Thursday, March 17, 2011

All,

I would like to bring to your attention a very different Safety Day Topic" for this month.

It has to do with a fire onboard a vessel managed by another company while vessel was alongside a jetty.
All tanker-guys like us can figure out in a blink the catastrophic potentials of such an event. And the sad think is that it can happen.
What is more sad and alarming is the plain fact that sometimes we simply do not control those "external" factors that can create such a dangerous situation for our selves.
It is like driving….
You can be the best driver ever, but the other driver who rammed you was either an idiot simply not as good as you.

In this case, this vessels' crew might have been the most competent in the word (and probably are) and their systems the best in place, but they were unfortunate enough to call at a berth were the conditions were in a very PC term "not very professional".
If you go through the attached Incident Investigation (all references related to vessel and its company is intentionally omitted) you will see that the fire caused by shore fault.

However what you won't find in this investigation is most important part and the reason I'm sending you this letter.
What is missing is the fact that the terminal personnel **EVACUATED** the terminal / jetty abandoning the vessel moored alongside.
What is also missing from the investigation is that no assistance boats from the shore side came to the help of the vessel neither to evacuate the crew nor to put out the fire.

This is the reason the crew evacuated the ship by lowering vessel's stbd lifeboat.

And here is where we want your input.
The vessel was equipped with twin-fall conventional close type lifeboats. This fact enabled them to lower the seaside one and steer away from the burning ship.
My question is what would have happen if vessel had one free-fall in the stern as the 80% of our fleet has.
In this particular berth it seems that vessel's stern is clear from obstacles shore lines etc and they could have easily lunched it.
But we all know this is not the case in the majority of the berths your ship usually calls.

Then what would the course of actions be in that case?
Lower the seaside gangway and swim away?
Through the life rafts overboard and paddle away on them?
How about if the water is freezing?
How about if we need to clear the area near the ship really quick?
Can we ensure that free-fall lifeboat lunching area is clear of any obstacles?
Can we include that in the ship shore safety check list?

Please come back to your office DP with your input.
We need any proposal and any type idea in this.
Meanwhile we will address the sane questions to our industry responsible organizations (Intertanko, OCIMF, ISGOTT) and see what kind of reactions we will receive.

Safe Seas
P.Hatzikyriakos

INVESTIGATION REPORT

THE INVESTIGATION

This Investigation Report conducted Company's DPA Capt …… and by Marine Superintendent Capt …….. who was on board the ship at the time of the incident.

THE VESSEL

M/T [redacted] – Bahamas Flag – IMO No: [redacted] - Call Sign : [redacted] is a 27.645 GRT, LOA 183,24 meters, Breadth 32.20 meters Oil and Chemical Tanker classed with DNV, was built in 1999 by Hyundai Heavy Industries, South Korea. M/T [redacted] is powered by a 6 Cylinder HYUNDAI B&W 6S50MC-MK6 diesel engine of BHP 10440 at 114 RPM. The Main Engine drives a single right-hand fixed-pitch propeller giving a service speed of 14 knots.

VESSEL DESCRIPTION			
Vessel's name:	[redacted]		
IMO number:	[redacted]		
Vessel's previous name(s) and date(s) of change:	TAINTLESS (Nov 01, 2006) HELLAS RENAISSANCE (Mar 22, 2005)		
Date delivered:	Jun 15, 1999		
Builder (where built):	Hunday Heavy Industries		
Flag:	Bahamas		
Port of Registry:	NASSAU		
Call sign:	[redacted]		
Type of vessel:	Oil Tanker		
Type of hull:	Double Hull		
Classification society:	Det Norske Veritas		
Class notation:	+1A1 Tanker for Chemical with FP above 60C and Tanker for oil ,ESP,SPM,EO,VCS-2,CSA-1		
IMO type, if applicable:	3		
Date / place of last dry-dock:	Apr 27, 2009	ANTWERP	
Date next dry dock due	Apr 27, 2012		
Length Over All (LOA):	183.24 M		
Length Between Perpendiculars (LBP):	174 M		
Extreme breadth (Beam):	32.2 M		
Moulded depth:	18.2 M		
Keel to Masthead (KTM) / KTM in collapsed condition (if applicable):	43 M	M	
Bow to Center Manifold (BCM) / Stern to Center Manifold (SCM):	91.1 M	92.14 M	
Distance bridge front to center of manifold:	56.9 M		
Parallel body distances:	Lightship	Normal Ballast	Summer Dwt
Forward to mid-point manifold:	37 M	40 M	42 M
Aft to mid-point manifold:	17 M	35 M	42 M
Parallel body length:	54 M	75 M	84 M
FWA at summer draft / TPC immersion at summer draft:	275 MM	50.77 MT	

What is the max height of mast above waterline (air draft)	Full Mast	Collapsed Mast
Lightship:	40.600 M	0.000 M
Normal ballast:	35.900 M	0.000 M
At loaded summer deadweight:	30.783 M	0.000 M
Net Tonnage:		12616
Gross Tonnage / Reduced Gross Tonnage (if applicable):	27645	
Suez Canal Tonnage - Gross (SCGT) / Net (SCNT):	28649	24782
Panama Canal Net Tonnage (PCNT):		22972

Loadline	Freeboard	Draft	Deadweight	Displacement
Summer:	6.014 M	12.217 M	46217 MT	55768 MT
Winter:	6.268 M	11.963 M	44927 MT	54478 MT
Tropical:	5.76 M	12.471 M	47506 MT	57057 MT
Lightship:	15.823 M	2.4 M		9551 MT
Normal Ballast Condition:	11.131 M	7.1 M	21260 MT	30811 MT

At the time of the incident her Class was fully maintained.Fire Fighting and Safety Equipment, Navigation, Engine, Cargo, Communication equipment and automation were fully operational. Relevant Records and Certificates have been reviewed by the Investigators.

At the time of the incident statutory and vessel's certification in general checked and found valid.

At the time of incident, the vessel was loading at [redacted] – [redacted] Terminal loading simultaneously a cargo of Jet Fuel and Gasoil

M/T [redacted] before the Incident at Huelva Spain.

The vessel was on a time charter to [redacted] to load a Cargo of Jet Fuel and Gasoil from [redacted] Terminal at [redacted] with intention to discharge at Jamaica.

THE CREW

Manning of the vessel is controlled by the managers, [redacted]. At the time of the incident the vessel was manned with 30 Crewmembers. All crew members found qualified, certified and medically fit in accordance with company's manning procedure.

While at port the 3 mates maintained a traditional 4 hours on, 8 hours off watch keeping routine with the Chief Officer being in charge of the Cargo Operations. Deck watch was supported by three Indonesian Ratings keeping watch at the cargo Manifolds/Deck and Gangway.

The qualifications of the Officers and Crew were examined. All Officers found qualified, certified, medically fit and competent to carry out their duties.

Rest hours were examined and found in accordance with STCW provisions. No Alcohol Test Carried out after the Incident.

DESCRIPTION OF THE INCIDENT

INTRODUCTION

At approximately 10:35 hours on 11 September 2010, a fire broke out on the deck of the M/T [redacted] At the time of the fire, the vessel was alongside and loading a cargo of gas oil and jet fuel at the [redacted] terminal in [redacted]

DETAILS OF THE EVENT

The vessel arrived at [redacted] on the 10th of September 2010 at 08:30 and berthed Port Side algongside on the 11th of September at 00:10 hrs in the [redacted] terminal in [redacted]

At 01:25, the cargo hose connection was completed and loading of gasoil into the vessel's tanks began at 02:25 hours. Loading of Jet A1 subsequently began at 02:40 hours and was routed to Port and Starboard tanks 1 and 5.

A.B. [redacted] and O.S. [redacted] were on deck maintaining watch over the hoses and manifold piping. Pump Man [redacted], Junior Officer [redacted] and the master, [redacted] were in the cargo control room. At approximately 10:32 hours, [redacted] saw the hose supplying Jet A1 to the vessel begin to leak. He shouted to the terminal watchman to stop the pump but is not certain that the watchman was at his station. He also notified the cargo control room personnel of the leak by radio.

Photograph 1 Leak from hose prior to fire.

Upon hearing of the leak over the radio, [redacted] went to the port side of the accommodation and saw a large spray coming from the transfer hose. (See Photo above) [redacted] initially saw what he classified as a small leak in the hose as he looked from the Cargo Control Room Window. He went to the deck, opened the valve to the slop tank and attempted to start the Wilden pump before the subsequent fire forced him to retreat.

The undersigned Captain [redacted] was on board at the time of the incident, joined the M/T [redacted] at [redacted], [redacted] on 7 September for a routine inspection. He was in the officer's smoke room when he heard of the report on the radio and went to the window where he observed a leak and watched it expand significantly over a period of 2 – 5 seconds. Captain [redacted] took a photograph from this location and then went to the Cargo Control Room and the Bridge where he took additional photographs of the incident. Upon reaching the Cargo Control Room, he observed the master holding the VHF radio and ordering the terminal to cease pumping. (See photo in the next page).

The vessel's Master Captain [redacted] stated that he called the terminal four to five times telling them in English and in [redacted] that the hose was broken. When he saw smoke from the jetty, he started the fire pump from the bridge and the crew began spraying the terminal. The flames grew quickly and spread to the vessel engulfing the manifold. As the vessel was trimmed by the stern, the leaking fuel flowed toward the accommodation, bringing the fire with it. (See following photos showing the commencement of the fire at the pier.)

Fire burning on jetty. Note vessel's fire stream directed upon jetty in bottom of photograph

Fire burning on jetty and vessel

The officer of the watch at the time of the incident [redacted] stated that after the master saw the fire, he ordered the tank valves closed to prevent the fire from reaching the tanks. Chief Mate [redacted] was asleep when he heard the alarm sound. He opened the curtain in his cabin and saw a fire at the manifold. He switched on his radio and proceeded to the Cargo Control Room where he saw that the tank valves had been closed.

