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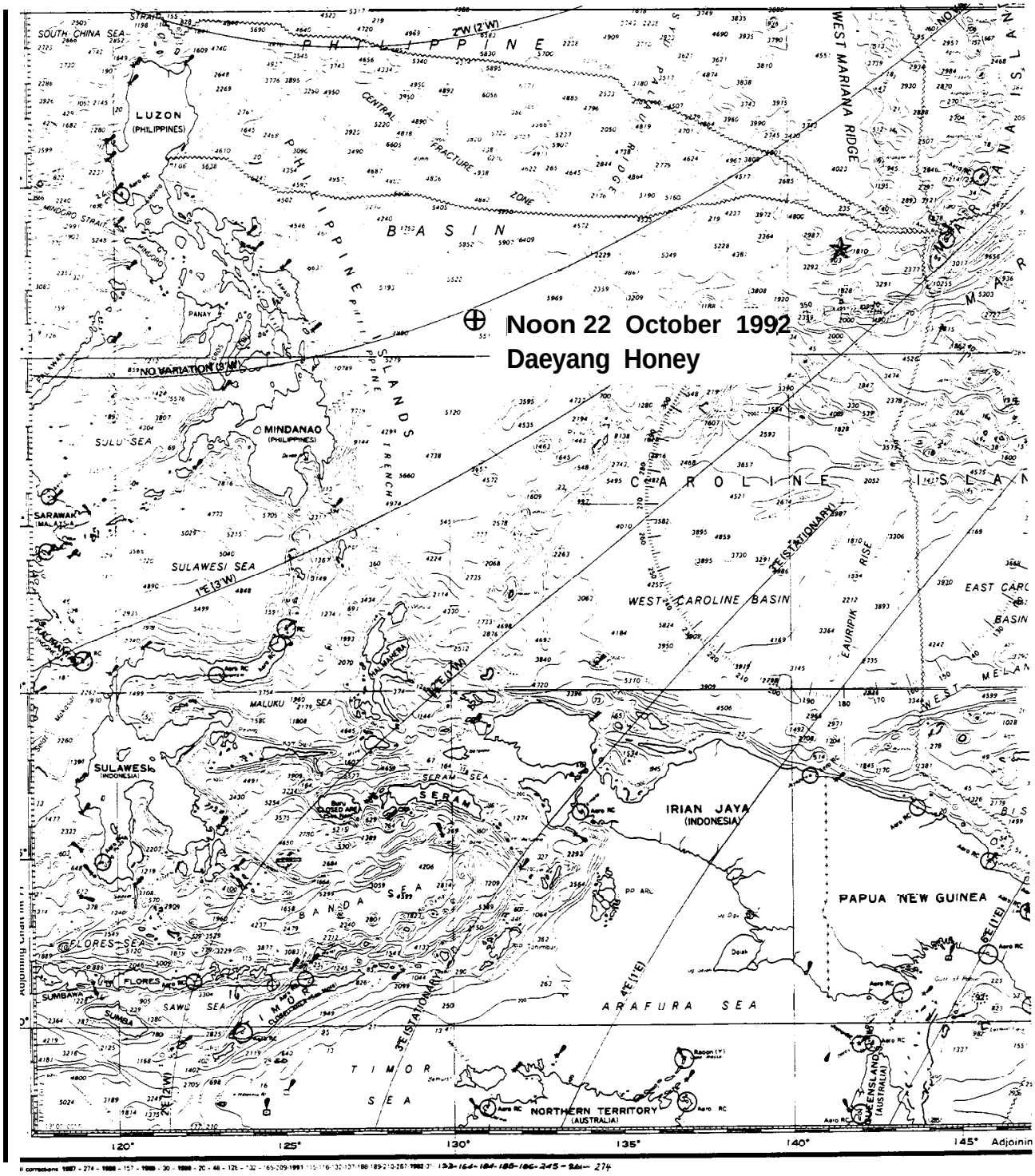
Portion of chart INT 52 - North Pacific Ocean (reduced)



Summary

The South Korean bulk ore carrier Daeyang Honey sailed from Koolan Island, Western Australia on 14 October 1992, with a crew of 28. The ship was loaded with a full cargo of about 122,300 tonnes of low-grade iron ore, bound for the Japanese port of Mizushima.

In the afternoon of 22 October, a signal from a float-free emergency-position indicator radio beacon (EPIRB) was detected by the search-and-rescue polar orbiting satellite system (COSPAS-SARSAT), about 300 miles east of the Philippine Islands, close to the area of the typhoon Colleen. The EPIRB was identified as coming from the Daeyang Honey.

An initial air search by the United States authorities based on the Island of Guam was hindered by bad weather associated with the typhoon. On 25 October, in better flying conditions, a liferaft was located and ships in the area were requested to search for survivors and wreckage. On 26 October the liferaft was relocated and a little later the EPIRB, surrounded by debris, was also sighted. The motor vessel Azaleaeverett was diverted to the position of the EPIRB, where debris and the beacon were found, but no survivors. At about the same time, the motor vessel Bum Ju located the liferaft and positively identified it as belonging to the Daeyang Honey.

The Daeyang Honey had loaded iron ore on a number of occasions at the Australian ports of Dampier and Port Hedland.

Under the provisions of the Navigation (Marine Casualty) Regulations the Inspector undertook an investigation of how the Daeyang Honey was loaded in Australia, with the aim of passing this and other information available within Australia, to the maritime authorities in the Republic of Korea, in accordance with the International Maritime Organization resolution A.637 (16), Cooperation in Marine Casualty Investigations.

Sources of information

Staff of BHP Koolan Island

BHP Port Hedland

Pan Ocean Shipping Co Ltd, Seoul

The Western Australian Police Force

The Commonwealth Quarantine and Inspection Service

Australian Customs Service

Australian Maritime Safety Authority, Ship and Personnel Safety Branch

Australian Maritime Safety Authority, Maritime Rescue Co-ordination Centre

Times: All times are given in ship's time, unless otherwise indicated. From arrival at Koolan Island to 17 or 18 October the Daeyang Honey kept zone time Universal Coordinated Time (UTC) +8 hours. From 18 October to 22 October the ship was keeping UTC +9 hours.

DAEYANG HONEY

Characteristics

The Daeyang Honey, registered in the Republic of Korea, was an ore carrier of 123,745 tonnes deadweight at a summer draught of 15.645m. It was built by Kawasaki Heavy industries, Kobe and launched as the Yachiyosan Maru in 1970 and classed with Nippon Kaiji Kyokai. The ship was bought by Pan Ocean Shipping, of Seoul, South Korea in 1983 and entered service under the South Korean flag and its classification was changed to the Korean Register.

Pan Ocean Shipping owns a mixed fleet of more than 76 ships varying in age from four years to more than 24 years: more than 60 of its fleet being bulk carriers or bulk ore carriers. The company also acts as manager for another seven ships.

The Daeyang Honey was 270.00m in length, with a beam of 42m and moulded depth of 22.20m. The ship was powered by a MAN K10Z86/16 diesel engine developing 16,918kW. The vessel had three cargo holds of 44.7m, 86.7m and 66.2m in length respectively, and nine hatches, two to No 1 hold, four to No 2 hold and three to No 3 hold. As an ore carrier designed for cargoes with a high stowage factor, the actual cargo holds did not extend to the ship's sides, but were down the centre line with a double bottom beneath the holds, and ballast tanks and a fuel tank down either side of the ship.

