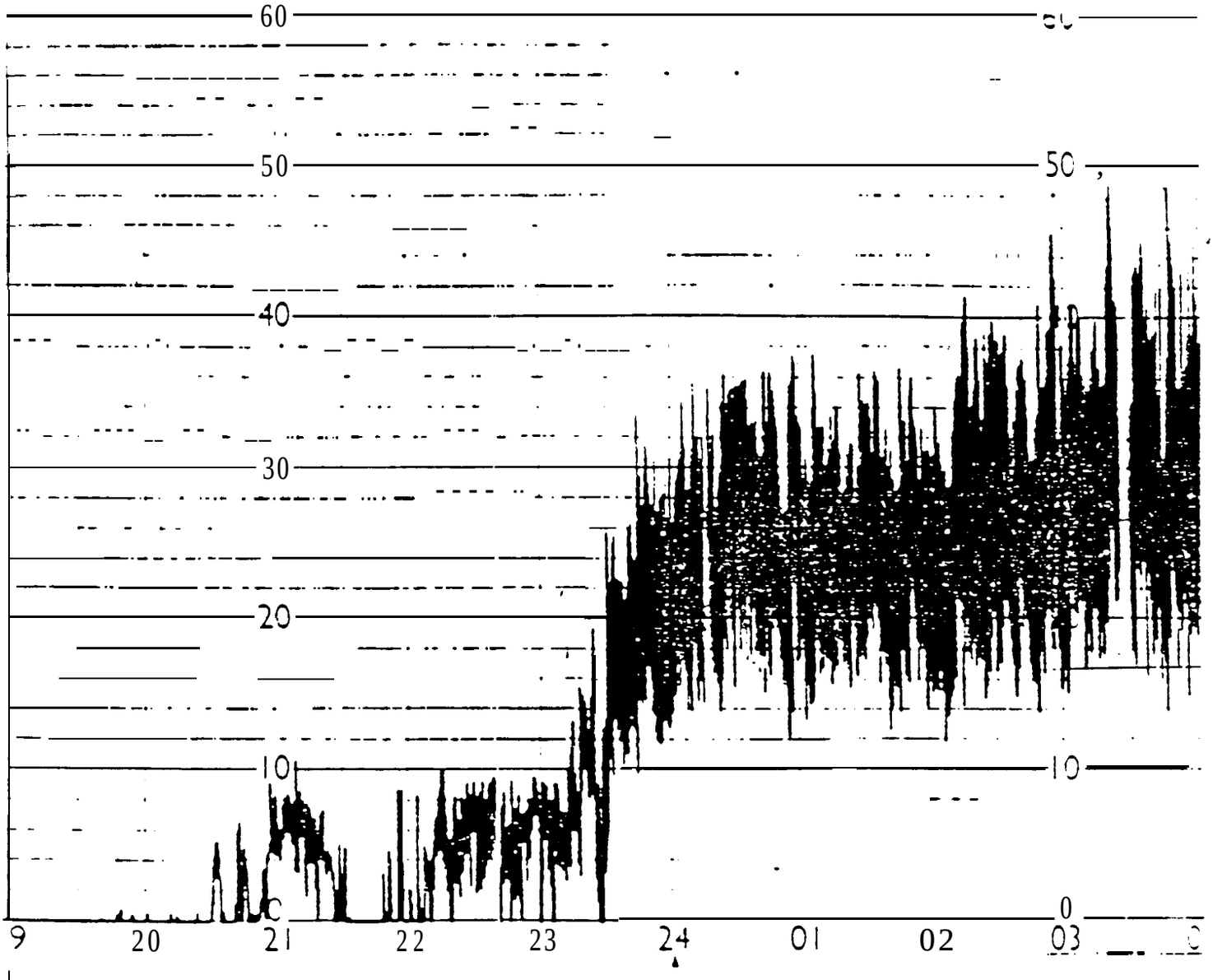
Time 24/7	ht. max	ht. av	Tp
11:00	2.00	1.12	6.64
11:10	2.00	1.12	6.26
11:20	1.83	1.10	9.24
11:30	1.75	1.12	5.53
11:40	1.99	1.15	6.63
11:50	1.93	1.13	6.69
12:00	1.78	1.05	6.62
12:10	1.73	1.03	6.63
12:20	1.86	1.02	6.75
12:30	1.85	1.02	6.54
12:40	1.75	1.08	6.69
12:50	1.75	1.13	7.04
13:00	1.74	1.18	7.16
13:10	2.27	1.14	7.19
13:20	2.27	1.13	9.81
13:30	1.94	1.11	7.25
13:40	1.95	1.08	6.87
13:50	2.0s	1.11	6.83
14:00	2.05	1.13	7.37
14:10	1.84	1.14	7.53
14:20	1.86	1.11	7.13
14:30	1.85	1.14	7.47
14:40	1.80	1.11	8.27
14:50	1.90	1.15	9.22
15:00	1.90	1.13	8.82
15:10	1.71	1.17	8.66
15:20	1.80	1.23	8.51
15:30	1.80	1.1')	9.27
15:40	2.00	1.29	9.42
15:50	2.00	1.39	9.37
16:00	2.13	1.43	9.53
16:10	2.23	1.41	9.51
16:20	2.23	1.41	8.41
16:30	2.41	1.53	8.46
16:40	2.50	1.59	9.00
16:50	2.50	1.60	8.80
17:00	2.83	1.64	8.23
17:10	2.83	1.69	8.13
17:20	2.76	1.77	8.26
17:30	2.76	1.71	8.64
17:40	2.35	1.71	8.59
17:50	3.35	1.84	8.40

