Report on the investigation of the serious

injury to a member of the crew of the LASH vessel

Spruce

at Victoria Docks, Hartlepool

6 March 2006

Marshall Islands Administration
International Registries (UK) Ltd
3rd Floor
42 Moorgate
London
United Kingdom
EC2R 6EL

Marine Accident Investigation Branch
Carlton House
Carlton Place
Southampton
United Kingdom
SO15 2DZ

Report No 27/2006
October 2006

This is a joint investigation report between International Registries Inc the maritime administrators for the Republic of the Marshall Islands flag state and the MAIB. The MAIB has taken the lead role pursuant to the IMO Code for the Investigation of Marine Casualties and Incidents (Resolution A.849(20)).

Extract from

The United Kingdom Merchant Shipping

(Accident Reporting and Investigation)

Regulations 2005 – Regulation 5:

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

NOTE

This report is not written with litigation in mind and, pursuant to Regulation 13(9) of the Merchant Shipping (Accident Reporting and Investigation) Regulations 2005, shall be inadmissible in any judicial proceedings whose purpose, or one of whose purposes is to attribute or apportion liability or blame.

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CONTENTS

GLOSSARY OF ABBREVIATIONS AND ACRONYMS

AB	-	Able Bodied Seaman
ABS	-	American Bureau of Shipping
GP	-	General Purpose
IDF	-	Inter-Departmental Flexibility
IMO	-	International Maritime Organization
ISM	-	International Safety Management
Kg	-	Kilogram
LASH	-	Lighter Aboard Ship
MCA	-	Maritime and Coastguard Agency
SMC	-	Minimum Safe Manning Certificate
SMS	-	Safety Management System
SOLAS	-	Safety of Life at Sea
STCW	-	Standards of Training, Certification and Watchkeeping
UTC	-	Universal Coordinated Time

SYNOPSIS

At 1718 UTC, on 6 March 2006, the cook of the LASH vessel *Spruce* sustained serious injuries to his left leg and left pelvis as the result of a fall of 6m from the ship's deck into the empty barge hold. These injuries required several operations, and it was 6 weeks before he was fit enough to be repatriated. It was estimated that it would be an additional 6 months before he would be fit to return to work on board ship.

Spruce was alongside at Victoria Harbour, Hartlepool in the United Kingdom. The vessel had completed the discharge of a full load of barges and was then deballasted to her usual seagoing condition of 4.25m draught even keel.

The incident occurred during the recovery of the vessel's portable gangway shortly before *Spruce* was due to let go her ropes and sail from the port. The injured person was assisting in this operation, although he was not trained for working on deck.

The operation to recover the gangway was labour intensive; five members of crew were used to manhandle the gangway up the side of the vessel to the main deck where the stowage position was located. The vessel was originally fitted with a method of retrieval for a fixed gangway, but this had been cropped and removed a number of years previously.

The minimum numbers of deck and engine personnel required by the vessel's Minimum Safe Manning Certificate (SMC) were insufficient for mooring operations and supplementary tasks. It was necessary for the cook and the steward (who were not included on the SMC) and motormen to assist on deck at times of peak workload.

On *Spruce*, the working regime relied on a system of Inter-Departmental Flexibility, but this had not been accounted for when determining the crew numbers under the SMC or when developing the ship's safety management system. Inter-Departmental Flexibility is a manning concept that is recognised by some individual flag states but which is not defined by the International Maritime Organization (IMO) in its Standards of Training, Certification and Watchkeeping (STCW) Code.

The lessons learned from this accident have resulted in the owners refitting a fixed method of bringing the gangway on board. An additional safety guard rail at the gangway stowage position has also been fitted to prevent anyone falling into the hold. In future, only cooks and stewards who have received additional training for work on deck will be assigned to this type of vessel.

Recommendations have been made jointly to the Marshall Islands Marine Administration, and the Maritime and Coastguard Agency (MCA) to take forward at IMO an initiative aimed at improving the assessment of levels of minimum safe manning and defining the requirements associated with Inter-Departmental Flexibility.

SECTION 1 - FACTUAL INFORMATION

1.1 PARTICULARS OF *SPRUCE* AND ACCIDENT

Vessel details

Registered owner	:	LCI Shipholdings Inc.
Manager(s)	:	LMS Shipmanagement Inc.
Port of registry	:	Majuro
Flag	:	Marshall Islands
Type	:	Barge carrier
Speed	:	10 knots
Built	:	1975 Toyo, Japan
Classification society	:	ABS
Length overall	:	112.5 metres
Gross tonnage	:	7,258

Accident details

Time and date	:	1718 UTC on 6 March 2006
Location of incident	:	Hartlepool
Persons on board	:	14
Injuries	:	The cook fell into the empty hold and suffered injuries while assisting with stowing the portable gangway.

Figure 1

Spruce in seagoing condition

Figure 2

Spruce ballasted prior to loading/unloading of barges

1.2 DESCRIPTION OF VESSEL AND TRADE

Spruce was originally built in 1975 in Japan at Sumitomo Heavy Industries Ltd. Initially she was operated as the unpropelled barge *Flash IV.* In 1978 she returned to the same yard to be converted to a twin screwed barge carrier, and was then renamed *Mammouth Spruce* for use in the Lighter Aboard Ship (LASH) industry. Subsequently, she was sold on to Lash Carriers Inc and renamed *Spruce.*

At the time of the accident, the vessel was trading predominantly between the ports of Rotterdam, Brake in Germany, and the English rivers Humber and Medway. She also occasionally traded to Hartlepool, subject to cargo requirements.

Spruce was used as a feeder ship serving two larger ocean-going vessels which carried the loaded barges on a regular route between Rotterdam and the Gulf of Mexico.

LASH was developed as a shipping concept in the USA for predominantly military use. The LASH mother vessel has the capability to carry around 80 LASH barges, each weighing up to 340 tonnes. Feeder vessels such as *Spruce* can carry around 15 barges.

Spruce had a single hold which was completely open to the sea at the after end. The vessel was ballasted down to enable barges to be floated in or out, and then de-ballasted to "ground" the barges in the hold for transport **(Figures 1 and 2)**.

The nature of the feeder trade is intensive and is rigidly geared to the schedule of the mother vessel.

1.3 NARRATIVE

On 6 March, *Spruce* arrived at Hartlepool to discharge 15 empty barges. Cargo operations were completed at 1035 and, after deballasting, the vessel was ready to leave the port with an empty hold at 1350. However, due to tidal constraints, she had to wait until early evening.

The pilot arrived at 1705, and the crew were called to prepare for departure at 1712. Five crew members, two seamen, two motormen and the steward, started to manhandle the gangway on board. The gangway was portable, about 100kg in weight and 6.0m long **(Figure 3)**.

