Transportation Safety Board of Canada
Bureau de la sécurité des transports du Canada

MARINE INVESTIGATION REPORT
M06N0014

FIRE IN CARGO OIL TANK

SHUTTLE TANKER *KOMETIK*
CONCEPTION BAY SOUTH
NEWFOUNDLAND AND LABRADOR
08 APRIL 2006

Canada

The Transportation Safety Board of Canada (TSB) investigated this occurrence for the purpose of advancing transportation safety. It is not the function of the Board to assign fault or determine civil or criminal liability.

Marine Investigation Report

Fire in Cargo Oil Tank

Shuttle Tanker *Kometik*
Conception Bay South, Newfoundland and Labrador
08 April 2006

Report Number M06N0014

Summary

On 08 April 2006, the shuttle tanker *Kometik,* in ballast condition, was at anchor in Conception Bay, Newfoundland and Labrador. A welder and a crew member were performing welding repairs in cargo tank No. 5 starboard when, at approximately 1113 Newfoundland daylight time, an explosive vapour mixture was ignited in the cargo tank. The welder escaped from the tank with serious injuries and the body of the crew member was recovered by shore-based firefighters later that afternoon.

Ce rapport est également disponible en français.

Other Factual Information

Particulars of the Vessel

Name of Vessel	*Kometik*
IMO Number	9131876
Port of Registry	St. John's, Newfoundland and Labrador (N.L.)
Flag	Canada
Type	Shuttle tanker
Gross Tonnage [1]	76 216
Length	271.8 m
Draught	14.8 m
Cargo	Vessel in ballast
Built	1997, Samsung Heavy Industries Co. Ltd.
Propulsion	Two (2) Hyundai MAN B&W Type 7S50MC 18 904 kW (25 700 bhp), two controllable-pitch propellers
Crew	26
Operator	Canship Ugland, Ltd. St. John's, N.L.
Owners	Joint venture between Mobil, Chevron, and Murphy Oil, St. John's, N.L.

Description of the Vessel

The vessel is a twin-skeg, twin-screw shuttle tanker with 12 cargo tanks, two slop tanks, 13 segregated ballast tanks, and a bow-loading system on the forecastle deck. The vessel is fitted with a dynamic positioning system that operates two controllable-pitch propellers (CPP) in the bow, two aft, and two Becker-type high-lift rudders.

Photo 1. Shuttle tanker *Kometik*

1 Units of measurement in this report conform to International Maritime Organization (IMO) standards or, where there is no such standard, are expressed in the International System of units.

History of the Voyage

On 04 April 2006, after discharging a cargo of Hibernia crude oil at Whiffen Head on Placentia Bay, N.L., the *Kometik* proceeded to anchorage in Conception Bay. In preparation to effect repairs of a deck crack in way of the MARPOL line [2] above cargo oil tank (COT) No. 4 port, and to inspect all cargo oil tanks to determine if any repairs in those tanks would also be required, all 12 COTs were washed, purged, and gas freed during the passage. The vessel was also advised that it would be required to arrive at Hibernia at 0600 on April 11. The *Kometik* anchored in Conception Bay on April 5 at 2024 [3]; an approximate track of the voyage is shown in Figure 1.