Loading the Daeyang Honey

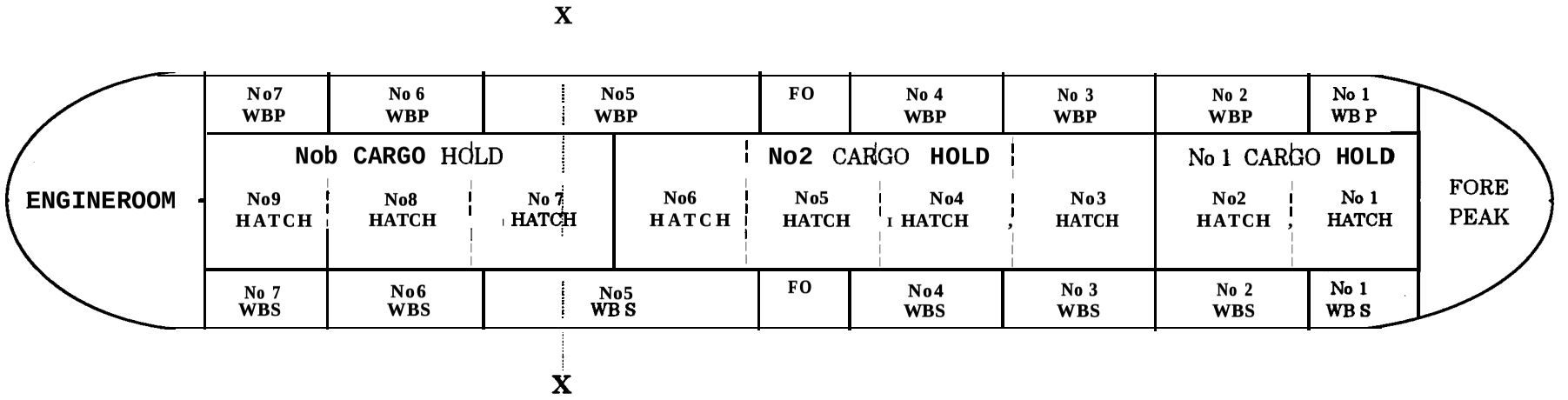
Initial notification that the Daeyang Honey was to load at Koolan Island was received by the BHP-Utah shipping agency, Koolan Island, on 7 September 1992. The vessel was chartered by Kawasaki Steel Corporation of Japan, to load about 120,000 tonnes of low-grade iron ore and shipped on a free-on-board basis for the company's steel works at the port of Mizushima.

Koolan Island is in Yampi Sound, 70 miles north of the Western Australian town of Derby and is run by BHP-Utah. Iron ore has been shipped from the Island since 1965. The loading berth, on the south side of the Island and sheltered from wind and prevailing swells, is approached by a fairway known as the Canal.

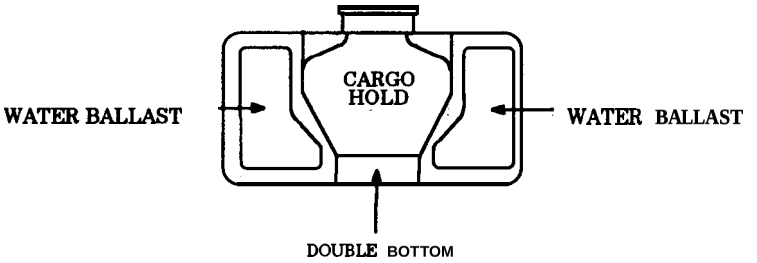
The berth is 170.7m long but has additional mooring dolphins to take ships of up to 160,000 tonnes deadweight with maximum beam of 44m. Ships are loaded by a travelling, retractable, luffing conveyor, which can move a total distance of 118.9m, thus requiring larger vessels to shift along the berth during loading in order to reach all hatches. The depth at the berth is 16.5m below datum and there is a tidal range of 10.7m. The minimum depth in the approach channel is 20.1m.

On 25 September, the Port Officer at Koolan Island, sent a facsimile message to the ship's principal agents with details of the ship loader and the distance of its travel along the berth, the tidal range, the depth alongside and in the approaches to the berth (Attachment 1).

DAEYANG HONEY
GENERAL OUTLINE



SECTION X-X



LENGTH	**271.01m**
BREATH	**42.07m**
DEPTH	**21.19m**
DRAUGHT	**15.645m**
DWT	123745
GRT	64956
NRT	22050

Diagram is not to scale

On 29 September the Daeyang Honey advised Koolan Island of an estimated time of arrival (ETA) of 1800 on 9 October. A number of routine telexes regarding details of the ship were also exchanged.

On 2 October the principal agents received a telex from the Daeyang Honey's master advising of the loading sequence by hatch:

Sequence	Hatch	Tonnage
1	5	6000
2	8	7000
3	2	7000
4	3	8000
5	6	6000
6	7	8000
7	9	10000
8	4	6000
9	1	12900
10	6	6000
11	3	7000
12	2	4500
13	9	2547
14	4	6000
15	8	7500
16	7	6500
17	4	7000
18*	9	2000
19*	2	2000

(*indicates final trimming)

The master detailed a final stowage plan of:

Hatch 1	12900	tonnes
Hatch 2	13500	tonnes
Hatch 3	15000	tonnes
Hatch 4	13000	tonnes
Hatch 5	12000	tonnes
Hatch 6	12000	tonnes
Hatch 7	14500	tonnes
Hatch 8	14500	tonnes
Hatch 9	14547	tonnes

This telex was passed by facsimile to BHP Koolan Island.

The master of the Daeyang Honey revised the ship's ETA to the morning of 9 October. On 8 October, he requested pratique by radio, indicating in the message that the ship had changed ballast on passage in accordance with the Australian Quarantine and Inspection Service guidelines to prevent the spread of harmful marine organisms from ships' ballast water. The Quarantine and Inspection Service, Port Hedland, granted pratique at 1015 on 8 October, based on the information supplied by the master.

The Daeyang Honey arrived in Yampi Sound at 0840 on 9 October 1992 with a crew of 29. As the berth was occupied by a ship completing loading, the master took the ship to anchor about 2 miles west of Nares Point.

At 1220 the pilot boarded and the vessel proceeded via the "Canal" towards the berth. Two tugs, the Fullerton Cove and the Latrobe were made fast to assist in the berthing operation: the Fullerton Cove by a towing line to the' Daeyang Honey's port bow, and the Latrobe alongside just forward of the bridge, secured by two lines from the tug's bow. When off the berth, the Daeyang Honey turned through 180 degrees to moor starboard side to the berth. When the vessel was turned, the towing hawser to the Fullerton Cove was released, and the tug came to a position at the break of the forecastle to push the Daeyang Honey alongside. It, too, was secured by two lines from its bow.

The berthing was without incident and the vessel passed the first line at 1400, by 1450 the vessel was made fast. The tidal height at 1400 was 4.97m above datum, giving a depth of water alongside of 21.47m.

At 1535 the pilot undertook a draught survey. The ship's arrival draught was observed as 10.20m forward, 10.99m aft, giving a mean draught of 10.595m. The observed midships draughts were 10.595m port and 10.59m starboard, giving a starboard list and an observed mean of 10.51m, giving the ship a slight hog (the distortion of a ship's hull when the bow and stern of the vessel are lower than their normal position in relation to the middle portion of the vessel - opposite to "sag").

There are no resident customs, quarantine and inspection, or immigration officers resident on Koolan Island. The West Australian Police Force undertake the routine duties on behalf of these Commonwealth agencies.