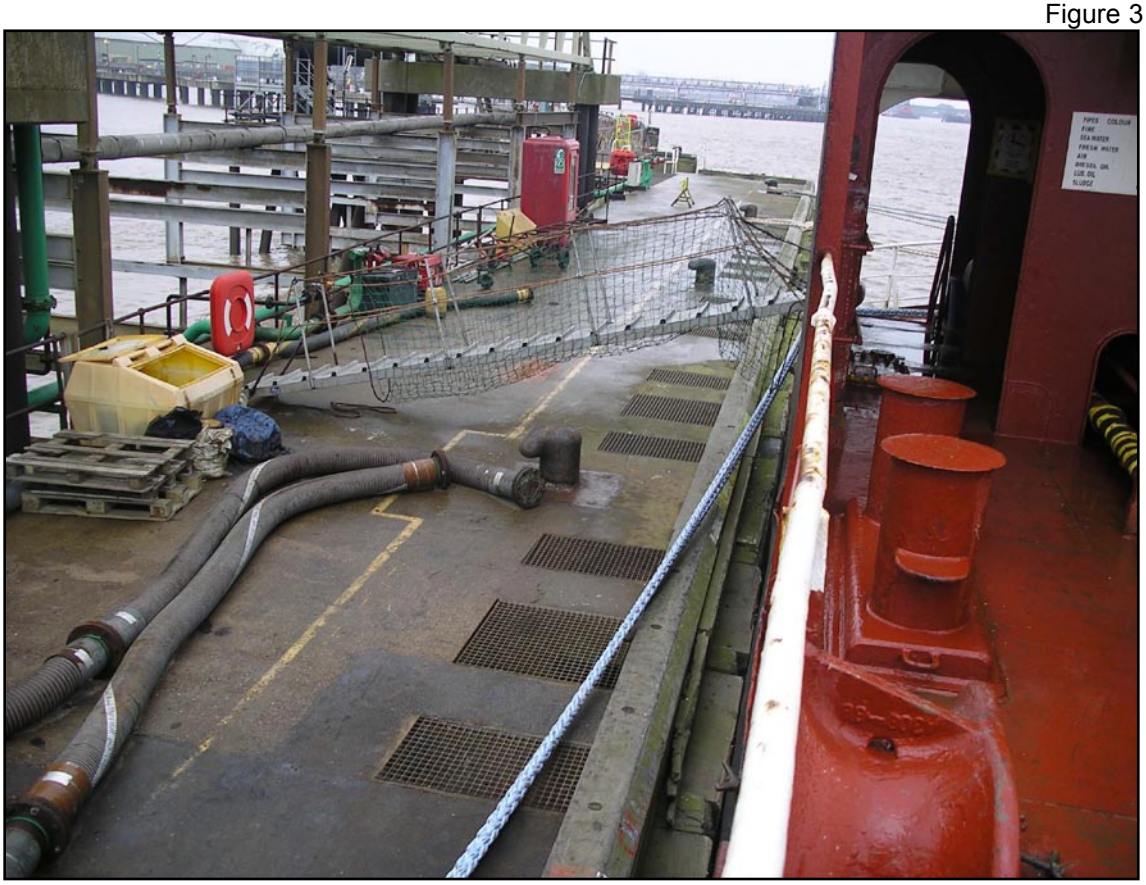
The cook came onto the deck ready for his mooring duties, and saw the gangway being retrieved. He proceeded to help tip it over the main deck rails and rotate it into its stowage position.

During the operation, the cook fell from the rails into the empty hold, a distance of 6 metres. As he fell, he still had hold of a rope steadying line, which was eventually jerked from his hands. This had the effect of causing him to land feet-first onto the steel tank top, where he sustained his injuries.

At 1718, the pilot reported the accident to the port authorities. First-aid was given on board, and an ambulance with paramedics arrived at 1737. The cook was taken to the local hospital.

The injuries sustained by the cook were severe, and included a fractured lower leg and pelvis which required surgery. The cook was not able to be repatriated for 6 weeks and was not expected to be fit to return to work for a further 6 months.

Figure 3



Spruce gangway rigged aft

1.4 ENVIRONMENTAL CONDITIONS

The weather at the time of the accident was dry and fair with good natural lighting. This is not considered to have played a part in this accident.

1.5 VESSEL OPERATION AND PROCEDURES

1.5.1 *Spruce*'s mooring and gangway arrangements

Spruce had a single superstructure sited right forward, containing accommodation, offices and the navigation bridge. The single open cargo space ran aft from the superstructure to an open stern. The cargo space was bounded by side and double bottom ballast tanks, fuel tanks and void spaces. With the vessel ballasted down, barges could be floated into and out from the hold through the open split stern **(Figure 4)**. Propulsion machinery was fitted in the void spaces on both sides of the cargo space in 1978. There was no cross access at main deck level between the two hold sides. Mooring winches were fitted on both parts of the hull aft and, with no quick access between the two sides, it was necessary to divide the crew into two after mooring gangs.

Access to the cargo hold and the tank top could be gained from the main deck using integral ladders built into the hull sides **(Figure 5)**.

Figure 4

Spruce hold and stern arrangement

Figure 5

Photograph showing the ladder which is recessed into the hull

The vessel's operation in port entailed a considerable amount of ballasting to facilitate the cargo work. This, in turn, meant that the arrangement for the gangway needed to be flexible and portable to cope with the vessel's varying freeboards. Her portable gangway was of aluminium construction. The design of the vessel allowed the gangway to be deployed from the platforms that were part of the ladder system within the hull. At sea, the gangway was stowed fully rigged on the main deck inboard of the ladder system on a rack over fixed pipework. The deck area between the railings guarding the cargo hold, and those guarding the inboard side of the ladder system, was only 2m wide. The passage fore and aft, between the pipes and the rails guarding the ladder system was only 0.7m wide **(Figure 6)**. The railings guarding the cargo space were of standard height – no allowance being made for the risks associated with people standing on the pipes.

The original outfitting of the vessel provided a lifting arrangement for a fixed gangway.

Over time, this arrangement was removed, possibly due to corrosion or damage. There is no record of when this happened, but it was before any of the present crew could remember.