Time 24/7	ht max	ht av	Tp
18:00	3.60	1.96	8.85
18:10	3.60	1.79	9.05
18:20	3.34	1.75	9.19
18:30	3.15	1.84	9.58
18:40	3.15	1.87	9.59
18:50	3.23	1.87	9.47
19:00	3.23	1.80	9.64
19:10	2.66	1.02	9.73
19:20	2.66	1.82	9.07
19:30	2.90	1.83	9.85
19:40	3.11	2.03	9.88
19:50	3.23	2.19	9.87
20:00	4.02	2.24	9.71
20:10	4.05	2.09	9.55
20:20	2.93	1.83	9.53
20:30	4.47	1.91	9.63
20:40	4.47	1.93	9.74
20:50	3.00	2.10	9.65
21:00	3.60	2.12	9.63
21:10	3.60	1.83	9.86
21:20	3.02	1.89	9.52
21:30	3.02	1.93	9.67
21:40	2.94	2.04	10.05
21:50	2.94	1.95	9.63
22:00	3.03	1.79	9.19
22:10	3.92	2.11	9.17
22:20	3.92	2.03	9.37
22:30	2.76	1.83	9.66
22:40	3.13	2.01	9.64
22:50	3.19	1.95	9.80
23:00	3.47	1.94	9.82
23:10	3.47	1.98	9.63
23:20	3.16	2.00	9.43
23:30	3.36	2.19	9.17
23:40	3.35	2.25	8.85
23:50	3.43	2.37	9.14