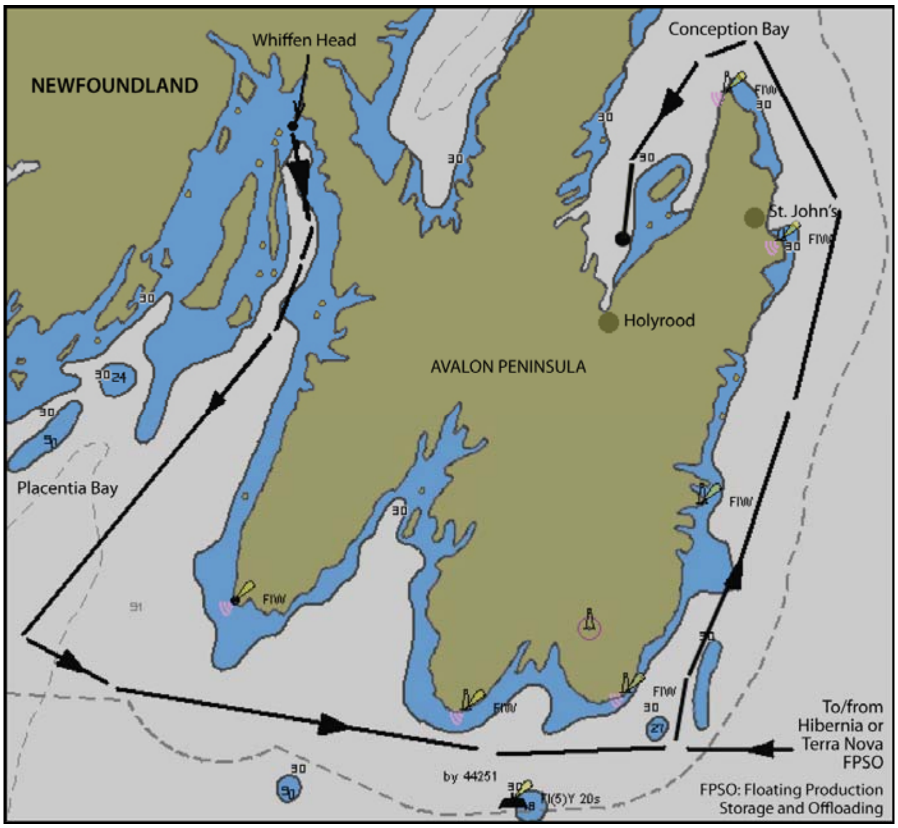


Figure 1. Approximate track of the *Kometik*

To utilize this extra time while at anchor in Conception Bay, it was decided by the ship's senior officers and confirmed by the shore-based superintendent that tankers would carry out as many repairs and inspections as possible in the time allowed. Under the continuous supervision of the chief officer (C/O), all 12 cleaned and gas-freed COTs were inspected for damage.

---

2 A small diameter line used to discharge ashore the remaining oil contained in the cargo mains and stripping lines after the completion of the cargo discharge.

