Departmental investigation the release of oil from the Italian flag motor tanker LAURA D'AMATO at Gore Bay, Sydney Harbour on 3 August 1999

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Navigation Act 1912
Navigation (Marine Casualty) Regulations
investigation into
the release of oil from the
Italian flag motor tanker
Laura D'Amato
at Gore Bay, Sydney Harbour
on 3 August 1999

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Summary

The Italian flag tanker *Laura D'Amato* berthed at the Shell Terminal Gore Bay Sydney, at 1224 on 3 August 1999, with about 90,957 tonnes of Murban Crude Oil. The loading arms were connected to the ship, the tank ullages measured and the quantity of oil on board checked. The mate and the Shell shore officer conferred and signed the 'Ship/Shore Safety' checklist. The checklist was also counter signed by a Sydney Ports inspector.

At 1412, the ship commenced discharging using no. 2 cargo pump. Initially, the water bottoms were removed at a slow rate of pumping. At 1430, all the cargo tanks were opened to lower their levels and the discharge rate was increased to 1000 m^3/h. At 1650, some cargo tanks were shut, the rate was further increased to 1500 m^3/h, and the suction valves for the two slop tanks (six wings port and starboard) opened.

By about 1815, the mate decided the level of the slop tanks was falling too slowly. To draw more directly from these two tanks and to increase the rate of discharge, the mate decided to open no. 3 cargo line to no. 2 pump by opening two 'crossover' valves on the main sea line in the pumproom. At about 1820, he ordered the cadet to open the two valves.

At 1825, the Shell wharf watchkeeper was returning from a routine check of the loading arms and moorings, when he suddenly smelled a strong odour of hydrogen sulphide. He immediately contacted the shore officer reporting the smell and asking whether the ship was venting its tanks for any reason. It was established that this was not the case.

The wharf watchkeeper went back to the shore manifold but detected no sign of a leak. The smell of hydrogen sulphide was still strong and, as he checked the water between the ship and the shore, he detected a slick of oil, which he traced to the ship's port side. He reported to the shore officer, who immediately ordered the ship to stop pumping.

The ship's pumps were stopped at 1836. The Shell emergency plan was implemented immediately.

The mate, who had already ordered the cadet to close the two valves that he had just opened, then ordered the 3rd mate to stop the cargo pump. He went ashore to see if he could locate the source of the oil spill. The wharf watchkeeper showed him the position on the port side, of the vessel, where oil was seen to be welling to the

surface of the water. The mate and the pumpman then went to the pumproom and checked all the valves. They found the two sea-chest valves on the sea suction line were fully open.

When the two men attempted to close the sea-chest valves, they found the large, manual, butterfly valves 'back-seated' open. To close the valves, both men had to use a large wheel key to break the seat. In closing the valves, any security seals placed between the two adjacent valve handles were broken.

At this point, the flow of Murban crude oil from *Laura D'Amato* into Gore Bay ceased.

Sources of Information

The master and crew of *Laura D'Amato*

V Ships Shipping Management SAM

Shell Australia and the Gore Bay Terminal Staff

Sydney Ports Corporation

Department of Transport, New South Wales

SGS Australia Pty Ltd

Redwood services SGS Gulf Limited

Safeship Pty Ltd – Marine Consultants

ITS Intertek Testing Services (Australia) Pty Ltd

Captain Peter Farrer, Ship Vetting

Registro Italiano Navale

Nippon Kaiji Kyokai

Transport Accident Investigation Commission, New Zealand

Maritime Safety Administration of People's Republic of China

Marine Administration, Isle of Man

Bureau of Maritime Affairs, Republic of Liberia

References

International Safety Guide For Oil Tankers and Terminals, Fourth Edition.

International Convention for the Prevention of Pollution from Ships, 1973/78 (MARPOL 73/78)

Acknowledgement

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Narrative

Laura D'Amato

Laura D'Amato is an Italian flag tanker of 96 121 tonnes deadweight at its summer draught of 13.62 m. It is owned by D'Amato Armatori and managed by V Ships of Monaco. The ship has been under its present ownership since November 1998, when it was transferred from Nippon Kaiji Kyokai classification society to the Registro Italiano Navale classification society.

Built in 1991 at the Namura Shipyard, Japan, it was launched as the Isle of Man flag tanker *Siratus,* owned by Concord Tankship Ltd (Shell International) and was under Nippon Kaiji Kyokai classification. In 1998, it was sold to Sanko Line and renamed *Sanko Concord* before being sold again in 1998 to its present owners.

As *Siratus* and *Sanko Concord,* it has been a regular caller at Gore Bay with cargoes of crude oil.

Laura D'Amato has a length overall of 241.8 m and a beam of 42 m. The main propulsion is provided by a B&W 7S60MC seven-cylinder two-stroke diesel engine driving a single fixed pitch propeller giving a service speed of 14 knots. There are three 500 kW Yanmar M 260L-EN generators, which provide the ship's electrical power needs. There is a single 55 000 kg/h water tube boiler, which provides steam and inert gas primarily for cargo operations.

Cargo operations are supervised from the cargo control room, situated inside the accommodation. Some valves are controlled remotely from the control room; others are manually actuated and can only be operated locally.

There are five centre cargo tanks and two sets of wing cargo tanks, 2 and 4 wings and a set of slop tanks, effectively
6 wings. The cargo pipeline system consists of three main lines, port (yellow), centre (green) and starboard (red). Flexibility of cargo handling is provided by a system of crossover lines and associated valves. Cargo is loaded by isolating the pumproom and using direct loading (or drop) lines to the tank pipelines.

For discharge, the ship has three steam- driven centrifugal pumps, one on each cargo line, each having a capacity of 2 500 m^3/h. *Laura D'Amato* can carry three separate grades of cargo with two-valve segregation.

The cargo system is connected directly to a sea chest on the port side of the pumproom, about 2 m above the keel, by a sea suction line. The sea suction line permits water to be pumped into the cargo system, either to provide a water plug between grades, to wash tanks and lines, or to ship extra ballast in extreme weather conditions. Any one pump can be used on another cargo line by means of crossover valves in the pump room, using the sea suction line as the crossover line. In addition to the crossover arrangement between the cargo lines and the sea suction line there is a direct connection to the slop tanks, used during crude oil washing (COW).

All cargo tanks are protected by inert gas and the tanks are cleaned by COW as the cargo is discharged. COW can be carried out using the yellow pump and line with direct suction to the slop tanks. Alternatively COW can be undertaken by using either the red or green pump, drawing from the slop tanks, through connections to the sea suction crossover line.

Laura D'Amato has a segregated ballast system and is in compliance with the International Convention for the Prevention of Pollution from Ships, 1973, as amended by the Protocol of 1978 (MARPOL), regulation 13. On ballast voyages, up to 38 540 m^3 (39 500 tonnes) of seawater can be carried in 1 wings, 3 wings, 5 wings and the forward and after peak tanks. There are dedicated steam- driven centrifugal ballast pump and ballast lines isolated from the cargo system by spool pieces connected to a sea-chest on the starboard side of the pumproom.

Since October 1998, *Laura D'Amato* had been vetted for charter and accepted by eight major oil companies: BHP, BP, Caltex, Cheveron, Mobil, Shell, Texaco, and Exxon. The ship appeared to be well maintained and in good condition.

The master in command on 3 August held an Italian Masters certificate with tanker endorsement, and had 22 years experience on tankers. He joined *Laura D'Amato* for the first time on 29 April 1999 at Whangarei, New Zealand.

