Report on the investigation of

a fatal accident on board

CEC Crusader

1.8 miles north of Foreness Point

on

22 November 2001

Marine Accident Investigation Branch
First Floor
Carlton House
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Southampton
United Kingdom
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Extract from

The Merchant Shipping

(Accident Reporting and Investigation)

Regulations 1999

The fundamental purpose of investigating an accident under these Regulations is to determine its circumstances and the cause with the aim of improving the safety of life at sea and the avoidance of accidents in the future. It is not the purpose to apportion liability, nor, except so far as is necessary to achieve the fundamental purpose, to apportion blame.

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GLOSSARY OF ABBREVIATIONS

AB	-	Able Seaman
CPR	-	Cardiopulmonary Resuscitation
gt	-	gross tonnage
ISM	-	International Safety Management (Code)
kW	-	kilowatt
m	-	metre
t	-	tonne
UTC	-	Universal Co-ordinated Time
VHF	-	Very High Frequency

SYNOPSIS

On 22 November 2001, the MAIB was informed that *CEC Crusader*'s chief officer had been fatally struck by a swinging hatch cover. The accident happened when the 6,714gt Bahamas-registered general cargo/container vessel was at anchor in Margate Road, in the River Thames estuary.

The deck crew, which included the chief officer, were in the process of removing tween-deck hatch covers, with the ship's crane, and stowing them in a specially adapted position on deck to facilitate a cargo of bagged grain to be loaded in Antwerp the following day.

While manoeuvring one of the hatch covers into its position on deck, the chief officer placed himself between it and the accommodation bulkhead. As he did so the hatch cover developed a swing and, despite his efforts to restrain it, it struck him, crushing his pelvis against the bulkhead.

The emergency services were contacted immediately, and the crew attempted to sustain the chief officer. Unfortunately, because of the severity of his injuries, he died about an hour later.

Contributing factors were:

- The chief officer's decision to place himself in immediate danger by working in a restricted space between the bulkhead and a suspended hatch cover.
- The roll and pitch of the vessel causing the hatch cover to swing.
- The casualty and the deck crew's complacency in their acceptance of an unsafe practice.
- The established practice of removing and replacing hatch covers while at sea.
- The lack of an effective risk assessment with regard to the dangers involved in transferring hatch covers.
- The lack of any company instructions and guidance as to where, and under what conditions, hatch cover removal and replacement should take place.

Recommendations have been addressed to the manager of the vessel, Graig Ship Management Limited.

Photograph courtesy of FotoFlite

CEC Crusader

Figure 1

SECTION 1 - FACTUAL INFORMATION

1.1 PARTICULARS OF *CEC CRUSADER* AND ACCIDENT

Vessel details

Registered owner	:	Crusader Shipping Company Ltd
Manager	:	Graig Ship Management Ltd
Port of registry	:	Nassau
Flag	:	Bahamas
Type	:	General cargo/containers
Built	:	Zhonghua Shipyard – Shanghai 2000
Classification society	:	Bureau Veritas
Construction	:	Steel
Length overall	:	100.5m
Gross tonnage	:	6,714
Engine power and type	:	7,800kW Wärtsilä Diesel
Service speed	:	16.5 knots
Other relevant info	:	Ahwartship Thrusters Controllable Pitch Propeller

Accident details

Time and date	:	1330 (UTC+1) 22 November 2001
Location of incident	:	51° 25.5’ N 001° 26.0 E 1.8 miles north of Foreness Point
Persons on board	:	13
Injuries/fatalities	:	1 fatality
Damage	:	None

1.2 DESCRIPTION OF VESSEL

CEC Crusader, built of steel in 2000, was a general cargo/feeder container vessel, specially constructed to take advantage of both the bulk and container trade. Her design incorporated two decks above the waterline with her bridge, which ran the full width of the vessel, superstructure and accommodation positioned aft **(Figures 1 and 2)**.

She was equipped with two deck cranes positioned on the port side of the main deck **(Figure 3)**. As well as loading and discharging, the cranes were used for both main and tween-deck hatch removal and replacement.

The main and tween-deck hatch covers were of slab-type construction, each weighing 17 and 32 tonnes respectively. The tween-deck hatch covers were of a design which enabled containers to be stacked and secured on top of them.

