

IMPERIAL CHEMICAL INDUSTRIES HEAVY ORGANICS DIVISION

SAFETY NEWSLETTER NUMBER 22

By Trevor Kletz

22/1 LEAKING NITROGEN CAN KNOCK YOU OUT

Two recent incidents have shown that leaking nitrogen can cause men to feel unwell or even pass out. The nitrogen is not poisonous but can cause oxygen starvation. In the first incident, a vessel was being purged with nitrogen and the top man-hole was open. A member of a cleaning squad decided to recover a rope which was half inside the vessel and which was caught up on something inside. While kneeling down, trying to disentangle the rope, he was overcome by nitrogen.

What was more disturbing, the injured man admitted that, if necessary, he would have gone into the vessel to recover the rope.

In the second incident a fitter and mate were affected by nitrogen while turning a spectacle plate in a line which was under slight nitrogen pressure. The job was completed by the supervisor working upwind. The clearance certificate said 'Beware of trapped pressure' but did not point out the danger of asphyxiation.

These incidents raise several questions:-

1. Do the men on your plant know that nitrogen coming out of a pipe or a hole in a vessel can asphyxiate someone who is close by?
2. What do you do to explain entry procedures to contractors?
3. Do you leave open manholes on vessels into which entry is NOT authorised? Must you? If so, can the opening be covered by a grid or some other barrier or can you put up a warning notice? (See also Newsletter 25/3)

22/2 FURNACE EXPLOSIONS

A recent report (No. 0.200,655/A — available through Division Reports Centres) described 13 explosions which have occurred in chemical plant furnaces as a result of explosive ignition of the burner fuel, and suggested ways in which they could be avoided.

I thought every possible sort of explosion had been covered but one of the Oil Companies has described a new one.

A furnace was equipped with gas firing and an automatic lighting system. The burner went out a few minutes after light-up and the operator started the lighting sequence again. When the ignition stage was reached an explosion occurred.

The flame failure was due to a slug of liquid in the fuel gas. The lighting sequence included a purge — this was sufficient to purge the furnace of gas but not to purge a slug of liquid.

This underlines the recommendation made in Newsletter 21, Item 2, that where liquid is liable to get into fuel lines, a catchpot should be provided and it should be fitted with a high level alarm.

Where furnaces are lit by hand, a test with a combustible gas detector will detect any volatile fuel that remains after purging. Heavier fuels may form explosive mixtures in a hot furnace but may not affect a combustible gas detector, as they may condense in the instrument.

22/3 STOP THE PUMP WHEN YOU CLOSE THE SUCTION VALVE

If there is a bad leak on a pump handling flammable liquids, it is risky to close the suction valve by hand as the leak might fire. (Sometimes we have to, and then we should use water sprays — see Newsletter 16, Item 1).

Many of our pumps have therefore been fitted with remotely operated suction valves which can be closed from a safe distance. We fit them when the chance of a leak is higher than usual, or if there is a very large inventory of oil which could leak out.

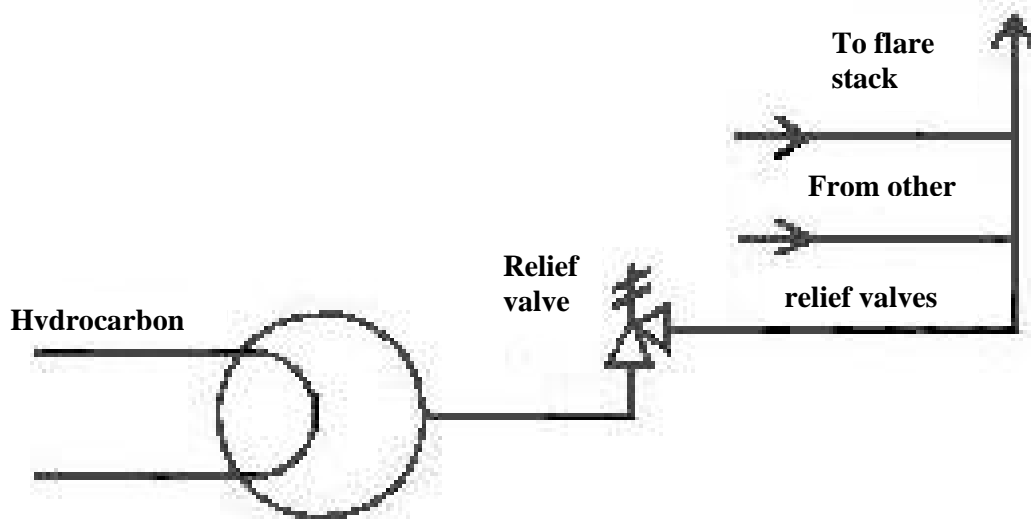
If a pump is left running with the suction valve closed, it might overheat and ignite the leak. Pressing the emergency isolation button should therefore also stop the pump.

