

## What caused this tank fire?

An unusual tank fire incident was reported earlier this year by the Petroleum Tank Management Association of Alberta (PMMAA), Canada.

An insulated, 400 bbl crude oil tank (API 12F) caught fire. The fire was restricted to the ullage space and the flames were coming from the 10" emergency vent and 3" normal vent. The tank owner company requested that the fire brigade put water to the vent space, focusing on the 10" vent.

Within seconds of applying the water, the tank roof blew off, flying 75 feet into the air. Luckily, the tank roof returned to earth without damaging structures or causing injury.

The tank had been on fire for three hours prior to the fire brigade's action. "My guess is that the water spray effectively reduced the exhaust space to the normal vent's capacity," said Don Edgcombe of PTMAA, "and the internal pressure quickly went over 24 ounces." Edgcombe said that the tank likely had a weak seam and therefore it might have not even taken 24 ounces of pressure to blow the top.

The local fire chief agreed with Edgcombe. "I believe this is exactly what happened, considering the expansion ratio of water into steam," he said. "It did not take much water (150 to 300 gallons) through the thief hatch to produce this situation. I don't think we blocked the primary vent while spraying water, because only a small portion of the water stream was actually entering the tank. The rest was bouncing off the roof and hatch because we were spraying the water from ground level and back a distance from the tank. Also, the wind was affecting our water stream by breaking it up before it reached the thief hatch."

### Official report doesn't specify cause of fire

The county inspection agency reached no firm conclusion in its investigation report. All three elements of the fire triangle were present:



1. Oxygen, because the tank was not a closed system;
2. Fuel source, because a gas vent line was directed to the top of the tank; and
3. Ignition source.

The report cites four possible ignition sources, three of which were eliminated in the post-fire inspection. According to the regulatory agency,

*"The ignition source was most likely to have been a piece of lighting rag traveling up the exhaust vent and igniting vapors exiting from the thief hatch and carried downwind towards the exhaust vent. The firetube was only lit for a few minutes, and as such, the exhaust vent stack temperature would have been very cool and not at a high enough temperature to ignite methane vapor on its own."*

### Tank Talk readers, what do YOU think happened?

Reviewing this incident, some experts said that water hitting the hot oil inside the tank will turn to steam. The steam increases by 1600 times the liquid volume, so a steam-induced explosion from high pressure that cannot be vented due to obstruction is a viable scenario.

What's your opinion? Send your comments about this incident to [info@steeltank.com](mailto:info@steeltank.com) and put "tank fire comments" in the subject line. The formal investigation of this incident is pending.