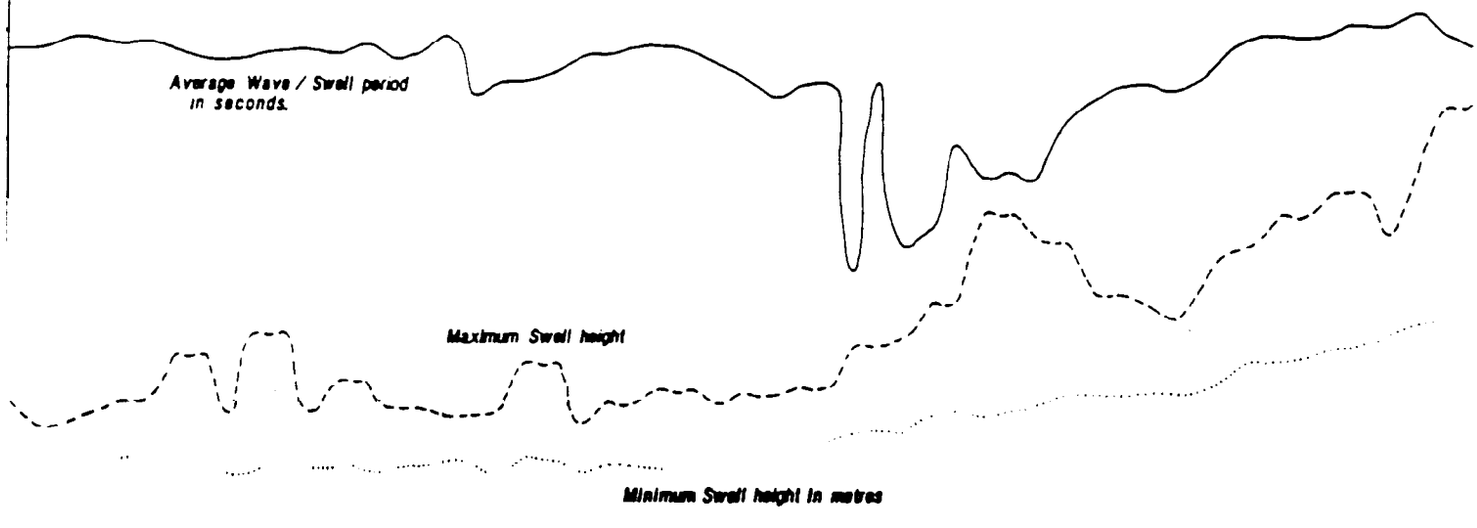
Time 25/7	ht max	ht av	Tp
00:00	3.44	2.49	9.15
00:10	4.29	2.63	5.65
00:20	4.29	2.68	9.19
00:30	4.49	2.55	6.17
00:40	5.09	2.94	5.45
00:50	5.09	3.03	8.05
01:00	6.81	2.94	7.39
01:10	6.01	3.07	7.53
01:20	6.23	3.13	7.34
01:30	6.23	3.33	8.45
01:40	5.23	3.37	8.83
01:50	5.23	3.3;	9.10
02:00	5.07	3.41	9.11
02:10	4.77	3.33	9.04
02:20	5.39	3.33	9.23
02:30	6.04	3.76	9.72
02:40	6.22	4.03	10.01
02:50	6.73	3.95	10.05
03:00	6.79	4.06	10.02
03:10	7.17	4.21	10.12
03:20	7.17	4.23	10.22
03:30	6.30	4.40	10.23
03:40	7.66	4.69	10.49
03:50	3.74	4.69	10.01
04:00	0.74	4.64	9.84
04:10	6.71	4.53	10.20
04:20	7.35	4.83	10.56
04:30	9.33	4.84	10.42
04:40	9.33	4.60	10.34
04:50	a.71	4.95	10.40
05:00	a.71	5.13	10.23
05:10	7.70	4.94	10.40
05:20	9.00	4.92	10.23
05:30	9.00	5.45	10.10
05:40	8.63	5.75	10.60
05:50	lo.43	5.57	10.52
06:00	10.48	4.99	9.91

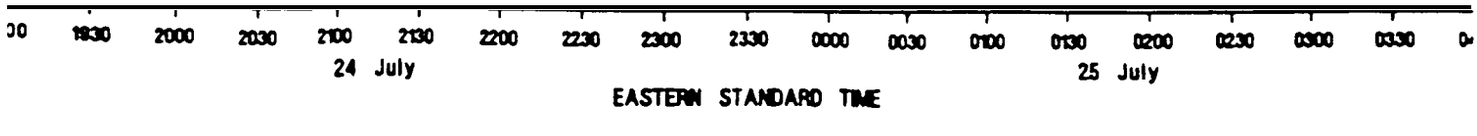
ATTACHMENT 6

COMPARISON OF ANEMOGRAPH AND WAVE RECORDER BUOY DETAILS



PORT OF BOTANY WAVE SYSTEM
(RECORDED EVERY TEN MINUTES)