3 All times are Newfoundland daylight time (Coordinated Universal Time minus 2.5 hours).

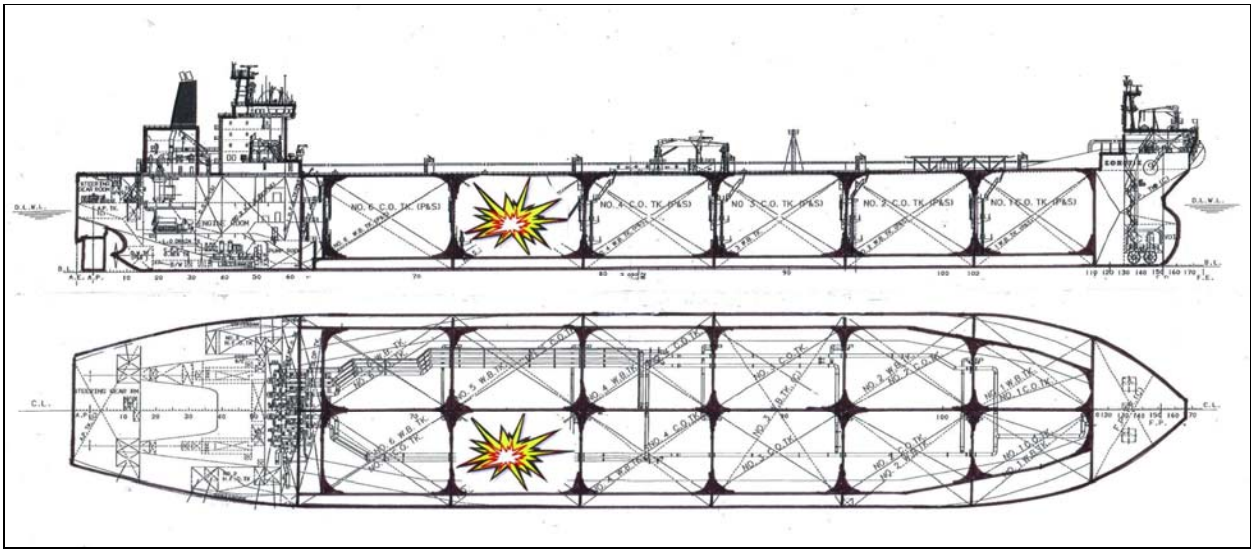


Figure 2. Cargo tank arrangement

On the morning of April 6, a welder and a marine chemist [4] boarded the vessel. As the welder performed minor repair work on and about the main deck, the chemist tested the atmosphere in COT No. 4 port and starboard, issuing a certificate of gas hazard (a gas-free certificate), valid for those two tanks only, at 1300. The C/O also completed the enclosed space entry and the hot work permits as contained in the vessel's shipboard safety manual (SSM). Crew members were subsequently sent into the tank to erect scaffolding and safety lines so the welder could make priority repairs inside the tank (on the underside of the deck). The chemist left the vessel the same day. At 1400, the C/O tested COT No. 5 port and starboard with a gas-detector multi-meter; both tanks were found to have 0 per cent of the lower explosive limit (LEL) of methane. The C/O and another crew member entered the tanks for inspection at 1910 and found some damage. At approximately 2200, the master phoned the superintendent—tankers and informed him of the findings.

On April 7 at 1345, the C/O again tested the atmosphere of cargo tanks Nos. 5 port and starboard and both were found to still have 0 per cent LEL of methane. The C/O and a crew member, the two of them now accompanied by the superintendent—tankers, re-entered the tanks to more closely ascertain the extent of repair work required. Cracks on brackets used to secure the cargo pipe lines in both cargo tanks were noted and provisions were made for a second welder to board the vessel the next day to assist with repairs.

Later that evening, due to an unfavourable weather forecast, the master decided to move the vessel to deeper water. Furthermore, it was decided to finish the repair work and have shore workers and their equipment put ashore as soon as possible so that the vessel could depart by noon on April 9.

4 A marine chemist physically inspects the conditions and carries out tests within a compartment or space, ensuring compliance with the minimum applicable requirements before issuing a certificate specifying that the area is safe for workers.

At 0800 on April 8, a safety meeting was held during which all relevant permits pursuant to the company's safety management system were issued. [5] At 0824, two crew members entered cargo tank No. 6 starboard to repair a broken hydraulic line that controlled the stripping line valve for tank No. 5 starboard. A few minutes later, the welder, the C/O, and a crew member entered tank No. 5 port to effect welding repairs.

At 0929, the two crew members working in tank No. 6 starboard had completed their repairs and requested that the stripping line valve for No. 5 starboard be cycled to bleed air from the newly repaired hydraulic line. The valve was activated from the remote control station on the bridge and it took 19 seconds to cycle the valve from closed to open to closed again. The crew members exited the tank shortly after. Ship's records indicate that this valve was again cycled at 1007 and that it took 15 seconds.

After a coffee break, the welding equipment was moved from tank No. 5 port to No. 5 starboard. Although the tank atmosphere was not tested by anyone on the morning of the accident, a crew member and a second welder entered that tank. Neither person carried an emergency breathing apparatus, nor was there ongoing gas monitoring as required by the shipboard safety manual. No safety harnesses or recovery safety lines were worn.

A fire hose was lowered into the cargo tank, but it was not pressurized. A tarp was laid down as a spark suppressor; however, it was not wetted down as indicated in the "Special Conditions/Precautions" section of the hot-work permit that had been issued at that morning's safety meeting.

At about 1113, a loud noise was heard and thick black smoke was seen coming from cargo tank No. 5 starboard. A few seconds later, the injured welder emerged on deck from the manhole at the tank's forward end. He was taken to the ship's hospital and later evacuated to a hospital ashore.

The ship's fire parties were mustered and they extinguished the fire within 15 minutes. During this time, the crew member still in the tank was in constant radio communication with the deck crew. Subsequently, the intense heat coming from the tank prevented anyone from entering, and no further communication was received from the trapped crew member.

The Conception Bay South Volunteer Fire Department boarded the vessel at 1255 and, with assistance from the ship's crew, recovered the crew member's body at 1440. A search and rescue (SAR) helicopter was used to transport the body to the local hospital.

Vessel Certification

The *Kometik* carried all appropriate certificates for a vessel of its class and voyage. The vessel also complied with the requirements of the *International Management Code for the Safe Operation of Ships and for Pollution Prevention* (ISM Code).

---

5 Specifically, a permit for hot work and one for enclosed-space entry were issued.

Personnel Certification

The master and officers of the *Kometik* held certificates that were valid for the vessel's class and service. All officers and crew had received Marine Emergency Duties training and had participated in an appropriate in-house training program consistent with the company's safety management system and Transport Canada's requirements, according to the position held on board.

