Blanket Gas

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S M Kumar
Process Design Consultant

Direct Query:
(1) In a buffer storage tank tank), fuel gas is used as blanketing gas. Norsk standard permit this.
How fuel gas is permitted as blanketing gas, since, fuel gas itself is explosive gas

(2) Suppose the blanket gas supply is lost. Then in order to protect the storage tank PVSV should open and let air comes into tank. In this case should we be concerned about explosive mixture formation inside of the tank and provide N2 as a backup gas. If N2 back-up is not available, should we avoid fuel gas as well

Response:
(1) Fuel gas is not explosive. It is mixture of air and Hydrocarbon that is explosive. If fuel gas blanketing can prevent vacuum inside the tank and avoid air entering tank, while emptying the tank or if tank's vapour space cools down on sudden rain, it achieves the purpose of not forming explosive mixture inside the tank!

(2) Even if you N2 what happens if it fails? Whether the blanket gas is N2 or FG, its failure has the same consequence. Best is to group the blanketing and venting of a group of tanks, so that one supplies flash gas to another. It is not that all tanks will empty at the same time! Even if you do not fuel gas as blanket gas, hydrocarbon vapour is going to be there from the flash gas!

You don't provide back-up to blanket gas. As soon as you get a N2 or fuel gas failure alarm, go fix it. There are 100s of tanks operating safely without any purging in remote oil & gas gathering stations. Blanketing is a primary protection. PVSV is backup.

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Mojtaba

Mojtaba Habibi
Process Engineer at Wood Group
Top Contributor

Dear Mr.Kumar,

About this part of your points:

"Best is to group the blanketing and venting of a group of tanks, so that one supplies flash gas to another. It is not that all tanks will empty at the same time! "

How about if there is only one or two storage tank(s)? Which remedial actions are necessary to protect the tank against explosion?

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S M

S M Kumar
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Best is to group if possible. Otherwise? Please read the next para saying: You don't provide back-up to blanket gas. As soon as you get a N2 or fuel gas failure alarm, go fix it. There are 100s of tanks operating safely without any purging in remote oil & gas gathering stations. Blanketing is a primary protection. PVSV is backup.

There are 1000s of Petrol and Diesel pumping staions on roadsides with storage tanks that are not blanketed, run by standards lesser than inside a refinery or oil & gas station. How many go kaboom? in safety issues, reality check is a must; I have seen good designs mauled by extra-zeal!

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Vinay

Vinay Singhal

Process Engineering Manager at McDermott International Inc.

Kumar, will take liberty to add on a few points:
(1) Caution should be raised regarding clubbing of blanketing and venting for a group of tanks. Some issues to think about are:
Cross-contamination;
blanketing gas PCV sizing (if designed for a high pressure drop, the port size may be too small for other tanks)
similar problem with common vent system.
(2) I came across a similar problem when designing a TLP. Huge quantities of MeOH stored in TLP legs, with N2 blanketting; but with a PVRV open to atmosphere. So if N2 fails, tank will take in O2, defeating the whole purpose of providing N2 blanketing to keep the O2 out. But, given the size of the tank and the leg cannot be designed for vacuum, leg collapse would be catastrophic and we didn't have any solution except provide PVRV.

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S M

S M Kumar

Process Design Consultant

Cross containation is a good point. I was thinking of closely located crude or produced water tanks!

PCV size too small? Difficult to visualize; if I have a small tank, even if I blanket it individually, the port size may be small. Perhaps good to let down in stages or have a RO in series. Will it help?

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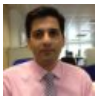

Saeid Rahimi Mofrad

Senior Specialty Process Engineer at Fluor

Having air inside the hydrocarbon tank in such a remote condition (PVSV opening) is acceptable as long as there is no obvious source of spark or heat (remember the fire triangle). However, to reduce the possibility of explosion following solutions can be examined. Blanketing gas may fail because of:

1. failure of blanketing gas source. In this case, blanketing system (at least critical users' header) can be backed up with alternative gas (nitrogen/FG).

2. failure of control valve or control system causing valve to close. In this case, a standby regulator can be added parallel to blanketing gas PCV.

3. any other reason including manual valve closure, ESD, operator mistake, pipe rupture, etc. No protection than alarm is recommended. Let PVSV and operator do their job!

If tank contains a HC above its auto-ignition point or ingress of air through PVSV contaminates the tank content, it is essential to consider items 1 and 2 (explained above) . Furthermore, PVSV with nitrogen connection on vacuum side can be provided to completely prevent ingress of air into the system.

Having balancing lines between tanks is fabulous design in particular cases. For example when liquid is pumped from one tank to the other one (typical example is ship loading; sending liquid from isolated tank to ship tanker). Otherwise, no credit should not be taken of balancing line to reduce/eliminate the blanketing requirement if the supply of gas is not always guaranteed.

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