IMPERIAL CHEMICAL INDUSTRIES LIMITED
PETROCHEMICAL DIVISION

SAFETY NEWSLETTER No. 81

81/1 A GASHOLDER IS SUCKED IN

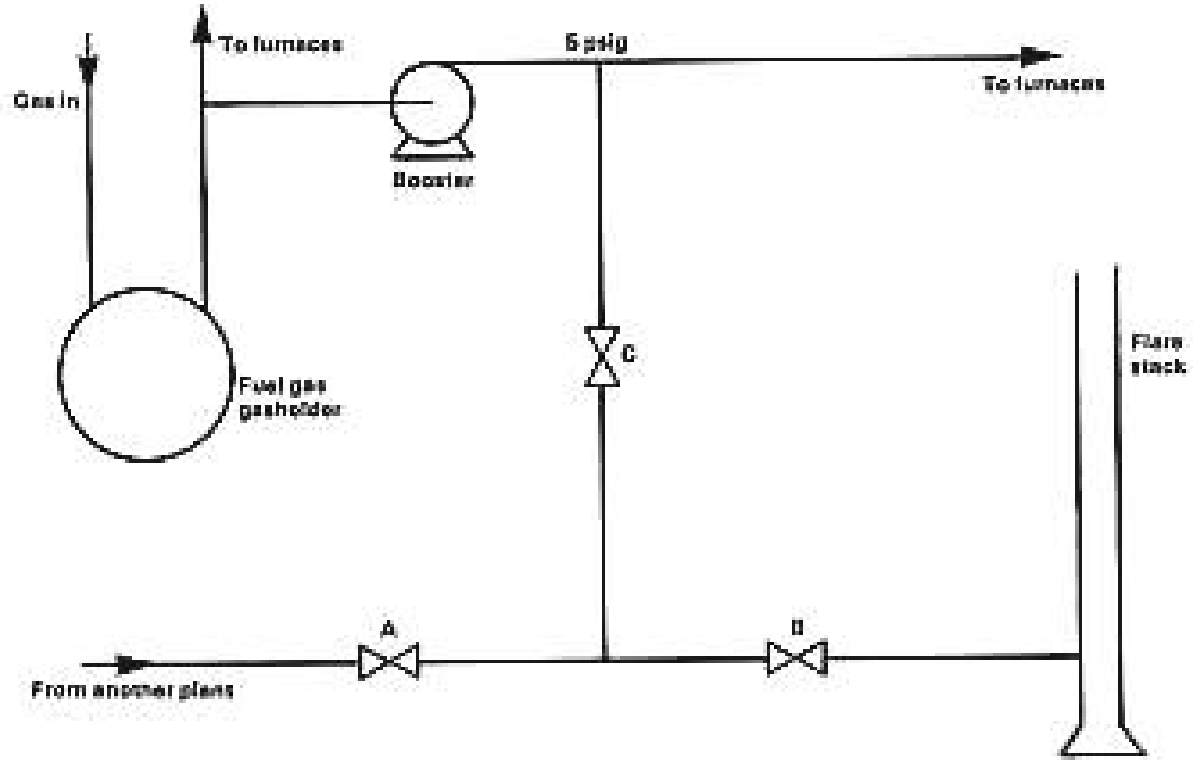
This incident shows what can happen when responsibilities for plant equipment are not clearly defined and operators in different teams, responsible to different managers, operate the same valves.

The flare stack shown in the diagram was once part of a plant which is now shut down. The flare stack is now used for venting surplus fuel gas through valves B and C. Valve C is normally left open because valve B is more accessible. On the day of the incident the operator responsible for watching the height of the fuel gasholder saw that it was falling. He therefore imported some fuel gas from another Works, but nevertheless an hour later the holder was sucked in.

How did it happen?

Another flare stack on another plant had to be taken out of commission for repair and so, according to previous practice, the operator locked open valves A and B, thus providing an alternative route to flare for his own plant. He did not realise that this would result in the gasholder emptying itself through valves C and B. He told three other men what he was going to do but did not tell the man responsible for controlling the gasholder height. He did not know that this man was concerned in any way.

Responsibilities for each item of equipment must be clearly defined at manager, supervisor and operator level; only the men responsible should operate it. If different teams of men are allowed to operate the same equipment, then sooner or later an incident will occur.



81/2 A FIRE IN A TEXTILE PLANT

Earlier this year a textile factory was completely destroyed by fire. The report on the incident contained several points of general interest.

The fire started when arcing in a faulty electrical light fitting set fire to a false ceiling made of Celotex, a flammable board made from sugar-cane fibres. The Celotex was contaminated with oil which had leaked out of ventilation ducting and as a result the fire spread right across the building in a few minutes.

Supplies of oil to the machinery were distributed through polythene pipes in the roof void. These were soon burned through and the oil fed the fire. As stated in our Safety Note 74/4, plastic piping should not normally be used for handling flammable liquids, though certain glass reinforced resins do withstand fire extremely well and may be used in situations where they will not be damaged by impact.

The fire hydrants around the factory were quite incapable of providing the quantity of water needed to fight the fire. As stated in Safety Newsletter 42/6, an estimate should be made of the fire water required on all plants and the available supplies checked against this figure.