Personnel History

The master had sailed on oil tankers since 1986, moving up from ordinary seaman (OS) to master and serving as master on two previous vessels. He had served as a C/O with the operating company since March 2000 and as master of the *Kometik* since June 2001.

The C/O graduated from the Fisheries and Marine Institute's Nautical Program in 1996 and had sailed on a variety of vessels including oil tankers. He began serving on the *Kometik* in May 2000, as third officer and then second officer. He had been serving as C/O since December 2002 and held a Master Mariner's Certificate issued 22 December 2003 and valid until 21 December 2008.

Injuries to Persons

The crew member trapped in the cargo tank died as a result of smoke inhalation.

The welder suffered extensive burns and lung damage.

Damage to Vessel

There was no structural damage to the vessel. Recovery operations, however, caused minor damage to heating coils at the bottom of the cargo tank.

Work Planning

Initial activities were carried out respecting standard procedures (for example, hiring a marine chemist to test COT No. 4 port and starboard). As the operations progressed, activities such as the repairs to pipe support brackets in two other tanks (COT No. 5 port and starboard) were added to the operations and carried out using the resources at hand. The C/O tested the atmosphere of all tanks using a hand-held meter prior to tank inspection. He also used this method for verifying safe entry into tanks requiring internal repairs. However, a marine chemist was not recalled after the initial visit on April 6 to certify those tanks in which hot work was to be done as "gas free."

The additional work was undertaken without the following:

- an overall plan for coordinating the individual activities;
- a risk assessment of the overall activity; and
- an assessment of the work/crew requirements.

The approaching bad weather added an element of time pressure, with the crew required to complete the work so the vessel could leave the area by noon on April 9.

Tank Maintenance

Cargo oil tanks are normally cleaned and gas-freed for inspection on an annual basis. However, it may be necessary to enter a tank at any point—to conduct, for example, necessary repairs to valves, hydraulic control lines, actuators, etc. When this occurs, the opportunity is taken to complete a tank inspection.

The procedure for cargo tank cleaning prior to an entry is a crude-oil wash (during the discharge) followed by a water wash. The time required for a full tank wash/gas-freeing is generally 48 hours. The cargo tank must first be purged by introducing inert gas (IG) by way of an IG system. Then, when oxygen levels are appropriate, the tank is water-washed. Gas-freeing occurs by blowing clean air into the tanks using the IG blowers.

Workload

On a shuttle tanker such as the *Kometik*, the vessel's short runs necessitate quick turnarounds and frequent cargo-handling operations. These take place on a 24-hour basis and require long periods of supervision.

The C/O is responsible for all cargo-handling operations as well as directing and supervising the deck department. He did not stand a bridge watch. Two other deck officers are designated as watchkeepers. Two vessels [6] that were similar, but which travelled to the United States (U.S.), had an additional qualified deck officer on board to assist with vessel operations, in accordance with U.S. regulatory requirements.

Tank cleaning is also an activity that requires close supervision by a senior crew member. Although it occurs infrequently, it is nonetheless an extensive, safety-sensitive procedure which normally spans both day and night shifts over several days.

Since beginning that particular trip on April 3, the C/O had been almost continuously involved in cargo operations and tank cleaning, in addition to his duties directing and supervising the deck department's daily work and monitoring repairs being performed by shore contractors.

Fatigue

The C/O normally worked day shifts of 12 hours' duration. On his first day of work after joining the vessel on April 3, he took a short nap in anticipation of an extended work schedule, and then worked through the night to support cargo-discharge operations. The following morning, he slept for approximately six hours before working the remainder of the day shift. As on subsequent days, he was involved in vessel operations until the late evening. He had disturbed sleep for the next two nights, and was suffering flu-like symptoms. He was taking cold medication that included a stimulant and he was also taking a prescription antidepressant. For the two nights preceding the accident, his sleep was less disturbed and more in accordance with his normal sleeping hours.

Tables in Appendix A illustrate the C/O's sleep history. All times are estimated, based on reports from the C/O and a review of the relevant logs.

