Cooling Water during a tank Fire
Best Practice?????

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Where and when to use **Cooling Water** during a tank fire??? This question has caused many heated discussions among groups of industrial fire fighting professionals for years.

Fire chiefs and officers have spend years asking for more water pumping capacity, more fire trucks, and more fire fighting equipment for the **big fire**. So it is natural that everyone wants to use all of there equipment and supplies during the largest and longest type fire, the petroleum storage tank fire.

Using those resources the wrong way will not only waste the water resource but many times it causes more problems.

It takes very good incident command and control organization to stop excessive water use at a fire that can last over 24 hours.

So where should it be used.

There is only three main reasons to use a lot of cooling water at a tank fire, direct flame impingement, radiant heat, and to try to stop the vertical tank wall on the burning tank from folding in. Lets look at each one in order of importance.

1. Very quickly cool other tanks that have **direct flame impingement** to there tank walls!

The first step of the fire assessment by the first responder is to look for flame impingement on adjacent uninvolved tanks, piping, and pumps. If there is **direct flame impingement** to other equipment cooling water should be started very quickly directly on to where the flames are touching the other equipment. (A FLAME IMPINGEMENT REQUIRES IMMEDIATE AND PRECISE COOLING AT THE POINT OF IMPINGEMENT),

2. To cool the adjacent tanks and piping exposed to the **radiant heat** (not requiring immediate attention),

Radiant heat exposure protection is to spray the cooling water directly onto another tank, or piping, or pumps, you must apply the water to the object to be cooled.

Years ago someone designed a spray nozzle to send a fan spray of water up in the air, and it was called a water curtain. This was thought to protect exposures if it was put between the fire and the exposure. It does not work enough to stop the very large amount of radiant heat generated by a tank fire. If you want to cool something put the water directly on it, not into the air.

3. Limited cooling the wall of the **tank that is on fire.**

One of the biggest and most wasteful use of cooling water is spraying water on the upper portion of the tank shell above the burning liquid level, in an effort to try to hold up the tank shell above the liquid product level. The main reason to try to keep the wall vertical is to prevent the wall from drooping over into the tank and ultimately dipping into the burning liquid. If the shell does bend over far enough to touch the surface it will make a tunnel of fire that the foam when applied to the surface will have to spread through if the tank is to be extinguished.

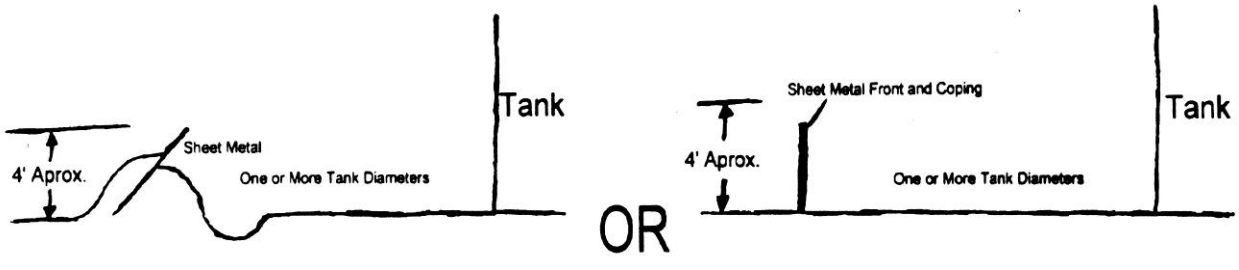
This keeping the wall from folding in **was** very important when the foam being used in Protein based because Protein based foams do not easily spread through one of these tunnels. If a AFFF type foam is to be used it is not as important to hold up the tank wall because the AFFF foams are very fluid and they spread through the tunnels much easier. Protein based foams are much more rigid that AFFF foams.

It has been proven over and over again, it is almost Impossible to keep the wall of a burning tank upright. The thing to remember the side wall of the tank is made out of very heavy steel. When it is heated red hot by the flame in the tank it looses all it strength turning like putty but it still weighs the same. It is very hard to keep it vertical, and can be a very big waste of your water supplies.

Cooling Water on Crude Oil Tank Fires Causes Additional Life Treating Hazards

Spraying cooling water or foam into a crude oil tank that has been burning for some time is very dangerous. It is very possible that even a small amount of water may cause a Very Large slopover that would top regular dikes. Crude oil heat waves and cooling water is a very bad situation waiting to happen. If you have never seen a real Slopover or Boilover **no words of caution are enough**.

Before the cooling water or foam is applied, the dikes walls should be built up higher and if possible a wave deflecting coping should be installed on the top of the dikes, at least on the side of the dike that has the most valuable exposure.



However the cooling water could be deliberately, but cautiously and intermitly sprayed into the burning Crude oil to:

1. test for a heat wave,

2. purposely cause the heat layer to froth over the side of the tank to break the heat layer up,

3. or just before the foam attack to test for a Slopover.

Again if you have never seen a real Slopover or Boilover **no words of caution are enough**.

What are the consequences of to much cooling water.

A. Putting water into a burning tank is not desirable, because it adds to the water bottom in the tank, and will raise the liquid level in the tank possibility causing the burning product to discharge over the tank wall and spill into the dike of the tank.

B. If there is pooled water in the dike area any spilled burning liquid will quickly spread over the water surface directly impinging on other non fire effected items in the dike like pumps, piping, and other tanks. The spreading speed of burning liquid product on water is very fast, because it is just floating across the water surface. If foam lines are not pre-deployed it can easily be so fast that fire fighters will not be able to get foam lines on the fire dike before piping and other tanks start exploding.

C. On an internal floating roof tank where the external roof has not blown off or fallen in, any water sprayed on top of the roof can very easily get into the tank through the air vent holes on the roof. If the internal roof is still intact the water will pool on the top of the roof eventually causing it to dip down on one side and then flip up product vapors into the vapor space. This could cause another explosion in the tank if the vapors are igniter by any fire in the tank or dike.