Figure 2

Photograph showing *CEC Crusader*'s bridge and superstructure

Figure 3

Photograph showing location of deck cranes

1.3 HATCH COVER REMOVAL, REPLACEMENT AND OPERATION

Before loading, the main hatch covers were lifted in sequence and stowed on top of each other to allow sectional access to the cargo hold. As a safety measure, the coamings around the main cargo hold were fitted with upright stanchions (crocodile teeth) to prevent excess transverse movement of the hatch covers during removal.

When engaged in bulk cargo shipments, it became necessary to remove the tween-deck hatch covers (pontoons) from the hold, and stow them in a specially adapted position immediately forward of the accommodation and superstructure (bays 21/23).

When engaged in containerised cargo, the tween-deck hatch covers were replaced to add strength to the structure of the hold, and to enable containers to be stacked on top of them.

All hatch cover movements were carried out by the two on-board cranes. When moving the main hatch covers, four wire slings, fitted with elephants' feet, and manual guide ropes, provided stability. When moving the tween-deck hatch covers, a container spreader, also with manual guide ropes, was used.

During hatch lifting operations, the deck officer in charge of operations was in direct VHF radio communication with the crane driver; normally the bosun or one of the ABs trained for this task.

The movement of hatch covers was under the direct authority of the master. This operation, as well as being carried out alongside in harbour, was regularly carried out at anchor, depending on the prevailing conditions and at the discretion of the master, who did not consider the vessel to be “at sea” when at anchor.

Before new crew members joined the vessel, they were given a video introduction of the operation of the cranes, and the removal and replacement of hatch covers. The ABs who operated the ship’s cranes were experienced crane drivers. They had carried out heavy lift operations, and the transfer of hatch covers on board *CEC Crusader,* numerous times.

Safety meetings were held on board at regular intervals, at which none of the crew had expressed any concern with regard to safety when engaged in this operation.

1.4 BACKGROUND TO THE INCIDENT

CEC Crusader, was engaged in a weekly feeder container service between the ports of Rotterdam, Dublin, Belfast, Southampton, Thamesport and occasionally Tilbury. She had worked this service for the previous 2½ months. Before this, she had traded in South American waters.

On 20 November 2001, she arrived in Southampton at 0918 and sailed at 1530. The following morning, she arrived in Felixstowe at 0524 and sailed at 1230. From there she sailed to Thamesport, arriving at 1830. She sailed at 2136 and berthed at Tilbury at 0048 on 22 November 2001, where she discharged the remainder of her cargo.

At 0354, *CEC Crusader* sailed from Tilbury, and at 0742, dropped anchor in Margate Road to await further orders.

1.5 THE CREW

The vessel had a complement of 13 crew members. The master, chief engineer and deck cadet were British. The remainder were Filipino.

The master held a UK class 1 certificate of competency. He had been employed on merchant vessels since 1964, during which time he had sailed mainly on dry bulk and container vessels. Having served as master since 1983, he joined Graig Ship Management Ltd in 1998 and had commanded *CEC Crusader* for the 3 months before the accident.

The casualty was the 44-year-old first officer. He held a Bahamian licence as chief mate and was an experienced seafarer.

The remainder of the deck crew were all experienced; some had served on board for more than 6 months. There was no evidence of drug or alcohol involvement in the accident. There was also no evidence of fatigue. The chief officer had been employed on non-watchkeeping duties, working cargo. He had been off duty from 0348 until 1130 on the day of the accident.

1.6 ENVIRONMENTAL CONDITIONS

The weather conditions at the time of the accident were a north-westerly wind, force 5, and a slight to moderate north-westerly sea swell. The visibility was good.

The weather conditions had been better earlier in the day, but had deteriorated as the day progressed. The following was recorded in *CEC Crusader*'s deck logbook:

	Wind	Sea
0800	WNW 3-4	WNW 0.6m
1200	NW 5	NW 1.5m
1600	NW 7	NW 2.0m

1.7 NARRATIVE OF EVENTS (ALL TIMES ARE UTC + 1 HOUR)

Following her anchoring at Margate Road, *CEC Crusader'*s master anticipated she would be off-hire for 2 to 3 days.