---

6 The tankers *Heather Knutsen* and *Jasmine Knutsen*

The *Canada Labour Code* states that it is the duty of both the employer and the employee to manage numerous health and safety issues. [7] Additional Canadian regulations in effect at the time explicitly spelled out the frequency and duration of rest periods for employees. [8]

In the days leading up to the occurrence, the C/O met the minimum requirement of six hours of rest per individual 24-hour period; however, he did not meet an additional requirement for a minimum of 16 hours of rest over the 48-hour period prior to the event.

Quality and Safety Management System

The ISM Code was adopted by the IMO in 1993 and provides an international standard for the safe management and operation of ships and pollution prevention. Governments are required to take necessary steps to safeguard the shipmaster in the proper discharge of his responsibilities in these areas. The code also recognized the need for management to be appropriately organized to respond to the needs of those on board to achieve and maintain high standards of safety and environmental protection.

In practice, a ship is issued a safety management certificate (SMC) and its operating company is issued a document of compliance (DOC) once the systems in place have been audited by an accredited organization. The *Kometik* engaged wholly in domestic trade but was nonetheless a convention vessel compliant with the ISM Code that came into force on 01 July 1998.

The operating company developed a quality and safety management system (QSMS) to meet the requirements of the ISM Code. Accordingly, classification society Det Norske Veritas issued a DOC to the operating company, and the American Bureau of Shipping issued an SMC to the *Kometik.* The SMC is subject to renewal every five years, with an interim external audit between the second and third anniversary dates of the SMC and an annual verification of the company's DOC through external audits. In accordance with the ISM Code, the *Kometik*'s SSM includes procedures for safe working practices including gas-freeing, enclosed-space entry, hot work, and the danger tag/lockout system. [9] Procedures were also in place to address identified operational risks and safety-critical equipment and systems.

Combustible Gas Meters

The instrument used on board the *Kometik* was a hand-held, battery-powered gas meter. It is used for sampling the ambient oxygen concentration and for detecting toxic or flammable materials that may be present in a cargo tank. Information saved in the data log, including time and readout/percentage/parts per million, can be downloaded to a computer. The instrument is accurate to ±3 per cent of the LEL. The built-in memory of the instrument shows monitoring activity only during the time the crew was in the COT No. 5 port.

---

[7] *Canada Labour Code,* SOR/92-544, section 124, 125, and 126

[8] *Canada Shipping Act—Crewing Regulations,* SOR/97-390, Division 2, Hours of Rest, General, subsection 13 (2) (Note that these were repealed as of 01 July 2007)

[9] The danger tag/lockout system prohibits crew members from activating any pump, valve, actuator, or other functional device within the cargo-oil control system, so as to render it sealed and unusable until ordered safe to do so.

Personal Protection Equipment

In this instance, the welder, a contract employee hired to carry out the hot work, wore coveralls made from 100 per cent cotton/denim. This heavy, tightly woven fabric has natural flammability resistance at low temperatures but does not provide protection against high-temperature flash fires. [10] On top of the denim coveralls, the welder wore a pair of the ship's disposable polyethylene coveralls. Neither of these items was treated to enhance flame-retardant properties, and the disposable coveralls were contaminated with petroleum products from the tank's oily residue. By the time the welder emerged from the tank, these disposable coveralls had been almost completely consumed. The crew member who was assisting the welder was wearing 100 per cent cotton coveralls with reflective patches. This was standard protective equipment issued by the company.

All fibres—natural or manufactured—have their own unique durability and flammability characteristics. Fabrics made from cellulose fibres tend to be more durable, but exhibit poor flammability characteristics. Fabrics produced from protein fibres, on the other hand, are less durable, but demonstrate good flammability properties. Manufactured synthetic fabrics, although durable, are generally heat sensitive. Modern textiles are often produced by combining natural and manufactured fibres to obtain the flammability properties of one and the durability characteristics of the other.