The mate on board on 3 August had served on tankers since 1980, working for major specialised tanker companies until joining V Ships Management in January 1999. He also joined *Laura D'Amato* in Whangarei on 29 April 1999.

At sea, the mates maintained the traditional routine of four hours on watch and eight hours off watch. In port the 2nd mate and 3rd mate worked six-hour watches and the mate, who was responsible to the master, remained on call throughout the cargo operations.

20 February to 29 July 1999

Laura D'Amato introduced a survey and dry-dock program in Singapore on 20 February. At this time, all overboard discharges and the sea-chest valves were opened up, checked and closed after overhaul. The ship left dry dock on 25 March for Barrow Island, Western Australia, to load a cargo of crude oil.

Laura D'Amato anchored at Barrow Island on 30 March, waiting to load a part cargo. On the morning of 11 April, the vessel berthed. At about 1000, an independent cargo surveyor boarded the ship, having discussed the loading plan on 10 April, and, with one of the ship's staff, went to the pumproom. He checked the port side sea-chest valves* and confirmed that they were closed. He fixed a red seal (no. 0064801) to the sea chest valves and another (no. 0064895) to the overboard discharge valve. The time the seals were fixed was entered in the surveyor's 'Time Log of Loading Operations', which was signed by both the surveyor and the mate. The mate also completed the *International Safety Guide for Oil Tankers and Terminals Ship/Shore (ISGOTT)* checklist in conjunction with the terminal representative.

Loading was completed in the evening of 12 April and, once the cargo formalities were complete *Laura D'Amato* sailed to the Saladin Terminal to complete loading. The ship sailed from the Saladin Terminal on 15 April, with 88 975 tonnes of crude oil for the Marsden Point Terminal, Whangarei, New Zealand.

Laura D'Amato arrived at Marsden Point on 29 April. Again, an independent cargo surveyor inspected the vessel. The surveyor stated that, amongst other things, he checked the sea-chest valves and noted that they were closed and sealed by seal no. 0064801. The overboard discharges were also sealed and the seal numbers noted. The mate and shore representatives signed the *ISGOTT* ship/shore checklist.

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* The 'sea chest' referred to hereafter is the port side sea chest, unless specifically stated.

The discharge and crude oil washing passed without incident. The ship was not required to pump a water plug between the two grades of crude oil (Barrow Island and Saladin) and the sea valves were not opened.

While at Marsden Point, the master and mate were relieved. Neither the new master nor the mate had sailed on *Laura D'Amato* before, but both were very experienced in tanker operations. Under the command of the new master, *Laura D'Amato* sailed for Westernport, Victoria.

Laura D'Amato arrived in Westernport early in the morning of 6 May. An independent cargo surveyor boarded the ship to discuss the loading and to undertake routine checks. The surveyor checked the pumproom overboard discharges and sea valves and noted the number of the seals in place. The seal on the sea chest valves on the sea suction line was noted as being numbered 0064801. The loading was completed without incident and the ship sailed in the early hours of 7 May for the Chinese oil port of Zhanjiang.

Laura D'Amato arrived in Zhanjiang on 23 May. No oil company, or other shore representative, conducted an inspection of the pumproom. The discharge was completed without incident. At no time did the refinery require *Laura D'Amato* to pump water to clear shore lines. The sea- chest valves remained closed and sealed.

Laura D'Amato sailed from Zhanjiang on 26 May for Singapore arriving on 31 May. Bunkers were taken and the vessel stood by waiting for a cargo. Some crew changes also took place. The vessel finally sailed on 18 June for Fujairah in the United Arab Emirates (UAE) arriving 29 June, where it bunkered again, and then sailed for Jebel Dhanna in UAE.

Laura D'Amato arrived at Jebel Dhanna on 4 July to load a cargo of Murban crude oil for Shell, Sydney. The mate and the pilot/loading master completed the *ISGOTT* checklist.

At about 0200, an independent cargo surveyor from a reputable international testing company, boarded the vessel. The cargo surveyor had a background in refinery operation and fifteen years experience as a cargo surveyor. A normal workload for a surveyor based in the UAE, is about 20 ships each month. On board *Laura D'Amato*, he discussed the loading plan with the mate and he also inspected the cargo tanks for residual oil.

At some time between 0235 and 0330, he went to the pumproom, accompanied by a Filipino member of the crew, whom he understood to be the pumpman. He checked that the overboard discharge valve was shut and

sealed it with seal no. AA 176066. He could not recall whether or not there was another seal in place.

With the crewmember, he went to the bottom plates and was shown two valves which, he was told, were the sea-chest valves. The crew member told the surveyor in Tagalog (Filipino dialect) that the valves were closed. The surveyor tried turning both valves in a clockwise direction and the valves would not move, indicating to him that the valves were indeed shut. His attention was not drawn to the valve indicator, nor did he look for such an indicator. He used seal no. AA 176067 to seal the valves and left the pumproom. At interview, four months after he sealed the valves in Jebel Dhanna, he could not recall whether there was a pre-existing seal on the valves, or if he had removed the existing seal when fitting the new seal.

Laura D'Amato completed loading at about 2300 on 4 July. After the cargo surveyor and the mate completed ullaging and cargo calculations, the ship sailed for Sydney at about 0100 on 5 July.

The incident

Laura D'Amato arrived off Sydney at 1830 on 29 July 1999 and tendered 'Notice of Readiness' to discharge. The ship drifted off the port until 0954 on
3 August, when the pilot boarded to enter Sydney Harbour. At 1148, the first rope was sent to the berth and, at 1224, the ship was all fast port side to no. 1 berth, Gore Bay. At 1310, two shore discharge arms were connected.

Gore Bay is a terminal and tank farm, which supplies the Shell refinery near Parramatta.

An independent cargo surveyor undertook the usual pre-discharge check of cargo quantity and quality, but was not contracted to inspect the setting of the valves for discharge. Separately, the mate and the Shell terminal shore officer went through the ship-shore checklist. The mate ticked the relevant 'ship' boxes and signed the declaration that all the indicated items had been checked. The shore officer then ticked the relevant 'terminal' boxes and he also signed the declaration that all the items had been checked. The checklist was then countersigned by the Port of Sydney port officer, the process being completed at 1318.

At 1400, the Shell terminal shore officers changed shift. The normal shift crew at Gore Bay consists of three operators. In addition, each shift has a spare operator to cover for leave and other absences. When a vessel is

discharging, an additional operator is stationed on the wharf as the 'wharf watch'. During the afternoon of 3 August, there were total of five Shell terminal operational staff—the senior operator (in charge), the shore officer, two other operators and the wharf watch. The shore officer is always in attendance while a vessel is discharging and is solely responsible for the ship/shore interface.

The 2nd mate had the afternoon watch under the general supervision of the mate. The cadet was also on general duty under the direction of the mate.

The cargo figures were calculated, and the shore and ship cargo lines set up. At 1412, the ship commenced discharging at slow speed, running no. 2 cargo pump at 500 RPM to take out water bottoms from no. 2 wing tanks, no. 3 centre tank and no. 4 port. This operation was completed at 1430 when the discharge rate was increased to about 1000 m^3/h, (800 RPM) and all of the cargo tanks were opened up to discharge. All of the cargo tanks were lowered by approximately 1 m and then shut off to leave only 2 wings, 4 wings, and the port and starboard slop tanks discharging.

During the course of the afternoon, a surveyor from the Australian Maritime Safety Authority completed a tanker safety inspection. In addition, a tanker vetting inspection, on behalf of a leading oil company, was undertaken by an independent vetting inspector.

