

Lessons Learned

Environmental Impacts - Spills & Discharges

NOVEMBER 2011

Internal Tank Transfers... Worth Some Thought

In our fleet, we spill more fuel and we do it more frequently during internal tank transfers than during fueling.

Does your ship assume these operations have less risk?

The following report is an edited version of a recent spill aboard a NOAA ship. Identify lessons learned that can apply to your ship.

Summary of Incident & Description of Spill

On the 0000-0400 watch, the Engineer-On-Watch (EOW) began routine fuel transfer, filling a day tank, then purifying or "recirculating" the fuel. During the recirculating process, the EOW inadvertently opened the incorrect valve, allowing the fuel in the port day tank to enter the purifier and overflow the starboard day tank.

A crew member reported a strong diesel smell in his berth. The EOW conducted a round to investigate and found diesel spilling from an uncapped sounding tube and 2 inches of diesel covering the deck of engineering stores area. The misaligned valve was identified and corrected.

One hour into the clean-up, a sheen was discovered on the starboard side of the main deck. Diesel had discharged from the starboard vent pipe, into the coffer dam, through the unplugged coffer dam drain, across the deck, and overboard (Figure 1).

According to tank soundings, an estimated 281 gallons of fuel is unaccounted for. Approximately 40-50 gallons were recovered from engineering stores. An unknown amount was discharged into the water.

Response, Containment & Clean Up

Clean-up was conducted with two teams of three people. Doors and hatches were opened; blowers were set up to ventilate the space. Response team members rotated every fifteen minutes for rest. Absorbent pads and booms were used to soak up diesel, recovered fuel was returned to day tank. Response was restricted to a select group to reduce exposure and ensure sufficient working space. The XO acted as on-scene leader. Clean-up efforts took 12 hours and involved engineering, deck, and wardroom members.

Upon discovery of the fuel on the main deck, the area was cleaned with absorbent material.



Figure 1: STBD cofferdam (note: plug is not inserted)



Figure 2: Valve fitting makes it difficult to determine if the valve is open or closed.

Corrective Actions & Lessons Learned

The cause of this incident was operator error; however, there were many opportunities to reduce the severity of the spill; can your ship take lessons from these?

1. **Procedures:**

Internal transfers were not identified in the SOPs, promoting the belief that they are less risky and contributing to complacency.

Coffer dams were not plugged, allowing burps and overflow to discharge over the side.

2. **Timing:**

Few people were on deck from 0000-0400, allowed spills and problems to go unnoticed; to remedy this, CME moved fuel transfer to daytime watches.

Bridge and engineering rounds were both started at the top of the hour; staggering the rounds would have caught the spill sooner.

This incident occurred near the end of the ship's field season; it is possible that fatigue contributed to the EOW opening the incorrect valve.

3. **Equipment:**

Tank Level Indicators were installed on the ship but never fully commissioned; there was no visual or alarm indicating the tank was overfilling.

The fittings on the fuel valves provide no visual indicator if the valve is open or closed (Figure 2).

4. **Improper boundary check:**

It took the clean-up team an hour to realize that fuel had also spilled on deck and overboard; a boundary check should be conducted to establish the boundary, ensure the spill has stopped (or slowed) and to assess the severity of the situation.

Teachable Moment – Diesel

Vapor burns more easily than liquid. Flashpoint defines the temperature at which a substance generates enough vapor to catch fire.

The flashpoint of diesel is ~140°F. At most normal shipboard temperatures, it will not produce sufficient vapor to burn. However, keep spilled diesel away from ignition sources during clean up and be aware of locations where temperature may exceed ~140°F.

Diesel vapor is heavier than air. Open doors and hatches and stage blower fans near the floor, where vapor will accumulate. For respiratory protection, consider half face respirator with organic vapor cartridge.

Prolonged exposure can irritate skin. Don nitrile gloves.

WEAR EYE PROTECTION – when chemical could splash in your face. Don't force your ship to respond to a medical incident at the same time they are attempting spill cleanup!



Is your ship prepared for a spill?

- Who is on your spill team? Do they know they are on the spill team?
- Have you agreed who is on-scene coordinator?
- Where are the three locations with greatest risks of spills?
- Where are the closest spill kits?
- What's inside your spill kits? Do they need to be refreshed?
- When was the last time you conducted a drill?

... talk with your ECO to arrange a drill or get more training.