Requirements for uniform/protective clothing are referenced in the *Marine Occupational Safety and Health Regulations* and also in the *Safe Working Practices Regulations*, which state:

> Where
>
> (a) it is not reasonably practicable to eliminate or control a safety or health hazard in a workplace within safe limits, and
>
> (b) the use of protection equipment may prevent or reduce injury from that hazard,
>
> every person granted access to the workplace that is exposed to that hazard shall use the protection equipment prescribed by this Part. [11]

Moreover, the regulations state:

> all protection equipment:
>
> (a) shall be designed to protect the person from the hazard for which it is provided; and
>
> (b) shall not in itself create a hazard. [12]

---

10 Although denim releases smoke particles and continues to glow and decompose once ignited, it seldom catches fire.

11 *Canada Labour Code*, *Marine Occupational Safety and Health Regulations*, Part X, Section 10.1

12 *Canada Labour Code*, *Marine Occupational Safety and Health Regulations*, Part X, Section 10.2

The regulations offer no guidance as to what fabrics constitute suitable uniform/protective clothing. However, Canadian General Standards Board standard CAN/CGSB-155.20-2000, *Workwear for Protection Against Hydrocarbon Flash Fire*, provides the minimum requirements for performance of workwear for protection against such a hazard. The standard also provides guidance for the warnings and information to be included on the label to be affixed to the workwear. [13]

13 In addition, Ship Safety Bulletin (SSB) 02/2006, *Inappropriate Apparel in Engine Room*, was issued to remind shipboard personnel to wear appropriate apparel and safety gear. Although this SSB is not specifically aimed at tankers and repairs to tanks, it indicates that clothing made of synthetic fibres is problematic, and that natural fibres are preferred.

Analysis

Source of the Flash Fire

A post-occurrence tank inspection revealed the presence of oil residue that was not present during a visual inspection the day before the occurrence. The residue's presence can be explained by the cycling of the stripping valve for COT No. 5 starboard which is located in the adjoining tank (No. 6 starboard) on the morning of the occurrence. This was demonstrated from April 21 to April 22 when the operating company performed a post-occurrence test by cycling the stripping valve for cargo tank No. 5 starboard—at which point approximately 1.7 cubic metres of water and cargo oil flowed back into the tank's suction well.

The fire therefore likely occurred when combustible vapours from the back-flowing oil/water mixture that had entered that workspace were ignited by the welder's arc.

Shipboard Safety Management

The provision of adequate policies and procedures enables a ship's crew to be better equipped to make correct decisions of a day-to-day operational nature. By applying the ISM Code, shipping companies minimize the range of poor human performance-based decisions that may lead to an accident.

An effective safety management system pursuant to the ISM Code requires that all risks be identified, with procedures put in place to minimize their potential impact. Part of the *Kometik*'s shipboard safety manual (SSM) requires the identification of all procedures to be carried out ahead of any hot work in an enclosed space (such as a cargo tank). At the April 8 safety meeting, however—where such risk assessment and permit issuing was to take place—no specific conflicting work items were identified, nor were any requirements identified for danger tag/lockout of pipes leading to the cargo tanks where hot work was to be performed.

Several other SSM procedural requirements were also not followed: disposable coveralls were used, fire hoses were not charged, people in the tank did not carry an emergency breathing apparatus (EBA) or a portable gas monitor, and safety lines were not used. Although the SSM requires that such mitigating actions be identified in advance of any work, the procedures were not fully followed.

Although the aforementioned tasks are all contained in the vessel's SSM, they were not carried out on the morning of the incident. This was due in part to the need to complete the tasks and get underway ahead of the advancing bad weather.

Fatigue/Workload

In the days leading up to the occurrence, the C/O was suffering from acute fatigue caused by several factors:

- He incurred a sleep debt by being awake for approximately 24 hours from April 3 to April 4 and then reportedly not getting restorative sleep for another two days;
- The unloading/cleaning work was demanding, both in terms of risk and time pressure; and
- He had been suffering from flu-like symptoms for several days.

It is not known if the antidepressant being taken by the C/O contributed to his state of fatigue or if it in any way affected the performance of his duties.

The C/O's greatest level of fatigue would have occurred two days before the accident when much of the repair work was being considered. It is likely that he was still in a fatigued state at the time of the accident, as he would have been unable to obtain sufficient restorative sleep to overcome the earlier sleep debt.

According to the IMO's *Fatigue and the Ship's Officer*, [14] fatigue can have a number of possible effects, including attitude change (such as failing to anticipate danger or ignoring normal checks and procedures) and diminished concentration and decision-making ability. The combination of excessive work hours and fatigue can result in negative effects such as increased risk-taking and increased use of shortcuts. Moreover, persons who are fatigued may not accurately assess their own level of fatigue.