At about 1630, the vetting inspector, accompanied by the 2nd mate and company superintendent, was in the pumproom, below the plates on the port side. The vetting inspector recalled seeing the sea valves. He stated that a loop of twine joined by a red plastic seal connected the two adjacent valve handles, which he assumed were shut. There was another seal hanging there, apparently not performing any function. He also recalled the large notice with red lettering positioned between the valves. He did not look at the valve spindles closely and did not see the position of the valve indicators.

At 1650, the pumping rate was increased to 1500 m^3/h . Sunset on 3 August was at 1721. At 1800, the 3rd mate relieved the 2nd mate in the cargo control room, as officer of the watch.

At about 1820, the mate was on the main deck. The slop tanks (6 wing tanks) were not discharging quickly enough to fit in with his discharge plan and the crude oil washing program. He decided that a shorter run of cargo line to the slop tanks would increase the rate of discharge from the two tanks. It was normal discharge

practice to use the sea suction line as a crossover and he decided to open the yellow (port) line directly to no. 2 pump. At this time, he instructed the deck cadet to go down the pumproom and open the crossover valves 203 and 303.

At about 1825, the Shell terminal wharf watchkeeper finished a routine visual check of the ship's moorings, the loading arms and valves. As he was returning to the wharf shed, he suddenly detected a strong smell of hydrogen sulphide, usually associated with Murban crude oil. He immediately called the shore officer in the terminal control room on the two-way radio to ask whether the ship had sought permission to vent the tanks to atmosphere. The shore officer contacted the ship's cargo control room with the ship/shore two-way radio. The 3rd mate denied any venting was taking place. The wharf watchkeeper could hear this exchange on the radio.

The wharf watchkeeper went straight to the loading arms and the ship's manifold connections, which showed no sign of escaping oil.

The wharf watchkeeper shone his torch between the ship's hull and the shore line and saw what he thought was an oil slick. He traced the slick along the hull to the after end of the ship's main deck, where he could see oil apparently welling up from below the water surface. He immediately called the shore officer and told him to order the ship to stop pumping.

On board *Laura D'Amarto,* at about 1827, the mate had instructed the cadet to close valves 203 and 303. The cadet then went to the cargo control room, where he heard the shore call on the dedicated two-way radio ordering them to stop pumping. The 3rd mate also heard the call and pressed the cargo pump emergency stop at about 1836.

At about 1837, the shore officer initiated the Shell emergency plan. As part of this plan, the shore officer contacted Sydney Ports Corporation and notified them of the oil spill.

With the cargo operations suspended, the mate went first to the cargo control room to check that the cargo operation had been closed down properly. He then returned to the deck. He was confident that any source of an oil spill lay within the terminal complex. At some time before 1845, the mate proceeded to the wharf. The wharf watchkeeper was on the eastern end of the wharf, watching the oil welling to the sea surface. Just after 1845, he was joined by the mate and another crew member. The mate told the wharf watchkeeper that the ship

had stopped pumping, that the valves were shut and that any oil must be coming from the shore. The wharf watchkeeper then drew the mate's attention to the oil welling to the surface of the water on the vessel's port side. The mate and crew member then hurried from the wharf back up the ship's gangway.

At 1845 the vetting inspector, who was in the master's cabin, looked at the clock on the bulkhead, completed his initial report documentation and made his farewells. At this time, neither the master nor the superintendent was aware of what was happening on deck and on the wharf. On his way to the deck, the vetting inspector went to the control room and looked in at about 1846. He thought it strange that nobody was in the room at that time. He met the 3rd engineer, who told him the mate and watchkeeper were on deck. As he opened the accommodation door to the deck, he immediately smelled a strong smell of high sulphur crude oil. He went along the main deck towards the gangway to leave the ship. Close to the gangway, he met the mate who, was apparently returning to the ship in something of a rush. The two men briefly shook hands and the mate hurried towards the pumproom. The time by now was about 1848.

The vetting inspector signed out of the terminal at 1900 and on the way saw oil containment booms being deployed.

The mate called the pumpman on the radio to meet him in the pumproom and at this point, the two men re-checked the suction line sea-chest valves. At first, they tried by hand to see that the valves were shut tightly on their seats. The men then checked the valve position indicators located on the side of the extended spindles. They discovered that the two sea-chest valves were indicating fully open.

The mate and pumpman again tried to close the valves by hand and found that the valves were jammed hard open on their seats. The two men finally managed to close the valves with the aid of a large wheel key. In the process of closing the valves, the seals placed between the hand wheels by the cargo surveyors were broken.

With the sea-chest valves closed, the flow of oil from the vessel was finally stopped.

By this time the Shell terminal staff had been mobilised and were in the process of running oil booms in Gore Bay to contain the oil spill. Contact had also been made with various agencies including the Sydney Ports Corporation, the Australian Maritime Safety Authority, the NSW Department of Transport, the Environmental Protection Agency and local emergency services who had subsequently been mobilised for the containment,

cleanup and investigations.

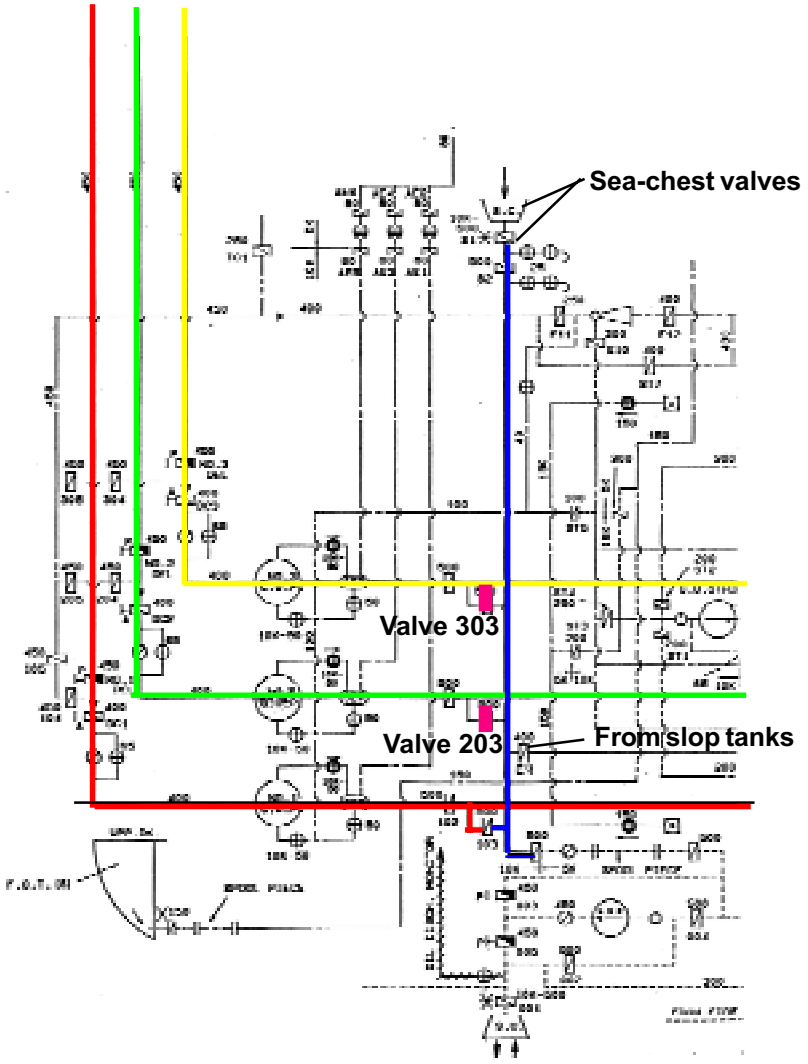
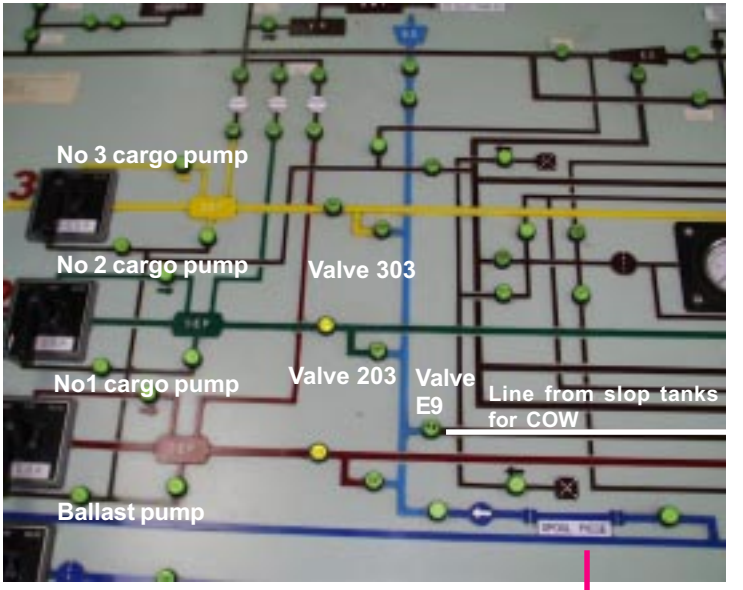