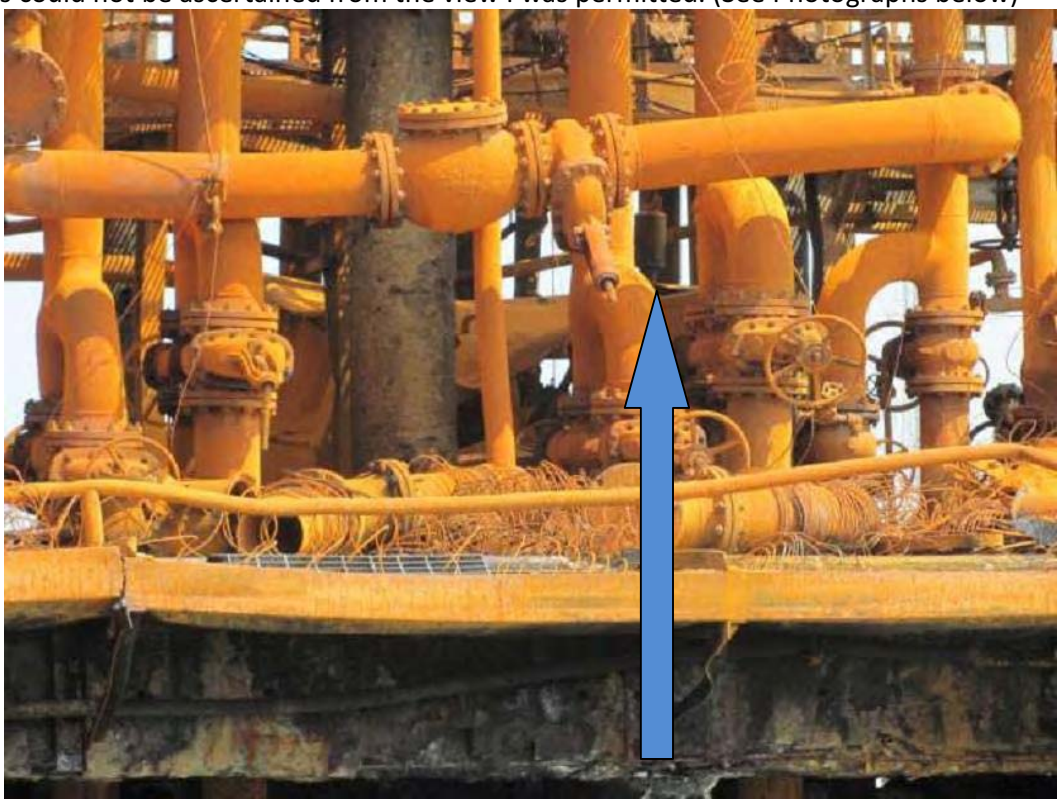
From there, [redacted] made his way to the foam room and started the foam pump. He opened two valves to allow the foam agent to be pumped into the fire hoses, but doesn't remember specifically which valves. [redacted] then informed Captain [redacted] that he had started the foam pump and then went on deck and opened the main inert gas valve to inert the tanks.

Per the master, the vessel was made fast with six wires and three ropes. When the fire came onboard, it was quickly too large for anyone to go forward to release the lines. It was therefore impossible to move the vessel away from the jetty. As the flames encroached the port side of the accommodation and burned the port life boat, the master ordered the crew to evacuate the vessel via the starboard life boat. The crew descended a monkey ladder one at a time to enter the life boat.

The crew conducts a fire drill every Saturday. The consensus of those interviewed is that the latest drill was conducted on 4 September and simulated a fire in the manifold, port side.

From sea, it was evident that the facility had suffered extensive damage.

Several individuals stated that [redacted] had installed a temporary diesel powered air compressor on the jetty. This could not be ascertained from the view I was permitted. (See Photographs below)



Precence of Internal Combustion Engine (Compressor at the pier)

[redacted]

Damage to side shell of vessel

The vessel suffered external fire attack to its starboard side shell and deck. Scorching of the deck coating was evident from the front of the deck house to just aft of the midpoint of the manifold. From the exterior, there was no obvious distortion of the deck. The port side deck house, which contained cargo samples, and crane were also seriously affected by the blaze. Fire affects to the accommodation were minor, although the

port side lifeboat was destroyed, and appeared to be the result of fire beside the vessel rather than on its deck.

Fire affects to the accommodation were minor, although the port side lifeboat was destroyed, and appeared to be the result of fire beside the vessel rather than on its deck.

Substantial deformation of the shell plate longitudinals was evident in ballast tank #3 port and the aft portion of #2 port. Deformation was also apparent to portions of the interior walkways and transverse bulkheads of these ballast tanks.

All that remained of the transfer hoses was the flanges and the reinforcing and grounding wires. While the wires were discontinuous, the ends showed no evidence of electrical arcing.

No Fatalities or human injuries incurred.

No Oil Pollution occurred.

27. IMMEDIATE CAUSES : WHAT SUBSTANCE ACTIONS AND CONDITIONS CAUSED OR COULD CAUSE THE EVENT

THE SOURCE OF LEAK

From the photos above, it is quite clear that the cargo leak occurred in the flexible portion of the transfer hose, adjacent to its connection with Cargo Line no.1 of the vessel's manifold

Potential causes for such a failure include excessive pumping pressure, dead heading, water hammer, excess axial strain due to draft differential and damage, defect or deterioration of the hose.

According to the record of the fire expert attended the vessel at [redacted] Anchorage on 14th of September 2010 the height of the spray is estimated at 31 feet above the leak point.

The nozzle efficiency for a leak of this sort would likely fall in the range of 0.5 to 0.7. Using the Bernoulli equation and this efficiency, the line pressure at the time of the photograph is estimated to be between 15.7 and 22 psig, which is within the normal operating pressure range for cargo loading. Therefore, excessive pumping pressure can be effectively ruled out as the cause of failure.

If the vessel's manifold valve (s) was closed with the cargo transfer pump in operation, all components of the transfer system upstream of the valve (s) would experience the pump deadhead pressure. Depending upon the design of the pump and any relief valve in the system, the dead head pressure can be substantially greater than the normal operating pressure. Based upon the estimated pressure calculated above, the system pressure is not abnormally high. Thus dead heading is not responsible for this failure.

Water hammer is a pressure wave that travels thru a fluid as a result of changes in the mass fluid flow of fluid in a piping system. If valves are manipulated excessively fast, a substantial pressure wave can be generated that can cause damage to the piping components. The crew members of the vessel have stated that they did not manipulate any of the cargo valves prior to the failure. Further, the vessel had only just begun the loading process and had only transferred about 15% of the Jet A1 fuel that was planned to be loaded. The vessel's crew would have had no reason to close or adjust a valve in the transfer piping. Therefore, water hammer has to be discounted as a credible cause for the failure of the hose.

During the loading process, the crew must continually alter the ballast of the vessel to account for the mass of the fuel loaded. If this process is not conducted properly, the change in draft could place excessive strain on the transfer hose. From Photographs 1 and 2, it is evident that the vessel is reasonably ballasted and that the transfer hoses are properly resting on the rail and not unduly stressed. Thus draft differential was clearly not the cause of the failure.

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ballasted and that the transfer hoses are properly resting on the rail and not unduly stressed. Thus draft differential was clearly not the cause of the failure.

Damage, defect or deterioration of the flexible portion of the transfer hose could result in a reduction of ultimate strength to a level insufficient to withstand the combined effects of pressure, hose and cargo weight and bending associated with the loading process. Since all of these effects appear to have been within normal parameters and no other reasonable cause exists, it must be concluded that the hose was defective as a result of damage, defect or deterioration and that this is the cause of the leak that released the fuel for the fire.

The Area of Fire Origin

From Photographs on page 8 and 9, it is clear that the fire began on the jetty and subsequently spread to the vessel. Unfortunately, the camera angle does not present a direct view of the area of origin. This combined with a lack of access to the terminal precludes the determination of a precise seat of the fire.

The Source of Ignition

As mentioned previously, in the photographs of the incident the vessel obscures the actual seat of the fire and therefore the potential sources of ignition. The view from the sea was not adequate to provide additional information on the source of ignition for the fire and I was not granted access to the facility to conduct a formal inspection.

Several individuals reported that a diesel powered air compressor had been installed on the jetty and was, or may, have been in operation at the time of loading.

CONCLUSION

The principle cause of the September 11, 2010 fire aboard the M/T [redacted] was a catastrophic failure of the transfer hose supplying Jet A1 fuel to the cargo tanks of the vessel. Damage, defect or deterioration of the flexible portion of the hose caused the failure to occur at normal operating pressure. The fire began on the jetty due to an unknown ignition source and subsequently spread to the vessel.

While the available evidence does not permit a conclusion as to the source of ignition, hearsay evidence suggests that the fire may have been started by an operating Diesel powered air compressor.


SONIA
NASSAU

INVESTIGATION REPORT

IDENTIFYING INFORMATION					
1. COMPANY			2. SHIP		
3. LOCATION OF INCIDENT **SOUTH AMERICA**			4. DATE OF INCIDENT 5. TIME **11/09/2010 10:32 LT**		6. DATE OF REPORT **20 October 2010**
INJURY OR ILLNESS			**PROPERTY DAMAGE**		**OTHER INCIDENTS**
7. INJURED'S NAME **N/A**			14. PROPERTY DAMAGE **SHIP + JETTY**		18. NATURE OF INCIDENT **N/A**
8. PART OF BODY **N/A**	9. DAYS LOST **N/A**		15. NATURE OF DAMAGE **FIRE DAMAGES TO SHIP's PORT SIDE**		19. INCIDENT COST / IF APPLICABLE **TO BE ADVISED**
10. NATURE OF INJURY OR ILLNESS **N/A**			16. COST	ESTIMATED ACTUAL **TBA**	20. PERSON REPORTING INCIDENT **MASTER OF M/T**
11. OBJECT EQT/SUBSTANCE INFLICTING / HARM **N/A**			17. OBJECT EQT/SUBSTANCE INFLICTING / DAMAGE **M/T**		21. OBJECT/ EQUIPMENT/SUBSTANCE RELATED **N/A**
12. OCCUPATION **N/A**	13. EXPERIENCE **N/A**		22. PERSON WITH MOST CONTROL WITH ITEM 17 **MASTER M/T**		23. PERSON WITH MOST CONTROL WITH ITEM 21 **N/A**

RISK	EVALUATION OF LOSS POTENTIAL IF NOT CORRECTED	24. LOSS SEVERITY POTENTIAL			25. PROBABILITY OF OCCURRENCE		
		MAJOR **X**	SERIOUS	MINOR	FREQUENT	OCCASIONAL	SELDOM **X**

26. INSERT HOW THE EVENT OCCURRED

This Investigation Report conducted Company's DPA Capt ----------and by Marine Superintendent Capt ----------, who was on board the ship at the time of the incident.