However, at 1000 a telex arrived from the manager, with instructions to prepare the vessel, and proceed to Amsterdam as soon as practicable, for a cargo of 5250t of bagged wheat for Libya.

To facilitate loading the cargo, at some point before doing so, the tween-deck hatch covers in bays 07/09 under deck needed to be transferred to their stowage position in bays 21/23 on deck, thus leaving the hold clear for cleaning and loading.

With this in mind, and because of an unfavourable weather forecast for later in the day, the master gave instructions to transfer the tween-deck hatch covers. Work began at 1030. On deck, carrying out the transfer, were the second officer, an AB and the bosun, who was operating the crane.

At 1045, the bosun, in a comment to the off-duty chief officer, expressed his concern about the movement of the tween-deck hatch covers during their transfer by the ship's crane, and indicated to him that the operation needed extra care. The chief officer acknowledged his concern, but took no action.

Work on the tween-deck hatch covers continued until lunch, by which time six hatches had been transferred. At 1200, the chief officer relieved the second officer on deck who, in turn, relieved the master on the bridge. After lunch, at 1300, work continued. The bosun was relieved in the crane by the AB.

The seventh hatch cover was then transferred, by crane, from the main hold and lowered on to the deck into its approximate stowage position, 1 metre forward of the accommodation bulkhead. This was done to dampen any undue movement **(Figure 4)**. The chief officer then contacted the crane driver by portable VHF radio. He instructed him to heave up the hatch cover to a position approximately 0.5 metre from the deck, so it could be manoeuvred manually into a position just above the retaining lugs, before instructions were given to the crane driver to lower it **(Figure 5)**. This was the normal practice with regard to the first hatch cover in a stack. Guide ropes were attached for this purpose.

However, at approximately 1330, while the hatch cover was suspended, the chief officer placed himself between it and the bulkhead, against which he braced himself in an effort to push the inner port end into position. This was a practice which was not normally carried out. As he did this, the hatch cover developed a swing to port and, despite his efforts to restrain it, it struck him, crushing his pelvis against the bulkhead.

Work was stopped immediately. The bosun then ran to the other side of the deck to assist the chief officer. While doing so, he instructed the crew to call the master. By the time the master arrived on the scene, the chief officer was still conscious, but was in a lot of pain, and lying on deck. The master made him as comfortable as possible with a pillow and a blanket, and then intramuscularly administered a 10ml injection of morphine substitute. Hurriedly returning to the bridge, he contacted Dover Coastguard by VHF radio and requested immediate medical assistance, which was confirmed. The time was 1349. He was then put in contact with a doctor ashore, who advised that the casualty should be medically evacuated ashore immediately.

When the master returned to the deck, the chief officer’s condition had visibly deteriorated and he was complaining of breathing difficulties. Oxygen was provided but, after a short period of time, he appeared to stop breathing. CPR was administered and this revived him temporarily but, at 1430, his breathing and pulse stopped.

At 1450, a rescue helicopter arrived on scene and a doctor was lowered to the vessel. After examining the casualty the doctor pronounced him dead. The chief officer’s body was eventually transferred ashore.

At 1600, the ship’s personnel were in a position to resume work but, by then, the weather had deteriorated to such an extent that it was necessary to delay operations until the following day when conditions improved.

CEC Crusader arrived in Antwerp shortly before midnight on 23 November 2001.

Figures 4 and 5 showing the seventh hatch cover's stowage position

1.8 ISM CODE

The International Management Code for the Safe Operation of Ships and for Pollution Prevention (ISM Code), came into force on 1 July 1998 for certain vessels. Applicable remaining vessels will be phased in by July 2002. This sets international standards for the safe management of ships. It requires companies to document and implement clear procedures, standards, and instructions for safety management on board.

It also requires a company to provide safe working practices, identify risks, and establish suitable safeguards.

CEC Crusader had been ISM Code accredited. As part of the accreditation a quality and safety system was in operation, which identified safe standard operating procedures for various tasks on board the vessel, including the securing of hatch covers while at sea, and their method of removal and replacement. However, there was no written guidance as to where, at sea or alongside, and under what conditions, the operation should be carried out.

