IMPERIAL CHEMICAL INDUSTRIES
PETROCHEMICALS DIVISION

SAFETY NEWSLETTER NUMBER 32

By Trevor Kletz

32/1 BLOWING LINES

When pipe-lines containing flammable liquids have to be blown clear we always use nitrogen, never air.

People sometimes grumble about the cost of the nitrogen and then think, “It’s for safety, so we will have to put up with the cost”.

The nitrogen bill is high because so often lines are blown the wrong way and nitrogen Is wasted.

Suppose we have to blow a line into a tank.

The WRONG method is:

Open valve C.

Open valve A.

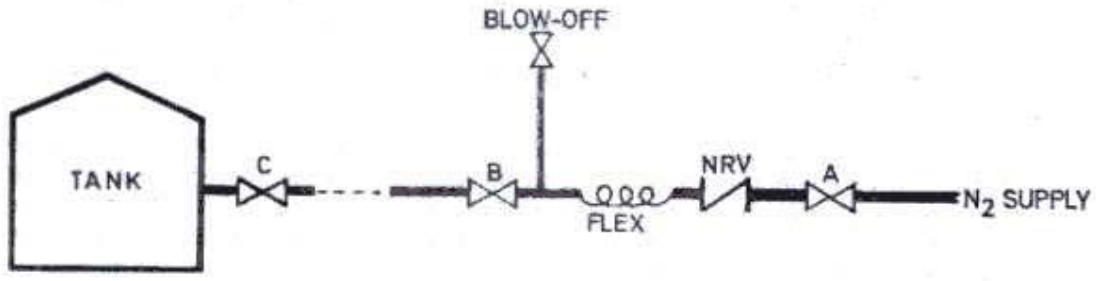
Open valve B.

Give the nitrogen time to get through.

Shut valve B.

Shut valve A.

Shut valve C.



Jimmy Whitmarsh suggests the following RIGHT method:

Open blow-off.

Open valve A and prove that the flex is clear.

Shut blow-off.

Open valve B.

Open valve C one or two turns, slowly and *stay beside it* until nitrogen is heard passing through. On most lines it will not take very long.

(On some very long lines it may take half-an-hour or more. If you have to leave, come back In plenty of time).

Close valve C and open It again one or two turns to make sure as much

liquid as possible is blown through.

Close valve C.

Close valve A.

Open blow-off to depressure the line.

Close valve B.

Close blow-off.

Remove flex.

The right method uses much less nitrogen.

Just because a Job is done for safety, we need not ignore the cost. It may be possible to be economical and Just as safe.

Can you think of any other cases?

32/2 DIESEL ENGINES

Newsletter 23, Item 1, described the precautions that should be taken when diesel engines are operating in areas where flammable gas or vapour may be present. It mentioned that the British Internal Combustion Engine Research Institute Limited (BICERI) had been asked to devise a means of stopping a diesel engine when it is running on vapour sucked in through the air inlet. In co-operation with Engineering Services (Wilton) Ltd. they have developed a device which is fitted in place of the air filter and consists of a disc valve, a carbon dioxide cylinder and a flame trap. When the driver wishes to stop the engine in an emergency he releases the carbon dioxide, the gas pressure closes the disc valve, and the gas itself also helps to stop the engine. A valve alone is not sufficient as enough air and vapour can be sucked past it (or past the piston) to keep the engine running. The flame trap prevents flashback occurring before the engine is stopped.

Six of the devices have now been used for over six months on the engines of mobile cranes. They have performed satisfactorily and have given no trouble. Arrangements have, therefore, been made to have the devices manufactured to meet our needs. Anyone who wishes to install one should contact Mr P H of Engineering Services (Wilton) Ltd, telephone No. W. 6942. The price of the whole device including flexible tubing is about £45.

32/3 FLYING SAUCERS HAVE LANDED

Some years ago a welder in another company was given a permit to modify a pipeline. He started to weld on the wrong line. The line he was actually welding was a common vent line from three storage tanks containing a flammable liquid. The tanks were not blanketed with nitrogen so there was an explosive mixture in the vent pipe. The welder ignited this mixture, the explosion travelled back along the vent pipe to the three tanks and their roofs were blown off. An old lady living half a mile away telephoned the police to tell them, “Martians have landed a few fields away from my cottage”.

This incident illustrates two points that have been made before in these Newsletters:—

(a) Equipment which is given to maintenance should be identified by fitting a numbered tag to the equipment. If a pipeline is to be modified the numbered tag should be fitted to the pipeline at the point where it is to be cut or welded. Showing the equipment to the maintenance people or pointing it out is not sufficient. See, for example, Newsletters 29/4, 20/1 and 10/1.

(b) The vapour spaces of storage tanks containing flammable vapours should not be connected together or an explosion in one tank will spread to the others. Sometimes if the tanks are nitrogen blanketed we connect a few tanks together to save nitrogen. In these cases there should be an alarm to give warning if the nitrogen blanketing fails. The alarm can be a low pressure alarm or a high oxygen concentration alarm.

32/4 OIL IN THE DRAINS CAN EXPLODE

Some people do not worry very much about the explosion hazard if a flammable liquid gets into the drains. “There will be no source of ignition down there”, they say.

Recently, some oil got into a main factory drain and blew up. Some man-hole covers were blown oft

and the contents of the drain blown out. The drain passes under a roadway, 13 feet below, and the surface of the road was raised and cracked.