THE VESSEL

M/T xxxxx – IMO No: 9-------- – Oil & Chemical Tanker, Bahamas Flag with Call Sign : C---- classed with DNV, was built in 1999 by Hyundai Heavy Industries, South Korea. The vessel is powered by a 6 Cylinder HYUNDAI B&W 6S50MC-MK6 diesel engine of BHP 10440 at 114 RPM. The Main Engine drives a single right-hand fixed-pitch propeller giving a service speed of 14 knots.

VESSEL DESCRIPTION	
Vessel's name:	
IMO number:	
Vessel's previous name(s) and date(s) of change:	
Date delivered:	Jun 15, 1999
Builder (where built):	Hunday Heavy Industries
Flag:	Bahamas
Port of Registry:	NASSAU
Call sign:	

Type of vessel:			Oil Tanker	
Type of hull:			Double Hull	
Classification society:			Det Norske Veritas	
Class notation:			+1A1 Tanker for Chemical with FP above 60C and Tanker for oil ,ESP,SPM,EO,VCS-2,CSA-1	
IMO type, if applicable:			3	
Date / place of last dry-dock:			Apr 27, 2009	ANTWERP
Date next dry dock due			Apr 27, 2012	
Length Over All (LOA):				183.24 M
Length Between Perpendiculars (LBP):				174 M
Extreme breadth (Beam):				32.2 M
Moulded depth:				18.2 M
Keel to Masthead (KTM) / KTM in collapsed condition (if applicable):			43 M	M
Bow to Center Manifold (BCM) / Stern to Center Manifold (SCM):			91.1 M	92.14 M
Distance bridge front to center of manifold:				56.9 M
Parallel body distances:		Lightship	Normal Ballast	Summer Dwt
Forward to mid-point manifold:		37 M	40 M	42 M
Aft to mid-point manifold:		17 M	35 M	42 M
Parallel body length:		54 M	75 M	84 M
FWA at summer draft / TPC immersion at summer draft:			275 MM	50.77 MT
What is the max height of mast above waterline (air draft)			Full Mast	Collapsed Mast
Normal ballast:			35.900 M	0.000 M
At loaded summer deadweight:			30.783 M	0.000 M
Net Tonnage:				12616
Gross Tonnage / Reduced Gross Tonnage (if applicable):			27645	
Suez Canal Tonnage - Gross (SCGT) / Net (SCNT):			28649	24782
Panama Canal Net Tonnage (PCNT):				22972
Loadline	Freeboard	Draft	Deadweight	Displacement
Summer:	6.014 M	12.217 M	46217 MT	55768 MT
Winter:	6.268 M	11.963 M	44927 MT	54478 MT
Tropical:	5.76 M	12.471 M	47506 MT	57057 MT
Lightship:	15.823 M	2.4 M		9551 MT
Normal Ballast Condition:	11.131 M	7.1 M	21260 MT	30811 MT

At the time of the incident her Class was fully maintained. All Fire Fighting & Safety Equipment, Navigation, Engine, Cargo, Communication equipment and automation were fully operational. Relevant records and Certificates have been reviewed by the Investigators.

At the time of the incident statutory and vessel's certification in general checked and found valid.

CERTIFICATION	Issued	Last Annual or Intermediate	Expires
Safety Equipment Certificate:	Apr 27, 2009	Jul 16, 2010	Jun 30, 2014
Safety Radio Certificate:	Apr 27, 2009	Jul 16, 2010	Jun 30, 2014
Safety Construction Certificate:	Apr 27, 2009	Jul 16, 2010	Jun 30, 2014
Loadline Certificate:	Apr 27, 2009	Jul 16, 2010	Jun 30, 2014
International Oil Pollution Prevention Certificate (IOPPC):	Apr 27, 2009	Jul 16, 2010	Jun 30, 2014
Safety Management Certificate (SMC):	Jan 18, 2010	Not Applicable	Mar 19, 2012
Document of Compliance (DOC):	Mar 03, 2008	May 13, 2010	Feb 28, 2013
USCG (specify: COC, LOC or COI): COC	May 19, 2010	May 19, 2010	May 19, 2012
Civil Liability Convention Certificate (CLC):	Feb 20, 2010		Feb 20, 2011
Civil Liability for Bunker Oil Pollution Damage Convention Certificate (CLBC):	Feb 20, 2010		Feb 20, 2011
U.S. Certificate of Financial Responsibility (COFR):	Nov 01, 2009		Nov 01, 2012
Certificate of Fitness (Chemicals):	Apr 27, 2009	Jul 16, 2010	Jun 30, 2014
Certificate of Fitness (Gas):	Not Applicable	Not Applicable	Not Applicable
Certificate of Class:	Apr 27, 2009	Jul 16, 2010	Jun 30, 2014
International Ship Security Certificate (ISSC):	Jan 18, 2010	Not Applicable	Mar 20, 2012
International Sewage Pollution Prevention Certificate (ISPPC)	Apr 27, 2009		Jun 30, 2014
International Air Pollution Prevention Certificate (IAPP):	Apr 27, 2009	Not Applicable	Jun 30, 2014

The vessel was on a time charter to load a Cargo of Jet Fuel and Gasoil South America with intention to discharge at Jamaica.
At the time of incident, the vessel was loading at South America loading simultaneously a cargo of Jet Fuel and Gasoil.

THE CREW

Manning of the vessel is controlled by the managers, ----------. At the time of the incident the vessel was manned with 30 Crewmembers. All crew members found qualified, certified and medically fit in accordance with company's manning procedure. Qualification of the deck and Engine Officers found to be the following :

QUALIFICATIONS OF DECK OFFICERS	**Master**	**Chief officer**	**OOW 04-08**	**OOW 12-04**	**OOW 08-12**
Nationality	Greek	Greek	UKRAINIAN	UKRAINIAN	POLISH
Certificate of Competency	Master	Chief Officer	O.O.W	O.O.W+SAFETY	O.O.W GMDSS
Issuing country	Greece	Greece	UKRAINE	UKRAINE	POLAND
Administration acceptance	Y	Y	Y	Y	Y
Tanker certification	O + C	O + C	O + C	O+C	O + C
STCW V paragraph 1 or 2 for current cargo	2	2	2	2	2
Radio qualification	Y	Y	Y	Y	Y
Years with operator	1.2	6	0.4	0.5	2
Years in rank	21	0.5	3	3	0.1
Years on this type of tanker	12	6	1	2	3
Years on all types of tanker	17	6	6	7	3
Months on vessel this tour of duty	3.5	7.5	4.5	5.7	1.5
English proficiency Good / Fair / Poor	G	G	G	G	G

QUALIFICATIONS OF ENGINEERING OFFICERS	**Chief engineer**	**2nd/Eng**	**3rd/Eng**	**3rd/Eng**	**Electrician**
Nationality	POLISH	POLISH	Greek	Indonecian	Romanian
Certificate of Competency	CH.ENG	2ND ENG	O.O.W	O.O.W	Electrician
Issuing country	POLAND	POLAND	Greece	Indonesian	Romania
Administration acceptance	Y	Y	Y	Y	Y
Tanker certification	O + C	O+ C	O + C	O + C	O + C
STCW V paragraph 1 or 2 for current cargo	2	2	2	2	2
Years with operator	15	4	4	5	0.2
Years in rank	12	0.2	2	4	4
Years on this type of tanker	10	4	3	5	0.1
Years on all types of tanker	20	7	4	10	0.1
Months on vessel this tour of duty	5	1.5	3	4	1.5
English proficiency Good / Fair / Poor	G	G	G	G	G

While at port the 3 mates maintained a traditional 4 hours on, 8 hours off watch keeping routine with the Chief Officer being in charge of the Cargo Operations. Deck watch was supported by three Indonesian Ratings keeping watch at the cargo Manifolds/Deck and Gangway.

The records of Rest hours were examined and found in accordance with STCW provisions. No Alcohol Test carried out after the Incident.

DESCRIPTION OF THE INCIDENT

INTRODUCTION

At the time of the fire, the vessel was alongside and was loading cargoes of gas oil and jet A1 at a terminal in South America

DETAILS OF THE EVENT

The vessel arrived at South America on the 10th of September 2010 at 08:30 lt. She was then berthed by port side on the 11th of September at 00:10 lt.

Cargo hose connection was completed at 01:25 lt. Two terminal cargo hoses were connected to ship's manifolds and commenced loading of gasoil at 02:25 hrs lt. Subsequently, the loading of Jet A1 started at 02:40 hours. Both grades of cargo were loaded as per ship's loading plan.

By that time, one A.B. and one O.S. were on duty maintaining watch over the cargo hoses and manifold piping while the Master, the Junior Officer on duty and the Pump Man were in the cargo control room. At approximately 10:32 hours, the O.S. on deck duty saw one cargo hose bursting and spraying cargo over ship's main deck and the jetty loading station***. He called immediately the terminal for emergency stop of loading but terminal did not reply***. He then notified the cargo control room about the cargo hose burst and the Deck Officer, who heard the O.S., went to the port side of the accommodation and saw a large spray coming from the JET A1 cargo hose (see photo next page).

Ship's oil pollution team was activated and pumpman opened immediately the main deck dump valve to the slop (P) tank in order to collect the cargo of JET A1 which was already spilled on deck port side. Besides, he also attempted to start the wilden pump in order to prevent overboard pollution.