On arrival the Sergeant of Police boarded the vessel and completed the arrival formalities. He formed the opinion that the master was efficient and had a good command of English. All documents required from the master were properly completed. He noted that all statutory safety and pollution certificates were valid, having expiry dates as follows:

International Load Line	25 June 1995
International Safety Equipment	25 June 1993
International Safety Equipment	25 June 1995
International Safety Radio	25 June 1995
International Oil Pollution Prevention	25 June 1995

As part of the quarantine inspection, the Police Sergeant inspected the galley, food stores and garbage-holding arrangements on the after mooring platform (the poop deck). He stated that the deck was covered in a substantial amount of rust. However, he did not make any observation of the condition of the ship forward of the accommodation block.

The BHP Agency officer also boarded on arrival and found the master helpful and efficient. The alley ways were clear and apparently clean, but the officer could make no comment on the condition of the hull, or exterior decks.

Both the Police Sergeant and the Agency Officer were involved in the repatriation of the ship's third engineer, who 'was signed off the ship on medical grounds.

Before loading began the mate gave the pilot and the operator of the ship loader the vessel's required loading sequence. The sequence was the same as that detailed by the master on 2 October. The loading-sequence sheet showed the distribution of ballast and its discharge, the bending moments, sheer forces and estimated draught for each stage of the loading operation (Attachment 2).

Loading solid bulk cargoes, such as iron ore, is governed by the provisions of Marine Orders Part 34 (Cargo and Cargo Handling - Solid Bulk Cargoes), which give effect to the Code of Safe Practice for Solid Bulk Cargoes, 1991 edition, published by the International Maritime Organization. Under the Code, iron ore is a cargo which is neither likely to liquefy nor does it possess any chemical hazards. Notwithstanding this, the shipper is required to provide the master with details of the stowage factor and angle of repose. At Koolan Island, such advice is not provided in written form.

Loading began at 1540 on 9 October and continued, subject to shift changes and other routine delays, until noon on 14 October. According to the Loading Detail Sheets maintained by the ship-loader operators, the ship shifted on four occasions (although the loading sequence submitted by the ship anticipated five shifts) when moving the loader from hatch 8 to hatch 2, hatch 4 to hatch 1, hatch 2 to hatch 9 hatch and from 9 to hatch 2.

The loading chute, to throw the cargo to the port side of the ship, was put on board into No 4 hold on the afternoon of 12 October, but it was not used until the final stages of the loading operation, to remove a starboard list. The rate of loading during the operation was unremarkable with pours of between 2000 and 2800 tonnes an hour.

The loading sequence originally stipulated by the master of the Daeyang Honey was followed, with the exception of the final pour into No 6 hatch. The amount of cargo loaded into 1, 3, 4, 5, 7 and 8 hatch spaces respectively was within 50 tonnes of the ship's original loading plan. However more than 1000 tonnes less than originally planned was taken into hatch spaces 2 and 9 and an excess of more than 800 tonnes into No 6 hatch. Examination of the loading records shows that these adjustments in distribution were undertaken during the final trimming operation and it is reasonable to conclude that the change of distribution was at the direction of the ship's staff.

According to loading records based on the readings of the weightometer connected to the ship loader, the final distribution of cargo was as follows:

No 1 Hatch	12,949	tonnes
No 2 Hatch	12,461	tonnes
Total No 1 Hold	25,410	tonnes
No 3 Hatch	15,040	tonnes
No 4 Hatch	13,056	tonnes
No 5 Hatch	12,047	tonnes
No 6 Hatch	12,844	tonnes
Total No 2 Hold	52,987	tonnes
No 7 Hatch	14,559	tonnes
No 8 Hatch	14,352	tonnes
No 9 Hatch	13,424	tonnes
Total No 3 Hold	42,505	tonnes

Total all holds 120,902 tonnes

By draught survey the total loaded was 122,270 tonnes, a difference of 1368 or an adjustment of 1.0114 on the weightometer readings.

Loading plan

LOADING SEQUENCE

PORT YAMPI SOUND
JOY No.: 041[illegible]

SQ. ND	HOLD QTY	DBT (F)	No.1	No.2	No.3	No.4	No.5	No.6	No.7	BM	SF	EST. DRAFT	REMARKS
		BALLAST CONDITION											
1	5H 6,000	8,000	(7,854)	(9,820)	(7,713)	(7,404)	(15,414)	(8,392)	(6,246)	-7/83	31/88	1083/1 113	
2	8H 7,000	6,500								-17/56	28/88	1007/1320	SHIFTING
3	2H 7,000			100						-14/56	25/88	930/1340	
4	3H 8,000	5 000								-18/75	33/88	112011293	
5	6H 6,000									27/62	31188	1099/1099	
6	7H 8,000	3 , 5 0 0					100			-15/56	31/88	1078/1 261	SHIFTING
7	5H 10,000	1,700								18/65	-45/49	919/1598	
8	4H 6,000	500								-19/53	-47/49	1013/1600	SHIFTING
9	1H 12,900	100	100		3,400					28/65	-40/49	1102/1516	
10	6H 6,000							6,700		14/52	-43/49	1158/1547	
11	3H 7,000				100					-12/52	-43/49	1251/1526	
12	2H 4,500					100				31/69	39/88	1268/1453	SHIFTING
13	9H 2547							5,000		35/36	-39/49	1246/1492	
14	5H 6 000							3,000		14/61	42/88	1[illegible]	
15	8H 7,500	10	10	10				100	3,000	-16/52	-51149	130711604	
16	7H 6,500				10	10	10	10	10	-25/55	-54/49	1346/1 627	
17	4H 7 000									-42/66	49/88	1505/1 546	
18	9H 2 ,000	TRIMMIMG								-38/57	-53/49	1481/1610	SHIFTING
19	2H 2,000									-65/66.5	73/49	1539/1568/1579	SAILING

Final draught survey readings gave:

Mean draught forward	15.40m
Mean draught aft	15.80m
Mean draught	15.60m
Draught midships port	15.60m
Draught midships stbd	15.75m

When loading was completed, the ship had a slight starboard list and had a sag of 0.075m.

The 'Certificate of Analysis" issued by the BHP Minerals Yampi laboratory showed that the ore loaded into the Daeyang Honey had an actual average moisture content of 1.68 per cent and the size of the ore particles varied between 100mm and less than 150 microns.

The Daeyang Honey sailed from Koolan Island at 1300 on 14 October with a crew of 28. The height of tide was 9.69m on an ebb tide, giving a depth in the berth of 26.19m. The unberthing of the ship was assisted by the tugs Fullerton Cove and Latrobe, the Fullerton Cove towing forward and the Latrobe alongside aft. The sailing proceeded normally and no incidents were observed or reported. The pilot ensured that the ship kept to the north of the fairway, clear of the 10 fathom (18m) contour off Nares Point. With the ship's engines on half maximum manoeuvring revolutions, he did observe some mud stirred up from the bottom in the area of 11 fathoms north-west of Nares Point. The pilot left the Daeyang Honey at about 1400, when 0.3 miles north-west of Nares Point and transferred to an inward-bound ship.

Based on hourly tidal predictions supplied to Koolan Island by the National Tidal Facility, Flinders University, and calculations based on the "Tidecalc" program of the UK Hydrographic office, the Daeyang Honey was afloat at all times. According to the loading program supplied to the terminal by the ship, the deepest draught was estimated as a little under 16.3m. This stage would have been reached at a time between 0500 and 0700 on 14 October. The least depth predicted in the berth between these times was 17.48m (16.5m datum + 0.98m tide) at 0640, leaving an under-keel clearance of 1.18, based on tidal predictions.

At the time the ship sailed, the tide was 9.71m above datum, and the ship passed over the shallowest part of the "Canal" (28.7m of water) at about 1400, giving an under keel clearance of 13m.