Since beginning that particular trip on April 3, for example, the C/O was involved in extensive tank cleaning/cargo operations in addition to his duties directing and supervising the deck department's daily work, and monitoring repairs performed by shore contractors. Although a risk analysis and schedule was created for each of the individual activities, no risk analysis or workload analysis was carried out for the overall cleaning and repair activity.

This lack of an overall plan and high workload while in a fatigued state likely had an impact on the C/O's performance.

An effective safety management system pursuant to the ISM Code requires that all risks be identified, with procedures put in place to minimize their potential impact. In this instance, the vessel's SSM did not identify fatigue or workload as risk factors and did not incorporate procedures, such as an increased crewing level, which would mitigate those risks. It is therefore likely that, as a consequence of fatigue and workload, the C/O did not recognize the potential conflict between the welding operation in cargo tank No. 5 starboard and the valve repairs in the adjacent tank. As a result, he did not follow the existing SSM procedures to mitigate the risks.

Personal Protective Equipment

The disposable polyethylene coveralls worn by the welder did not meet the minimum requirements for performance of workwear for protection against hydrocarbon flash fires as contained in Canadian General Standards Board standard CAN/CGSB-155.20-2000, *Workwear for Protection Against Hydrocarbon Flash Fire*, nor did they meet the requirements of the *Canada Labour Code* to provide adequate personal protective equipment and clothing. [15] These coveralls were not fire-resistant and they were contaminated with petroleum products from the tank's oily residue, which itself created a hazard. They therefore likely contributed to the severity of his injuries.

---

14 CIRC\MSC\1014\ANNEX

15 The marine requirements for uniform/protective clothing are referenced in the *Marine Occupational Safety and Health Regulations* (Part X: Safety Materials, Equipment, Devices, and Clothing) and the *Safe Working Practices Regulations* (Personal Protective Clothing, Paragraph 78).

Protective clothing available on the market includes items manufactured with fabric blends of 88 per cent cotton and 12 per cent high-tenacity nylon that is treated so as to extinguish combustion once the ignition source is removed. However, the coveralls supplied by the company as protective clothing for use on board the vessel were of 100 per cent cotton, and not suitable protection against high-temperature flash fires.

Given the risk exposure of personnel working on oil tankers to flash fire incidents, the protective gear supplied or available to the crew members of the *Kometik* was not consistent with their risk exposure profile.

Findings as to Causes and Contributing Factors

1. Established procedures for hot work and enclosed spaces were not followed.
2. A crew member with a high workload of safety-sensitive duties worked while in a fatigued state, leading to insufficient oversight of the welding activities.
3. When conflicting work items were not identified during pre-planning, the cycling of the tank stripping valves on two occasions allowed a flammable air/hydrocarbon fuel mixture to form in the tank where hot work was to be performed.
4. The atmosphere in cargo tank No. 5 starboard was not tested immediately before or during the work, thereby allowing an explosive atmosphere to go undetected.
5. The welder's arc introduced an ignition source for the flammable atmosphere in the tank.
6. Neither the welder nor the crew member carried appropriate personal protection equipment while working in the tank, thus exposing them to the risks associated with their assigned work.
7. The disposable polyethylene coveralls worn by the welder likely contributed to the severity of his injuries.

Findings as to Risk

1. Given the risk exposure of personnel working on oil tankers to flash-fire incidents, the protective gear supplied or available to the crew members of the *Kometik* was not consistent with their risk exposure profile.
2. The vessel's shipboard safety manual did not identify fatigue or workload as risk factors and did not incorporate procedures to mitigate them.

Safety Action

Action Taken

Operating Company

Following this occurrence, the tanker ships *Kometik*, *Vinland,* and *Mattea* were provided with an additional officer to ease the workload on the chief officer of each vessel. In addition, all work planning is now monitored monthly by shore personnel.

The company's quality and safety management system (QSMS) has been revised and updated. The pre-critical task meetings as well as the job site planning meetings (Toolbox meetings) were reviewed and improved. Seminars were conducted for shore staff with ships' crews in attendance focusing on responsibility and accountability regarding safety on ships.

