

Process Safety Forum

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

Process Safety Alert 002

Issued on:

16th 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 25m³ 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.

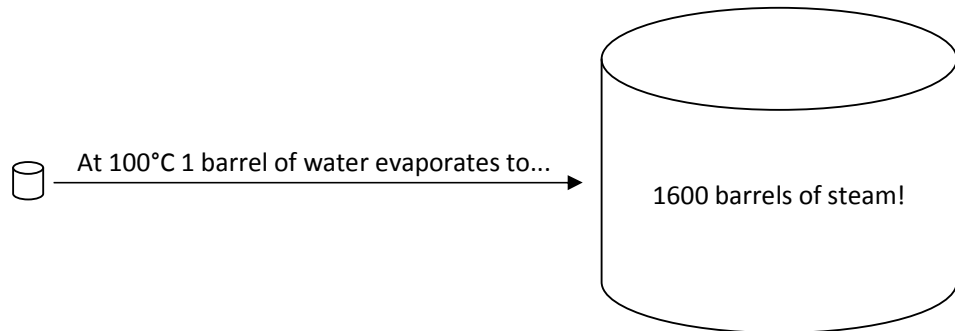


Damage to vent and roof

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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