VOYAGE TO JAPAN

14 to 19 October

The Master entered a sailing plan with the Australian Maritime Rescue Coordination Centre, under the Australian Ship Reporting System (AUSREP), nominating a position of 12 degrees south, 122 degrees 32 minutes east at 0500 UTC (1300 WAST) 15 October for leaving the scheme. He also nominated an arrival time at the port of Mizushima, Japan of 1500UTC on 25 October at 12 knots.

The Daeyang Honey sent a "final report" (exit from area) under the AUSREP scheme at 0450 on 15 October. No further details were included in the message.

The master sent messages to his owners on 14 (departure report) 16, 19 and 21 October, and a deviation report. It is apparent from the positions given in the messages that the ship sailed through the Indonesian Archipelago, west of Timor, through Selat Ombai and between the islands of Baru and Seram through Selat Manipa. Between 16 October and 19 October the ship averaged a speed of a little more than 12 knots.

Typhoon Colleen – 18 to 26 October

Typhoon Colleen, a tropical cyclone, developed to the east of the Philippines on about 18 October 1992. Originally a tropical depression, it developed into a tropical storm, and shipping received the first warning of the system in approximate position 12 degrees north, 131 degrees east, at 1940 UTC on 18 October 1992 (0440 on 19 October, UTC +9). At 1800 UTC on 19 October (0300 on 19 October) it was reported in position 14 degrees north, 128 degrees 48 minutes east.

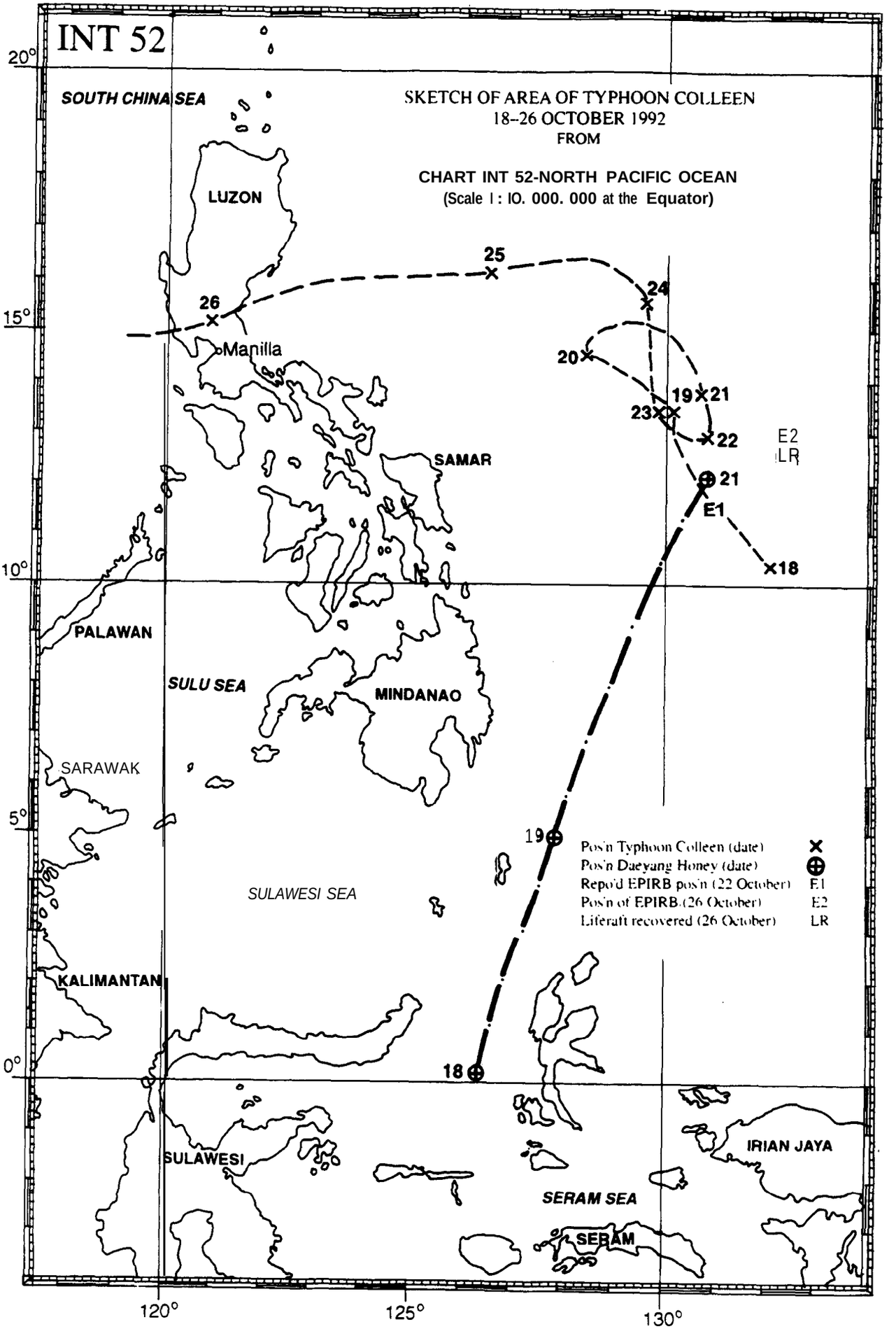
According to experts within the Special Services Unit of the Bureau of Meteorology, using additional information in a "hind cast", the system originated at 0000 UTC on 18 October in approximate position 11 degrees 30 North, 132 degrees East. The system moved north-west until 20 October.

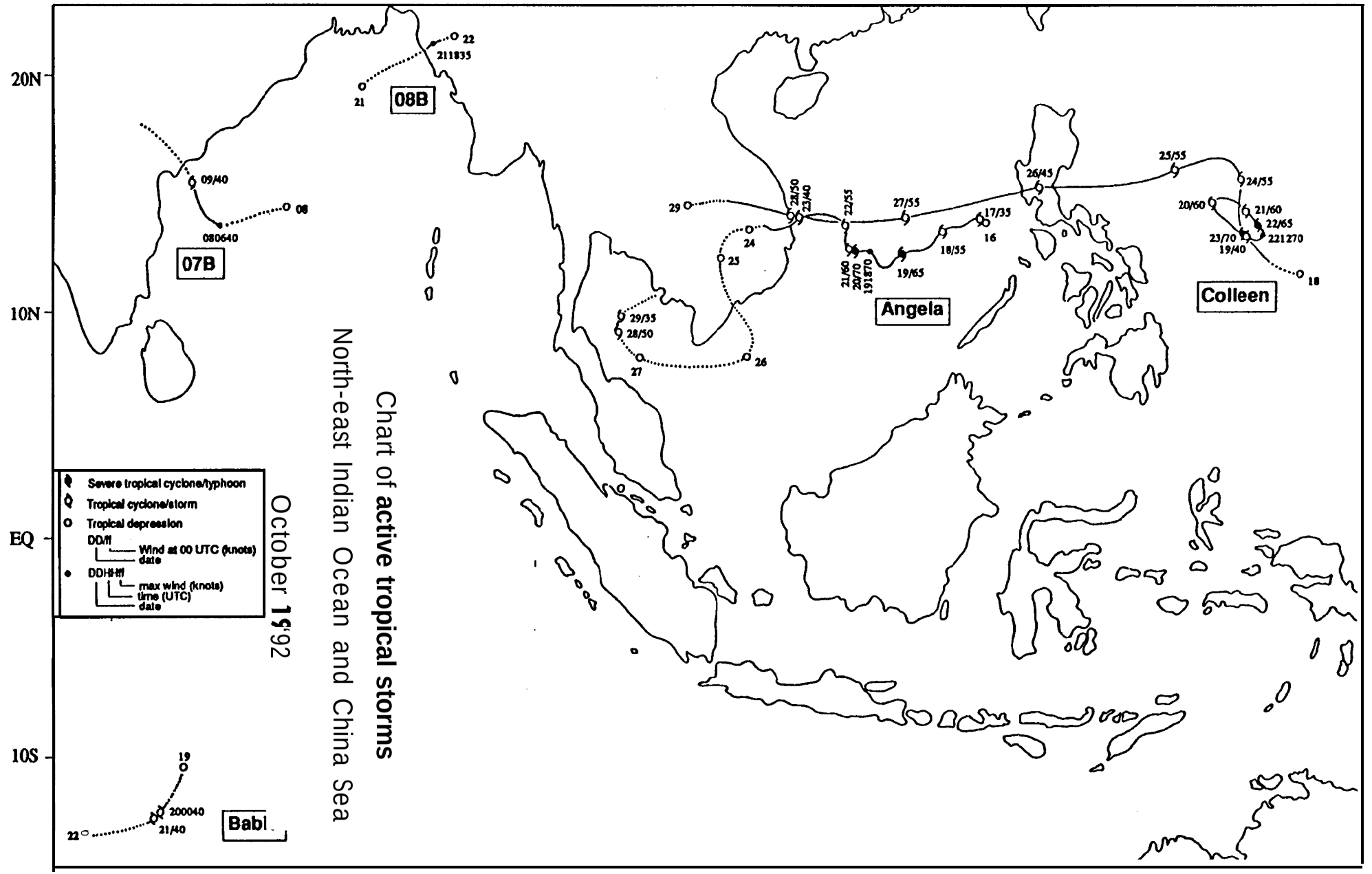
On 19 October the master sent a noon position of 04 degrees 53 minutes north 127 degrees 49 minutes east. At about the same time typhoon Colleen was centred in approximate position 13 degrees north 130 degrees east, some 530 miles to the north of the Daeyang Honey, travelling in a north-westerly direction at about 8 knots.