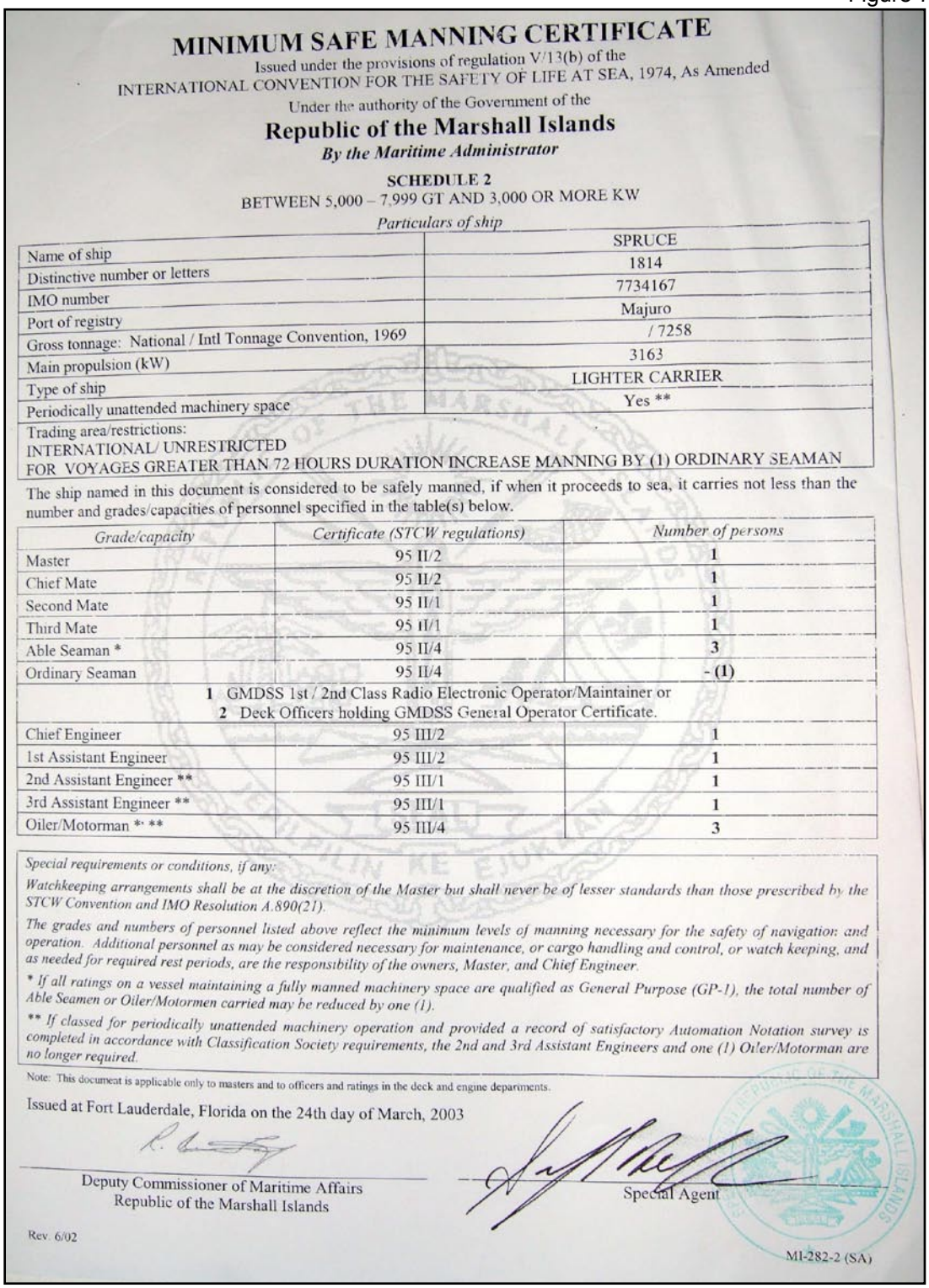
Figure 6

Gangway stowage area

1.5.2 Manning

Spruce was provided with a valid Minimum Safe Manning Certificate (SMC), issued on 24 March 2003 by the Marshall Islands Administration. The SMC required a complement of 14 **(Figure 7)**. However, there were provisions for reductions to this manning level if the vessel, like *Spruce*, operated with a fully unmanned engine room, in which case two engineer officers and one motorman were not required. The minimum safe manning requirement for *Spruce* was therefore 11 (master, chief officer, second officer, third officer, bosun, 2 x seamen, chief engineer, second engineer, 2 x motormen).

Figure 7



MINIMUM SAFE MANNING CERTIFICATE

Issued under the provisions of regulation V/13(b) of the
INTERNATIONAL CONVENTION FOR THE SAFETY OF LIFE AT SEA, 1974, As Amended

Under the authority of the Government of the

Republic of the Marshall Islands

By the Maritime Administrator

SCHEDULE 2

BETWEEN 5,000 – 7,999 GT AND 3,000 OR MORE KW

Particulars of ship

Name of ship	SPRUCE
Distinctive number or letters	1814
IMO number	7734167
Port of registry	Majuro
Gross tonnage: National / Intl Tonnage Convention, 1969	/ 7258
Main propulsion (kW)	3163
Type of ship	LIGHTER CARRIER
Periodically unattended machinery space	Yes **

Trading area/restrictions:
INTERNATIONAL/ UNRESTRICTED
FOR VOYAGES GREATER THAN 72 HOURS DURATION INCREASE MANNING BY (1) ORDINARY SEAMAN

The ship named in this document is considered to be safely manned, if when it proceeds to sea, it carries not less than the number and grades/capacities of personnel specified in the table(s) below.

Grade/capacity	*Certificate (STCW regulations)*	*Number of persons*
Master	95 II/2	1
Chief Mate	95 II/2	1
Second Mate	95 II/1	1
Third Mate	95 II/1	1
Able Seaman *	95 II/4	3
Ordinary Seaman	95 II/4	- (1)
1 GMDSS 1st / 2nd Class Radio Electronic Operator/Maintainer or 2 Deck Officers holding GMDSS General Operator Certificate.		
Chief Engineer	95 III/2	1
1st Assistant Engineer	95 III/2	1
2nd Assistant Engineer **	95 III/1	1
3rd Assistant Engineer **	95 III/1	1
Oiler/Motorman * **	95 III/4	3

Special requirements or conditions, if any:

Watchkeeping arrangements shall be at the discretion of the Master but shall never be of lesser standards than those prescribed by the STCW Convention and IMO Resolution A.890(21).

The grades and numbers of personnel listed above reflect the minimum levels of manning necessary for the safety of navigation and operation. Additional personnel as may be considered necessary for maintenance, or cargo handling and control, or watch keeping, and as needed for required rest periods, are the responsibility of the owners, Master, and Chief Engineer.

** If all ratings on a vessel maintaining a fully manned machinery space are qualified as General Purpose (GP-1), the total number of Able Seamen or Oiler/Motormen carried may be reduced by one (1).*

*** If classed for periodically unattended machinery operation and provided a record of satisfactory Automation Notation survey is completed in accordance with Classification Society requirements, the 2nd and 3rd Assistant Engineers and one (1) Oiler/Motorman are no longer required.*

Note: This document is applicable only to masters and to officers and ratings in the deck and engine departments.

Issued at Fort Lauderdale, Florida on the 24th day of March, 2003

Deputy Commissioner of Maritime Affairs
Republic of the Marshall Islands

Special Agent

Rev. 6/02

MI-282-2 (SA)

At the time of the accident, *Spruce* was operating with a crew of 14, ie three crew more than strictly required by the SMC, but including two catering staff who were not allowed for in the SMC. *Spruce*'s complement of 14 was made up as follows:

Master; chief officer; second officer; third officer; bosun and 2 x seamen

Chief engineer; second engineer; third engineer; 2 x motormen

Cook; steward

Due to the special design of the vessel, there were insufficient deck crew to cope with the peak workload at mooring stations without the use of crew from the engine and catering departments.

The crew were generally deployed to mooring stations as follows:

Bridge:	master – one officer – seaman
Forward Stations	chief officer – bosun – motorman – cook
Aft – Inboard	one officer – steward
Aft – Outboard	seaman – motorman
Engine Room	chief engineer – one engineer officer

A standard berthing or unberthing operation appears therefore to require 13 people.

The manning was multinational, with a Swedish master, British chief engineer and Filipino junior officers. The ratings were from the Philippines and Eastern Europe, and were employed through manning agencies.

All the ratings were expected to assist with duties such as lifting and stowing the gangway as the need arose.

1.5.3 Safety Management System

The company and vessel had valid ISM certification. The ship's ISM certificate was issued by the American Bureau of Shipping (ABS), on behalf of the Republic of the Marshall Islands, on 27 October 2004 and was valid until 25 July 2009. The last external audit was completed on 26 July 2004.

The vessel's Safety Management System (SMS) contained a comprehensive vessel familiarisation program, covering both general requirements for all crew and department specific tasks. It was necessary to have completed this familiarisation training before undertaking any of the specified tasks.

Familiarisation and training records were completed for all ship's officers and ratings. From these records, it was determined that the cook had completed departmental familiarisation training in the catering department (which does not cover mooring operations or any operations on deck). Mooring operations were covered only in the deck department's familiarisation training.