Additionally, no formal risk assessment had been carried out with regard to the dangers involved in transferring hatch covers.

The designated person ashore was an employee of Graig Ship Management.

1.9 SUBSEQUENT ACTION

Since the accident, Graig Ship Management has issued a fleet notice to all its vessels advising that the handling and movement of tween-deck hatch covers (pontoons), generally should only be carried out in port. It did, however, indicate it could be done at sea should the schedule demand. If carried out at sea, the company has advised that the operation should only be undertaken when there is minimal movement of the vessel. In addition, it has instructed all personnel involved in the operation, to be briefed on the intended lifts and stacks, and to be made aware of “no-go” areas and potential escape routes should something not go to plan.

Crews have also been advised that all movement of tween-deck hatch covers should be carried out using the guiding ropes provided, and personnel should never be exposed to the possibility of being struck by a cover. The importance of carrying out a risk assessment for each operation has also been stressed. **(Annex 1)**.

On a wider front, in light of this accident, manning agents used by Graig Ship Management have been inspected for the quality and relevance of their training methods.

In consultation with a firm of naval architects, a new lifting sling arrangement has been introduced, which improves the airborne stability of tween-deck hatch covers. Additionally, improved alignment markings should reduce the amount of airborne time required for stacking.

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 THE ACCIDENT

The deck crew had been involved in the transfer of hatch covers on numerous previous occasions, without incident. However, for some reason, this time the chief officer decided he would manoeuvre the hatch cover into position by bracing himself against the accommodation bulkhead. This meant going into a space approximately 1 metre wide, with a solid bulkhead behind him, and a 17-tonne hatch cover suspended in front of him.

Given that the chief officer was an experienced seafarer, it is difficult to understand why he placed himself in such a position. It is probable that he did not fully appreciate the effect any movement of the vessel would have on the suspended hatch cover. While suspended, it would have been quite easy to move the cover around, perhaps giving him a false impression of the actual weight of the hatch cover, but when its mass was subject to the momentum caused by the swing to port, its weight acted directly against the chief officer's efforts to restrain it.

The chief officer should have realised the danger into which he was placing himself when carrying out this task. As an experienced officer he should have understood the risks involved, and measures should have been in place to safeguard against those risks.

Had the chief officer not placed himself in immediate danger, the accident would have been avoided.

Given the weather conditions, and that they were deteriorating as the day progressed, it is concluded that the movement of the hatch cover was primarily caused by the roll and pitch of the vessel.

2.3 HATCH COVER REMOVAL AND REPLACEMENT

In accordance with the company's safety management system, while at sea, all hatch covers had to be secured. To remove hatch covers at sea was therefore a "non-conformity", and, as such, the ISM Code required this to be reported to management. However, the master did not consider the vessel to be "at sea" when at anchor. Consequently, the removal and replacement of hatch covers while at anchor was common practice, and was carried out at the master's discretion. Guidance from the company as to when its vessels are deemed to be "at sea" or otherwise would be beneficial to its crews so that the possibility of any ambiguity would be eliminated.

The practice of hatch cover removal and replacement while at anchor probably originated when the vessel was trading in South American waters which, because of certain port restrictions, requires vessels to load and discharge cargoes while at anchor. The better sea conditions experienced in these areas provide a more stable platform for carrying out the operation, and thus the risks involved are significantly less. This led to the belief that the operation was generally safe.

This belief was probably an influencing factor in the master's decision, and the deck crew's acceptance, to proceed with the operation on the day, albeit the bosun expressed some concern and the need to take extra care.

No formal risk assessment had been made with regard to the dangers involved in transferring hatch covers. As a result, the risk, which was avoidable, was not formally identified. Consequently, no safeguards were put in place and, during the period of time the vessel was working in north European waters, the procedure of hatch cover removal and replacement, while the vessel was subject to possible movement, was accepted. No concern had been expressed at the regular safety meetings held on board and the crew had, in effect, become complacent. A formal risk assessment could have identified the dangers involved and suitable control measures to reduce or eliminate the risks, including ceasing work, could have been put in place.