Photograph 1 :Burst of cargo hose before fire.

The Marine Superintendent Capt -- ------ was on board for a routine inspection. At the time of the incident, he was in the officer's smoking room when he heard the report on the radio and went to the window where he observed the spray of cargo and watched it expanding significantly over a period of 2 – 5 seconds. ***Capt. ------ took a photograph from that location inside accommodation and then went to the Cargo Control Room where the Master was staying and later on to the Bridge where he took additional photographs of the incident. Upon reaching the Cargo Control Room, he observed the master holding the VHF radio and ordering the terminal for emergency stop. This happened a few minutes later the terminal had eventually stopped pumping. (See photo below).***

Master called the terminal four to five times by VHF reporting the cargo-hose burst until terminal had finally replied. ***Right after that he saw black smoke coming from the jetty and he immediately put in***

operation the ship's fire pump and ordered the crew to start spraying towards the jetty loading station. The smoke became thicker and then flames were visible on jetty. The flames grew quickly and spread to the vessel engulfing the manifold. As the vessel was trimmed by the stern, the spilled Jet A1 flowed toward the accommodation port side, bringing the fire with it. (See following photos showing the commencement of the fire at the pier.)

Fire burning on jetty. Note vessel's fire stream directed upon jetty in bottom of photograph

Fire burning on jetty and vessel

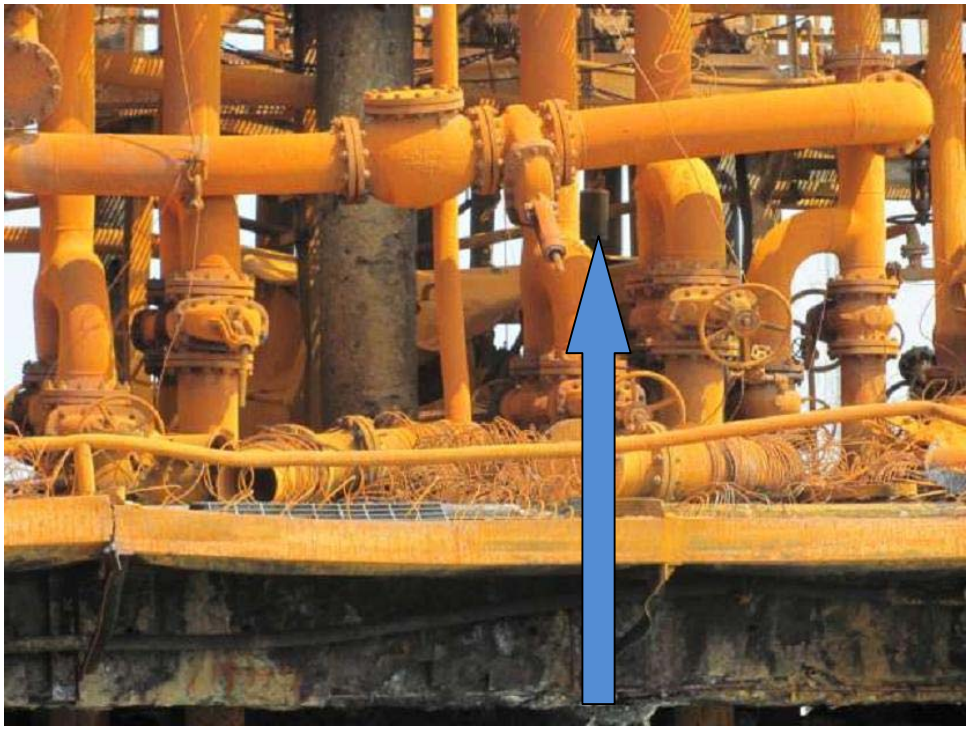
The Deck officer of the watch at the time of the incident stated that after the master saw the fire, he ordered the tank valves closed to prevent the fire from reaching the tanks. Chief Mate was resting in his cabin at the time the fire started and he was asleep when he heard the alarm sound. He opened the curtain in his cabin and saw a fire at the manifold. He switched on his radio and proceeded to the Cargo Control Room where he saw that the tank valves had been closed.

Chief Mate made his way to the foam room and started the foam pump. He opened two valves to allow the foam agent to be pumped into the fire monitors. Chief Mate then informed the Master that he had started the foam pump and then went on deck and opened the main inert gas valve to inert the tanks.

The vessel was moored with six wires and three ropes***. When the fire came onboard, it was quickly too large for anyone to go forward to release the lines from the vessel; however, the ship's moorings could be released from the shore side, if the Terminal's mooring hooks had been activated. It was therefore impossible to move the vessel away from the jetty.*** As the flames reach the port side of the accommodation and burned the port life boat, the master ordered the crew to evacuate the vessel via the starboard life boat. The crew descended a rope ladder one at a time to enter the life boat.

The crew conducts a fire drill every Saturday. The consensus of those interviewed is that the latest drill was conducted on 4 September and simulated a fire in the manifold, port side.

THE PHYSICAL EVIDENCE During investigation the Terminal, did not permit us to access to the Terminal's jetty where the vessel was moored. However, we managed to go by launch and have a close view of that jetty where it was evident that the facility had suffered extensive damage. ***Several individuals stated that Terminal had installed a temporary diesel powered air compressor on the jetty. This was obvious from the close up view by boat. (See Photographs below)***



Presence of Internal Combustion Engine Compressor behind the pipes on the jetty

Damage to side shell of vessel

The vessel suffered from the fire to her port side shell and main deck. Scorching of the deck coating was evident from the front of the deck house to just aft of the midpoint of the manifold. From the exterior, there was no obvious distortion of the deck. The port side deck house and ship's crane were also seriously affected by the fire blaze. All that remained from the terminal cargo hoses was the flanges and the

reinforcing and grounding wires. While the wires were discontinuous, the ends showed no evidence of electrical arcing.

Fire effects to the accommodation were minor, although the port side lifeboat and life-rafts were destroyed.

Substantial deformation of the shell plate longitudinals was evident inside ballast tank #3 port and the aft portion of #2 port. Deformation was also apparent to portions of the interior walkways and transverse bulkheads of these ballast tanks. No Fatalities or human injuries incurred.

27. IMMEDIATE CAUSES : WHAT SUBSTANCE ACTIONS AND CONDITIONS CAUSED OR COULD CAUSE THE EVENT

THE SOURCE OF CARGO SPRAY /SPILL

From the photos it is quite evident that the cargo spray /spill started from the flexible portion of the cargo-hose which was connected with Cargo Line no.1 of the vessel's manifold.

Potential causes for such a failure include excessive pumping pressure, dead heading, water hammer, excess axial strain due to draft differential and damage, defect or deterioration of the cargo hose.

According to the record of the fire expert attended the vessel at South America's Terminal Anchorage on 14th of September 2010 the height of the spray is estimated at 31 feet above the leak point.

The nozzle efficiency for a leak of this sort would likely fall in the range of 0.5 to 0.7. Using the Bernoulli equation and this efficiency, the line pressure at the time of the photograph is estimated to be between 15.7 and 22 psig, which is within the normal operating pressure range for cargo loading. Therefore, excessive pumping pressure can be effectively ruled out as the cause of failure.

If the vessel's manifold valve (s) was closed with the cargo transfer pump in operation, all components of the transfer system upstream of the valve (s) would experience the pump deadhead pressure. Depending upon the design of the pump and any relief valve in the system, the dead head pressure can be substantially greater than the normal operating pressure. Based upon the estimated pressure calculated above, the system pressure is not abnormally high. Thus dead heading is not responsible for this failure.

Water hammer is a pressure wave that travels thru a fluid as a result of changes in the mass fluid flow of fluid in a piping system. If valves are manipulated excessively fast, a substantial pressure wave can be generated that can cause damage to the piping components. The crew members of the vessel did not manipulate any of the cargo valves prior to the cargo hose failure. Furthermore, the vessel had only just begun the loading process and had only transferred about 15% of the Jet A1 fuel that was planned to be loaded. The vessel's crew would have had no reason to close or adjust a valve in the transfer piping. Therefore, water hammer has to be discounted as a credible cause for the failure of the hose.

During the loading process, the crew must continually alter the ballast of the vessel to account for the mass of the fuel loaded. If this process is not conducted properly, the change in draft could place excessive strain on the transfer hose. From Photographs 1 and 2, it is evident that the vessel is reasonably ballasted and that the transfer hoses are properly resting on the rail and not unduly stressed. Thus draft differential was clearly not the cause of the failure.

Damage, defect or deterioration of the cargo hose could result in a reduction of ultimate strength to a level insufficient to withstand the combined effects of pressure, hose and cargo weight and bending associated with the loading process. Since all of these effects appear to have been within normal parameters and no other reasonable cause exists, it must be concluded that the hose was defective as a result of damage, defect or deterioration and that this is the cause of the leak that released the fuel for the fire.

The Area of Fire Origin

From Photographs on page 8 and 9, it is clear that the fire began on the jetty and subsequently spread to the vessel. Unfortunately, the camera angle does not present a direct view of the area of origin. This combined with a lack of access to the terminal precludes the determination of a precise seat of the fire.

The Source of Ignition

As mentioned previously, in the photographs of the incident the vessel obscures the actual seat of the fire and therefore the potential sources of ignition. The view from the sea was not adequate to provide additional information on the source of ignition for the fire and we were not granted access to the facility to conduct a formal inspection.

Several individuals reported that a diesel powered air compressor had been installed on the jetty and was, or may, have been in operation at the time of loading.

CONCLUSION

The principle cause of the September 11, 2010 fire aboard the M/T ------- was a catastrophic failure of the cargo hose loading Jet A1 to the cargo tanks of the vessel***. Damage, defect or deterioration of the flexible portion of the hose caused the failure to occur at normal operating pressure. The fire began on the jetty due to an unknown ignition source and subsequently spread to the vessel.***

While the available evidence does not permit a conclusion as to the source of ignition, hearsay evidence suggests that the fire may have been started by an operating Diesel powered air compressor.