Other training records indicated that the cook was scheduled to be provided with some training in rigging of the gangway and pilot ladder, mooring and anchor operations as part of the monthly on board training plan. This had not been conducted at the time of the accident, even though the cook had been involved in several of these operations during his 22 days on the vessel.

The only training in mooring operations that the cook had received consisted of an unrecorded 30 minute walk round, and briefing from the bosun on joining the vessel. The main focus of this "training" was to deliver general information about the windlass and mooring rope-handling guidance on the handling of mooring ropes.

The ship's SMS did not contain any procedures or risk assessments associated with the deployment or recovery of the gangway, or with the use of non deck department personnel during mooring or other tasks on deck.

1.6 THE COOK'S ROLE ON BOARD

Prior to travelling to join *Spruce*, the cook had attended the manning agent's office in the Philippines to sign the employment contract. At this time he was not made aware that his duties on *Spruce* would routinely include mooring operations and other work on deck. He was surprised when, on joining the vessel, he was advised of these extra tasks.

The details of the cook's duties and responsibilities are provided in the manager's procedures manual, which is a controlled document[1]. The relevant section covers only what would be considered the usual duties of a ship's cook.

There were additional details provided on an apparently uncontrolled document that included the following reference:

> *"the cook shall also take place in mooring/unmooring the vessel his duties are to handle the mooring lines and anchor windlass as assigned by the chief officer" [sic]*

The cook had never performed any of these deck duties in previous tours of duty. It was the unwritten practice of the vessel that the experienced deck crew would "keep an eye out" for the safety of those crew from the engine and catering departments.

1.7 SYSTEMS OF SAFE MANNING

With respect to the work that ratings perform, at least three recognised systems of manning exist:

- Conventional:

  A crew member will be trained and certificated in his departmental capacity (deck, engine or catering), and will be normally assigned exclusively to that area except for communal operations requiring additional manpower such as transporting of stores, spares etc.

- General Purpose (GP):

  GP rated seamen are those who have been trained in both deck and engine room duties. Such ratings may be employed in either department according to the needs and requirements of the company.

  A GP rating may be employed within a conventional system.

[1] "controlled document" – document forming part of a safety management system whereby its issue status, together with any corrections are recorded and managed.

- Inter-Departmental Flexibility (IDF).

  IDF manning is an unofficial concept that, at its most basic, allows for a member of any department to assist in any other when the workload is deemed exceptional enough to require additional personnel. It is effective in distributing the crew to duties, but can result in personnel operating outside their areas of competence. This phrase is referred to in both the Marshall Island and UK applications for Safe Manning Certificates, but there are no definitions as to what training is required to be considered competent as an IDF rating.

Spruce operated with a largely conventional manning system, however, occasionally an IDF system was adopted when engine and catering crew were required to work on deck at times of peak workload.

1.8 PREVIOUS SIMILAR ACCIDENTS

In order to discover the frequency of accidents involving engine room or catering ratings when working on mooring or gangway operations, a search of the MAIB database was conducted for the last 3 years. The following five accidents were revealed:

1) An engine room rating's foot was trapped between the capstan and a mooring wire as it was heaved up. He suffered broken bones in his foot.

2) An engine room rating slipped, and then fell while assisting in heaving up a mooring rope by hand. He fractured his right hand.

3) An engine room rating suffered injuries to both legs when heaving up slack in a mooring line.

4) An engine room rating caught his hand under a rope on a capstan while heaving the rope tight. He suffered fractures to hand and fingers.

5) A motorman was assisting in bringing the portable gangway on board when the gangway struck him. He sustained a fatal head injury.

The MAIB also requested relevant information from other Flag States' accident investigation databases, but without success. Most other databases did not differentiate between ratings from different departments.

However, it could be extrapolated from the UK accident statistics that the use of untrained personnel on mooring and gangway operations is a significant international problem.

SECTION 2 - ANALYSIS

2.1 AIM

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

2.2 FATIGUE

The effect of fatigue on the crew members involved was assessed, and it was not considered to be a contributory factor to this accident.

2.3 CIRCUMSTANCES OF THE ACCIDENT

2.3.1 The operation to bring on board and stow the gangway

Generally, *Spruce* was loaded with barges on departure, and the gangway was passed across and on top of the barges in the hold before being manhandled to its stowage position. It was rarely necessary to lift the gangway on board and stow it with the cargo hold empty.

The method of bringing the gangway on board, that was used on 6 March, required at least five crew members **(Figure 8)**. The vessel was light, and this meant that the gangway had to be manhandled on board and up two deck levels on the outside of the hull.

For this evolution, crew were required at three stations: one on the dock, two on the mid platform of the fixed ladder system **(see description in Section 1.5.1)** and two on the main deck by the ladder stowage position. The gangway was brought along the dock to the stowage area, and then one end was raised up to the level of the mid platform by using a rope steadying line which was fixed to the inboard end of the gangway.

When the end of the gangway was on the mid platform, the steadying line was passed up to the main deck level and the gangway was then manhandled by the four crew on board with the man on the dock assisting by pushing.

As the gangway moved up towards the main deck level, the crew at that level tilted the gangway over the ship's outer rail, with the crew at the mid level continuing to push upwards.

Two seamen, two motormen and the steward were involved in retrieving the gangway on 6 March. The cook joined them in the latter stages to assist in tipping the gangway over the top rails and into its stowage position. The other crew on the main deck knew the cook was there and was helping, but no words passed between them.

Without being asked, the cook took hold of the steadying line at the end of the gangway, wrapping it around his hands, and then proceeded to pull down to help turn the gangway in and onto the deck near its stowage position. Due to the restricted amount of space, the retrieval of the gangway was hampered. As the gangway came further inboard, the cook found he needed to move further towards the inner side of the deck space, and he stepped onto some pipes to get better leverage. Finding that this was not sufficient to bring the end of the gangway down, he then straddled the inner ship's rail.