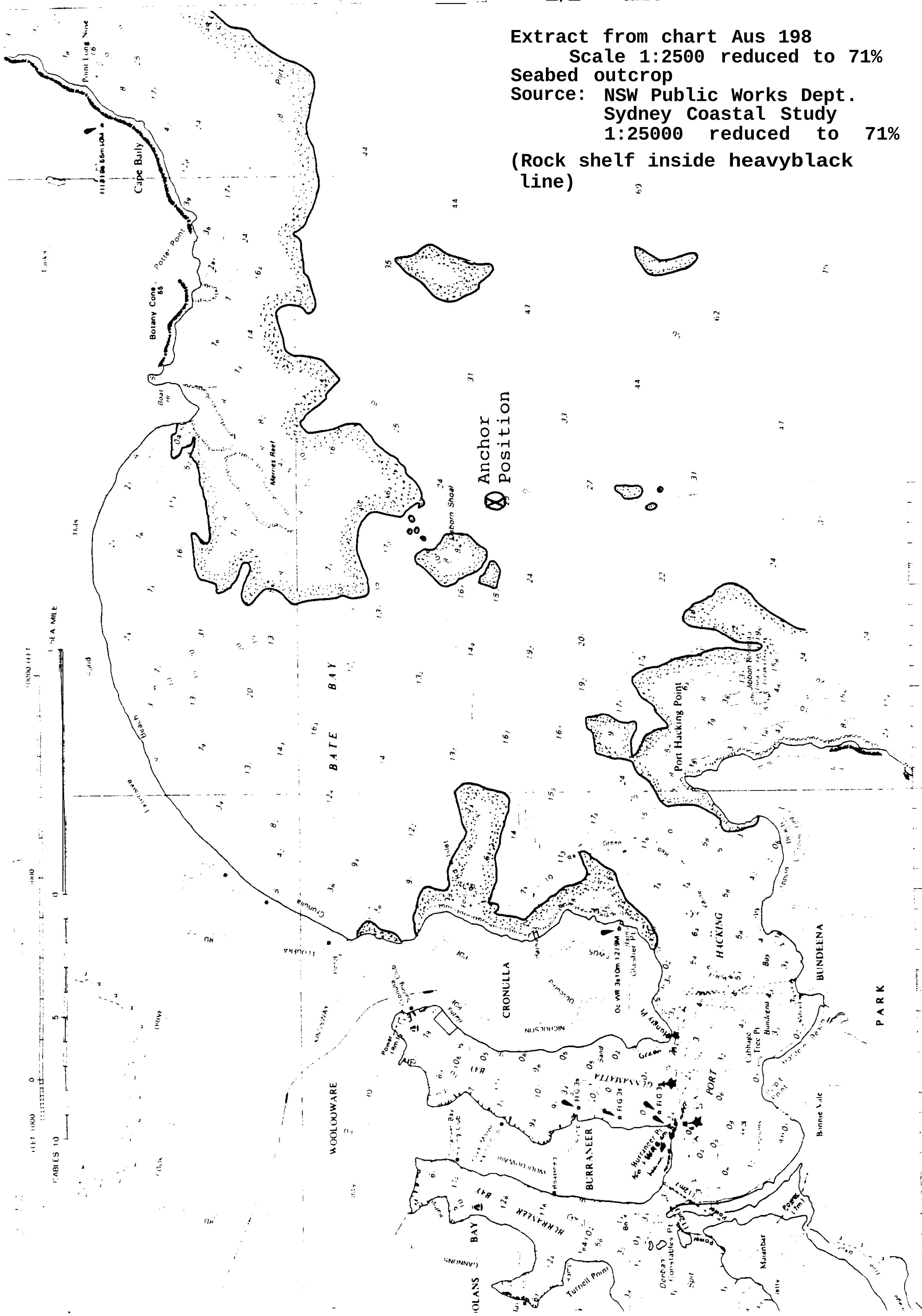




EASTERN STANDARD TIME

"Attachment 7

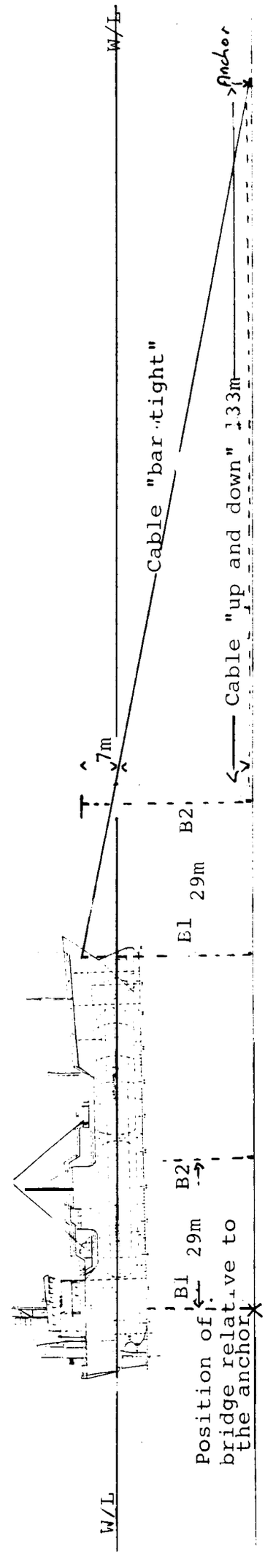
Extract from chart Aus 198
Scale 1:2500 reduced to 71%
Seabed outcrop
Source: NSW Public Works Dept.
Sydney Coastal Study
1:25000 reduced to 71%
(Rock shelf inside heavyblack line)



"Kouris"

Scope of anchor chain

(Bl - B2 Movement of bridge)