FIGURE 2

Section of *Laura D'Amato* cargo system schematic



Normally removed spool piece connecting cargo system to segregated ballast system

Note:
All valves shown thus on this section of console are locally, manually operated. Indicator lights on console are manually switched to indicate valve open/shut.

FIGURE 3

Section of console displaying schematic positions of critical valves

Comment and analysis

The oil spill

There is no dispute that the oil that polluted Sydney Harbour on 3 August 1999 escaped through the sea-chest valves on the port side of *Laura D'Amato's* pumproom. The two sea valves were open and when the sea suction line was used as a crossover between the yellow (no. 3) line and the green (no. 2) pump, oil escaped to the sea. There was no mechanical or equipment system failure that could explain why the valves were open. The two valves had to have been opened either when the ship was alongside in Gore Bay, or open before the ship arrived.

Other than some catastrophic failure of a tanker's structure, the three operational areas having the greatest potential for causing an oil pollution incident are the overfilling of tanks, the valves at the ship's manifold and sea valves connected to the cargo pipeline system. For this reason, there are specific guidelines and procedures to prevent pollution from these sources. In the case of a direct connection between the cargo system and the sea chest, as in the case of *Laura D'Amato,* there are checks and tests relating to the sea-chest valves.

The issue is why the two sea-chest valves were opened and how the defences (procedural and mechanical safeguards) failed to prevent the incident.

The pumping operation

The incident would not have occurred had valves 203 and 303 not been opened. It is possible to draw cargo from the slop tanks on the yellow line, using the port (yellow) no. 3 pump. By modifying the cargo discharge plan, it is theoretically possible (though not very practicable) to complete every discharge operation, including the full crude oil washing program, without using the sea suction line.

The decision of the mate to use the crossover capacity, however, was quite reasonable and not an unusual tanker practice. The evidence suggested that the use of the sea suction line as a crossover between the pumps was normal practice during discharge—including connection to the slop tanks by means of valve E9 for COW.

At Gore Bay, because of Shell terminal requirements, the ship had been required to pump slowly at 1500 m³/h using only two-thirds capacity of one of three cargo pumps. To avoid using the crossover line, it would have been necessary to either stop or slow the centre (green) pump and also run the yellow pump at slow speed. Also, steam-driven pumps require a relatively lengthy period of 'warming through', or preparation by the ship's engineers, prior to starting. The practice of using the sea suction line as a crossover between the pumps provided flexibility and reduced cargo pump stop/start operations.

The International Convention for the Prevention of Pollution from Ships, 1973, as amended by the Protocol of 1978 (MARPOL 73/78), makes provisions for the prevention of pollution from ships. The aim of the Convention:

> ...is to achieve elimination of intentional pollution of the marine environment by oil and other substances and the minimisation of accidental discharge of such substances.
>
> Annex 1 of MARPOL 73/78 deals specifically with oil pollution and makes specific provisions for oil tankers built after 1979. The central thrust of the Convention deals with the separation of the cargo and ballast systems.
>
> Regulation 13 provides that every crude oil tanker shall be provided with segregated ballast tanks. The quantity of segregated ballast carried is to be sufficient such that only in exceptional cases is there need to carry any ballast in dedicated cargo tanks.
>
> Regulation 1 (17) states that the ballast and cargo systems must be completely separate, with a dedicated pump, or pumps, and separate piping. Provision may be made to interconnect the two systems by means of spool pieces (removable or movable sections of pipe) between the normally blanked-off and separate systems.

The IMO 'unified interpretation' states that:

> the segregated ballast system should be a system which is 'completely separated from the cargo oil and fuel oil systems' as required by regulation 1(17). Nevertheless, provisions may be made for emergency discharge of segregated ballast by means of a cargo pump through a portable spool piece. In this case non-return valves should be fitted on the segregated ballast connections to prevent passage of oil to the segregated ballast tanks. The portable spool piece should be mounted in a conspicuous position in the pumproom and a permanent notice restricting its use should be prominently displayed adjacent to it.

In these respects, *Laura D'Amato's* ballast and cargo pipeline systems complied with the provisions of MARPOL

73/78. In submission, the ship managers emphasised the point that the cossover arrangement conformed to the rules and was an arrangement found on new and existing tankers (submission page 29). A section of *Laura D'Amato's* cargo piping system line diagram is shown in fig.2.

Although the arrangement of having the cargo system connected directly to the sea chest would seem inconsistent with the aims of MARPOL 73/78, the Convention does not prohibit the arrangement. Advice from a number of administrations suggests that they would expect a spool piece, or a normally blanked spectacle piece, to be fitted as a defence against accidental spillage. However, inspection of the pumproom showed no means of isolating the sea-chest from the cargo system, such as a 'spectacle piece'. Also the ship's 'cargo oil and water ballast piping diagram' shows no means of isolating the sea suction crossover from the sea-chest, or intermediate valve, that would be associated with a spool piece or blank.

Why the cargo system should need to be connected directly to the sea-chest valve is not obvious. The provisions, under MARPOL 73/78, for the segregated ballast system to be connected to the cargo system would seem to cover all operational requirements. The fact that the permanent ballast system can be connected to the cargo system by a spool piece means that such a connection could be used on the infrequent occasions it may be necessary to load heavy weather ballast, pump water plugs or water wash lines or tanks.

On *Laura D'Amato,* the size and difficulty of handling the existing spool piece to separate the segregated ballast system from the cargo system, would make such an option impracticable. However, this is an issue of design. It should be possible to provide a spool piece that meets the MARPOL 73/78 requirements yet is easy to connect when required.

At the very least, if it is necessary to have a direct connection between the cargo system and sea, the sea chest should be appropriately isolated.