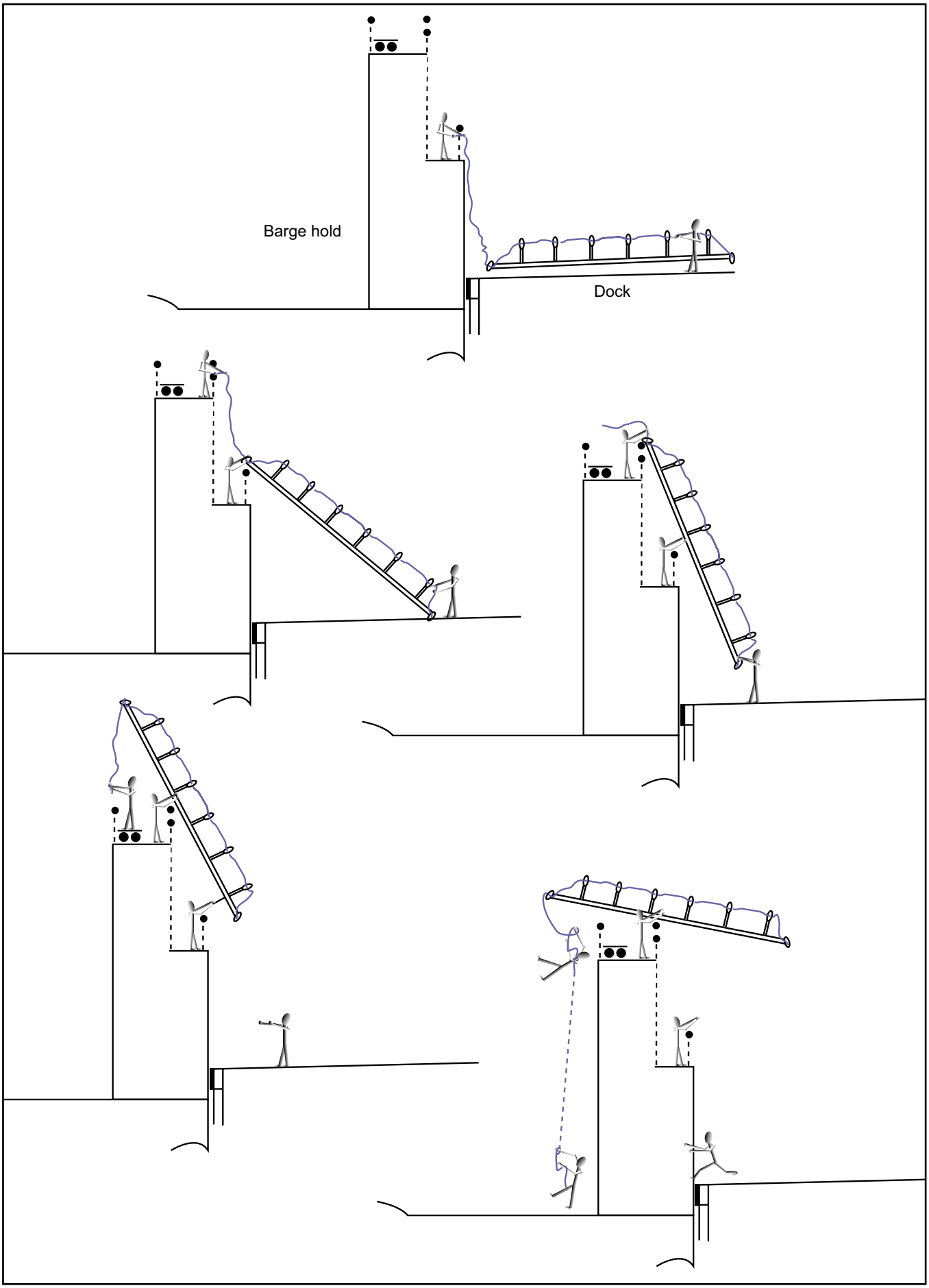


Diagram showing sequence of events (not to scale)

The crew continued to heave and push as the gangway came further over the outer ship's rails. The cook was still heaving on the line but, by now, he was leaning out and over the empty cargo space.

The gangway pivoted over the top rail and tipped towards the cook very suddenly, and he found himself with nothing to pull against and consequently lost his balance.

The cook fell into the empty cargo space, a distance of 6 metres. As he fell, he still had hold of the line which was eventually jerked from his hands. This had the effect of causing him to land feet-first onto the steel tank top, where he sustained his injuries.

The personnel involved in this operation had not been specifically designated the task; it was the practice that whoever was available helped out. There was no supervisor assigned, and no single person was in overall charge.

There was an unwritten understanding that the experienced crew would keep an eye on the inexperienced and untrained crew. In this case, that meant the two seamen should have watched out for the four persons from other departments (two motormen, a steward and the cook) who were helping. This was not achievable in practice, given their dispersed positions and that the two seamen were fully involved in the operation.

Although this operation was difficult, and involved a manoeuvre to twist and turn the gangway around in limited deck space, it had not been considered a critical or dangerous operation. No written risk assessment had been conducted and there were no procedures in place for the operation. It was not considered necessary for this operation to be overseen by the bosun or an officer.

It is unlikely that this serious accident was the first incident involving this operation. It is probable that, at the very least, a number of near miss incidents will have occurred previously, but it appears that the senior management on board and ashore were unaware of the danger. This calls into question the effectiveness of the safety committee and incident reporting system on board.

2.4 FURTHER SAFETY MANAGEMENT ISSUES

2.4.1 The removal of a former gangway handling system

A system to help in handling a fixed gangway had been fitted during an earlier period of the ship's life **(Figure 9)**. This had been removed some time before the accident, and had not been replaced. The date of its removal, and the reason, was not documented and is not known.

It is likely that it was removed before *Spruce* operated a formal safety management system, and the new manpower-intensive operation to handle the gangway was not therefore risk assessed, and no procedures were written. However, despite this, the risks associated with handling a heavy, awkward shaped object, in a confined and cluttered deck area, should have been fairly obvious, and procedures should have been put in place to mitigate the dangers.

2.4.2 Training

The only recognition in the SMS of the fact that crew from the catering (and engine room) departments were required, of necessity, to work on deck during mooring and gangway retrieval operations, was a reference to monthly 30-minute briefings to

Figure 9

Remains of removed lifting arrangement

be given by the bosun. These briefings consisted mainly of familiarisation with the windlass and anchor handling. Additionally, uncontrolled documents highlighted the extra duties that the cook and steward and, probably, the motormen had to perform.

The cook had never carried out any deck work before, and had been unaware that this was part of his duties on *Spruce* until the day he joined. He did have one 30-minute familiarisation briefing session with the bosun soon after joining, but this did not cover the gangway retrieval and general deck safety. The ISM system required signatures each time these briefings were given but, on this occasion, the bosun and cook did not sign **(Figure 10)**. There is no indication that this was anything other than an oversight. The records of these briefings being given to the cook's predecessor and the steward each month were complete.

The on board training, given to completely untrained and inexperienced personnel, particularly in respect of mooring operations, was inadequate. Handling mooring lines is one of the most dangerous aspects of a seaman's job. Despite the fact that it was the unwritten practice that the experienced deck crew would "keep an eye out" for the safety of crew from the engine and catering departments, this was an impractical safety measure. The normal mooring team forward, for instance, consisted of the chief officer, the bosun, the cook and a motorman. In such a team, the cook and the motorman would have to be fully hands-on and the bosun and chief officer would also be fully occupied with their own share of the duties. In that team, the experienced personnel could not sensibly be expected to effectively look out for the inexperienced ones. The same can be said for the operation to retrieve the gangway. The two seamen involved were at two different locations, and were fully occupied with their own safety, and their own important and active role. The seaman on the main deck was

Figure 10

ON BOARD TRAINING RECORD

Vessel *m/v "SPRUCE"* Seafarer's Name: _____

Seaman's Book No. _____ Date of Joining: *Filipino/11.02.06*

Rank or Rating *Chief Cook* Name of Trainer:

Details of Training	Date	Crew Member's Signature	Trainer's Signature
DRILLS	*February*		
FIRE	*11,19,26*		
ABANDON SHIP	*11,19,26*		
MAN OVERBOARD			
GROUNDING/STRANDING			
COLLISION			
SEARCH AND RESCUE	*11,*		
STEERING GEAR FAILURE	*11*		
PIRACY	*11,24*		
SERIOUS INJURY	*11,*		
SECURITY	*11,24*		
TERRORISM	*11,24*		
VIDEO	*February*		
Personal Survival Part 1			
Personal Survival Part 2			
Personal Survival Part 3	*11*		
Personal Survival Part 4	*19*		
	26		
TRAINING	*February*		
SART, EPIRB, Line Throwing apparatus, Immersion Suit, Pyrotechnics, VHF radio, MOB, Liferaft launching, Start stbd/side L/boat's engine, TPA, cold water survival	*19*		
EEBD			
Anchors operations	*19*		
Mooring operations			
Rigging of gangway / Pilot ladder			
Deck Monorail Using			
Launching of L/B's on water	*11*		

aware that the cook was behind him, but he did not know what he was doing. It would be feasible to look out for the safety of one inexperienced person on the forecastle during moorings or helping with the gangway but only if the experienced person is standing back with proper oversight.