The fire onboard was caused by the spray of jet A1 from the fractured cargo hose loading at that time on the port side manifold being ignited by the jetty air compressor.

27. IMMEDIATE CAUSES : WHAT SUBSTANCE ACTIONS AND CONDITIONS CAUSED OR COULD CAUSE THE EVENT (Continued)

VIOLATION BY IN DIVIDUAL

ISGOT 26.4 8. The terminal's cargo and bunker hoses/arms are in good condition, properly rigged and appropriate for the service intended.

No Records for the maintenance of the Terminal cargo hose has been presented to the Investigation Team.

Hoses should be in a good condition and properly fitted and rigged so as to prevent strain and stress beyond design limitations. All flange connections should be fully bolted and any other types of connections should be properly secured. Hoses/arms should be constructed of a material suitable for the substance to be handled, taking into account its temperature and the maximum operating pressure.

Cargo hoses should be indelibly marked so as to allow the identification of the products for which they are suitable, specified maximum working pressure, the test pressure and last date of testing at this pressure, and, if used at temperatures other than ambient, maximum and minimum service temperatures.

IMPROPER PLACEMENT OF TOOLS OR EQUIPMENT

Indeed a diesel powered air compressor has been found in the pier after the incident.

There was a delay in response of the fire brigade of the terminal. In general the response to the fire by the ships officers and crew was appropriate. Without the late but effective assistance of the tugs it is likely that the damage to the ship would have been much worse.

Several individuals reported that a diesel powered air compressor had been installed on the jetty and was, or may, have been in operation at the time of loading.

28. BASIC CAUSES : WHAT SPECIFIC PERSONAL OR JOB FACTORS CAUSES OR COULD CAUSE THIS EVENT?

INADEQUATE PREVENTIVE MAINTENANCE & INADEQUATE AUDIT INSPECTION MONITORING

No records of Maintenance and pressure testing of the Cargo hose has been presented to the investigation team after the incident.

NO EQUIPMENT RECORD HISTORY

There are no logbook records for the use and maintenance of the cargo hose. See comments above.

INADEQUATE ASSESSMENT OF NEEDS AND RISKS

The ship-shore safety checklist has been signed and agreed by the Chief Officer of M/T Sonia and the loading master prior commencement of loading. Both check-lists Company's form and terminal's form were signed and agreed by both parties.

Specific reference is made to Item 8 of the ship shore safety checklist i.e. "the terminal's cargo and bunker hoses / arms are in good condition properly rigged and appropriate for the service intended" which has been checked and has been signed however no visual inspection to the cargo hoses has been performed by the vessel's chief officer. At this time it is worth mentioning that a defect can also occur

internally of the hose and in this way the defect cannot be visible during a visual inspection. However not any cargo hose test certificate or maintenance record has been requested by the Chief Officer during the completion of the check-list.
Besides, on Item 10 of the Terminal's ship shore safety checklist says "Are cargo and bunker hoses arms in good condition and properly rigged and, where appropriate certificates checked". Although item signed by both parties the Chief Officer did not request from the terminal to see any maintenance records or any certificates of the cargo hose.

INADEQUATE PLANNING

ISGOT 21.1.1 SHIP EVACUATION - There should always be a reciprocal arrangement between ship and shore in any evacuation plan and it is important that masters of all ships using the facility are appraised of the emergency evacuation arrangements. These arrangements should be discussed at the pre-cargo safety conference and identified during the completion of the Ship Shore Safety Check List. There may be occasions whereby the safest and most efficient means of evacuation is provided by removing the ship from the terminal. Evacuation procedures were not discussed in the pre-cargo safety conference.

INADEQUATE SALVAGE AND RECLAMATION (No Launch was available to assist the crew in the evacuation of the vessel).

ISGOT 20.2.7.3 Rescue Launches A launch or launches, if available, should be included in the plan to assist with:

- The recovery of personnel who may be in the water.
- The evacuation of personnel trapped on a tanker or on a berth.

Launches detailed for these duties should have the following equipment and supplies:

- A communication link capable of being integrated into the control centre's communication system.
- Fixed or portable searchlights for operations during darkness or periods of reduced visibility.
- Blankets, as personnel recovered from the water are likely to be suffering from cold and shock.
- Portable boarding ladders to facilitate entry into the launch Personnel in the water may have little or no reserve energy and may be unable to help themselves.
- Self contained breathing apparatus.
- Resuscitation equipment.

The crews of the launches should receive instruction in rescuing survivors from the water, bearing in mind that these may be seriously injured or suffering from extensive burns. They should also receive instruction in artificial respiration. Launch crews should be made aware that survival time in water could be very short and the prompt rescue of personnel is therefore important.

ISGOT 26.4 THE SHIP IS SECURELY MOORED
Means should be provided to enable quick and safe release of the ship in case of an emergency.

Irrespective of the mooring method used, the emergency release operation should be agreed, taking into account the possible risks involved. Emergency Release Operation was not agreed between the ship and the Terminal.

Although it is not compulsory anymore for ships to be alongside to be equipped to emergency towing off pendants, the emergency towing off pendants helped a lot in the described incident. Further damages avoided with the use of emergency towing off pendants.

INADEQUATE COMMUNICATION

ISGOT 9.9.2.4 At a terminal the sounding of the ship's fire alarm system should be supplemented by a series of long blasts on the ship's whistle, each blast being not less than 10 seconds in duration, or by some other locally required signal. ***The vessel failed to comply with this requirement however emergency communication has been done at VHF channel 12 as agreed by the Vessel and Terminal during signing the Ship / Shore Safety checklist.***

The terminal emergency plan should include full contact details, both during office hours and A.O.H., for those inside and outside the organisation, who must be called in case of emergency.

The names of alternates, who will be available in the event the functionary is absent or unavailable, should be included. Alternates should be fully aware of their responsibilities and trained in the proper execution of their duties.

The contact list should be sufficiently comprehensive to eliminate the need to refer to other documentation, such as telephone directories. However, not any detailed contact list handed to the vessel but the vessel was obliged to ask for such list. This requirement is not included in the ship shore safety checklist.

A limited understanding of English led to language difficulties between the Ship's Staff/crew and Dock Master, both in raising the alarm when the fire was discovered and in communication between the ship's staff and the Terminal Control Room.

CONTRIBUTING FACTORS

The response of the vessel's fire fighting organization was both fast and somehow effective. This was due to the fact that all officers and key personnel had personal VHF radios and excellent communications were maintained between all those involved throughout the incident within the vessel.

The actions taken by the ship's staff to fight the fire were correct and the speed with which the preparations for starting the IGS were made was commendable.

Realistic fire drills carried out on a regular basis on board the vessel, incorporating such techniques as using radios while wearing breathing apparatus and scenarios such as manifolds fires, contributed to the efficiency with which the fire was handled.

The initial reaction to the fire by the Master and crew was in accordance with the prescribed and practiced procedures in as much as the Master take control of the situation from the bridge and there seems to have not been any confusion and a degree of panic in the response by the crew.

The vessel held current certificates for all ship's safety equipment, including the fire fighting equipment. The ship was subject to a weekly inspection by the master and senior officers to ensure that the vessel was well maintained and the principles of a good ship management were observed.

REVIEW OF COMPANY'S PROCEDURES AND DOCUMENTS

1. Officers Matrix Reviewed and found in compliance with the Company's Requirements as laid down in Company's SMS - Manning Procedure TBP 05 , Appendix 1.

2. Clear instructions with regard to the person who is responsible for the activation of the foam liquid were not included in Muster Lists.

3. The requirement of ISGOT that at a terminal the sounding of the ship's fire alarm system should be supplemented by a series of long blasts on the ship's whistle, each blast being not less than 10 seconds in duration, was not included in the Muster List.

4. On Company's Drill Schedule, there is no provision for the vessel to carry out a fire drill at the terminal or a berth. Form No Deck 28 – Safety Drills Tests and Records only mentions that the vessel should carry out fire drill at least once every month. Fire Drill at a Terminal or a Berth is not included in the Drill Schedule (Form No: Deck 28). The last three fire drill scenarios were which found on drill records were refiring to "Fire on Deck".

5. Company's SMS, Fleet Instructions Manual Section B Paragraph 5.3.2. refers to instructions for carrying out fire drills using different scenarios.

6. SMS Form No: Deck 28 specifies that Abandon Ship drill should be carried out at least monthly. Besides, Evacuation Drill at a Terminal is not included in the drill schedule / record.

7. SMS Form Deck 29 - Safety Committee Meeting, the standard agenda among other issues it also provides "Fire in various ships area. Means of fire fighting equipment" which should be discussed during such meetings. Besides, provisions for the Fire in a Terminal and Evacuation Procedures at the Berth are not included and should be added in the Safety Committee Meeting Standard Agenda.

8. SMS form Deck 33 - Familiarisation General Checklist, there is no reference to the "Evacuation at the Berth Procedures" and should be added accordingly.

9. Company's SMS, Fleet Instructions Manual Section B Paragraph 5.3.1. refers to instructions for Abandon Ship Drill. There are no instructions in the SMS for an Evacuation Drill at the berth.

10. Emergency Response Plan has been reviewed. Although there are extensive checklists for Various Scenarios of Fire on board i.e. Fire in general, Accommodation fire, Engine Room fire, Cargo Tank fire, Pump room Fire, Galley Fire and Fire on Deck there is no specific Checklist for Fire at the Terminal. Relevant Instructions are included in the Fleet Instructions Manual Section F – Chapter 14.1.

11. Vessels Response Plan and has been also reviewed. Although there are extensive checklists for Various Scenarios of Fire on board i.e. Fire in general, Accommodation fire, Engine Room fire, Cargo Tank fire, Pump room Fire, Galley Fire and Fire on Deck there is no specific Checklist for Fire at the Terminal. Emergency Response Case No 3.