The sea-chest valves

These sea-chest valves are 500 mm manually actuated butterfly valves (figs. 4 & 5). The valves are located in series on the sea suction pipeline adjacent to the sea chest, on the port side of the pumproom, with a short section of pipe connecting the two valves. There are extended spindles for each valve that connect the actuating

hand wheels above the pumproom floor plates to the valve gearboxes located on the after side of each valve beneath the floor plates. There is a position indicator for each valve located immediately under the handwheels. Located on the short section of pipe between the two valves is a small bore pipe that acts as a drain and pressure test line. It is fitted with two isolation valves, a connection piece for the pressure test line, and a pressure gauge.

The two sea-chest valves are routinely lashed off at the handwheels in addition to being sealed by one or more cargo surveyor's valve seals. There is also a large white sign (approximately 600 x 500 mm) lashed between the two valves' extended spindles with the following text, clearly visible, in large red letters (fig. 4)

> WARNING!
> SEA CHEST V/V
> DON'T BREAK THE SEAL
> DO NOT OPEN.

Other than for repair or overhaul, the sea- chest valves need only be opened for three operational reasons to:

- pump water plugs between different grades of cargo;
- water wash cargo tanks and cargo lines; and
- take extra ballast in the event of heavy weather.

The last time that the sea valves had been opened under normal operational conditions was at dry dock in Singapore between 20 February and 25 March 1999. This was witnessed by the pumpman who was on board in Gore Bay and who rejoined the vessel in Singapore in early June.

Laura D'Amato has ample ballast capacity in segregated ballast tanks and there had been no occasion to take ballast into the cargo tanks since leaving dry dock. Neither had there been any water washing of the cargo lines or tanks nor had any water 'plugs' been pumped since leaving dry dock in March. Consequently, there had been no reason to open the sea- chest valves.

Since leaving dry dock and before arriving at Gore Bay, *Laura D'Amato* had discharged at Whangarei, New Zealand and Zhanjiang, China. The sea suction line had been used routinely when discharging cargo at these

Figure 4
Laura D'Amato's sea-chest valve actuationg handwheels

Figure 5
Sea-chest valve spindles showing position indicator

ports and advice from both ports is that no water plug was pumped at any time and that there was no pollution incident. The sea-chest valves must, therefore, have been shut at these times.

Possibility of inadvertent opening of sea-chest valves

It is possible that the sea-chest valves were inadvertently opened, in operational error, in Gore Bay after the vetting inspector's inspection of the pumproom.

Just prior to the oil spill, the pumproom was set up to discharge using the centre (no. 2) pump on the centre (green) cargo line. Between each cargo line and the sea suction line there is a single valve. In the case of the green line, this was valve 203. The only time that can be positively established for opening valve 203 was about 1825 when the mate directed the cadet to open valves 203 and 303 to effect the crossover between the yellow line and the green (no. 2) pump.

The possibility that the cadet may have opened the sea valves when opening crossover valves 203 and 303 is very slight. He would have had to open three of four valves. It is also unlikely that he would have left the sea-chest valves in the open position. At interview, the cadet explained that when he opened any valve, he had been taught to then close the valve one turn to ensure that it was obvious that the valve was open.

The mate and pumpman stated that when they checked the pumproom after 1845, the seal connecting the two sea valve handles was intact. Their evidence was that the two sea valves were 'back-seated' open. They described how, together, they had to use a large wheel key to unseat both valves, before being able to close them normally by hand.

The inspector is satisified that the sea-chest valves were not inadvertently opened in Gore Bay.

The valve seals

The sea-chest valves, and overboard discharges on the cargo system, are routinely inspected and sealed by independent cargo surveyors engaged by the cargo shippers at every loading port. The valves are confirmed as shut and then sealed using twine and a numbered plastic locking device. On some occasions the existing seal

Figure 6
Sea-chest valve seal placed while in Barrow Island

Figure 7
Macro examination of seal no. 0064801 showing tamper damage

may be left in place and the number noted, if the surveyor is satisfied that an existing seal is intact and the valve is indicating closed.

The intact seal is an indication that the valve(s) had not been moved from the time the cargo was loaded. The seals are fitted to protect the integrity of the cargo against loss or contamination. The effectiveness of the seal as a security device is dependent upon relatively weak twine being used that will break before the plastic lock pops open.

Two seals, numbered 0064801 and AA 176067, were recovered by the MIIU from *Laura D'Amato* at Gore Bay on the evening of 4 August.

Seal no. 0064801 was attached to the two sea-chest valves, on 11 April 1999 at Barrow Island, by an independent cargo surveyor prior to loading the cargo for Marsden Point, Whangarei (figs. 6&7). Independent surveyors confirmed that this seal remained in place and intact at Marsden Point and Westernport.

Evidence obtained through the Maritime Safety Administration of the People's Republic of China, confirms that the valves were not checked by any port or terminal official at Zhanjiang on 23 May. The Singapore authorities confirmed that the ship did not undertake any cargo operations and there was no record of any check of the sea valves at Singapore in late May or early June.

A cargo surveyor checked the valves at Jebel Dhanna. The evidence of the mate and pumpman stated that the cargo surveyor checked the sea valves on the sea suction line. The seal fixed in Barrow Island (no. 0064801) was still in place. The surveyor tried the valve, which appeared to be shut, and fixed a new seal, no. AA176067.

There are some inconsistencies in the accounts of the ship staff and the cargo surveyor, that may be due to the passage of time. The pumpman on *Laura D'Amato* in Jebel Dhanna was actually Italian, not Filipino as indicated by the cargo surveyor's evidence. The cargo surveyor was sure that the crew member was Filipino as they spoke to each other in Tagalog, in which case it was probably the boatswain who accompanied the surveyor to the pumproom. There are also conflicting accounts as to whether seal no. 0064801 fitted in Barrow Island, was actually broken when the new seal no. AA176067 was fitted in Jebel Dhanna.

Of real importance is that a seal was seen by the vetting inspector to be in place in Sydney at about 1630 on 3

August. The vetting inspector also recalled an additional seal hanging on one of the valves, but apparently not fastened. This lends weight to the account of the mate and pumpman that they broke the intact seal at about 1900 on 3 August, when both sea valves on the sea suction line were found to be open.

There was no check of the sea-chest valves/seal by an independent cargo surveyor in Sydney, although a surveyor attended the vessel and performed a cargo quantity/quality survey prior to the discharge commencing.

Examination of the seals and twine

Both seal no. AA176067 and seal no. 0064801 were sealed in separate sample bags and submitted to the Scientific Unit, Forensic Services, of the Australian Federal Police. The Unit was asked to test three propositions:

1) The plastic seals had been tampered with (forced open and reassembled).

2) The twine had been cut and rejoined in some way.

3) The twine had been broken by being stressed–pulled apart.

The Scientific Unit reported that the male component of the plastic lock from seal no. 0064801 revealed white discolouration near the distal (hinge) end at the junction of the insert section. The surface of the area near the discoloured area appeared distorted. The surface of the female component adjacent to the strings also revealed distortion. These three observations indicate the seal had been subjected to excessive force and supports the proposition that it had been tampered with.

The Scientific Unit also reported that examination of seal no. AA176067 did not reveal any apparent evidence to support the proposition that it had been subjected to excessive force or tampering. Also, there was nothing to support the proposition that the twine from either seal had been cut and rejoined. The Unit was unable to determine whether or not the twine had been broken under tension.

On the basis of this examination, it would seem that seal no. 0064801 may well have been subjected to tampering, but there was no evidence that the seal fixed at Jebel Dhanna, no. AA176067, was subjected to any tampering.

Valves opened–timing

From the forensic evidence and the statements of the witnesses, it is probable that the sea-chest valves were opened at some point between Zhanjiang and Jebel Dhanna.