Alternatively, everyone employed in these hazardous tasks should be properly trained and experienced before the tasks are undertaken for the first time. For *Spruce* this is likely to entail training ashore before joining the vessel, or recruiting fully qualified and experienced GP ratings and AB/cooks.

2.4.3 Procedures

The ship's SMS did not contain any procedures or risk assessments associated with handling the gangway or with the use of non deck department personnel during mooring or other supplementary deck tasks.

2.5 MINIMUM SAFE MANNING CERTIFICATES (SMC)

The International Convention for the Safety of Life at Sea (SOLAS), 1974, states:

> "Contracting governments undertake. For each of its national ships, to maintain, or, if it is necessary, to adopt, measures for the purpose of ensuring that, from the point of view of safety of life at sea, all ships shall be sufficiently and efficiently manned". The principles of which are contained within Resolution A.890(21).

Resolution A.890(21), Principles of Safe Manning, includes specifically the capability to:

> *Moor and unmoor the ship safely*

In compliance with SOLAS, *Spruce* was issued with a Minimum Safe Manning Certificate (SMC) by the vessel's flag administration on 24 March 2003.

The certificate states:

> "The ship named in this document is considered to be safely manned, if when it proceeds to sea, it carries not less than the number and grades/capacities of personnel specified …"

Additionally:

> "The grades and numbers of personnel listed above reflect the minimum levels of manning necessary for the safety of navigation and operation."

The flag administration produced Marine Notice 7-038-2 detailing the administration's requirements regarding safe manning of vessels flying their flag, stating the following:

> *"There should always be sufficient qualified persons on board to deal with peak workload conditions; for instance mooring or unmooring …"*

and:

> *"the proposal will be evaluated by the Administration to ensure that … the proposed ship's complement contains the number and grades/capacities of the personnel to fulfil the task, duties and responsibilities required for the safe operation of the ship …"*

Spruce was operating with three crew more than required by her SMC. However, due to the special design of the vessel, during peak workload, inexperienced and inadequately trained crew were still required to assist during mooring operations.

When a shipowner applies for an SMC, he must complete and submit information about his vessel to the flag state. For the Marshall Islands and several other flag administrations, this is done using a form such as MSD 336 MI **(Annex 1)** or similar.

The form requires only basic vessel information, and invites the owner to attach *"whatever additional information is necessary to support their manning proposal"*.

When only basic ship dimensional information is available to the flag state, it may not be possible to properly assess the manning levels proposed by the owners and identify if peak workload conditions can be coped with. Supplemental information about the equipment on the vessel, its trade, area of operation and other relevant factors is critical.

If supplemental information is not voluntarily provided to the flag administration for the assessment of minimum safe manning levels, a more comprehensive application form calling for specific details would be necessary. The alternative would be for flag states to inspect every individual vessel prior to issuance of the SMC to verify that the manning level is sufficient, which for most cases would not be considered feasible. The SMC is issued to fulfil an internationally agreed standard, therefore guidelines for requisite documentation and information to be obtained by the administration in order to assign this certificate could be standardized.

2.6 INTER-DEPARTMENTAL FLEXIBILITY

The flag administration's Marine Notice 7-038-2, which has been mentioned in 2.5 above, also states:

> *"If an interdepartmental flexibility system of manning is proposed, the Administration **may** require evidence that non-deck or engine personnel are competent to perform their additional duties and are not employed in capacities for which they are untrained or unqualified."*

The manning system employed on *Spruce* might be described as utilising Inter-Departmental Flexibility (IDF), although the owners did not use the term, and therefore the flag administration was not made aware of the manning system onboard. IDF is becoming recognised as a method whereby ratings from one department can occasionally be utilised to help out in another one. This is a convenient way to overcome the problems associated with manning to cope with times of peak workload. From a commercial point of view, the benefits are obvious. Some flag states, including the Marshall Islands and UK, now recognise the existence of IDF, but it is not defined anywhere, and the training requirements for crew to work outside their discipline are not laid down. The UK accidents database reveals that other accidents have occurred which have this as a factor. If the MAIB figures are extrapolated worldwide, and there is no reason why this should not give accurate results, the problem is significant and probably growing. It is recommended that the subject is raised for discussion at IMO with a view to a definition and requirements being included in the next revision of the Standards of Training, Certification and Watchkeeping (STCW) Code.

SECTION 3 - CONCLUSIONS

3.1 SAFETY ISSUES

The following safety issues have been identified by this investigation. They are not listed in any order of priority.

1. There was no supervisor assigned, and no single person was in overall charge of the operation to bring on board and stow the gangway. [2.3]

2. It is probable that, at the very least, a number of similar near miss incidents will have occurred previously, but it appears that the senior management on board and ashore were unaware of the danger. This calls into question the effectiveness of the safety committee and incident reporting system on board. [2.3]

3. Although this operation was difficult, and involved a manoeuvre to twist and turn the gangway around in limited deck space, it had not been considered a critical or dangerous operation. No written risk assessment had been conducted, and there were no procedures in place for the task. [2.3]

4. Even so, the risks associated with handling a heavy, awkward shaped object in a confined and cluttered deck area, should have been fairly obvious, and procedures should have been put in place to mitigate the dangers. [2.3, 2.4]

5. The on board training given to completely untrained and inexperienced personnel, particularly in respect of mooring operations, was inadequate. [2.4]

6. Despite the fact that it was the unwritten practice that the experienced deck crew would “keep an eye out” for the safety of crew from the engine and catering departments, this was an impractical safety measure. [2.4]

7. Everyone employed in these hazardous tasks should be properly trained and experienced before the tasks are undertaken for the first time. [2.4]

8. Despite having three more crew than the minimum specified, due to the special design of the vessel, during peak workload, inexperienced and inadequately trained crew were still required to assist during mooring operations. [2.5]

9. The application form for a safe manning certificate used by the Marshall Islands and some administrations’ flag asks for only basic dimensional information about the vessel. This is insufficient for the administration to assess reasonable levels of safe manning. [2.5]

10. Inter-Departmental Flexibility (IDF) is becoming recognised as a crewing method whereby ratings from one department can occasionally be utilised to help out in another one. However, it is not defined, and the training requirements for crew to work outside their discipline are not laid down. [2.6]

SECTION 4 - ACTION TAKEN

1) LMS Shipmanagement Inc has arranged for fixed gangway lifting arrangements to be designed, supplied and fitted to *Spruce.* Additional railings have been fitted on the inboard side adjacent to the gangway stowage position **(Figure 11)**.

Figure 11

Modified lifting arrangements and extended safety rail

2) LMS Shipmanagement Inc has instructed the manning agents to ensure that only cooks and stewards who have received additional training for work on the deck are assigned to these types of company vessels.

3) The Marshall Islands Administration has amended the MSMC Application (Form MSD 336M1) with a section prompting applicants to provide a description of special operational considerations or vessel configurations that may affect manning.

The Marshall Islands Administration has also revised the guidelines contained in M1 Marine Notice 7-038-2, specifically section 2.1.6, indicating that if an IDF system of manning is proposed, then the structure (specifications and operational elements) of the system shall be clearly defined and presented to the Administration for consideration, along with documentary evidence that the personnel are competent to perform the additional duties assigned.