The weather forecast issued by the Japan Meteorological Agency at 0300 on 20 October predicted that the Colleen would continue to move slowly in a west-north-westly direction with winds of 45 knots at its centre. At that time the Daeyang Honey was in a position 330 miles south and slightly east of the typhoon's centre.

However, Colleen curved to the north and east on 20 October, and it

Sketct of area of Typhoon Colleen





UNOFFICIAL TRACKS OF CYCLONES: 07B, ANGELA, COLLEEN, BABIE AND 08B

became centred on an area of 40 miles radius and virtually stopped. Plots of the reported position of the centre suggests that the system in fact completed a tight circle at a speed of about 2 knots during 21, 22, 23 and into 24 October. On 22 and 23 October the system was upgraded from a "tropical cyclone: to a "severe tropical cyclone" with increased average wind speeds of 65 and 70 knots.

On 21 October at 0900 local time, in position 12 degrees 03 minutes north 130 degrees 47 minutes east, the master sent a "change of course" report to his owners. At the same time typhoon Colleen was centred on a position 13 degrees 42 minutes north 130 degrees 26 minutes east. The system had moved east and south of the previous day's position slowing to three knots, while the wind speed within the typhoon intensified and sea conditions further deteriorated. The Daeyang Honey was at this time 100 miles from the centre of the typhoon, and would reportedly have experienced winds of 50 knot average wind speed, with heavy swells and breaking waves.

Three hours later, at 1200 local time, the master sent a routine noon report in position 12 degrees 04 minutes north, 130 degrees 43 minutes east. In three hours, the vessel had covered a distance of four miles, making good a course of 285 degrees. The vessel was effectively hove to. This was the last message received from the Daeyang Honey.

It is not known whether or not the Daeyang Honey continued on that course, or whether the ship turned southward. By the early afternoon of 22 October, the centre of typhoon Colleen had tracked south and was within 50 miles of the Daeyang Honey's last reported position. The ship would have been experiencing the maximum force of the winds at 75 to 85 knots with very high seas and swell.

Tropical storms and typhoons are common in the North-West Pacific and China Sea with an average frequency of 30.5 a year, with the maximum average frequency in August with 6.8 systems. In October an average of 4.3 systems occur[1]. Between 15 to 20 of the systems can be expected to generate winds of force 12 (64 knots) or stronger, with mean wave heights of 14m or more[2]. It is recommended that any vessel should keep at least 100 miles from the centre of such systems.

At 0656 UTC (1556 ship's time) on 22 October, a signal from a 406 Mhz EPIRB was detected through the

[1]Meteorology for mariners (Third Edition). London. 1978
[2]The Marinres Handbook (6th Edition). Hydrographer of the Navy.Taunton 1989

international search-and-rescue satellite system (COSPAS/SARSAT), by the United States Rescue Coordination Centre, Guam. Over the following six hours a further five positions were detected through satellite, confirming that the Daeyang Honey's EPIRB was transmitting from an approximate position of 11 degrees 22 minutes North, 130 degrees 48 minutes East. The detected position was about 80 miles from the centre of typhoon Colleen, to the north of the ship's position (Attachment 3).

Air searches were hampered by the extreme weather conditions until 25 October, when a liferaft was sighted. On 26 October search conditions were excellent and an airborne search located debris, the EPIRB and a liferaft. Searching surface craft, the Bum Ju (also owned by Pan Ocean Shipping) and the Liberian cargo ship Azaleaeverett were diverted to the area. The EPIRB was recovered from position 12 degrees 43 minutes North, 132 degrees 18 minutes East and the liferaft from position 12 degrees 24 minutes North, 132 degrees East. The search on 26 October and subsequent searches did not locate any survivors.

It is not known what action the master took to avoid Colleen. The alternative, longer route to Japan, west of Sulawesi and Luzon was also affected by tropical storm activity, with Typhoon Angela active west of Manila, between 16 October and 23 October. In any case, the master would not have known of the formation of Colleen until sometime on 19 October, by which time the Daeyang Honey was south and east of the Philippine Islands. Charting the progress of the typhoon over 19 and 20 October, he could have expected the system to clear his intended route by 21 to 22 October.

As it was, the system doubled back on itself, curving towards the equator.

It was, therefore, inevitable that, unless the master slowed the vessel or altered course some time between 1200 and 2400 on 20 October, the Daeyang Honey would be within 100 miles of the centre of the typhoon. As it was, it seems that he did not take action until 0900 on 21 October.

PREVIOUS LOADINGS IN AUSTRALIA

Since April 1990, the Daeyang Honey had loaded in north-west Australian ports on seven previous occasions: Port Hedland in September 1990, March, July and September 1992; and Dampier in April 1990, February 1991 and July 1991.

The ship was subject to a Port State Control inspection in March 1992 and again in September 1992 by the Australian Maritime Safety Authority Surveyor , Port Hedland.

During the March inspection, 14 deficiencies were brought to the master's notice, none were of major significance and most were rectified at Port Hedland. The surveyor was satisfied that any outstanding deficiencies did not affect the safety of the ship.

In September, 12 deficiencies were noted, including that

- The engine room skylight could not be closed remotely.
- The funnel door could not be closed.
- The "goose necks" of the main deck after vents were corroded and wasted.
- The mushroom ventilator on after main deck could not be closed.
- The main deck water-tight doors were found to be not watertight.

The ship was allowed to sail without the repair to the remote engine room skylight closing device, because it could be closed locally, on the undertaking that it would be repaired at the next port. All the other deficiencies noted were rectified before the ship sailed.

The surveyor stressed that he did not carry out any structural inspection, but his assessment was that the ship's condition was compatible with its age. He said the crew carried out their duties efficiently and seemed to know what they were doing. He also recalled that the master had told him that the ship had spent three months in a ship yard in Korea undergoing a refit that involved 850 tonnes of new steel work.