No pollution occurred during the Zhanjiang discharge, although the mate stated that the sea inlet line had been used as cargo pump crossover as normal. There is some evidence that seal no. 0064801, which had been in place since April, was still in place on arrival at Jebel Dhanna. Circumstantially, it seems that between Zhanjiang and Jebel Dhanna the seal was removed, the two valves jammed hard open and the seal no. 0064801 was refitted between the open valve handles to mislead anybody making an inspection of the sea-chest valves.

Why the two sea-chest valves may have been opened in this fashion is a matter for conjecture. The reasons for any such actions are related to human factors issues and are beyond the scope of this investigation.

Seal no. 0064801 had been in place for three months and four ports. It is probable that the ship's staff assumed the sea-chest valves were shut at all times. In Jebel Dhanna, given the crew's perception and an attempt by the cargo surveyor to close the sea-chest valves, it is probable that seal no. AA176067 was fitted to open valves.

From 4 July until about 1900 on
3 August, the assumption that the valves were closed by reason of the seal was perpetuated. No proper inspection was made of the valve position indicators and no air pressure test was carried out on the sea-chest valves.

ISM Code

The International Maritime Organisation (IMO) in November 1993 adopted the International Safety Management Code for the Safe Operation of Ships and for Pollution Prevention (ISM Code). The ISM Code recognises and codifies the responsibilities of shipping company management in ensuring adherence to marine safety guidelines and environmental protection standards. The stated objectives of the ISM Code (Article 1.2.11) are to:

> ...ensure safety at sea, prevention of human injury or loss of life, and avoidance of damage to the environment, in particular to the marine environment and to property.

Compliance with the ISM code requires that companies develop and maintain a Safety Management System (SMS) that will:

- Provide for safe practices in ship operation and a safe working environment:
- Establish safeguards against all identified risks: and
- Improve the safety management skills of personnel both ashore and on ships.

The SMS must include the following functional requirements:

- a safety and environmental protection policy;
- instructions and procedures to ensure safe vessel operation and environmental protection in compliance with relevant international and domestic laws;
- defined levels of authority and lines of communication between and among shipboard and shore-side personnel;
- procedures for reporting accidents and non-conformities;
- emergency preparedness and response procedures; and
- internal audit and management review procedures.

Compliance with the ISM Code is mandatory for companies operating large vessels in international trade. The deadline for compliance for oil tankers was July 1 1998.

The responsibility for ensuring the integrity of any overboard discharge, which if open could lead to a discharge of oil, rests firmly with the ship. In the case of the cargo system sea suction valves and overboard discharge valves, this responsibility ultimately rests with the mate. This responsibility is emphasised in various sections of *Laura D'Amato's* ISM Code Ship Operation Manuals.

The vessel's procedure manuals stipulated that the sea-chest valves must be checked by ship's crew prior to each loading, discharge or tank cleaning operation. The inspection is noted, dated and signed by the mate in a

purpose log in section 05 (Pumproom Sea Suction Valves) of the Cargo System Tests Book. According to the log, the valves were checked before arriving at both Jebel Dhanna and berthing in Sydney on 3 July and 29 July respectively.

A simple procedure, as part of a check system to ensure the sea valves are closed, is to ensure the valve position indicators show the valves in the closed position. If the ship's account is correct and the valve indicators were examined before arrival in Sydney, the indicators would have shown the valves in the open position. To see the valve indicators, an operator has to bend down and look below the valve hand wheels. The indicators are clearly visible if this simple procedure is followed.

Laura D'Amato's Pollution Prevention Manual (PPM) contains a procedure for testing the integrity of the sea valves by air pressure. The procedure described in the PPM is based on the procedure described in the ICS/ OCIMF publication *Prevention of Oil Spillages Through Cargo Pumproom Sea Valves', 2nd edition, 1991*. According to the procedure, the sea suction line may be tested with compressed air before arrival at each port. It is not necessary to move the sea-chest valves for this test. The test involves draining the sea suction line between the two sea valves and then introducing compressed air at 50 psi and ensuring there is no pressure drop. This procedure is then repeated for the line inboard of the inner sea valve.

If the sea valves had been tested prior to arriving in Jebel Dhanna and Sydney as detailed in the procedure, it would have been impossible to drain the line and the subsequent air pressure test would have failed. The sea valves would definitely have been found to be open. The air pressure test had obviously not been performed and the physical check of two sea-chest valves at both of these times failed to detect that the valves were open.

By its non-specific nature, the vessel's safety management system contributed to a series of factors that failed to ensure that the sea-chest valves were properly checked.

The cargo control panel

The ballast and cargo system consisted of a mix of manual valves, locally operated hydraulic valves and hydraulically actuated valves with local control and control from the cargo control room.

Indication as to whether any particular valve was open or shut was displayed on the cargo control panel. On the console display, on/off light buttons, dependent on the ship's staff for operation, showed the status of the manual valves and the locally operated hydraulic valves. Only the hydraulic valves controlled directly from the cargo control console automatically indicated whether valves were open or shut.

In submission, the ship managers noted that automatic indicators were not commonly fitted to manual operating valves. In researching the issue, they could find only one instance of a similar incident. However, they noted that such a modification was relatively simple and that installation of such a system was under review.

As the sea-chest valves were manually actuated, there was no automatic indication in the control room. Given the importance of these valves and the age of the ship, the lack of such an indication seems to be something of a deficiency in the system.

ISGOTT

The International Safety Guide for Oil Tankers and Terminals, ISGOTT, is the oil industry-standard reference work on the safe operation of oil tankers and terminals. The guide makes recommendations for tanker and terminal personnel on the safe handling of crude oil and petroleum products at oil terminals. It was prepared originally by combining the contents of the *Tanker Safety Guide (Petroleum)* published by the International Chamber of Shipping (ICS) and the *International Oil Tanker and Terminal Safety Guide* published on behalf of the Oil Companies International Marine Forum (OCIMF).

ISGOTT emphasises that the completion of a safe and successful cargo handling operation is dependent upon effective cooperation and coordination between all parties involved. Chapter 5.7 (p. 40) of *ISGOTT* details the form and content of ship-shore communications and specifically refers to a 'Ship/Shore Checklist':

> The purpose of the Ship/Shore Checklist is to ensure the safety of both ship and terminal and of all personnel and it should be completed jointly by a responsible officer and terminal representative. Each item should be verified before it is ticked. This will entail a physical check by the two persons concerned and will be conducted jointly where appropriate. It is of no value if it is merely regarded as a paper exercise.
>
> SGS Redwood Services SGS Gulf Limited submitted that *ISGOTT* clearly states that each item of the checklist is to be

verified before it is ticked. This is to be a physical check by the two persons concerned. This is an accurate interpretation of this part of the *ISGOTT*.

However, appendix A of *ISGOTT* provides a pro-forma and guidelines for completing a standard Ship/Shore Checklist and states under 'Mutual Safety Examination' (p. 229):

> All items lying within the responsibility of the tanker should be personally checked by the tanker's representative and similarly all items which are the terminal's responsibility should be personally checked by the terminal representative. In carrying out their full responsibilities however, both representatives, by questioning the other, by sighting of records and, where felt appropriate, by joint visual inspection should assure themselves that the standards of safety on both sides of the operation are fully acceptable.

This portion of *ISGOTT* does not stipulate that each item on the checklist be physically checked by both parties and indicates that the checklist is used as a verification tool. Australian oil terminals, including Shell's, base their procedures on this text and use the checklist as a means of checking that each party has confirmed to the other that the items on the checklist are 'as required' before cargo operations start.