When the master authorised the work to be carried out in the morning, the weather conditions were favourable. However, as the day progressed, conditions deteriorated. In the deck logbook for 1200, the weather was recorded as being a force 5 north-westerly wind, with a 1.5m north-westerly sea swell. In those weather conditions the vessel was subject to significant movement, through pitching and rolling. This was confirmed by the bosun's earlier concern to the chief officer. However, work continued.

A quality and safety management system was in operation, but there was no written guidance as to where, and under what conditions, hatch cover removal and replacement should take place. Had there been, the accident could probably have been avoided.

It would have been much safer to have carried out the operation of hatch cover removal and replacement alongside the berth in Antwerp, when the vessel's movement would have been minimal, and probably avoided the accident happening.

The subsequent action taken by Graig Ship Management will contribute to reducing the possibility of a similar accident occurring **(see Section 1.9)**.

SECTION 3 - CONCLUSIONS

3.1 CAUSE

The chief officer died as a result of injuries caused by his being crushed between a swinging hatch cover and the accommodation bulkhead.

3.2 CONTRIBUTING FACTORS

1. The chief officer's decision to place himself in immediate danger by working in a restricted space between the bulkhead and a suspended hatch cover. [2.2]

2. The roll and pitch of the vessel causing the hatch cover to swing. [2.2]

3. Complacency of the casualty and the deck crew in their acceptance of an unsafe procedure. [2.3]

4. The established practice of removal and replacement of hatch covers while at sea. [2.3]

5. The lack of an effective risk assessment with regard to the dangers involved in transferring hatch covers. [2.3]

6. The lack of any company instructions and guidance as to where, and under what conditions, hatch cover removal and replacement should take place. [2.3]

3.3 OTHER FINDINGS

1. Written guidance from the vessel's manager as to when its vessels are deemed to be "at sea", or otherwise, would eliminate the possibility of any ambiguity. [2.3]

2. The subsequent action taken by Graig Ship Management Ltd will contribute to reducing the possibility of a similar accident occurring. [2.3]

SECTION 4 - RECOMMENDATIONS

Graig Ship Management Limited is recommended to:

1. Ensure that a formal risk assessment is carried out on board *CEC Crusader*, and similar vessels in its fleet, with regard to the dangers involved in transferring hatch covers.

2. Provide written instructions and guidance to its vessels, in accordance with the ISM Code as to where, and under what conditions, hatch cover removal and replacement should take place.

3. Provide written guidance to masters regarding when its vessels are deemed to be “at sea” or otherwise.

Marine Accident Investigation Branch
August 2002

ANNEX 1

Fleet Notice 179

Fleet Notice 179

Pontoon Handling and manoeuvring
Maindeck and Tweendeck.

The safety principles referred to here also relate to the lifting of any object, containers, project cargo etc. You must consult the other information placed on board when planning any lift.

Pontoon handling will, generally, only be done in port although it can be done at sea. A substantial proportion of our trade involves load and discharge of cargoes and project heavy lifts at sea.

If the schedule requires the pontoons to be moved whilst at sea please ensure that you use your discretion to lift only when the sea state and weather gives the smallest movement to the vessel.

In port, the vessel movement can be quite considerable so adequate planning should be made to ensure no personnel are at risk from a moving pontoon. Be aware to consider passing vessels, lock movements, independent crane operations etc.

The pickup area and landing area of each pontoon should be cleared of loose gear to minimise the risk of personnel tripping.

During the planning process all personnel that will be involved with the operation should be briefed on the intended lifts and stacks. They should be made aware of no go areas and potential escape routes should something not go to plan. All guiding should be done with ropes with the personnel remaining well clear of the airborne pontoon. Personnel should never get under a lift or be within the front and side areas of the direction of travel. Planning should done to avoid personnel being exposed to striking by the pontoon. All personnel should be constantly aware, as the pontoon changes location during the move, of escape routes or sites to protect them should some mishap occur.
Crane drivers should be aware of, and practised in, the need to quickly land a pontoon should the need arise to arrest movement or should it be observed that ground handling personnel are becoming exposed.

Personnel should never get trapped between a moving pontoon and fixed objects that will not allow them to escape to a safe area.
For example, if landing pontoons into a bay immediately in front of and close to the accommodation house then no personnel must be in front of the house as the pontoon approaches.