As so often happens, the source of ignition was never found. This incident shows once again that if air and fuel are mixed in the right proportions they are liable to go 'Bang', even though we do what we can to remove known sources of ignition.

A similar incident was described in a Home Office Memorandum issued a few years ago. The drain valve on a petrol tank was not fully closed. About 20 tons of petrol ran out, soaked into the ground and percolated into the public sewer which was made of porous material. Two miles away the fumes caught fire and a series of minor explosions followed the line of the drain. Two men were injured.

On plants handling flammable liquids the inlets to the drains are normally sealed and the chance of ignition is low. (Newsletter 20, Item 2 described a fire which occurred because the U-seals were by-passed). All the same, drains should be checked regularly and flushed out if any oil is present. They should always be checked if a spillage, liable to put oil in the drains, has occurred.

A good way of detecting oil in the drains is to install Sieger combustible gas detectors in the oil-water separators.

On new plants we now install fully-flooded drains. They have no free space inside them and explosive mixtures cannot form.

If a flammable liquid gets into an ordinary unsealed drain the chance of ignition is much higher. II there is any chance of this happening, regular monitoring is necessary. On some of our main drains which are liable to get contaminated with oil we have installed Sieger combustible gas detectors. They work very well despite the damp and dirty surroundings.

32/5 WHY IS IT SO HARD TO ELIMINATE ALL SOURCES OF IGNITION?

Why do mixtures of flammable gas or vapour and air ignite so readily even though we do what we can to eliminate known sources of ignition?

The reason is that the energy required for ignition is very small - 0.2 millijoule is sufficient.

If you find it hard to visualise what this means, it is the energy developed when 1 gram falls through 20 millimetres or one-tenth of an ounce falls 1 inch.

Of course, dropping one gram through 20 millimetres will not ignite a vapour-air mixture because the energy is not concentrated enough. But this amount of energy concentrated into a spark or a hot speck of metal will ignite a vapour-air mixture.

32/6 PORTABLE STEP LADDERS

Portable step ladders with chipboard treads are unsuitable for outdoor use as if the chipboard gets wet and then dries it breaks very easily. If there are any on your plant the treads should be replaced.

32/7 THREE YEARS AGO

"Double isolations with a blow-oft inbetween are widely accepted as a satisfactory method of operation when isolating equipment for maintenance provided the main valves are locked shut and the blow-off valve is locked open.

A recent incident in which a man was nearly gassed has shown that this system is not foolproof. The size of the blow-off must be large and it must go to a clear and obvious opening. A long thin line leading away to a stack from a small blow-oft valve is not satisfactory as a back pressure may be developed in the inter-space and this may cause leakage through the second isolation valve." *From Safety Newsletter No. 3, July 1968*

We now have a standard for the size of blow-off lines (Engineering Specification PR 0310)

SIZE OF MAIN LINE	SIZE OF BLOW-OFF
½ " and ¾"	½ "
1" and above but below 6"	1"
6" and above	1½ "

For HP pipes the standard size of blow-oft is 3/8"

Recently a plant nitrogen supply became contaminated with hydrogen. The nitrogen was isolated by double isolation valves with a blow-off in-between *but the blow-off valve was closed.* Does everyone on your plant know why the blow-off must be open when the other two valves are shut?

In Petrochemicals Division double isolation valves with a blow-off in between are not acceptable as the sole means of isolation for long maintenance jobs. They are acceptable only for quick jobs or to isolate equipment while a slip-plate is fitted.

32/8 FIRE IN ORGANIC HOUSE

It is not only the Works that have fires. One occurred recently in the Division's main office block. A lighted cigarette was left on the edge of a desk and fell into a waste paper basket.

When the fire alarm sounded, a lot of people did not know what to do. Fire alarms should be tested regularly so that people know what they sound like and, occasionally, there should be a practice fire drill, including evacuation of the building.

32/9 UNUSUAL ACCIDENTS - No. 2

"We like not to be surprised in this business", said a Factory Inspector, "but the shop assistant who cut her toe off with a bacon slicer just shows you the sort of thing we are sometimes up against. She had stood on it to close a window."

32/10 RECENT PUBLICATIONS

(a) Newsletter 27, Item 9, mentioned a report from one of the oil companies on some fires which have occurred during the loading and unloading of road tanker wagons. This report proved very popular. A further report (Incidents in the Oil Industry No. 3) is now available.

(b) If you attended a discussion on the causes of some fires and explosions and the action that should be taken to prevent them happening again, you should have received a copy of a blue 'souvenir' booklet. If you have not received one, please let us know.

(C) The Systems Reliability Service of the UK Atomic Energy Authority issue a quarterly newsletter describing the information that Is available and the work that is in hand on equipment reliability. It can be borrowed from Division libraries.

(d) The River Tees Oil and Chemicals Safety Committee has produced a manual giving detailed advice on the loading, unloading and handling of 45 bulk chemicals. Copies can be obtained from Distribution Department, Petrochemicals Division, Organic House, price £2.

(e) The set of diagrams showing how to tell whether Audco, Klinger and Truflo cocks are open or closed [Newsletter 29/11(e)] has been reproduced as a small poster.

(f) The list of suitable materials for hoses, tank lining, gaskets and valve and drum seals mentioned In Newsletters 20/5 and 10/10 has now been revised.

(g) Wilton Works have issued a Guide to the Safe Operation of High Pressure Water Wash Equipment.

For, copies of (a), (b), (e), (f) and (g) or for more information on any item in this Newsletter, please write to Miss M N, Organic House, Billingham, or ring B. 3927. 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.

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