The initial discription of the 'Ship/Shore Checklist' and the guidelines for completing the checklist are somewhat contradictory in *ISGOTT*.

The integrity of the sea valves is referred to in item (15) in the *ISGOTT* Ship/Shore Checklist, which asks, 'Are sea and overboard discharge valves, when not in use, closed and visibly sealed?'. The Guide elaborates in annex A (page 234):

> Experience shows the importance of this item in pollution avoidance on ships where cargo lines and ballast systems are interconnected. Remote operating controls for such valves should be identified in order to avoid inadvertent Section console displaying schematic positions of critical valves opening.
>
> If appropriate, the security of the valves in question should be checked visually.

Shell submitted that the shore officers did not physically check the pumproom. Shore officers undertake training in their specific duties and in liaison with ships' staff. Although expert in terminal operations and equipment, they only had a general operational knowledge of ships and there was a wide variety of configurations between different tankers using terminals. It is not the practice for shore officers to physically check each item on the list.

They complete the checklist by asking questions of the ship staff (usually the mate), supplemented by the shore officer's observations, as he/she walks around on board the ship, of scupper plugs, towing wires and moorings etc.

Shell also contracted an independent firm of cargo surveyors to take samples, check ullages and calculate the quantity on board before and after discharge. At some ports, such a cargo surveyor would also be required to review the cargo operations plan, and inspect the valve settings, including the pumproom sea- chest valves. In the case of tankers discharging at Gore Bay, the independent surveyor is not contracted to check the valve settings.

A checklist was completed prior to *Laura D'Amato* loading the cargo of Murban crude oil at Jebel Dhanna and also prior to the discharge in Gore Bay. It was signed by the mate and the shore officer and countersigned by an inspector from the Sydney Ports Corporation. The signature of the inspector from the Sydney Ports Corporation was to certify that the two principals, the mate and the terminal shore officers, had completed the checklist appropriately.

The responsibility for the correct answer to question 15 of the *ISGOTT* checklist, 'Are sea and overboard discharge valves, when not in use, closed and visibly secure?', lay with the mate. While 'visibly secured', the strong probability is that the two valves were open and that the ship's staff had not checked the valve position indicators either at Jebel Dhanna or before arriving at Gore Bay. The Shell terminal shore officers and the Sydney Ports Corporation inspector followed their procedures.

Ship inspection regime

Oil tankers are periodically 'vetted' by independent vetting inspectors engaged by oil companies. The object of the vetting exercise is to ensure that the vessels meet the oil companies' requirements for the carriage of their cargoes. Such inspections look in detail at the vessel type, condition, systems, and compliance to the various requirements of class and statute which govern the carriage of bulk oil cargoes.

The vetting inspector, who attended the vessel in Gore Bay on the afternoon of the incident, found the ship to be in generally good condition and of a standard that met his principals' requirements. He pointed out only two

deficiencies in the pumproom: a vent flap required freeing, and the emergency escape breathing apparatus set was missing from the bottom of the pumproom.

Given the evidence of the vetting inspector, it is reasonable to accept that the two sea-chest valves had not been touched at that time while in Gore Bay.

Ship crews have raised the issue of the proliferation of ship inspections. A number of journal articles have also been written citing the increased workload involved, the distraction from key operations and the limitation placed on the free time of ship staff during short stays in port.

On the afternoon of 3 August, *Laura D'Amato* was subjected to a tanker safety inspection by the Australian Maritime Safety Authority (AMSA) and a ship vetting inspection. The ship staff made no complaint of either inspection, both of which were conducted in a professional and unobtrusive manner. Both inspections were completed prior to the oil spill. Unfortunately, neither inspection had any cause to target or physically test the sea valves.

The AMSA surveyor, the vetting inspector, the Shell shore officer and the Sydney Port Corporation inspector had no responsibility for the open sea-chest valves. Nevertheless, it does seem something of an irony that, with the two ship inspections and the *ISGOTT* checklist being signed by two shore personnel, such a fundamental factor as open sea valves should have gone unnoticed.

International statistics

During the investigation, the inspector contacted a number of Protection and Indemnity Clubs, seeking some statistics on the frequency of pollution incidents from operational error while handling oil cargoes. Some of those clubs contacted were unable to provide any precise information, however, two Clubs were able to provide data.

Statistical data from the Japan Protection and Indemnity Club indicates that of 126 files relating to oil pollution incidents during cargo operations, 15 (12 per cent) were due to operational error, of which two (1.6 per cent) were due to the sea- chest valves being open.

The UK P& I Club, in any given period, insure in the region of 1 000 tankers. Statistics provided by the Club,

covering oil pollution claims greater than
$US 100 000 over a period of eight years, record claims against 59 ships of which 10 involved misuse of valves.

Given the number of tankers involved the pollution rate can be considered as low. However, the financial and environmental impact of just one spill would seem to justify a review of the procedures and mechanisms that are designed to stop valves being misused.

Conclusions

These conclusions identify the different factors contributing to the incident and should not be read as apportioning blame or liability to any particular organisation or individual.

The factors which lead to the escape of crude oil cargo from *Laura D'Amato* into Sydney Harbour include but are not limited to:

1. The sea-chest valves on the sea suction line adjacent to the port sea chest in the vessel's cargo pumproom were open.

2. The use of the sea suction line as a cargo pump suction crossover line led to cargo filling the line and escaping through the open sea-chest valves overboard.

3. The ship's cargo system did not provide for a separate designated cargo pump suction crossover line or some means of isolating the cargo system from direct connection to the sea chest.

4. The presence, at various times, of seals placed between the sea-chest valves lead to a false assumption on the part of the ship's staff that the sea-chest valves must therefore be shut.

5. The false assumption contributed to the fact that the ship's staff did not properly check the sea-chest valves, as required by the ISM Code procedure, the *ISGOTT* Guide and normal tanker operations, before loading in Jebel Dhanna and discharging in Sydney.

6. There was no remote monitoring, on the cargo control console, of the positioning of the two sea-chest valves.

7. The vessel's Safety Management System did not adequately detail the pressure test procedures to be carried out on the sea-chest valves each time they were to be checked for tightness.