IMPLEMENTATION OF WORK RULES POLICIES STANDARDS AND PROCEDURES

The following table contains a gap analysis with the intention to identify gaps in procedure implementation by the terminal or by the vessel:

ISGOT Requirement	Implementation by the vessel – Comments	Implementation by the Terminal – Comments
ISGOT DEFINITIONS Open flames or fires, lighted cigarettes, cigars, pipes or similar smoking materials, any other unconfined sources of ignition, electrical and other equipment liable to cause sparking while in use, unprotected light bulbs or any surface with a temperature that is equal to or higher than the auto- ignition temperature of the products handled in the operation.	Vessel complies	***Terminal does not comply with this requirement due to the presence of the compressor at the Terminal's jetty.***

ISGOT Requirement	Implementation by the vessel – Comments	Implementation by the Terminal – Comments
ISGOT 9.8.11.1 Fire mains should be continuously pressurised, either by ship's pumps or from a shore supply. There should be an agreed pressure for the fire main, which should be maintained at all times. 9.8.11.1	Vessel's Fire mains were pressurized during the incident.	***Terminal's fire fighting equipment was not activated at the time of the incident.***
ISGOT 9.9.2.4 At a terminal the sounding of the ship's fire alarm system should be supplemented by a series of long blasts on the ship's whistle, each blast being not less than 10 seconds in duration, or by some other locally required signal.	Vessel did not comply with this requirement	Not applicable to the terminal
ISGOT 9.9.2.5 Fire Control Plans Fire control plans must be permanently displayed in prominent positions showing clearly, for each deck, the location and particulars of all fire-fighting equipment, dampers, controls, etc. When the ship is in port, these plans should also be displayed, or be readily available, outside the deckhouse for the assistance of shore-based fire-fighting personnel.	Vessel complied with this requirement	Not applicable to the terminal
ISGOT 9.9.2.6 Fire-fighting equipment should always be ready for immediate use and should be checked frequently. The dates and details of such checks should be recorded and indicated on the appliance, as appropriate. The inspection of all fire-fighting and other emergency equipment should be carried out by a responsible officer, and any necessary maintenance work completed without delay.	Records have been audited after the incident. Not any discrepancy or non conformity noted as a result of this review.	No records of maintenance have been presented by the terminal

ISGOT Requirement	Implementation by the vessel – Comments	Implementation by the Terminal – Comments
ISGOT 9.9.2.7 Training and Drills Ship's personnel should be familiar with the theory of fire-fighting outlined in Chapter 5 (ISGOT) and should receive instruction in the use of fire-fighting and emergency equipment. Practices and drills should be arranged at intervals to ensure that personnel retain their familiarity with the equipment. If an opportunity arises for a combined fire practice or 'table-top' drill with shore personnel at a terminal, (see Section 20.2.8), the master should make an officer available to show the shore personnel the location of portable and fixed fire-fighting equipment on board and also to instruct them on any design features of the ship which may require special attention in case of fire	Training and Drills have been reviewed after the incident and found in compliance with the Company's Procedures. No Table Top Exercise carried out with the Terminal Representatives.	We haven't had access to the Terminal's Drill Records.
ISGOT 15.4, 15.5 The Terminal Operating Manual should include the roles and responsibilities of the berth operating personnel and procedures associated with emergencies such as fire, product spillage or medical emergency. A separate emergency response manual should be provided to cover such topics as emergency call-out procedures and interaction with local authorities, municipal emergency response organizations, or other outside agencies and organisations. (See Chapter 20 for more detailed guidance on emergency planning and response).	Not applicable to the Ship	We had no access to the Terminal's Records

ISGOT Requirement	Implementation by the vessel – Comments	Implementation by the Terminal – Comments
ISGOT 19.1.2 Every terminal should have a comprehensive safety programme designed to deliver an appropriate level of safety performance. The safety programme should ensure that the following topics are addressed: • Emergency management. • Casualty response and casualty evacuation. • Periodic fire and oil spill drills. These drills should address all aspects and locations of potential incidents and should include vessels at a berth. • Feedback from emergency drills and exercise. • Hazard identification and risk assessment.	Not applicable to the Ship	We had no access to the Terminal's Records
ISGOT 19.2.1 Fire safety at marine terminals is provided through layers of protection as follows: -: • Prevention and isolation. • Detection and alarm facilities. • Protection equipment. • Emergency and escape routes. • Emergency planning. • Evacuation procedures.	Not applicable to the Ship	We had no access to the Terminal's Records

ISGOT Requirement	Implementation by the vessel – Comments	Implementation by the Terminal – Comments
ISGOT 19.2.3 FIRE DETECTION AND ALARM SYSTEMS The selection and fitting of fire detection and alarm systems at a terminal is dependent upon the risk exposure presented by the product being handled, tanker sizes and terminal throughput. In general terms, automatic detection and alarm systems have the purposes of alerting personnel and initiating a system to respond with the aim of reducing loss of life and property due to fires or other hazardous conditions. These systems may have one or more circuits to which automatic fire detectors, manual alarm activation points, water flow alarm devices, combustible gas detectors and other initiating devices are connected. They may also be equipped with one or more indicating device circuits to which alarm indicating signals, such as control panel indicator and warning lamps, outdoor flashing lights, bells and horns are connected	Not applicable to the Vessel	***Fire detection systems were not available by the Terminal at the berth.***
ISGOT 19.2.3 ALARM AND SIGNALLING SYSTEMS An alarm and signalling system must perform four significant functions. It should: (a) Rapidly transmit an alarm or signal to indicate the detection of fire before there is significant damage. (b) Initiate a sequence of events to evacuate personnel in the vicinity of fire. (c) Transmit an alarm or signal to notify responsible parties or initiate an automatic extinguishing system. (d) Have the capability to automatically self test and warn of malfunction.	Not applicable to the Vessel	No alarm sound by the Terminal

ISGOT Requirement	Implementation by the vessel – Comments	Implementation by the Terminal – Comments
ISGOT 19.5 FIRE FIGHTING EQUIPMENT Fire fighting systems are required to protect potentially exposed equipment in order to avoid fire escalation and to minimise fire damage. Ideally, most fires should be controlled and extinguished by first isolating the source of the fuel and, if necessary and feasible, by extinguishing the fire with appropriate agents. Where marine terminals have land connections with refineries or related installations, the fire fighting system on the terminal is usually an integral part of the fire-fighting scheme for the whole of that installation. Fixed fire-fighting systems should be capable of full operation by the personnel locally available, within the first five minutes of the outbreak of a fire.	Fixed fire fighting systems has been deployed by the vessel	***Fixed fire fighting systems were not deployed by the terminal.***
ISGOT 19.5.3.1 Fire Water Supply Fire water at marine terminals is often provided by the unlimited supply available from the sea, rivers or dock basin. Where the fire water supply is obtained from static storage, such as a tank or reservoir, then the reserve for fire-fighting purposes should be equivalent to at least 4 hours continuous use at the maximum design capacity of the fire-fighting system. The reserve for fire-fighting would normally be additional to that required by any other user taking water from the same static storage. The piping arrangements at such storage facilities should be arranged to prevent use of the fire-fighting reserve for other purposes and the integrity of the make-up water supply to such a reserve would need to be assured.	Not applicable to the vessel	***Fire water supply was not provided by the Terminal. Water supply provided by the Tugs arrived in the scene after the incident.***

ISGOT Requirement	Implementation by the vessel – Comments	Implementation by the Terminal – Comments
ISGOT Table 19.1Installation Minimum Provisions 1. Tanker berth at a wharf or jetty handling ships of less than 50,000 tonnes deadweight or more than one tanker per week of less than 20,000 tonnes deadweight. Fire main incorporating isolating valves and fire hydrants with a water supply of 350 m3/hr. Portable and wheeled fire-fighting equipment. Fixed foam/water monitors and appropriate bulk concentrate supplies. Jetty support structure protection (optional). Portable equipment: • 4 x 9 kg portable dry chemical extinguishers • 2 x 75 kg wheeled dry chemical extinguishers	Not applicable to the Ship	***Mentioned Equipment was not deployed by the terminal***
19.5.3.5 International Shore Connection All marine terminals and berths with a firewater system should have at least one international shore fire connection, complete with nuts and bolts, through which water could be supplied to a tanker's fire main if required for shipboard fire-fighting. The connection should be kept protected from the elements and located so as to be immediately available for use. The location and purpose of this connection should be made known to all appropriate staff and discussed during the joint completion of the Ship Shore Safety Check List. One 63mm hose connection should be provided for every 57 m3/hr of required pumping capacity.	Not applicable to the ship	***International Shore Connection was not used by the terminal***

ISGOT Requirement	Implementation by the vessel – Comments	Implementation by the Terminal – Comments
19.5.3.6 Pump-In Points for Fire-fighting Vessels If tugs are used to berth or unberth tankers at a terminal, they may be equipped to pump fire-fighting water into the terminal's fire main system. Pump-in points should be provided at suitable, accessible locations near the extremities of the fire-mains and preferably where fire-fighting vessels can be securely moored. In an extreme emergency, a fire-boat can then be used to augment the fire water supply to the shore fire main grid. Pump-in points should be comprised of at least 4 x 63mm hose inlets or equivalent. The hose inlets should be valved and/or fitted with non-return valves and installed so as to minimise the possibility of hose 'kinking'. The location of these inlets should be highlighted, for example, by appropriate signage and white painted hydrants.	Not applicable to the vessel	Firefighting vessels have been used by the terminal
ISGOT 19.5.3.10 Maintenance of Fire-Fighting Equipment Terminal fire-fighting equipment is usually dispersed around the site and much of it is exposed to the weather. To ensure that it is fit for use, it is essential that all fire-fighting equipment is regularly inspected and tested. Terminals should ensure that all fire-fighting equipment is maintained under the control of a planned maintenance system.	Not applicable to the vessel	We had no access in the terminal fire fighting maintenance records.