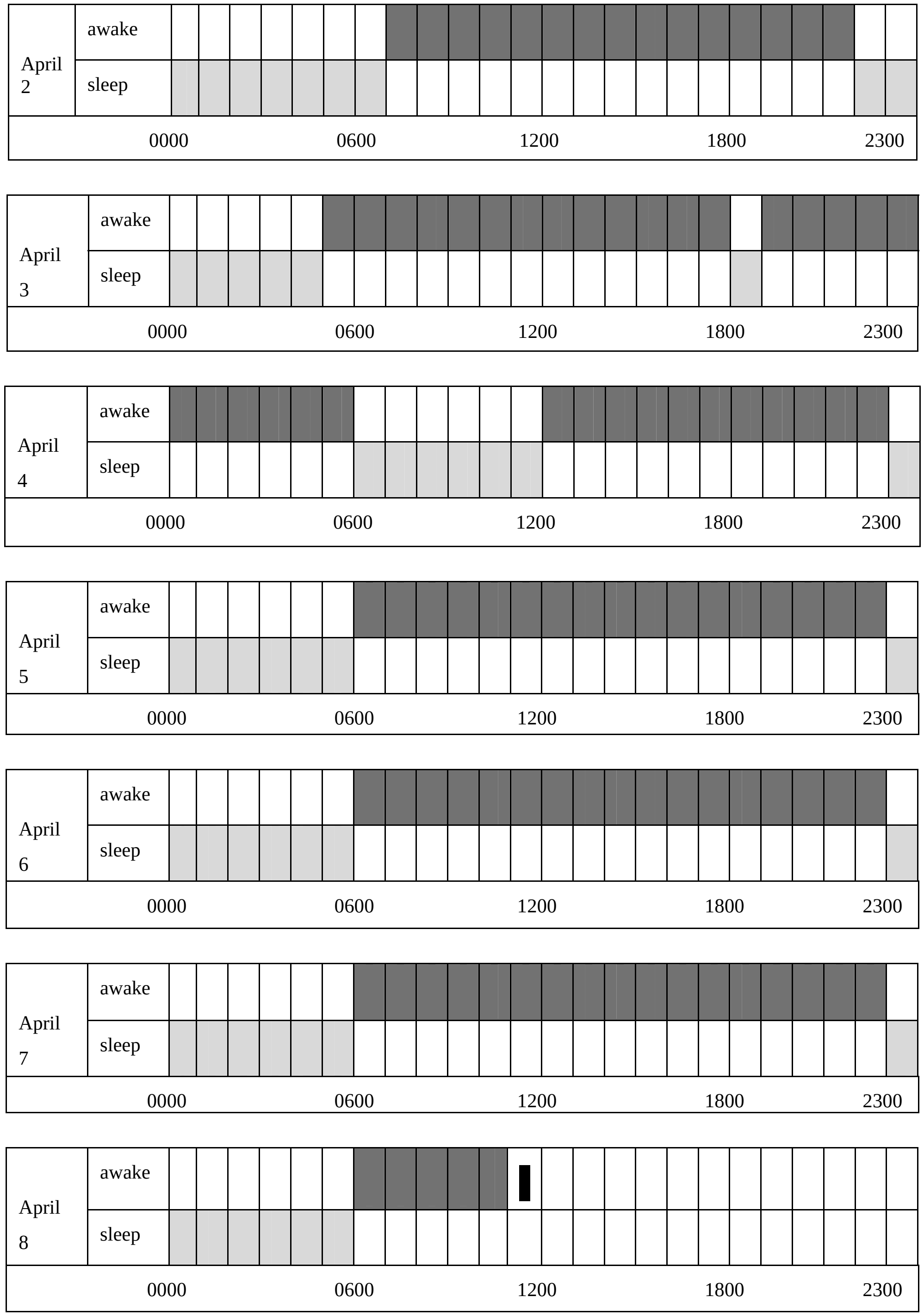
The revised QSMS reinforces the employer requirement that the master be informed of any prescription medication that crew members may be taking. Recent changes in the seafarer's medical examinations (under the *Canada Shipping Act, 2001*) add to this employer requirement.

This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board authorized the release of this report on 14 November 2008.

*Visit the Transportation Safety Board's Web site (**www.tsb.gc.ca**) for information about the Transportation Safety Board and its products and services. There you will also find links to other safety organizations and related sites.*

Appendix A – Chief Officer's Sleep History

All times are estimated, based on reports from the chief officer (C/O) and a review of the relevant logs. The C/O indicated that his sleep was very disturbed/broken on April 4, 5, and 6.



The symbol ▌ denotes the time period in which the accident happened.