Pan Ocean Shipping submitted that, based upon the report of 17 February 1992, examinations by the Korean Register of Dayeang Honey's longitudinal strength showed that the ship conformed to and exceeded the strength requirements of the Society.

Records for the loadings of March, July and September 1992 confirm that the vessel changed its ballast water at sea in accordance with the guidelines issued by the Australian Quarantine and Inspection Service. On these occasions, the total ballast on arrival varied between 38,060 tonnes and 42,600 tonnes and mean draughts between 7.07m and 7.61m. This compares with 72,162 tonnes of ballast on arrival at Koolan Islands and a correspondingly deeper draught of 10.595m. On all occasions the vessel was hogged between 0.027m and 0.10m.

Records showing the loading sequence, as nominated by the master, for the visits to Port Hedland in July and September, and the nominated loading sequence at Koolan Island show similar, although not identical, planning (Attachment 4). The Port Hedland loadings were predicated on a sequence of 20 pours into the nine hatches, effectively two pours a hold with a final two pours, 4000 tonnes of cargo, for trimming the ship. The Koolan Island loading consisted of a planned sequence of 19 pours, No1 hold being loaded in one pour of 12,900 tonnes.

The actual loading sequence followed, with the exception of the August loading, followed the nominated sequence with some, apparently minor, variations. The loading at Port Hedland on 2 to 4 August, involved loading from two "shiploaders" simultaneously, for a period of 2 hours 10 minutes. The complete loading involved 22 significant pours of cargo, as a result of changes from lump ore to iron ore fines and back again.

Without full details of the ship and a knowledge of the actual sequence of ballast discharge related to the amount and disposition taken on board at any time, no accurate assessment can be made of the stresses placed on the ship during these loadings. A cursory examination would suggest that any change in the planned loading was not especially significant.

COMMENT

From the loading plan submitted by the mate at Koolan Island there is every indication that the loading was planned carefully and the bending moment and sheer stress for each phase of the operation calculated, based on the information provided to the ship by the classification society. It should be noted that this information is based on the original information supplied to the vessel as new.

The statements made by the shore staff at Koolan Island and the AMSA surveyor at Port Hedland indicate that those responsible for loading the ship were efficient and competent.

The master had been attached to the ship for some time. However examination of the crew lists from July, September and October shows that the crew were changed regularly, and that five officers and a number of ratings had joined the ship immediately before the voyage to Koolan Island.

From evidence available, it is apparent that nothing happened at Koolan Island that contributed to the loss of the ship. The speed of loading of 2800 tonnes maximum is relatively slow, and there seems little remarkable in the sequence of loading or the distribution during loading.

The weather conditions experienced by the Daeyang Honey off the Philippines were severe. However, with the known frequency of such storms (in October averaging one a week) the potential conditions could not be described as unusual or unexpected. Based on the forecast by the Japan Meterological Agency, theoretical systems and statistical records, it could have been expected that Colleen would have continued in its original direction or curved to the north-east: it was very unusual for such a system to curve and track towards the equator. It should be noted that an officer of the Bureau of Meteorology's Regional Specialised Meteorological Centre in Darwin, described the typhoon Colleen system as a "forecasting nightmare" because of the unusual path it followed in moving during 20 to 22 October towards the equator,"a characteristic rarely displayed by such systems".

CONCLUSIONS

1. Nothing occurred at Koolan Island that contributed to the loss of the vessel.

2. The cargo loaded contained no characteristic that would have involved an increased risk over the normal ore shipped from Koolan Island.

3. The failure to supply the master with a written loading declaration had no bearing on the loss of the ship. The information on Koolan Island iron ore, contained in such a declaration, would not have altered or modified the loading of the cargo.

4. The Daeyang Honey encountered a severe tropical storm (typhoon) during 21 and 22 October. It would seem that the ship foundered from whatever cause in the early afternoon of 22 October 1992. The storm must be considered to have significantly contributed to the loss.

OWNERS SUBMISSION

Pan Ocean Shipping made a number of submissions relating to the draft report, sent to them under the provisions of sub-regulation 16(3) of the Navigation (Marine Casualty) Regulations. Where appropriate these submissions have been adopted into the text of the final report.

In referring to the comment on the weather at page 21 (last paragraph) Pan Ocean Shipping submitted that the second sentence of the last paragraph could be misconstrued.The sentence reads,

> *"However with the known frequency of such storms (in October averaging one a week) the potential conditions could not be described as unusual or unexpected. "*

Pan Ocean are of the view that the frequency of such storms is not relevant, given that Colleen took an unusual and unexpected course. They are concerned lest the sentence reflect adversely on the Master's navigation and judgment.

The Inspector considers that the weather conditions that may be anticipated for any given voyage is revelant to the planning and actions of any master and that the sentence is revelant. The Inspector accepts unreservedly that the path of typhoon Colleen was extremely unusual and could not be anticipated.

Attachment 1

Copy of basic Port Information sent to Master - Daeyang Honey

22 September 199

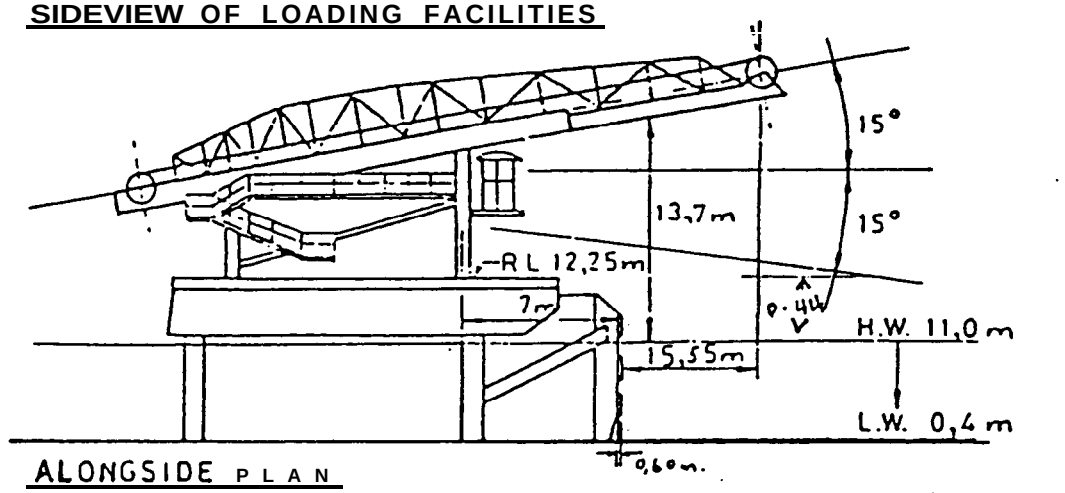
REMARKS

Koolan Island

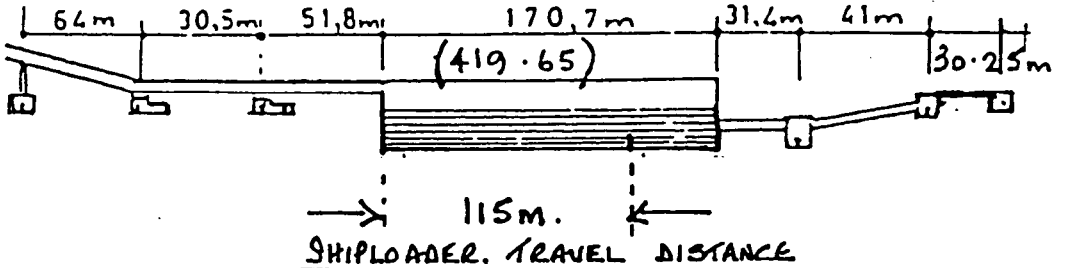
VESSELS CAN EXCEED BERTH DEPTH BY COMPLETING LOADING ON A RISING TIDE.