ISGOT Requirement	Implementation by the vessel – Comments	Implementation by the Terminal – Comments
ISGOT 19.6 WATERBORNE FIRE FIGHTING EQUIPMENT In special circumstances, such as terminals handling a high number of tankers or harbours with multiple terminals, consideration may be given to the provision of a specifically equipped fire-fighting vessel. Fire-fighting craft, especially those at terminals with sea island berths, should be equipped with an International Shore Connection for providing firewater to a ship's fire water main, or should have a suitable adaptor for this purpose. The craft should also have a similar connection to enable it to supply water to the terminal fire main. One 63 mm hose connection should be provided for every 57 m3/hr. of required pumping capacity.	Not applicable to the ship	***Normal Tugs were used to fight the fire. No specifically equipped fire-fighting vessel was used in the emergency.***
ISGOT 20.2.5 ACCESS TO EQUIPMENT All emergency equipment should be readily accessible and kept free of obstructions at all times.	Ship complied with this requirement. All emergency equipment was readily accessible and kept free of obstructions at all times.	***The dock was not manned at the time of the incident in order Terminal's personnel to have access in the terminal's fire fighting equipment.***
ISGOT 20.5 EMERGENCY REMOVAL OF TANKER FROM BERTH It is recognised that in the interest of the tanker, the safety of the shore installation, and often that of the whole port, the ship should be kept alongside whenever possible. This would improve the possibility of shore based personnel and equipment being used to tackle an emergency on board. However, if a fire on a tanker or on a berth cannot be controlled, it may be necessary to consider whether or not the tanker should be removed from the berth. Planning for such an event may require consultation between a port authority representative or harbour master, the terminal representative, the master of the tanker and the senior local authority fire officer. The plan should stress the need to avoid precipitate action that might increase, rather than lessen, the danger to the tanker, the terminal, other ships berthed nearby and other adjacent installations.	Not applicable to the ship	***Terminal Complies with this requirement however considerable time elapsed (about 2,5 hours) from time of commencement of the fire up to the moment that vessel evacuated the berth by using the terminal's tugs.***
ISGOT Requirement	Implementation by the vessel – Comments	Implementation by the Terminal –

		Comments
ISGOT 21.2.1 PRIMARY AND SECONDARY ESCAPE ROUTES Terminal facilities should have at least two (2) remotely separate evacuation routes from all occupied or work areas and from berthed vessels. Escape routes should be located such that in the event of fire, at least one route provides a safe evacuation path, sufficiently far from the source of probable fire to afford personnel protection during evacuation. Evacuation routes and secondary evacuation routes should be clearly marked, and preferably numbered, in order that precise instructions can be given to personnel to proceed via a designated route and/or disembarkation position.	Not applicable to the vessel	***The Terminal did not comply with this requirement.***
ISGOT 21.2.3 BOAT ACCESS All terminals should be designed or modified to adequately provide for the emergency evacuation of personnel. Particular emphasis should be given to safe disembarkation positions at suitably protected locations.	Evacuation Procedures were not agreed by the ship. There are no procedures related with the safe evacuation of the ship	***Evacuation procedures were not agreed in the ship shore safety meeting.*** ***Terminal did not provide resources for the safety evacuation of the ship***
ISGOT 21.2.4 AVAILABILITY OF RESCUE CRAFT When evacuation is required to be undertaken by rescue craft, such transport should be alerted at a very early stage of the emergency and be kept as close as possible to the evacuation point, such that they can be on scene rapidly, certainly no later than 15 minutes from initial advice. The mobilisation of all available harbour or terminal rescue craft would also form part of any emergency plan.	Evacuation Procedures were not agreed by the ship. There are no procedures related with the safe evacuation of the ship	***Evacuation procedures were not agreed in the ship shore safety meeting.*** ***Terminal did not provide resources for the safety evacuation of the ship***

ISGOT Requirement	Implementation by the vessel – Comments	Implementation by the Terminal – Comments
ISGOT 22.7.2 REPAIRS ON THE TERMINAL No construction, repair, maintenance, dismantling or modification of facilities should be carried out on a tanker berth without the permission of the terminal manager. If a tanker is moored at the berth, the terminal representative should also obtain the agreement of the master.	Not applicable to the vessel	We cannot ascertain the use of the compressor found in the pier after the incident.
ISGOT 24.8 FIRE-FIGHTING EQUIPMENT On the jetty, fire-fighting equipment should be ready for immediate use. While this may not involve the rigging of fire hoses, the preparations for emergency operation of the fire- fighting equipment should be apparent and communicated to the tanker. Consideration should be given to having portable extinguishers available for use adjacent to the jetty manifold area.	Not applicable to the vessel	***Fire fighting equipment was not deployed by the terminal***
ISGOT 24.10.2 NOTICES ON THE TERMINAL Permanent notices and signs indicating that smoking and naked lights are prohibited should be conspicuously displayed on the jetty in appropriate languages. Similar permanent notices and signs should be displayed at the entrance to the terminal area or the shore approaches to the jetty. Emergency escape routes from the tanker berth to safe areas ashore should be clearly indicated.	Not applicable to the vessel	Terminal complied.

27.CORRECTIVE ACTIONS : WHAT HAS AND/OR SHOULD BE DONE TO CONTROL THE CAUSES LISTED? LESSONS TO LEARN

1. Certificates or Maintenance of the Cargo Loading hoses or Loading Arms should be requested by the Chief Officers during Ship/Shore pre loading and pre-discharging safety meetings. If records are not available the Master and head office should be informed and a Letter of Protest should be issued. Ship / Shore Safety Checklist – Form No: Deck 25 should be revised accordingly.

2. Terminals Contingency Plan should be requested by the Chief Officers during Ship/Shore pre loading an pre-discharging safety meetings. If records are not available the Master and head office should be informed and a Letter of Protest should be issued. Ship / Shore Safety Checklist – Form No: Deck 25 should be revised accordingly.

3. Cargo hoses should be clearly marked so as to allow the identification of the products for which they are suitable, specified maximum working pressure, the test pressure and last date of testing at this pressure, and, if used at temperatures other than ambient, maximum and minimum service temperatures. The Deck watch should inform the Chief Officer about that markings. If that markings are not observed a Letter of Protest should be issued. Ship / Shore Safety Checklist – Form No: Deck 25 should be revised accordingly. A detailed list of the terminal personnel should left on board.

4. Terminal's Jetty should be checked by the deck crew to the most possible extend. In case that a source of Ignition should be observed in the berth the Master and or Chief Officer should be informed immediately and loading or discharging should stop immediately.

5. A risk assessment should always be carried out on board before loading or discharge in a Terminal. This Risk Assessment should be included in the Ship / Shore Safety Checklist.

6. ***Although it is not compulsory anymore for ships when alongside to be equipped to emergency towing off pendants, the emergency towing off pendants helped a lot in the described incident. Further damage was avoided by the deployment of the emergency towing off pendants.***

7. ***Emergency Unmooring to be discussed with the Terminal Personnel and results should be recorded in the Ship/Shore Safety Checklist Form No : Deck 25.***

8. In case of fire in terminal the fire alarm should be supplemented by a series of long blasts on the ship's whistle each blast being not less than 10 seconds in duration. The requirement of ISGOT that at a terminal the sounding of the ship's fire alarm system should be supplemented by a series of long blasts on the ship's whistle, each blast being not less than 10 seconds in duration, should be included in the Master List.

9. Clear instructions with regard to the person who is responsible for the activation of the foam liquid should be included in Muster Lists.

10. On Company's Drill Schedule, there is no provision for the vessel to carry out a fire drill at the terminal or a berth. Form No Deck 28 – Safety Drills Tests and Records only mentions that the vessel should carry out fire drill at least once every month. Fire Drill at a Terminal or a Berth should be included in the Drill Schedule (Form No: Deck 28).

11. Evacuation at the Terminal Drill carried out at least every three months should be included in the Fleet Instructions Manual Section B – Paragraph 5.

12. Evacuation at the Terminal Drill carried out at least every three months will be included in the Company's Schedule for Drills – Form No : Deck 28.

13. Results of the Evacuation Drill Lists should be included in the standard Safety Committee Meeting agenda on Form No: Deck 29

14. "Evacuation at the Berth Procedures" should be made part of the Familiarisation General Checklist form No: Deck 33.

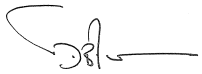
15. Instructions to execute an Evacuation Drill at a Berth should be included in the Fleet Instructions Manual Section B – Drills.

16. A fire at a Terminal Checklist should be included in the Emergency Response Plan – Section 5

17. A fire at a Terminal Checklist should be included in the SOPEP / VRP – Emergency Case No 3 – Fire

DOCUMENT REVIEWED

1. Vessel's Certificates
2. Vessel's Safety and Fire fighting Certificates
3. Vessel's Safety and Fire fighting records
4. Foam Certificates
5. Vessel's Maintenance Records
6. Officers Matrix
7. ISGOT
8. The ship shore safety checklists
9. Mooring Rope and wire records and certificates
10. Records of pressure tests in the cargo lines and certificates
11. Winch Brake Certificates
12. Mooring Pattern in Pilot Card
13. Fire Fighting posted instructions
14. PV Valve Tests
15. The previous Ship Shore Safety Checklists
16. Muster Lists
17. Crew Training Records
18. Drill Reports
19. Safety Committee Meetings
20. Familiarisation Checklists
21. Form No Deck 28 – Safety Drills, Tests and Records
22. Fleet Instructions Manual Section B – Chapter 5, Drills
23. Fleet Instructions Manual Section F – Cargo Operations for Oil Tankers
24. SOPEP and VRP

	30. SIGNATURE OF INVESTIGATOR 	31. DATE **20/08/2010**	32. FOLLOW-UP: CIRCLE NUMBER FOR TEMPORARY, X OUT FOR FINAL ACTION DATE		
	33. SIGNATURE OF REVIEWER	34. DATE **25/10/2010**	1.	3.	5.
			2.	4.	6.