The Marshall Islands Administration has also proposed, but has yet to formally agree that, in future, all applications for Minimum Safe Manning Certificates will be more fully reviewed by the administration. Before a certificate is issued, the administration plan to check that the relevant information, including special proposals and requests for non-standard manning arrangements, has been supplied complete with all the necessary supporting documentation.

4) MAIB has arranged for a two page summary of this accident to be promulgated widely to the marine community.

SECTION 5 - RECOMMENDATIONS

The MCA and International Registries are recommended to:

2006/215 Jointly or separately take forward at the IMO's STW sub-committee during the forthcoming review of the Guidance on Safe Manning:

- the need for flag states to ensure that on application for a safe manning certificate, they are supplied with sufficient information regarding all the relevant operational needs of the vessel.
- The need for clarification of the terms used to describe manning systems on board ships including that of Inter-Departmental Flexibility.

LMS Shipmanagement Inc (vessel's managers) is recommended to:

2006/216 Ensure that safety critical operations are identified, risk assessed, and operational procedures are implemented and documented in accordance with the requirements of the ISM Code. The procedures should include a suitable level of supervision to be allocated for each task.

Marine Accident Investigation Branch
October 2006

Annex 1

Sample application forms for minimum safe manning certificate

1 Marshall Islands

2 Panama

3 Liberia

4 United Kingdom

The Republic of the Marshall Islands
Office of the Maritime Administrator

APPLICATION FOR MINIMUM SAFE MANNING CERTIFICATE

Owner/Operator Name:	Address:
Phone Number:	Fax Number:
Vessel Name:	Previous Vessel Name:
Official Number:	IMO Number:
Type:	Date Built:
Gross Tonnage:	Net Tonnage:
Trading Route:	
Number of Main Engines:	Type of Boilers:
KW Propulsion:	Automated Machinery: ☐ Yes ☐ No
Steam: ☐ Yes ☐ No	Motor: ☐ Yes ☐ No
Indicate Class Notations for Unattended Machinery Operation if any:	
Classification Society:	
Number of Lifeboats:	Number of Rescue Boats:
Number of Life Rafts:	Life Rafts with Launching Appliances:

FOR NEW REGISTRATIONS ONLY

Expected Date of Registration: _____

Expected Location of Registration: _____

Comments:

Application will be reviewed by Seafarers' Documentation and a Minimum Manning Certificate under the authority of Maritime Regulation 7.38(5), will be issued subject to all necessary information requested being provided.

Print Name of Submitter: _____

(Submitter should be a nominated Decision Maker for the above Vessel)

Signature of Submitter: _____

Title: _____ Date: _____

Application for Manning Certificate

Please fill and Return by FAX

Name / Address / Fax# of Applicant:

Name of the Vessel: _____

Type of Vessel: _____

Call Letters: _____

IMO No.: _____

ITC 69
Gross Tonnage _____

Net Tonnage _____

GENERAL INFORMATION:

1. Have you ever applied for MSMC for this ship? YES ☐ NO ☐
   YES answer the following:
   MSMC Certificate No.: _____ Previous Tonnage: _____

MACHINERY:

1. Main engine's power (HP or KW): HP: _____ KW: _____
2. Vessel certified for UMS (unattended Machinery Space Operations)? YES ☐ NO ☐
3. Vessel Certified for GMDSS? YES ☐ NO ☐

THE NATURE OF SERVICE AND TRADING AREA:

1. Distance between ports less than 600 miles? YES ☐ NO ☐
2. Any other special condition or requirements? _____

PRESENT MANNING:

DECK		ENGINE	
OFFICERS	CREW	OFFICERS	CREW

THE REPUBLIC OF LIBERIA
BUREAU OF MARITIME AFFAIRS

APPLICATION FOR MINIMUM SAFE MANNING CERTIFICATE

NAME:		IMO NO:
ADDRESSS:		PRESENT SHIP NAME:
		PREVIOUS SHIP NAME:
FAX/PHONE:		
GROSS TONS:	O.N.:	TYPE:
DATE BUILT:	TRADING AREA:	

CLASS SOCIETY: (Circle One) [ABS] [BV] [CCS] [DNV] [GL] [KRS] [LRS] [NKK] [PRS] [RINA] [MRS]

MACHINERY

NO. AND TYPE OF MAIN ENGINES	TYPE OF BOILERS:
_ STEAM_ _ MOTOR	KW EACH MAIN
NO. OF GENERATOR	TOTAL KW
AUTOMATED MACHINERY: YES NO	
INDICATE CLASS NOTATIONS FOR UNATTENDED MACHINERY OPERATION IF ANY:	
NO. OF LIFEBOATS:	NO. OF RESCUE BOATS:
NO. OF LIFERAFTS:	WITH LAUNCHING APPLIANCES:

OWNERS MINIMUM MANNING PROPOSAL

.....Master	.....Able Seamen	.....Chief Engineer	.....Fireman
.....Chief Mate	.....Ordinary Seamen	.....1st Assistant Engineer	.....Oilers/Motormen
.....2nd Mate	.....	.....2nd Assistant Engineer	.....
.....3rd Mate	.....	.....3rd Assistant Engineer	.....

..... 1 GMDSS 1ST/2ND CLASS OPERATOR OR
..... 2 DECK OFFICERS HOLDING GMDSS GENERAL OPERATOR CERTIFICATES

Owners should feel free to attach whatever additional information owner feels supports his proposal for reduced Manning. Catering Department personnel not included in minimum safe manning unless they are trained general-purpose personnel. Application will be reviewed by Marine Safety Division and a minimum Safe Manning Certificate under authority of Maritime Regulation 10.292(5) will be issued provided all necessary information requested of owner has been provided to Marine Safety Division.

Print Name of Submitter:

_____

Submitter should be a nominatedDecision Maker for the above Vessel).

Signature of Submitter:_____

Title: _____DATE: _____

Maritime and Coastguard Agency

APPLICATION FOR A SAFE MANNING DOCUMENT

EXPLANATORY NOTES

With effect from 1 February 1997, the revised IMO Convention on Standards of Training, Certification and Watchkeeping (STCW 95) came into force. New UK merchant Shipping (Safe Manning, Hours of Work and Watchkeeping) Regulations 2002 specify the revised requirements for safe manning of ships over 500gt and you are advised to read these and the advice given in Merchant Shipping Notice MSN 1767 and Parts 5, 6 and 10 of the Guidance on Training and Certification before completing this application.