MAXIMUM DRAFT IS GOVERNED BY TIDAL RANGE.

SIDEVIEW OF LOADING FACILITIES



ALONGSIDE PLAN



SHIPLOADER. TRAVEL DISTANCE

V/LS MAY BE REQUIRED TO SHIFT SHIP

V/LS. TO RETAIN MAX. BALLAST
V/LS BERTH. STARBOARD 'SIDE TO'
ALL LOADING KGS IN METRIC TONNES.
TIDAL RANGE. 0 - 11 Metres.
DEPTH ALONGSIDE. 16.5 m.

PILOT BOARDING STN. AT ORE STAGE.
NARES. Pt. Lt/Bcn Beg. 090° T x 2.0 M.

BERTHING. DAYLIGHT HOURS. — DEPART. AFTER COMPLETION PAPERS DAY/NIGHT OR

Attachment 2

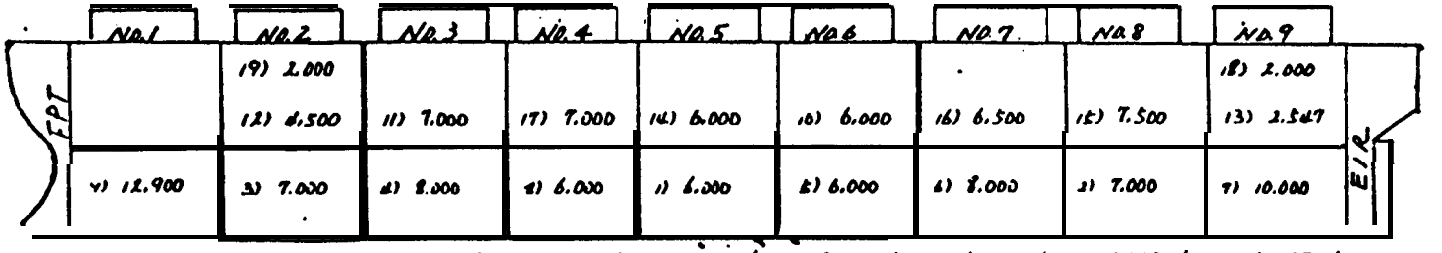
Loading sequence/plan as submitted by Daeyang Honey

LOADING / ~~DISCHARGING~~ SEQUENCE

PORT YAMPI SOUND

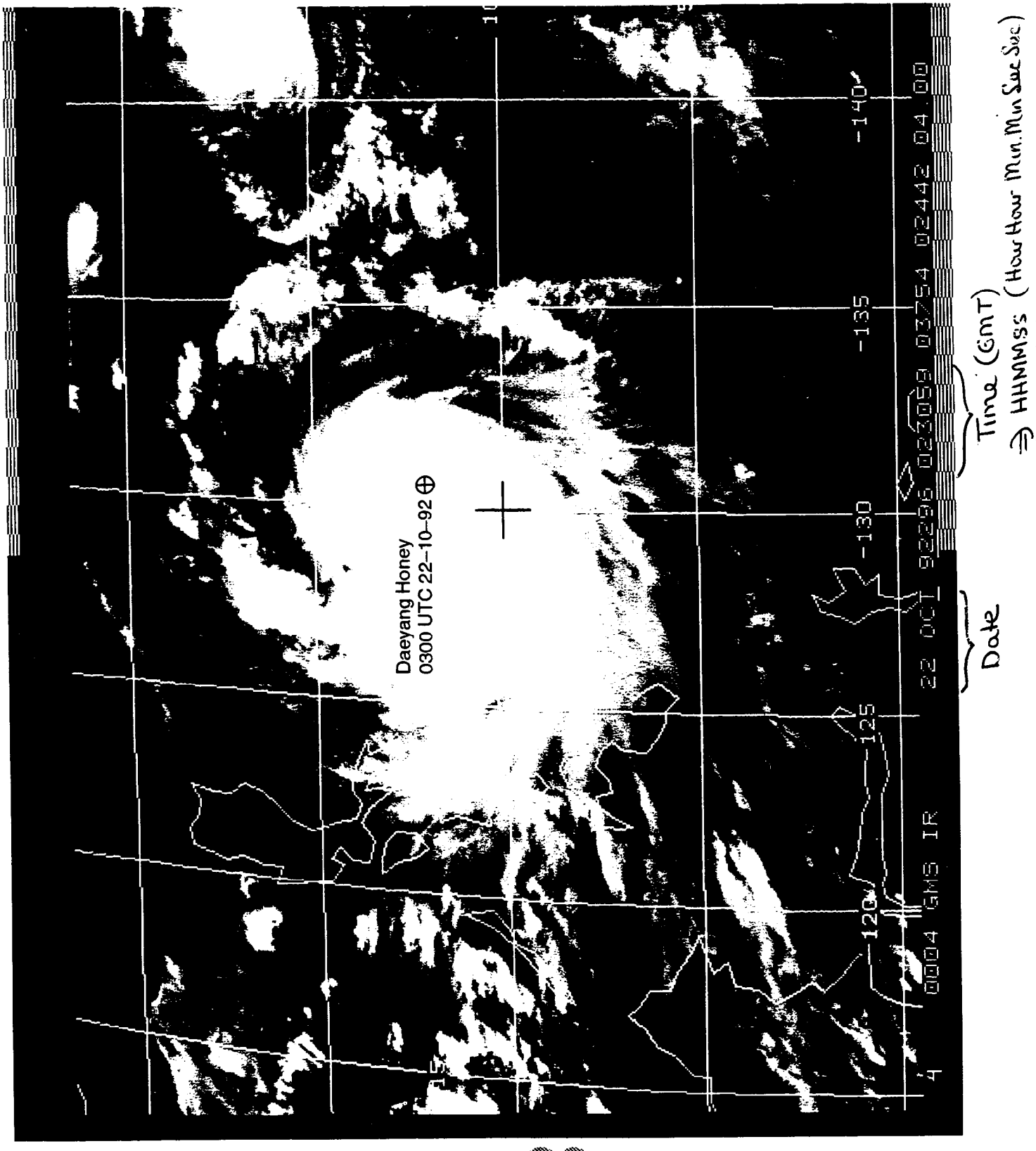
JOY No. 041

SQ NO	HOLD QTY	BALLAST CONDITION								B/M	S/F	JUDGE	EST DRAFT	REMARKS
		DBT (#)	NO.1 (7,854)	NO.2 (9,620)	NO.3 (7,713)	NO.4 (7,404)	NO.5 (15,414)	NO.6 (8,392)	NO.7 (6,246)					
1	5H 6,000	8,000								-7/83	31/88		1083 / 1113	
2	8H 7,000	6,500								-17/56	28/88		1007/1320	SHIFTING
3	3H 7,000			100						-14/56	25/88		930/1340	
4	3H 5,000	5,000								-18/75	33/88		1120/1293	
5	6H 6,000									27/62	31/88		1099/1099	
6	7H 8,000	3,500					100			-15/56	31/88		1078/1261	SHIFTING
7	9H 10,000	1,700								18/65	-45/49		919/1598	
8	4H 6,000	500			43 MT					-19/53	-47/49		1013/1600	SHIFTING
9	1H 12,900	100	100 MT		3,400					28/65	-40/49		1102/1516	
10	6H 6,000							6,700		-14/52	-43/49		1158/1547	
11	3H 7,000				100					-12/52	-43/49		1251/1526	
12	2H 4,500					100				31/69	39/88		1268/1453	SHIFTING
13	9H 2,547							5,000		35/69	-39/49		1246/1492	
14	5H 6,000							3,000		14/61	42/88		1333/1484	
15	8H 7,500	(7,503.16)	10	10				100	3,000	-16/52	-51/49		1307/1604	
16	7H 6,500	(567)			10	10	10	10	10	-25/55	-56/49		1346/1627	
17	4H 7,000	0525~								-42/66	49/88		1505/1546	
18	9H 2,000	~TRIMMING								-38/57	-43/49		1481/1610	SHIFTING
19	2H 2,000									-65/68	-73/49		1539/1568/1579	SAILING