POSSIBLE IMMEDIATE/DIRECT CAUSES

1. Following Procedures	2. Use of Tools or Equipment	3. Use of Protective Methods
1-1 Violation by individual	2-1 Improper use of equipment	3-1 Lack of knowledge of hazards present
1-2 Violation by group	2-2 Improper use of tools	3-2 Personal protective equipment not used
1-3 Violation by supervisor	2-3 Use of defective equipment (aware)	3-3 Improper use of proper personal protective equipment
1-4 Operation of equipment without authority	2-4 Use of defective tools (aware)	3-4 Servicing of energizes equipment
1-5 Improper position of posture for the task	2-5 Improper placement of tools, equipment or materials	3-5 Equipment of materials not secured
1-6 Overexertion of physical capability	2-6 Operation of equipment at improper speed	3-6 Disabled guards, warning systems or safety devices
1-7 Work or motion at improper speed	2-7 Servicing of equipment in operation	3-7 Removal of guards, warning systems or safety devices.
1-8 Improper lifting	2-8 Other	3-8 Personal protective equipment not available
1-9 Improper loading		3-9 Other
1-10 Shortcuts		
Other		

4. Installation / Lack of Awareness	8. Protective Systems	6. Tools, Equipment & Vehicles
4-1 Improper decision making or lack of judgment	5-1 Inadequate guards or protective devices	6-1 Defective equipment
4-2 Distracted by other concerns	5-2 Defective guards or protective devices	6-2 Inadequate equipment
4-3 Inattention to footing and surroundings	5-3 Inadequate personal protective equipment	6-3 Improperly prepared equipment
4-4 Horseplay	5-4 Defective personal protective equipment	6-4 Defective tools
4-5 Acts of violence	5-5 Inadequate warning systems	6-5 Inadequate tools
4-6 Failure to warn	5-6 Defective warning systems	6-6 Improperly prepared tools
4-7 Use of drugs or alcohol	5-7 Inadequate isolation of process or equipment	6-7 Defective vehicle
4-8 Routine activity without thought	5-8 Inadequate safety devices	6-8 Inadequate vehicle for the purpose
4-9 Other	5-9 Defective safety devices	6-9 Improperly prepared vehicle
	5-10 Other	6-10 Other

7. Work Exposures to	8. Work Place Environment / Layout
7-1 Fire or explosion	8-1 Congestion or restricted motion
7-2 Noise	8-2 Inadequate or excessive illumination
7-3 Energized electrical systems	8-3 Inadequate ventilation
7-4 Energized systems, other than electrical	8-4 Unprotected height

7-5 Radiation 7-6 Temperature extremes 7-7 Hazardous chemicals 7-8 Mechanical hazards 7-9 Clutter or debris 7-10 Storms or acts of nature 7-11 Slippery floors or walkways 7-12 Other	8-5 Inadequate work place layout • controls less than adequate • displays less than adequate • labels less than adequate • locations out of reach or sight • conflicting information is presented

POSSIBLE INDIRECT / SYSTEM CAUSES
PERSONAL FACTORS

1. Physical Capability	2. Physical Condition	3. Mental State
1-1 Vision deficiency 1-2 Hearing deficiency 1-3 Other sensory deficiency 1-4 Reduced respiratory capacity 1-5 Other permanent physical disabilities 1-6 Temporary disabilities 1-7 Inability to sustain body positions 1-8 Restricted range of body movement 1-9 Substance sensitivities or allergies 1-10 Inadequate size or strength 1-11 Diminished capacity due to medication 1-12 Other	2-1 Previous injury or illness 2-2 Fatigue • due to workload • due to lack of rest • due to sensory overload 2-3 Diminished performance • due to temperature extremes • due to oxygen deficiency • due to atmospheric pressure variation 2-4 Blood sugar insufficiency 2-5 Impairment due to drug or alcohol use 2-6 Other	3-1 Poor judgment 3-2 Memory failure 3-3 Poor coordination or reaction time 3-4 Emotional disturbance 3-5 Fears or phobias 3-6 Low mechanical aptitude 3-7 Low learning aptitude 3-8 Influenced by medication 3-9 Other
4. Mental stress	**5. Behavior**	**6. Skill Level**
4-1 Preoccupation with problems 4-2 Frustration 4-3 Confusing directions / demands 4-4 Conflicting directions / demands 4-5 Meaningless or degrading activities 4-6 Emotional overload 4-7 Extreme judgment / decision demands 4-8 Extreme concentration / perception demands	5-1 Improper performance is rewarded • saves time or effort • avoids discomfort • gains attention 5-2 Improper supervisory example 5-3 Inadequate identification of critical safe behaviors 5-4 Inadequate reinforcement of critical safe behaviors • proper performance is	6-1 Inadequate assessment of required skills 6-2 Inadequate practice of skill 6-3 Infrequent performance of skill 6-4 Lack of coaching on skill 6-5 Insufficient review of instruction to establish skill 6-6 Other

4-9 Extreme boredom 4-10 Other	criticized • inappropriate peer pressure • inadequate performance feedback • inadequate disciplinary process 5-5 Inappropriate aggression 5-6 Improper use of production incentives 5-7 Supervisor implied haste 5-8 Employee perceived haste 5-9 Other	

JOB FACTORS

7. Training / Knowledge Transfer	8. Management / Supervision Employee / Leadership	9. Contractor Selection & Oversight
7-1 Inadequate knowledge transfer • inability to comprehend • inadequate instructor qualifications • inadequate training equipment • misunderstood instructions 7-2 Inadequate recall of training material • training not reinforced on the job • inadequate refresher training frequency 7-3 Inadequate training effort • inadequate training program design • inadequate training goals / objectives • inadequate new employee orientation • inadequate initial training • inadequate means to determine if qualified for job. 7-4 No training provided • need for training not identified • training records incorrect or out of date • new work methods introduced without training • decision made not to train. 7-5 Other	8-1 Conflicting roles /responsibilities • unclear reporting relationships •conflicting reporting relationship • unclear assignment of responsibility • improper or insufficient delegation of authority 8-2 Inadequate leadership • standards of performance missing or not enforced • inadequate accountability • inadequate or incorrect performance feedback • inadequate work site walk-through • inadequate safety promotion 8-3 Inadequate correction of prior hazard / incident 8-4 Inadequate identification of worksite / job hazards 8-5 Inadequate management of change system 8-6 Inadequate incident reporting / investigation system 8-7 Inadequate or lack of safety meetings 8-8 Inadequate performance measurement & assessment 8-9 Other	9-1 Lack of contractor prequalification 9-2 Inadequate contractor prequalification 9-3 Inadequate contractor selection 9-4 Use of unapproved contractor 9-5 Lack of job oversight 9-6 Inadequate oversight 9-7 Other

JOB FACTORS (Continued)

10. Engineering / Design	11. Work Planning	12. Purchasing, Material Handling & Material Control
10-1 Inadequate technical design • design input obsolete • design input not correct • design input not available • design output inadequate • design input infeasible •design output unclear • design output not correct •design output inconsistent • no independent design review 10-2 Inadequate standards, specifications, and or design criteria 10-3 Inadequate assessment of potential failure 10-4 Inadequate ergonomic design 10-5 Inadequate monitoring of construction 10-6 Inadequate assessment of operational readiness 10-7 Inadequate monitoring of initial operation 10-8 Inadequate evaluation and / or documentation of change 10-9 Other	11-1 Inadequate work planning 11-2 Inadequate preventive maintenance • assessment of needs • lubrication / servicing • adjustment / assembly •cleaning / resurfacing 11-3 Inadequate repair • communication of needed repair •scheduling of work • examination of parts •parts substitution 11-4 Excessive wear and tear • inadequate planning for use • extension of service life • improper loading •use by untrained people •use for wrong purpose. 11-5 Inadequate reference materials or publications 11-6 Inadequate audit / inspection / monitoring • no documentation • no correction responsibility assigned • no accountability for corrective action. 11-7 Inadequate job placement • appropriate personnel not identified • appropriate personnel not available • appropriate personnel not provided.. 11-8 Other	12-1 Incorrect item received • inadequate specifications to vendor • inadequate specifications on requisition • inadequate control on changes to orders • unauthorized substitution • inadequate product acceptance requirements • no acceptance verification performed. 12-2 Inadequate research on materials / equipment 12-3 Inadequate mode or route of shipment 12-4 Improper handling of materials 12-5 Improper storage of materials or spare parts 12-6 Inadequate material packaging 12-7 Material shelf life exceeded 12-8 Improper identification of hazardous materials 12-9 Improper salvage and / or waste disposal 12-10 Inadequate use of safety and health data. 12-11 Other

13. Tools & Equipment	14. Work Rules / Policies / Standards / Procedures (PSP)	15. Communication
13-1 Inadequate assessment of needs and risks 13-2 Inadequate human factors / ergonomics considerations 13-3 Inadequate standards or specifications 13-4 Inadequate availability 13-5 Inadequate adjustment / repair / maintenance 13-6 Inadequate salvage and reclamation 13-7 Inadequate removal / replacement of unsuitable items 13-8 No equipment record history 13-9 Inadequate equipment record history 13-10 Other	14-1 Lack of PSP for the task • lack of defined responsibility for PSP • lack of job safety analysis • inadequate job safety analysis 14-2 Inadequate development of PSP • inadequate coordination with process / equipment design • inadequate employee involvement in the development • inadequate definition of corrective actions • inadequate format for easy use 14-3 Inadequate implementation of PSP, due to deficiencies • contradictory requirements • confusing format • more than one action per step • no check-off spaces provided •inaccurate sequence of steps • confusing instructions • technical error / missing steps • excessive references • potential situations not covered 14-4 Inadequate enforcement of PSP • inadequate monitoring of work • inadequate supervisory knowledge • inadequate reinforcement • non-compliance not corrected	15-1 Inadequate horizontal communication between peers 15-2 Inadequate vertical communication between supervisor and person 15-3 Inadequate communication between different organizations 15-4 Inadequate communication between work groups 15-5 Inadequate communication between shifts 15-6 Inadequate communications methods 15-7 No communication method available 15-8 Incorrect instructions 15-9 Inadequate communication due to job turnover 15-10 Inadequate communication of safety and health data, regulations or guidelines 15-11 Standard terminology not used 15-12 Verification / repeat back techniques not used 15-13 Messages too long

	14-5 Inadequate communication of PSP • incomplete distribution to work groups • inadequate translation to appropriate languages • incomplete integration with training • out of date revisions still in use 14-6 Other	