

IMPERIAL CHEMICAL INDUSTRIES PETROCHEMICALS DIVISION

SAFETY NEWSLETTER NUMBER 38

By Trevor Kletz

38/1 IF YOU USE A TRIP TOO OFTEN, IT WILL LET YOU DOWN

Newsletter 28, Item 2 pointed out that most trips develop faults which prevent them operating about once every 18 months. If the trip is not tested regularly it may not work when required.

A recent incident illustrates another limitation of trips.

On one of our plants a tank is fitted with a high level trip which switches off the feed pump. The operators got into the habit of using the trip to stop the movement every time. Instead of watching the level in the tank they got on with something else. The manager knew this and prided himself that the trip was being tested several times per week.

After a year or so the trip went out of order and the tank was overfilled. This could have been forecast. Sooner or later the trip was bound to get out-of-order. When this happened overfilling was inevitable. The trip was being used as a process controller.

If a spillage every year or so is unacceptable, then a second trip is needed, to function as a genuine trip and protect the tank when the 'process controller' fails.

Instead of making the plant safer, the so-called trip made it less safe. Operators sometimes overfill tanks, but not as often as once in 18 months.

If an automatic process control is needed, then a genuine trip may be needed as well, to prevent overfilling when the process controller fails.

38/2 WHAT SORT OF HOSE IS CARRIED ON THE TANKER?

We use a lot of hoses in the Division and every Works has a procedure for making sure that they are made from suitable materials and are tested regularly. We can let you have a list showing which materials are suitable for various process materials.

The hoses carried on road tank wagons are not always suitable. Several accidents have occurred because tankers carried the wrong sort of hose.

A few years ago a hose burst while sulphuric acid was being off-loaded from a tank wagon the hose was the wrong sort. Now two more incidents have occurred. One occurred while sulphuric acid was being off-loaded through a natural rubber hose, a material which is quite unsuitable.

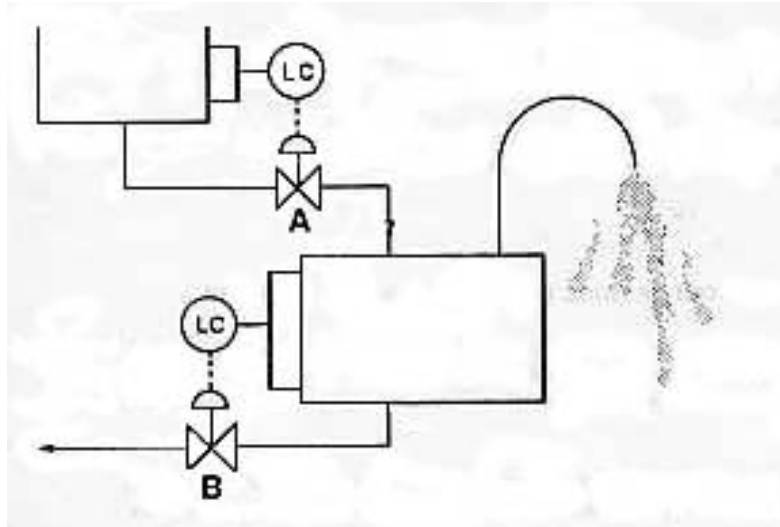
If you off-load hazardous materials regularly: -

- 1 Use a fixed pump instead of the tanker's pump or compressor. The hose is then at a lower pressure. (In addition, if the material is flammable and the tanker's pump or compressor is used, the engine will ignite any spillage.)
- 2 Use your own hose, of the right material. Keep one on the job.
- 3 Store the hose on suitable hangers. If it is thrown on the ground it will be damaged and may leak next time it is used.

Of course, if tankers are off-loaded only a few times per year it is hardly worth keeping a special pump and hose but make sure that the tanker carries the right sort of hose.

38/3 PUTTING A QUART INTO A PINT POT

Acid overflowed from a tank, fortunately without injuring anybody. The reason valve A could pass a bigger rate than valve B;



The plant was an old one. Nowadays we would fit a high level alarm on the tank. In addition, the operability study (see Newsletter 27, Item 8) would show up the fact that valve A can pass more than valve B, so its size could be reduced.

Are there any situations like this on your plant?

38/4 ANOTHER WAY OF DEALING WITH SPILLAGES OF LPG

Newsletter 29, Item 1, described ways of dealing with spillages of LPG and, in particular, suggested that they should be covered with foam to reduce evaporation.

Some LPG will evaporate and bubble through the foam and a writer in "Fire Prevention", 1971, Vol. 91, page 26, therefore suggests reducing the volatility of LPG by adding a less volatile hydrocarbon such as gas oil.

This method was used successfully by another company when some LPG got into the drains. They promptly poured some gas oil down the drains to absorb the LPG and reduce the probability of an explosion.

If an LPG spillage is covered with foam, after the LPG has been removed or has evaporated, you may want to wash away the foam. Be careful this may release entrained gas.

38/5 AN LPG VAPORISER FREEZES AND CRACKS

On one of our plants LPG is vaporised by steam and used as fuel on a series of furnaces. One day the demand from the furnaces was greater than the vaporiser could supply. The pressure in the vaporiser therefore fell away, more LPG evaporated and the temperature fell. In the end the condensate froze and cracked a tube; LPG entered the steam main, got past the non-return valve and was detected elsewhere in the system.

The report on the incident recommends that the fuel line from the vaporiser is fitted with a low pressure alarm.

If you have any vaporisers on your plant, is it possible for the pressure in them to fall as the result of a large demand for gas and, if so, how can you prevent it?