Attachment 3

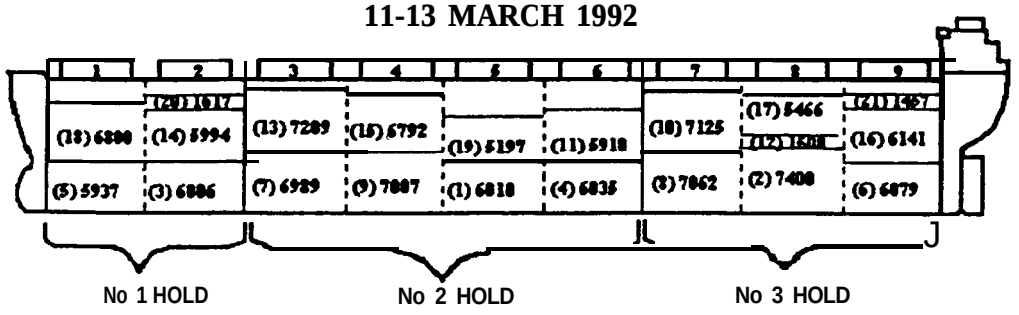
Satellite photograph of typhoon colleen 0231 UTC (1311 UTC +9) on 22 October 1992



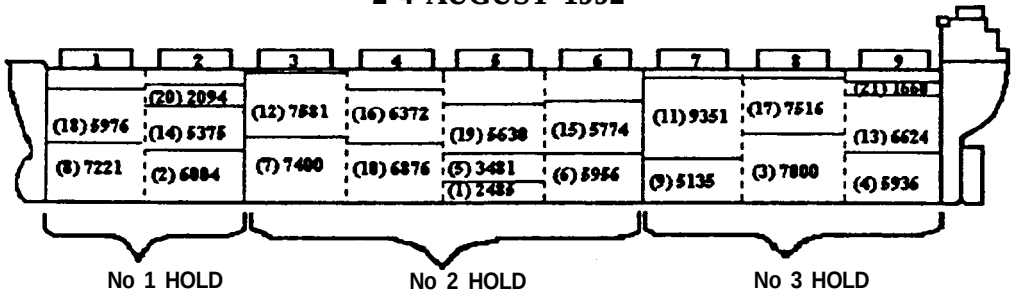
Attachment 4

Comparision of loading sequence, Port Hedland and Koolan

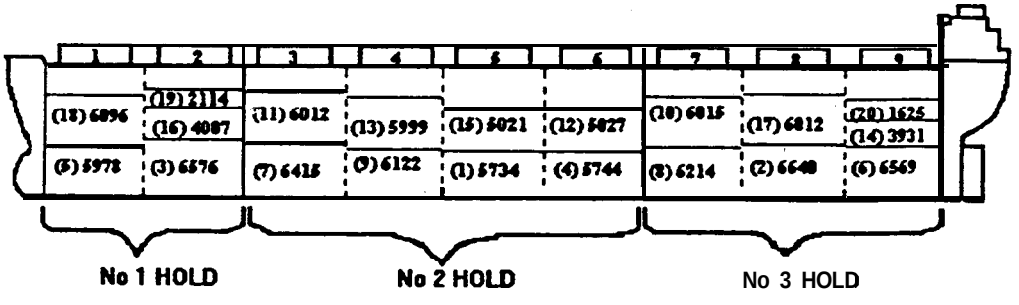
PORT HEDLAND
11-13 MARCH 1992



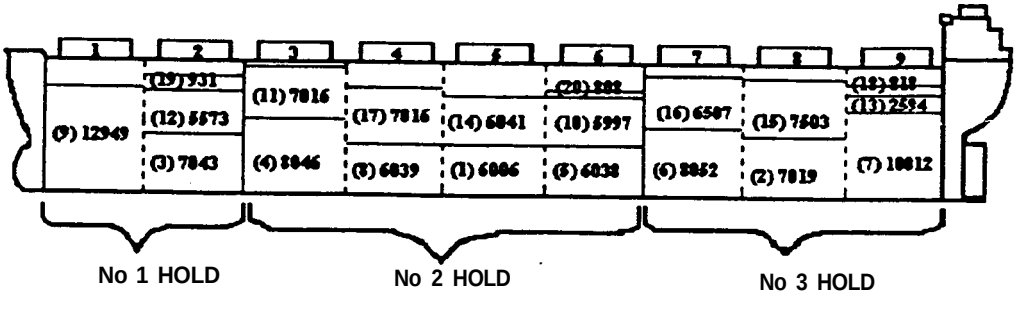
PORT HEDLAND
2-4 AUGUST 1992



PORT HEDLAND
11-12 SEPTEMBER 1992



KOOLAN ISLAND
9-14 OCTOBER 1992



DAEYANG HONEY PAST LOADINGS

		Oct 9-14		Sept 11-12		August 2-4		March 11-13	
		Arrival	Dept	Arrival	Dept	Arrival	Dept	Arrival	Dep
Draught	F(Mn)	10.2	15.4	7.02	14.11	6.43	15.42	7.1	15.57
	A(Mn)	10.99	15.8	8.20	15.08	7.71	15.67	8.035	15.69
	Mn F&A	10.595	15.6	7.61	14.595	7.07	15.545	7.5675	15.63
	Mid Mn	10.51	15.675	7.51	14.70	7.03	15.685	7.53	15.68
Hog/Sag		HO.08	so.015	HO.10	so.105	HO.04	so.14	HO.0275	SO.05
BALLAST/CARGO		72162	122,270	42426	108,122	38056	121,894	42618	120,046

ACTUAL HATCH (#) QUANTITIES LOADED

Koolan Is <-----PORT HEDLAND----->

	Oct 9-14	Sept 11-12	August 2-4	March 11-13
Hatch (#) quantities 1	12949	12417	13023	12828
2	12616	13602	13359	13650
3	15737	15183	14678	14233
4	13055	12553	13067	13833
5	12047	12923	11438	11233
6	12843	11591	11579	11974
7	14559	14230	14382	14181
8	14522	14020	14318	144401
9	13422	13959	14125	13711
Total	121750	120478	119969	120046

Attachment 5

Particulars of ship

Name	**Daeyang Honey (ex Yachiyosan Maru)**
Flag	**South Korea**
Lloyd's Number	**7013537**
Call Sign	**D9JV**
Owners	**Pan Ocean Shipping**
Classification	**Korean Registry (ex Nippon Kaiji Kyokai)**
Type	**Motor Ore Carrier**
Builder	**Kawasaki Heavy Industries Ltd. - Kobe**
Year Built	**1970**
Length	**270.00m**
Breadth	**42.00m**
Depth	**32.20m**
Summer Draught	**15.042m**
Gross Tonnage	**64,955**
Net Tonnage	**22,050**
Summer Deadweight	**123,745 tonnes**
Engine	**MAN 10 cylinder**
Engine Power	**16,918kW**
Propeller	**One fixed**
Crew	**28**