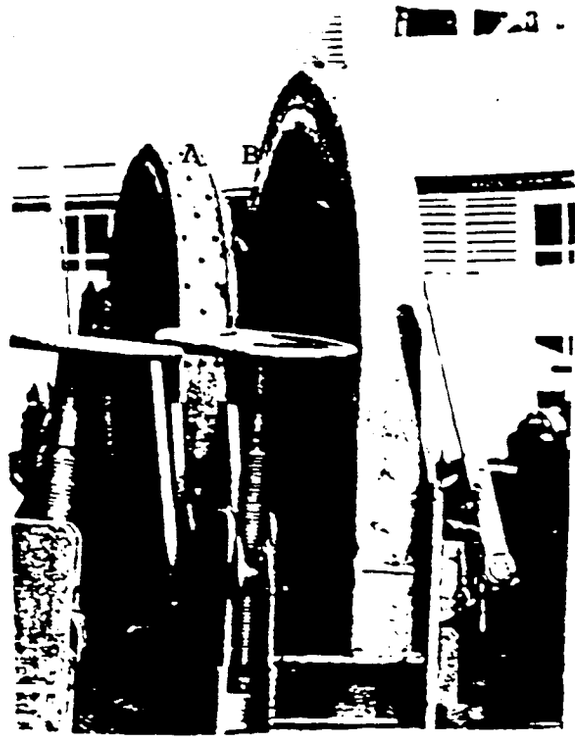
POSSIBLE DRIFT OF "KOURIS"

From chart Aus 198 with outline of rock ledge from chart by NSW Public Works Dept

ANCHOR CABLE (PORT), CABLE GYPSY, ANCHOR STOPPER

PORT ANCHOR CABLE
END LINK

STARBOARD ANCHOR
BREAKBAND (A) AND
GYPSY (B)



ANCHOR STOPPER (X)

Attachment 11

PARTICULARS OF SHIP

Name	Kouris
Port of Registry	Limassol
Flag	Cypriot
Official Number	708528
Call Sign	P3UW2
Classification Society (Number)	Germanischer Lloyd (30602)
Class	+lOO A4E3
Length overall	81.95 metres
Registered length	74.99 metres
Breadth	13.60 metres
Moulded depth	9.30 metres
Summer Freeboard	2.165 metres
Maximum draught	7.17 metres
Gross tonnage	2935
Registered tonnage	881
Total cargo volume	3260.65 cu metres
Engine	MWM 8 cylinder
Power	2573 kW
Keel laid	1982
Year of Launch	1983
Registered Owners	Maxine Shipping Co Ltd, Limassol

Certificates valid to:

Cargo Ship Safety Construction	30.11.93
Cargo Ship Safety Equipment	8.3.90
Cargo ship Safety Radiotelegraphy	13.3.90
International Load Line	8.3.93
Fitness for Liquid Gases in Bulk	30.11.93
Oil Pollution Prevention	30.11.93
Noxious Liguid	31.5.89

APPENDICES

WFATHER INFORMATION AND FORECASTS

Appendix 1

WEATHER INFORMATION

Routine weather broadcasts are issued by Sydney Radio (Call sign VIS) by radio telephony on VHF and Medium frequency radio at 1148 (0148 UTC), 1748 (0748UTC), 0348 (1748UTC), 0548(1948UTC) and 0748 (2148UTC) on the following frequencies:

	Calling Channel/Frequency	Listening Channel/Frequency
VHF	16	67
MF	2182kHz	2101kHz
MF	4125kHz	4428.7kHz

Strong wind and gale warnings are broadcast on receipt of the message by telex from the Bureau of Meteorology and repeated after the first "silence" period, and thereafter at 48 minutes past every odd hour.

Routine broadcasts by wireless telegraphy are issued on 500kHz at 1918 (0918UTC) and 0848 (2248UTC). Gale warnings are issued on receipt, repeated after the first silence period thereafter and repeated every two hours at 18 minutes past every even hour.

Weather forecasts for high seas areas are transmitted through H+MAS Harman (VIX), Canberra, every 4 hours commencing at 0330.

In addition to these broadcasts there is also a facsimile forecast service through the Bureau of Meteorology, Melbourne. Between 1500 23 July and 0630 25 July the Bureau of Meteorology issued 9 strong wind or gale warnings for New South Wales Coastal waters. These warnings are broadcast by Sydney radio through their coast station at La Perouse, Sydney on VHF Channel 16 and Medium Frequency radio. They also issued seven ocean forecasts over this period, which also were broadcast by VHF and MF radio and by radio telegraphy.