38/6 CAN STRANGERS WANDER ROUND YOUR PLANT

On many of our plants it is very easy to wander round the plant without being challenged. The operators assume that the stranger has a good reason for being there - and of course he usually has.

But if there is a fire or a leak he is at risk. People should not go on a plant without the supervisor's

knowledge and permission. When visiting other companies I have noticed that they are much stricter than we are.

The lay-out of some of our plants does not help as people can approach from all sides. Nevertheless, if your plant is one of the easy ones, I suggest you try to make it harder for the stranger to go on the plant without permission.

38/7 BOLTS USED FOR TWO PURPOSES

A Castell lock had to be removed from a valve body. It was held on to the valve body by two bolts. When these were undone the process liquid came out and two men were burnt. The valve core was held on to the body by the same two bolts.

A check on the Works concerned showed that in most cases the valve core and the Castell locks were secured to the valve body by separate bolts but in a few cases the same bolts were used.

If you have any Castell locks on your plant, check which way they are secured. If possible, a standard method should be used throughout your Works and, if possible, the bolts used to fix the lock should have no other function.

38/8 SWITCH FILLING CAUSES AN EXPLOSION IN A ROAD TANK WAGON

An explosion in a road tank wagon in one of our overseas companies threw the man-hole cover 100 ft in the air. It landed 200 ft away, fortunately without injuring anybody. The tanker was being filled at the time with a non-flammable waste liquid and the driver was standing on the top smoking. On its previous journey the tanker had carried a waste liquid containing some dissolved flammable gas. Some of the gas was left in the tanker and was pushed out when it was filled with the next load.

Switch filling, as it is called, is the biggest single cause of explosions and fires in road tank wagons. People fill a safe material into a tank wagon without realising it may be full of flammable vapour from the last load.

If you fill tank wagons do you have a way of finding out what was in the tanker last and whether or not it has been gas freed?

38/9 THREE YEARS AGO

The temperature controller on the base of a still went out of order at 5 a.m. and drew a straight line; this was not noticed. Between 5 a.m. and 12 noon the temperature of the 19th tray rose from 145°C to 255° C; this was not noticed. Five other temperatures also rose, as indicated by charts or by entries on the log sheet. The level in the base of the still fell, the level in the reflux drum rose and the take-off rate also rose. All these readings were put down on the record sheet but their significance was not realised.

I said in Newsletter 7, Item 1, "There is a danger that our training of process workers may be too sophisticated. We try and teach them elementary chemistry and chemical engineering, and it is right that we should do so, but not before we have taught them that tanks and other vessels are not always designed to withstand the pressure to which they can be subjected, that air and fuel mixed together will go 'bang' and that addition of hot oil to water will cause steam to be formed with explosive violence".

Our training of process operators (and supervisors) needs to be even more fundamental. It is clear that many do not know why they take readings and do not realise that if a reading is unusual and they don't know why, they must at least ask.

From Safety Newsletter No. 8, March 1969.

38/10 UNUSUAL ACCIDENTS NO 8

A member of the Division drew up at a country filling station in his mini-van. He got out of the van just in time to prevent the attendant filling up the van by putting the nozzle of the petrol pump into the ventilation lid on the roof.

38/11 A STORAGE TANK BURSTS

On 14th October 1814 a 600 m³ vat full of beer burst. A newspaper described the incident as follows:-

“The neighbourhood of St. Gile’s was thrown into the utmost consternation on Monday night, by one of the most melancholy accidents ever remembered. About six o’clock one of the vats in the extensive premises of Messrs Henry Meux and Co. in Banbury-street, St. Gile’s, burst, and in a moment New-street, George-street, and several others in the vicinity, were deluged with the contents, amounting to 4500 barrels of strong beer. The fluid, in its course, swept everything before it. Two houses in New-street, adjoining the brewhouse, were totally demolished. The inhabitants, who were of the poorer class, were all at home. In the first floor of one of them, a mother and daughter were at tea; the mother was killed on the spot; the daughter was swept away by the current through a partition and dashed to pieces. The back part of the house of Mr Goodwin, poulterer, of Mr Hawse, Tavistock Arms, and Nos. 21 and 25, in Great Russell Street, were nearly destroyed. The female servant of the Tavistock Arms was suffocated. Three of Mr Meux’s men employed in the brewery were rescued with great difficulty, by the people collected to afford relief, who had to wade up to the middle through the beer.

The site of the place is low and flat, and there being no declivity to carry off the fluid, in its fall it spread and sunk into neighbouring cellars, all of which were inhabited. The bursting of the brewhouse walls, and the fall of heavy timber, materially contributed to aggravate the mischief, by forcing the roofs and walls of adjoining houses.

The crowd collected from the time of the accident to a late hour was immense. It presented many distressing scenes of children and others enquiring for and lamenting their parents, relatives, and friends.

When the beer began to flow, the neighbourhood, consisting of the lower classes of the Irish, were busily employed in putting in their claim to a share, and every vessel, from a kettle to a cask, were put into requisition, and many of them were seen on Tuesday enjoying themselves at the expense of the proprietors, whose loss is estimated at an immense sum.”

The vat was made of wood secured by 29 iron hoops. The lowest hoop fell off. The hoop above gave way with a loud crack and the rest opened up one after the other.

The lowest hoop had fallen off many times before but instead of telling anyone the operators pushed it back into position, probably hooking the rivets back into place. Is there a moral here?

From “Safety“, the accident prevention magazine of the British Steel corporation, August 1971.

For more information on any item in this Newsletter ring B.3927 or write to Miss M N, Organic House, Billingham. If you do not see this Newsletter regularly and would like your own copy please ask Miss N. to add your name to the circulation list.

March 1972