HFACtS REPORTS

A Quarterly Newsletter Reporting Marine Facility Incidents Using the Human Factors Analysis & Classification System

Volume 1, Issue 2 **May 2002**

HFACS FEATURED AT PF2K2

HFACS will be among the topics discussed during the Human Factors session of *Prevention First 2002*, The California State Lands Commission's fifth biennial Onshore & Offshore Pollution Prevention Symposium & Technology Exhibition on September 10-11, 2002, at the Westin Long Beach Hotel.

Session speakers include: **Anita Rothblum**, U.S. Coast Guard Research & Development Center, who will discuss keys to successful incident investigation programs; **Denise McCafferty**, American Bureau of Shipping, who will explain how to spot terminal and vessel equipment and structures that are poorly designed for human use; and **Doug Wiegmann**, co-developer of the HFACS taxonomy, has been invited to introduce the tool and give illustrative examples of its use in devising effective prevention strategies.

Prevention First 2002 sessions during the two-day event will cover marine oil terminal engineering standards, homeland security, ballast water management, as well as offshore and environmental issues. The adjoining Technology Exhibition will feature 42 vendor booths covering a wide range of pollution prevention products and services. The early registration fee is $150. You can obtain additional information by calling (800) 858-7743 or www.slc.ca.gov.

ARCING PROBLEMS: WHAT'S YOUR RESPONSE?

During oil transfer operations, cargo hose connections pose a risk of electrical arcing whenever there is electrical continuity along the length of hose connecting a vessel and terminal. Regulation requires *either* an insulating flange joint or a single length of non-conducting hose – *but not both* – to assure electrical discontinuity.

Recently, State Lands Inspectors have observed transfer connections in which both an insulating flange joint and a non-conductive hose have been used in operations. This is an unsafe situation because the segment between the flange and the non-conductive hose segment is not grounded.

For the vast majority of transfers, vessels will supply cargo hoses to fit a terminal's header, and *either* can provide the equipment necessary to reduce the risk of electrical arcing. This is one situation when both parties' attempts to provide the means for a safe connection can actually create risk: coordination during transfer preparation rather than "more parts" is what is really needed to accomplish the goal. While regulation requires that hoses be marked, markings may be easily overlooked, especially if the connection process becomes too familiar and routine.

What "barrier" or defense might operators use to assure that transfer connections are properly grounding prior to operations? We would like to hear from our industry readers who are familiar with this risk and have suggestions for how to deal with it effectively. You can provide your suggestions by completing and mailing the back flap of this report.

SELECTED CASE: CONFUSING DISPLAY

The case example below includes a brief, de-identified narrative description of an actual incident, and a listing of the factors that contributed to its occurrence. These key contributing factors along with the narrative are entered into the HFACS database.

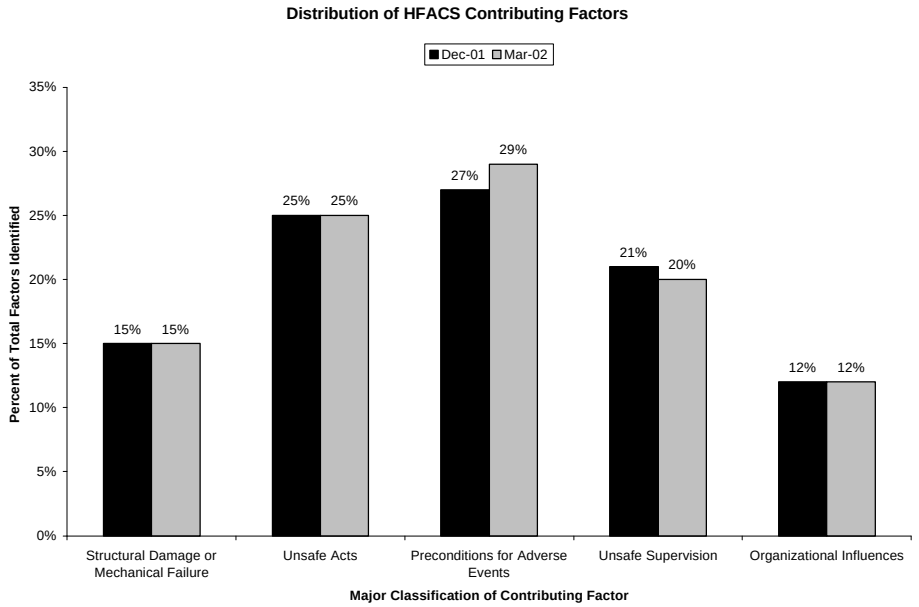
During start-up of the fueling of a vessel by a marine terminal, the TPIC and VPIC heard and observed fuel spilling from the vessel's #2 port fuel tank vent. The TPIC shut the discharge valve and then the VPIC shut the valve for the fueling station. A crewman watching the manifold shut the valve at that location. Approximately 4 gallons spilled into the water.