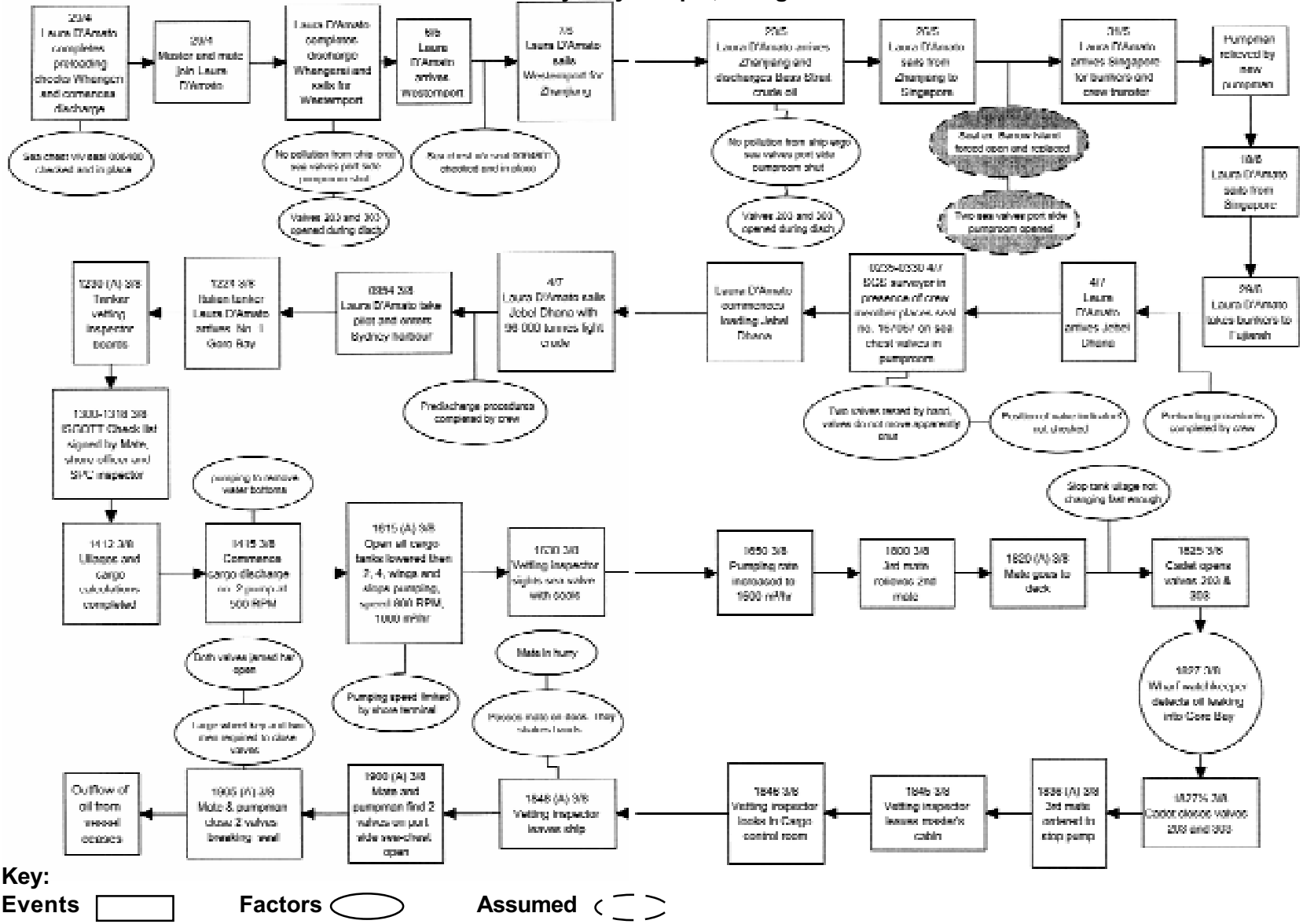
8. The independent cargo surveyor in Jebel Dhanna did not recognise that the sea-chest valves were, in fact, open.

9. The Ship/Shore Checklist procedures, in Jebel Dhanna and Sydney, did not physically check and identify that the sea-chest valves were in a closed position.

10. The probability is that the sea-chest valves were opened some time after leaving Zhanjiang and before arriving at Jebel Dhanna. There was no operational reason for opening these valves.

Figure 8

Event and causal factor chart for Laura D'Amato - Sydney oil spill, 3 August 1999



Submissions

Under sub-regulation 16(3) of the Navigation (Marine Casualty) Regulations, if a report, or part of a report, relates to a person's affairs to a material extent, the inspector must, if it is reasonable to do so, give that person a copy of the report or the relevant part of the report. Sub-regulation 16(4) provides that such a person may provide written comments or information relating to the report.

The final draft of the report, or relevant parts thereof, was sent to the following:

- the master of *Laura D'Amato;*
- the mate of *Laura D'Amato;*
- V Ships Shipping Management SAM.;
- Redwood Services SGS Gulf Limited;
- Sydney Ports Corporation;
- Shell Company of Australia
- Transport Safety Bureau, NSW Department of Transport; and
- the Australian Maritime Safety Authority.

Replies were received from the mate, V Ships Shipping Management SAM, Redwood Services, Shell Company of Australia and the Australian Maritime Safety Authority.

The mate

The mate accepted the report as being mostly correct, but made five specific observations. Where appropriate the text has been amended.

The mate also made submissions relating to three specific areas of the report:

1. The shutting of the main line suction valves would have stopped the outflow of oil. The valves were closed no later than 1840.

2. Based on the cadet's ability, the clear identification of the valves and the warning notice at the sea valves, there is no possibility that the cadet opened the sea valves.

3. The sea-chest was tested before arrival in Sydney.

V Ships Shipping Management SAM

The ship managers made submissions on three specific conclusions–conclusions 3, 6 and 7.

The managers submitted as follows:

> Conclusion 3. The present cross-over arrangement is in line with any applicable rule and is widespread on new and existing vessels.
>
> As for any other arrangements the risk of sea pollution exists only in case of breakdown or where procedures are, for any reason, not adhered to.
>
> The company, after the incident, as part of the alternatives to be considered for improving the cargo system, has made a study for altering the piping system in the pumproom, in order to fit a blank flange (spectacle) between the two sea chest valves. However, as per Marpol – Annex 1 – Reg 13.3.a, there may be the necessity to carry additional ballast, in case of severe weather condition. As the repositioning of a spectacle flange of such dimensions may take some hours of work, the risk of a ballasting delay in case of sudden weather deterioration has not to be underestimated.
>
> Conclusion 6. These systems are not commonly fitted on manual operating valves. The on board arrangements and procedures are perfectly suitable in normal conditions to allow the safe manual operation of the valves. Most of the tanker vessels have been built with the same arrangement and as far as we have been able to find one only similar incident has occurred in the history of the tanker.
>
> However, as this modification is of a simple installation and will further improve redundancy, it will be proposed to the Owners for their further consideration.
>
> Conclusion 7 Our Safety Management System has been recognised and certified by the Classification Society and Flag

Administration, and we have no other instances where the crew has misrepresented such instructions.

We believe our manuals are as specific as necessary and in line with the industry manuals issued by well recognised organisation as ISGOTT, ICS. OCIMF etc.

In fact the text of the sea valve monitoring procedure is in line and refers to a well specific and recognised guide edited by a reputable and recognised organisation in the industry (see Prevention of Oil Spillage through the Cargo Pumproom Sea Valves II – Edition 1991 –5.3-page 8-Edited by ICS).

Not withstanding the above, we have issued additional operation instructions to ensure that the verification loop is effectively closed.

SGS

SGS made submission relating to conclusions 5 and 8. SGS considers that *ISGOTT* does not allow scope for assumptions.

SGS feel that the emphasis of conclusion 5 should more properly be upon the failure to follow proper procedures rather than focusing upon a perceived false assumption created by the seals fixed to the valves. SGS understand the *ISGOTT* checklist to require items to be physically checked by the two persons concerned. In their view the reference to false assumptions should be replaced by reference to the terminal staff, the port authority staff and the ship's staff.

Shell Company of Australia

A submission from Shell Company of Australia was accommodated by a minor amendment to the text.

Details of vessel

Name	*Laura D'Amato* (Formerly *Siratus, Sanko Concords)*
IMO No.	8907539
Flag	Italian
Classification Society	Registro Italiano Navale (Nippon Kaiji Kyokai)
Vessel type	Tanker
Owner	D'Amato Armatori
Year of build	1991
Builder	Namura Shipyard, Japan
Gross tonnage	54962
Summer deadweight	96,121 tonnes
Length overall	241.8 m
Breadth, extreme	42.00 m
Depth	20.4 m
Draught (summer)	13.62 m
Engine	Hitachi/B&W Diesel 7S60MC
Engine power	10,151 kW
Service speed	14 knots
Crew	23 (10 Italian, 13 Filipino)