22/4 HOLES IN RELIEF VALVES AGAIN

In Newsletter 18, Item 1 I described two leaks which occurred through relief valve drain holes. These holes are provided so that rain water will not collect in the tail pipe and they must be plugged off if the relief valve discharges into a blow-down or other closed system. (Do not confuse these drain holes with the vent holes in bellows sealed relief valves – see Newsletter 19, Item 1).

Now another incident has occurred.

The steam side of a heat exchanger is connected to a relief valve. The hydrocarbon in the tubes is at a higher pressure than the steam; if a tube bursts hydrocarbon will come out of the relief valve; the discharge pipe is therefore connected to the blow-down header.



When another relief valve lifted hydrocarbon vapour came back along the discharge pipe and out of the drain hole.

Will the next incident be on your plant?

Sure?

There is another point of interest. To decide in cases like this whether or not to connect the relief valve to the blow-down system we should assume that one tube breaks and then calculate the composition of the mixture that comes out of the relief valve. If there is enough steam there to make it non-flammable, then it can safely be discharged to atmosphere. Quite a lot of steam is necessary, usually about 90% by volume. (If the oil is not volatile, remember it may come out of the steam trap).

22/5 CHECK OLD PIPES BEFORE CHANGING THEIR DUTY

A recent spectacular incident in another Division shows what can happen if old pipes are used on another duty without checking their condition.

A hole 6 inches long and 2 inches wide occurred in a 3 inch pipe carrying flammable gas under pressure. The hole was due to corrosion/erosion which occurred while the length of pipe had been in use on another process in which corrosion/erosion is known to occur. Its condition was not checked before transfer to the new duty.

22/6 DON'T RUN POLYTHENE DRINKING WATER LINES THROUGH OILY GROUND

Polythene pipes should not be used for drinking water if the pipes pass through ground which may be contaminated with oil. Hydrocarbons are absorbed very slightly by polythene and can affect the taste of the water.

22/7 EXPLOSION IN A STARTER

Another Division have reported that an explosion occurred in the starter of an electric motor. The casing was shattered and a man was injured.

The explosion was caused by repeated pressing of the start button. This caused a breakdown of the oil. There was a vapour space above the oil and this became filled with a flammable mixture.

So remember that with this type of starter, — rather old and not used very much now — never press the start button repeatedly.

If the motor does not start after two presses send for the electrician.

22/8 INSTANT PUMP EMERGENCY SERVICE

HOC Division Engineering Department now have available an "Instant Pump Kit" with a very comprehensive range of pumping duties. The basic purpose of the kit is to provide a readily available pump to cover the urgent pumping requirements that can arise during the commissioning of large plants. Other plant emergencies will be considered on their merits. Requests for assistance should be made to the Equipment Group Engineer or the Machines Section Engineer.

22/9 FIRE HAZARD OF EXPANDED POLYSTYRENE TILES

The Fire Research Station has undertaken an investigation to determine the fire hazard of expanded polystyrene tiles when used on ceilings in kitchens or living rooms. Tests have shown that although the material is flammable, if it is properly attached to the ceiling and left undecorated, there is no serious fire hazard. However, rapid fire spread can occur if tiles decorated with gloss paint are ignited. These remarks apply to both the standard and the self-extinguishing grade products.

The following advice is given to the users of the tiles

1. Fix the tiles firmly to the ceiling. Avoid 'dab' application - use adhesive over the whole of the surface.
2. Leave the tiles undecorated for maximum safety.
3. If the tiles become dirty and must have a decorative finish, only a flame retardant paint or a matt finish emulsion paint should be used.
4. Never use a gloss paint on tiles. If an existing ceiling has been so treated, the tiles must be removed.

22/10 WHAT SHOULD WE DO WHEN PEOPLE BREAK THE RULES?

A report on an incident in another Division involving permits-to-work recommended that supervisors should be reminded in writing of their responsibilities every six months.

Special local circumstances might justify this recommendation, but unless there are some I would not support it.

Regular spot checks by managers are the best way of making sure that instructions are being followed. They also allow the manager to find out why the rules are not being followed perhaps someone does not understand them or the reasons for them, or perhaps it is impossible to follow the rules.

A speaker at the RoSPA Industrial Safety Conference in Scarborough this year said, "The right attitude cannot be expected to be self-generating at the operational level".

22/11 RECENT NOTES

- (a) Newsletters 13—21 have been bound together and issued as Report No. 0.200,647/A, available from Division Reports Centres.
- (b) Safety Note 70/14 lists the precautions to be taken when handling mercury.
- (c) Safety Note 70/15 reviews the arguments for and against the installation of excess flow valves and recommends that they should not be installed on ship and tanker filling points. Instead remotely operated quick shut-off valves should be provided and combustible gas detectors should be installed to give warning of a leak.
- (d) A bibliography of papers on the electrical safety of analysis instruments, by A.W.H is available from Instrument Development Group Registry, HOC Division, Billingham.

For copies of (b) or (c) or for more information on any other item in this Newsletter, please write to Mrs J. M.W, Organic House, Billingham, or phone B.3927. If you do not see these Newsletters regularly and would like your own copy, please ask Mrs W to add your name to the circulation list.

September 1970