PLEASE COMPLETE IN BLOCK CAPITALS

1. PARTICULARS OF APPLICANT

Full name of owner	
Address	
	Postcode

Name of applicant if not the owner	
Address of applicant if not the owner	
	Postcode

2. PARTICULARS OF THE SHIP

Any further relevant details not adequately covered below should be included in a separate letter

Name of ship			
Port of Registry		Official Number	
Year of build		IMO Number	
Type of ship			
Principal dimensions (LOA x B x draught)			
Unusual characteristics / features of ship			
Tonnage 1. Gross		2. Max. summer deadweight	
Auto Steering	Yes / No*	Details of hatch covers	
External communications (tick as appropriate)	W/T	R/T	VHF
Details of internal communications			

* Delete as appropriate

2. PARTICULARS OF THE SHIP (continued)

LSA class		Number of Lifeboats	
Area of Operation (tick as appropriate) Near-Coastal (UK)		Number of ILRs	
Unlimited		Number of ILR Davits	
Number of Passengers		Number of Rescue Boats	

Restricted conditions (please specify)

Bow thruster	Yes / No*	Stern thruster	Yes / No*
CP propeller	Yes / No*	Number of engine-room spaces	
Number of main engines		Registered power per engine (kW)	
Type of engines	Steam / Motor*		
Steam Boilers (tick as appropriate)	None	Auto	Manual
High bilge alarm system	Yes / No*	Bridge Control	Yes / No*
Unattended Machinery Space (UMS) Certificate	Yes / No*	Engine-room fire detection fitted	Yes / No*

* Delete as appropriate

Details of engine-room / bridge communication system

3. INTENDED SERVICE

Please give details of the intended nature of service of the ship

4. MANNING SYSTEM

(See Marine Guidance Note MSG 97(M) - Training and Certification Guidance - Part10)

Please give details of the type of manning system
i.e. Conventional, General Purpose, Share System, Interdepartmental Flexibility or other

5. **Please submit your proposals for the safe manning of the above ship in the table below. (The tables at Annex 1 of MSN 1682 provide guidance on the numbers of certificated deck and engineer officers appropriate to different sizes of ships, tonnages and trading areas).**

	Near-Coastal*	Unlimited
Master		
Chief Mate		
OOW (Deck)		
Rating (Deck) Grade 1		
Rating (Deck) Grade 2		
Chief Engineer		
2nd Engineer		
OOW (Engineer)		
Rating (Engine)		
Cook		
Doctor		
Other (specify)		
Rating (GP) Grade 1		
Rating (GP) Grade 2		
TOTAL (Minimum number of crew to be carried)		

* **Near-Coastal -** within 150 miles from a safe haven in the UK or 30 miles from a safe haven in Eire.

6. SUPPLEMENTARY INFORMATION

Merchant Shipping Notice MSN1767 must be read in conjunction with the details required in this section. This section of the form is to be used by owners and managing operators as guidance in the assessment of proposed safe manning levels, especially in relation to paras 2.2 and 2.3 of MSN1767.

(Additional sheets should be attached if the space provided is insufficient)

Describe anticipated trade or trades

Describe anticipated length and nature of voyages

Describe the anticipated geographical trade areas

6. SUPPLEMENTARY INFORMATION (Continued)

Detail how the following capabilities will be covered:

1. Maintain a safe bridge watch at sea in accordance with Regulation VIII/2 of STCW 95, which includes general surveillance of the vessel.

Which watch system will be adopted? TWO / THREE* (* Delete as appropriate)

Will the Master undertake a navigational watch? YES / NO*

Will the Master be required to undertake his/her own pilotage? YES / NO*

Are office to ship communications handled only by the Master? YES / NO*

What is the communication system between bridge & watch rating?

2. Moor and unmoor the vessel effectively and safely

Are self-tension mooring winches fitted to the vessel? YES / NO*

Detail mooring station equipment and manning requirements for peak workload situation:

Forward

Aft

3. Operate and, when practicable, maintain efficiently, all watertight closing arrangements, fire equipment and life-saving appliances provided, including the ability to muster and disembark passengers and non-essential personnel (as appropriate), and mount an effective damage control party.

Is the vessel fitted with an accommodation fire detection system? YES / NO*

Are fire pumps started remotely? YES / NO*

Who is responsible for equipment maintenance?

Describe the lifeboat and rescue boat launching systems (as appropriate)

State how fire/damage control/LSA requirements are covered

4. Manage the safety functions of the vessel at sea, when not under way.

Does the vessel have DP capability? YES / NO*

6. SUPPLEMENTARY INFORMATION (Continued)

5. Maintain a safe engineering watch at sea in accordance with Regulation VIII/2 of STCW 95, and also maintain general surveillance of spaces containing main propulsion and auxiliary machinery.

Will a watch system be adopted?	YES / NO*	(* Delete as appropriate)
Which watch system will be adopted?	TWO / THREE*	
Is there a UMS Certificate in operation?	YES / NO*	
Are all machinery spaces covered by a fire detection system?	YES / NO*	
Are all machinery spaces covered by a bilge alarm system?	YES / NO*	
Will the Chief Engineer undertake a watch?	YES / NO*	
Can emergency steering be engaged by one person?	YES / NO*	

How will the engineer watch rating duties be covered?

6. Operate and maintain in a safe condition, the main propulsion and auxiliary machinery to enable the ship to overcome the foreseeable perils of the voyage, and maintain the safety arrangements and cleanliness of machinery spaces to minimise the risk of fire.

Who will undertake machinery space cleaning?

Who will assist in the event of breakdowns?

7. Provide for medical care onboard.

How is the provision satisfied?

8. Maintain a safe radio watch in accordance with 1974 SOLAS and ITU Regulations, as amended.

What is the radio equipment maintenance agreement? ONBOARD / SHORE BASED*

Who will be the primary GMDSS operator?

9. Maintain the precautions and safeguards necessary to protect the marine environment in accordance with MARPOL 73/78, as amended.

What personnel are necessary to cover the vessels SOPEP requirements?

6. SUPPLEMENTARY INFORMATION (Continued)

10. Maintain safety in all ship operations whilst in port.

What cargo handling gear is fitted to the vessel and who operates it?

Who undertakes hold/tank cleaning?

11. Ships Cook

Will a certificated ships cook be carried? YES / NO* (* Delete as appropriate)

If not, how will the cooking duties be covered?

12. Ships Doctor

With respect to the M.S. (Ships Doctors) Regulations 1995, S.I. 1995/1803, state compliance (as appropriate):

(UK ships are required to have a doctor on board if carrying 100 or more persons on an international voyage of more than three days, or on a voyage during which it is more than one and a half day's sailing time from a port with adequate medical equipment)

HOURS OF WORK PROVISION

Provide an explanation of how the proposed manning level takes account of the requirements contained in the M.S. (Safe Manning, Hours of Work and Watchkeeping) Regulations 2002, ensuring that the working arrangements allow for sufficient rest periods to avoid fatigue:

6. PLANS SUBMITTED WITH THIS APPLICATION (tick ✓ as appropriate)

Fire		Mooring & equipment		Escape (Passenger ships only)	
Schedule of duties		General arrangement		Engine-room arrangement	

7. DECLARATION **(The maximum penalty for a false entry is £5000)**

I declare that to the best of my knowledge, the particulars given by me on this form are correct.

Signed (on behalf of the owners) _____ Date _____

Please now complete the PAYMENT DETAILS in Section 8 below

The completed form together with the appropriate fee and enclosures should be sent to:

Maritime and Coastguard Agency
Seafarer Training and Certification
Spring Place
105 Commercial Road
Southampton SO15 1EG

Tel 02380 329231
Fax 02380 329252

8. PAYMENT DETAILS (To be completed by applicant)

Please tick (✓) the appropriate box below to indicate your chosen method of payment. **CASH WILL NOT BE ACCEPTED**

Switch ☐ Visa ☐ Mastercard / Access ☐ Delta ☐ Cheque/bankers draft ☐ Postal Orders ☐

Name of Card Holder	
Card Number	
Start Date	
Expiry Date	
Switch Issue Number (Switch Cards only)	

Signature _____ **Date** _____

ALTERNATIVELY - If you have a Rolling Account with the MCA, please provide the following information:-

Client Reference Number _____

Marine Office where Account is held _____

Customer Service Manager _____

FOR OFFICIAL USE ONLY

Fee received by _____

File reference MC49/48/ _____

F264 _____

Official Stamp