The areas affected by these coastal forecasts were areas south of Port Kembla and the ocean forecasts for areas to the east and south of Botany Bay.

Appendix 2

WEATHER FORECASTS

Coastal weather forecasts issued through Sydney Radio extend from the NSW/Queensland border to Gabo Island and are divided into seven areas, which extend 60 miles to seaward. Bate Bay is covered by two areas of the Coastal forecast, Sydney Coastal Waters and Illawarra Coastal Waters, the boundary between the two areas being Port Hacking.

At 1748 on 23 July the following coastal weather forecast was broadcast through Sydney Radio:
Sydney Coastal Waters, Broken Bay to Port Hacking
Warnings:nil
Wind: Northeasterly, tending southeasterly 20 knots on Monday
Sea: 1 metre rising to 2 metres
Swell: 1 metre
Weather:Patchy rain easing to showers.

Illawarra Coastal Waters, Port Hacking to Ulladulla
Warning: Strong wind warning current, south of Port Kembla
Wind: Northeasterly 15/20 knots, turning south to southeast and increasing to 20/30 knots tomorrow
Sea: 2 metres rising to 3 metres in southeasterly
Swell: 1 metre rising to 2 metres in southeasterly
Weather:patchy rain easing to showers.

A further forecast was broadcast at 0348,0548 and 0748:
Sydney Coastal Waters, Broken Bay to Port Hacking
Warnings:nil
Wind: Tending southwest to southeast 15/20 knots
Sea: 1 metre rising to 2 metres
Swell: 2 metres
Weather:Patchy rain easing to showers.

Illawarra Coastal Waters, Port Hacking to Ulladulla
Warning: Strong wind warning current, south of Port Kembla
Wind: Southwest 15/20 knots, increasing to 20/30 knots south of Port Kembla
Sea: 2 metres rising to 3 metres
Swell: 2 metres
Weather:rain easing to showers.

At 1148 Sydney Radio issued the following forecast:
Sydney Coastal Waters, Broken Bay to Port Hacking
Warnings:Strong wind warning current
Wind: West to southwest to 20 knots at first turning southeasterly by tonight and increasing 30 knots by the morning
Sea: 1 metre rising to 2 metres to 3 metres by the morning
Swell: 1 metre rising to 2 metres tomorrow morning
Weather:Rain periods.

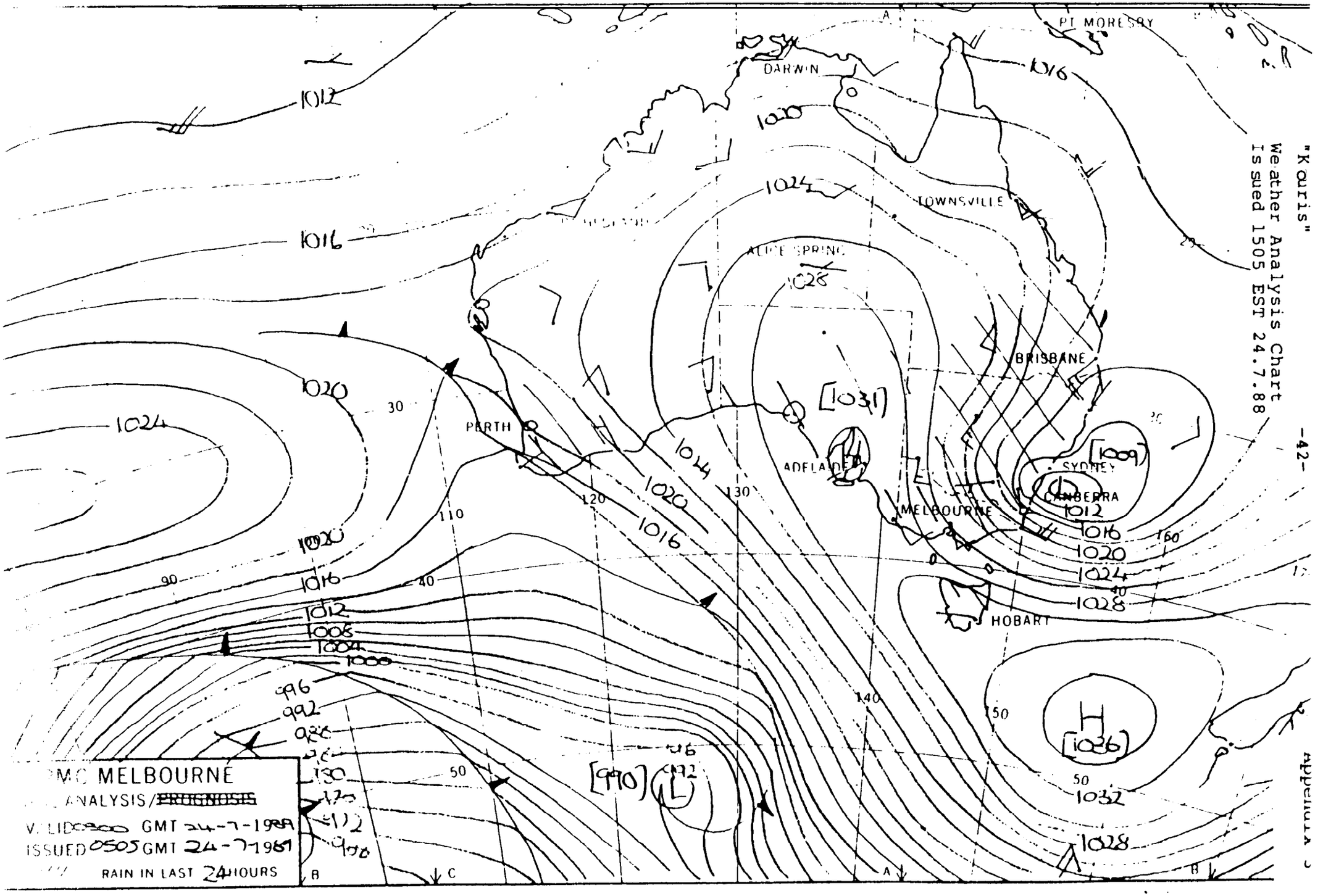
Illawarra Coastal Waters, Port Hacking to Ulladulla
Warning: Strong wind warning current
Wind: Southwest to 25 knots, turning south to southeast tonight and increasing to 30 knots
Sea: 2 rising to 3 metres
Swell: 2 metres
Weather:rain periods.