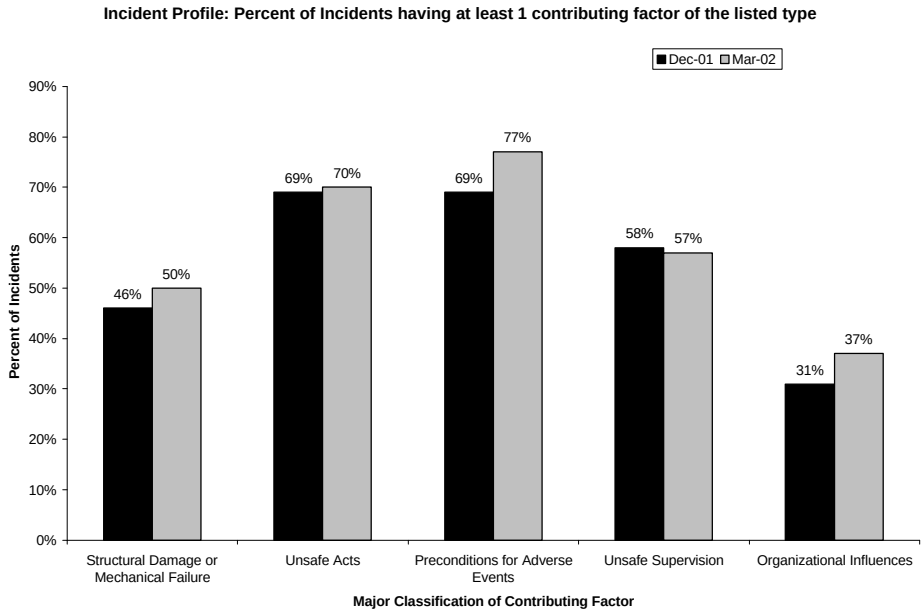
This vessel has one fueling station that serves four different tanks. Fuel can be directed to one of the tanks by adjusting a valve located in the engine room space. A placard mounted above the valve acts as a guide for positioning the valve to fill either the port tank, the port day tank, the starboard tank, or the starboard day tank, and supplements identifying labels on each valve. The mapping of tanks to valves on the placard was not clear at a glance, and individual labels were similar enough to be easily confused. The machinery technician did not interpret the display correctly, and aligned the valve to the port tank rather than the port day tank as had been directed by the chief engineer. The port tank was already full. The machinery technician had been assigned to the vessel only a few days prior to the event.

Who/What	Contributing Factor	Classification	Subclass 1	Subclass 2	Detail
Vessel Machinery Technician	misread a fueling station display & aligned a valve to direct fuel into full tank	unsafe act	error	perceptual	misread indicator
Placard	did not clearly indicate the mapping of valve positions to tanks	precondition for adverse events	substandard work interface	substandard design	poorly designed for use: ambiguous instrumentation
Chief Engineer	failed to alert new crewmember to known potential for confusion in operating fueling station valves	unsafe supervision	inadequate supervision		failed to provide guidance
Vessel Operator	did not address an apparent and correctable usability problem evident in the placard's design	organizational influence	resource management		inadequate design & maintenance of facilities

Note: Subsequent to this incident, the vessel operator has instructed that for all fleet vessels of this type, fueling valve placards should be removed and individual labels re-worked. The vessel organization contributed to this report.

DATA: Summary Statistics





Data Notes: *Dec-01 data includes 26 incidents that occurred between May 11th – December 31st 2001. This is updated with an additional case that was completed since the last issue of HFACtS Reports. The Mar-02 figure reflects 30 incidents, adding 4 that occurred during the first quarter of 2002.*

Quick Facts

- One-third of the 30 incidents analyzed to date could have been prevented with proper use of the Pre-transfer Conference and Declaration of Inspection.
- While violations are the effect that triggers nearly every HFACS inquiry (i.e., a class 3 violation or oil hitting the water), acts classified as violations on the part of operators or supervisors are less frequently (23% of the time) identified as a contributing cause of incidents. More on this in the next issue.

PROBLEMS & SOLUTIONS

KEEP IT SIMPLE, SAILOR

The vessel fueling station shown in this photograph includes a bank of valves that serve four different tanks. While differing in detail, sets of controls clustered like this are common aboard vessels and at marine terminal facilities. Their proper use is essential to safe and effective fueling or cargo transferring operations. Without clear and unambiguous displays that map valves to tanks, there is a risk of misuse that could result in over-pressurized lines, overfilled tanks and spilled oil.

An incident of this sort, described in the *Selected Case* section on page 2, might have been prevented with a better display. The photograph shows each valve handle at the station with a descriptive label that clearly indicates its function. This represents the correction made by the organization involved as a result of the spill incident described in the case. Two problems with the display were resolved with this action.

First, while in the old display individual labels were present, they were not clearly marked. For example, tanks were identified as “Port D/T” and “Port F/O”. Being situated so close together, these are much more easily confused at a glance than the current labeling of “Port Day Tank Suct” and “Port #2 Fuel Oil Tank.”

Second, in the old arrangement the display included *similar* information about the *same* fueling station valves in two *different locations*. In addition to individually labeled valve handles, the fueling station also had a placard depicting a mapping of tanks to valves. The approximate positioning of the placard is shown in the photograph by the arrow. Users had to choose *where to* look to identify valves, and face the potentially confusing situation of “going back and forth” between the placard and valves. The organization removed this risk by removing the (unnecessary) placard.

The importance of simple, clear displays may not seem critical in everyday operations with an experienced crew familiar with the equipment being used. Displays designed with human users in mind do become valuable, however, on those not infrequent occasions when there is pressure to act quickly, or when crewmembers are unfamiliar with the specific equipment involved.

In the next issue of HFACtS Reports…

- **Unsafe Acts: When does training help?**
- **Addressing DOI related incidents.**

This newsletter was composed & edited by Bob Shilland and Maria Gutierrez. Questions about the content of this newsletter or about HFACtS can be addressed to Marc Chaderjian, Research Program Specialist I, at chaderm@slc.ca.gov, (562) 499-6312, or by faxing this half page to (562) 499-6317.

HFACtS FEEDBACK

❶ Your answer/solution to the Arcing problem on page 1.

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❷ What would you like to see in future HFACtS REPORTS?

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❸ Please add the name and address of someone who might appreciate receiving HFACtS REPORTS:

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