

# Process Safety Forum

The Process Safety Forum consists of representatives from UKPIA, TSA, CIA, OGUK and NIA

## Process Safety Alert 002

Issued on:

16<sup>th</sup> November 2009

Issued by:

Process Safety Forum

Subject:

Tank Overpressure

Issue

### What happened?

- A large storage tank was being prepared to receive heavy fuel oil.
- Just after opening the tank-side valve, the operator saw the tank expanding and lifting from its base.
- As the tank landed the shell to floor weld failed in one quadrant of the tank, releasing 25m<sup>3</sup> of oil/water.
- There were no casualties but damage to the tank and associated equipment was significant.



***Damaged tank***

### What caused it?

The investigation is ongoing, but the probable cause is the big pressure rise associated with the confined evaporation of hot water, followed by rapid condensation, as follows:

- There was a substantial amount of free water in the oil, both in the tank and the import pipe line.
- Steam heating had been applied on the import line for several hours,

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which heated the water/product mix to over 100°C in places.

- When the system was opened to the storage tank the hot water rushed into the tank and evaporated very rapidly.
- The 1600x increase in volume from water to steam overwhelmed the tank's vents, leading to swelling of the shell.
- Witness statements and damage to the tank indicate that the tank was then sucked back in due to a rapid pressure drop when the steam cooled rapidly and condensed back to water.

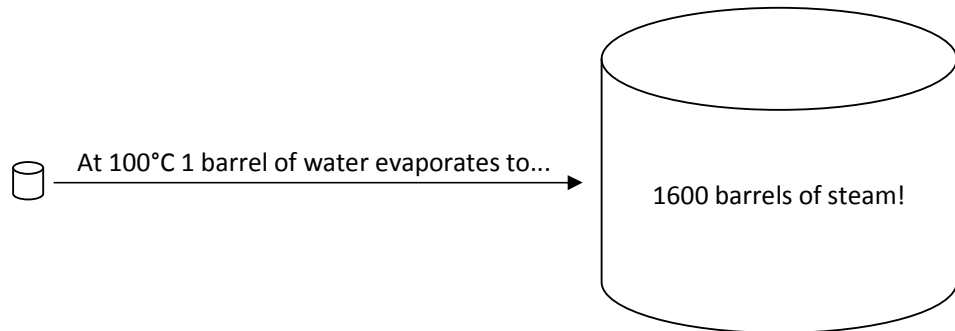


**Damage to vent and roof**

## Learning

- Look for accumulation of water in oils.
- Control and limit the degree of heating on pipelines, and keep it below 100°C
- Ensure staff understand the hazards of steam, especially the potential for rapid pressure increase when water evaporates rapidly in a vessel and the rapid pressure drop when steam condenses.

## Remember!



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Further  
Consideration

None.

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