Appendix 2

Synoptic Situation: 2100 24/07/1989
High in south Tasman Sea. Low Centre just south of Nowra.
New South Wales Coastal Waters:
Warning: A strong wind warning is current south of Port Stephens
Wind: Westerly to 15 knots in north, southwest to 20 knots central, south to southeast to 30 knots in south becoming south to south east throughout overnight, 30 knots up to mid north coast and 25 knots northward.
Sea: 1 metre in north rising 2 to 3 metres in south and extending northward slowly.
Weather: rain south from the Hunter. Showers developing northward tomorrow.

The forecast for 1748 24 July:
Sydney Coastal Waters, Broken Bay to Port Hacking
Warnings:Strong wind warning current
Wind: West to southwest to 20 knots at first turning southerly tonight and increasing 30 knots by the morning
Sea: 1 metre rising to 2 metres to 3 metres by the morning
Swell: 1 metre rising TV 2 metres tomorrow morning
Weather: Showers developing.

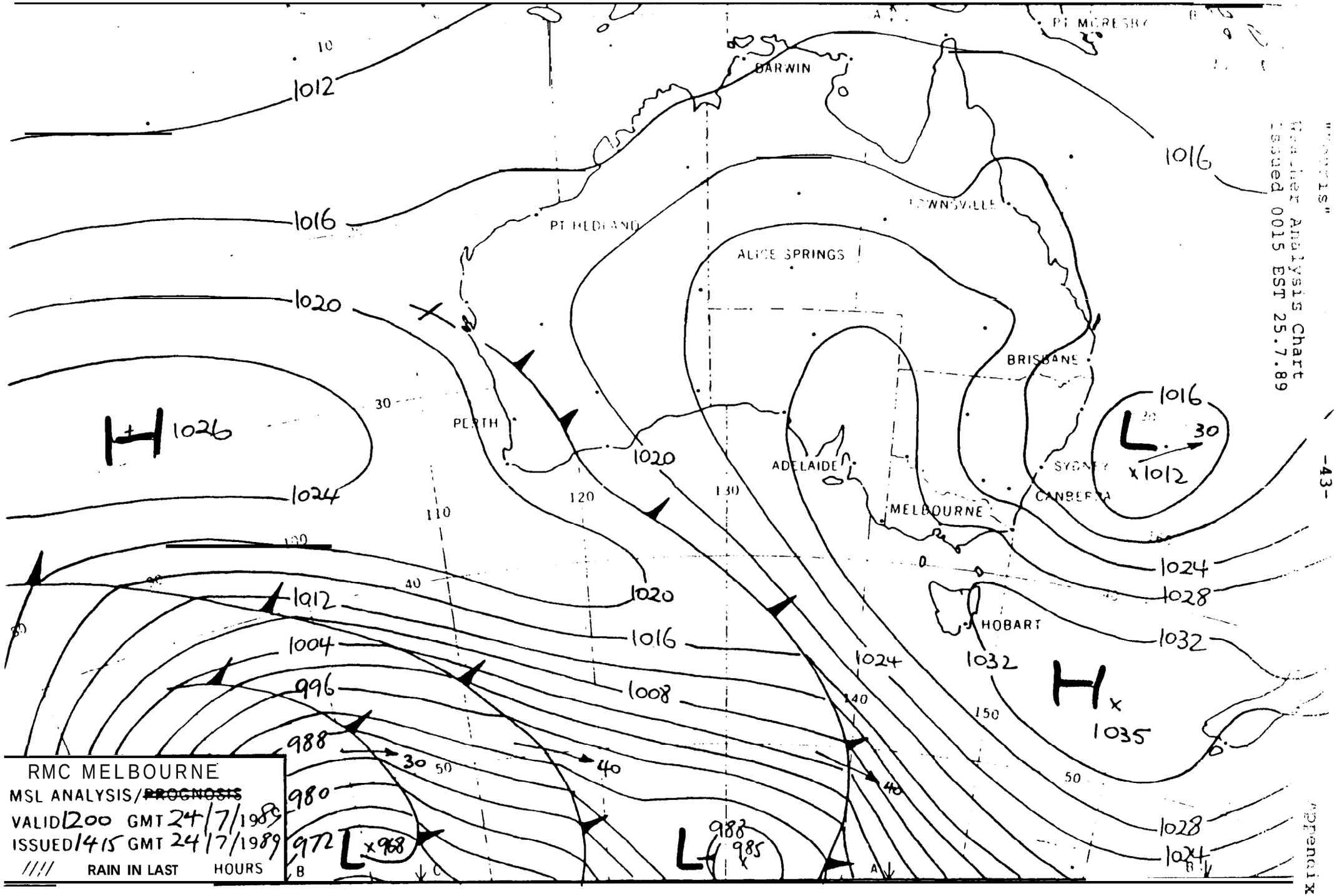
Illawarra Coastal Waters, Port Hacking to Ulladulla
Warning: Strong wind warning current to Point Perpendicular and a gale warning south of Point Perpendicular
Wind: Southwest to 25 knots in north to 35 knots in south, turning south to southeast tonight and easing to 25 knots tomorrow afternoon
Sea: 2 rising to 4 metres in south abating to 2 metres throughout tomorrow afternoon.
Swell: 2 metres
Weather:Showers



"Kauris"

Weather Analysis Chart
Issued 1505 EST 24.7.88

Appendix 3



Weather Analysis Chart
Issued 0015 EST 25.7.89

-43-

Appendix 4

Appendix 5

SUBMISSIONS ON DRAFT REPORT

On 13 September a final draft report was sent to the master, mate, chief engineer, second engineer, second mate and to the Australian legal representatives of Hartmann Schiffahrts. All were invited to make any submission on the draft report within four weeks, a period later extended upon request to 30 October 1987.

Where the submissions were corrections of fact the text has been altered accordingly. Where any part of a submission was considered relevant to the findings the text was altered to reflect such submission or is summarised below.

Mr Mangilog (mate)

Mr Mangilog referred to page 24 and the impression gained that the ship was effectively run by the master, chief engineer and gas engineer, and that the mate could not be considered as a second in command. This observation "depressed" the mate, who pointed out that the ship could not be run without the support of the Filipino officers and crew. The investigators stand by the impression gained. This in no way reflects upon the actual competence of either the mate or second mate, but upon the apparent attitudes of those on board the ttKourisll.

Mr Mangilog also referred to the comment on the failure by the watchkeeping officers to take transit or visual cross bearings to ensure that the ship maintained its position. He maintained that the failure to use these techniques did not cause the grounding. The investigators consider the report's observation and analysis as valid and that reference to the apparent lack of experience should be retained.

Master and chief engineer.

Neither the master and chief engineer wish to raise any objection or comment in any other way on the draft report submitted to them. This should not, however, be taken as indicating that either the master or the chief engineer are in agreement with the findings of the report.

Owner's managers

The owner's managers of the vessel have no objections to the report. In so far as the report may be seen as critical of the management of the vessel, they do not agree with such findings.