Although over 300 people were in the factory at the time of the fire, no-one was injured. All left safely within three minutes of the alarm being sounded. Regular fire drills had been carried out and the incident demonstrates their value.

81/3 ARE STRONGER VESSELS SAFER?

A few years ago I wrote a paper on some myths of the chemical industry — deeply ingrained beliefs that are not wholly true. (It was summarised in Newsletter 72). Here is another myth.

If I design a vessel to be stronger than it really needs to be, then it will be safer.

Suppose a vessel has to operate at 20 psig. It would normally be designed to withstand a slightly higher pressure, say 25 psig, and the relief valve would be set at this pressure.

Suppose a vessel designed for 50 psig was available and was used instead. Many people would feel that it would be safer— less likely to fail because of a mechanical defect, less likely to corrode to a dangerous extent, and provided the relief valve was set at 50 psig, less likely that the relief valve would lift.

This is true, but suppose the vessel is exposed to fire.

The pressure will rise to the relief valve setting and the relief valve will lift. This, however, will not prevent the vessel bursting; the metal may get so hot that it loses its strength and the vessel bursts at design pressure (see Newsletter 73/4). A vessel which bursts at 50 psig will cause more damage than a vessel which bursts at 25 psig.

Of course, if we use a vessel designed for 50 psig and set the relief valve at 25 psig, or we are able to lower the pressure in the vessel to below 25 psig, then the stronger vessel will be safer.

Sometimes we use a pressure vessel when all we require is an atmospheric pressure storage tank. The atmospheric pressure storage tank would be designed with a weak seam roof; if the tank is exposed to fire the roof blows off but the rest of the tank remains intact and the contents do not spill. If the pressure vessel is exposed to fire however, rupture may occur at either end; if it occurs at the base the tank may even go into orbit. An accident in which this actually occurred was described in Newsletter 62/3.

One Company allows pressure vessels to be used as atmospheric pressure storage tanks for flammable liquids only when the surrounding ground is sloped so that spillages cannot accumulate and the tank cannot be surrounded by fire.

So you see, stronger vessels are not always safer.

81/4 A RUNAWAY REACTION

A plant was being brought on line. Feed was started to No. 1 reactor, but not to No. 2. The operator saw the temperature on No. 2 reactor start to rise. He assumed it was an instrument fault and asked an instrument man to check the temperature recorder.

In fact, a runaway reaction was occurring on No. 1 reactor, but during the shutdown the temperature points on the two reactors had got crossed and the recorder labelled “No. 2 reactor’ was actually recording the temperature in No. 1 reactor.

Feed continued to No. 1 reactor until somebody saw that part of the pipework was glowing red hot.

Where temperature is very important, as in this case, there should be a high temperature alarm or trip operated by an independent temperature point.

Also after major maintenance or before the commissioning of a new plant, all important instruments on which the safety of a plant depends, should be checked. This check should be as near to the ‘real life’ situation as possible. (Newsletter 58/1 described a fire which occurred because a trip was removed from its case for testing. In position it did not work, because a moving part rubbed against the case).

Finally, do not assume that unusual instrument readings are entirely due to faults instruments — make sure that there is nothing wrong on the plant.

81/5 AN UNEXPECTED REACTION IN A ROAD TANK WAGON

An incident in another Company shows the importance of making sure that road tank wagons are cleaned (or free from harmful materials) before they are filled.

A tanker was filled with a waste sludge which contained some particles of aluminium. The tanker had previously carried caustic soda and had not been washed out. The caustic soda reacted with the aluminium and the build-up of pressure caused one of the inspection ports on the top of the tanker to lift and discharge a mixture of gas and liquid spray. An operator was on the top of the tanker at the time and he was lifted into the air and fell to the ground, sustaining serious injuries.

81/6 A MAN PUTS HIS ARM THROUGH AN OPEN VALVE

While washing out a vessel an operator in another company put his arm through one of the openings into the vessel. It is not clear from the report why he wanted to do this, but perhaps he wanted to feel the inside to make sure it was clean. He put his hand through an opening which was fitted with a butterfly valve operated by compressed air and held open by the air pressure. A few moments after the operator had removed his arm there was a failure of the instrument air supply and the butterfly valve closed. If the operator’s arm had still been in the opening he would have been severely injured.

If an automatically operated valve has to be held open for an operation of this sort, then it must be locked in the open position by a clamp strong enough to resist failure of the air supply. If the valve is

opened by air failure, then the air line must be vented and the vent valve locked open.

Reminder: Newsletter 42/2 listed the precautions necessary when automatic valves are used to isolate equipment for maintenance.

81/7 A SLIPPING ACCIDENT ON A STAIRCASE

A man slipped on a staircase, twisted his ankle and was absent for 17 shifts. The staircase seemed to be in good condition and so did the man's boots.

When we read this our first reaction is that it is just another of those incidents that we can do nothing about — another of those occasions when "Man told to take more care" should appear in the accident report.

However, on the plant concerned they were not satisfied with this easy way out. They looked into it more thoroughly. They asked the injured man why he had not used the handrails.

It then came to light that the handrails were covered with plastic, and that when anyone wearing insulated footwear used them he got an electric shock when his hand touched bare metal. As he ran his hand along the plastic coating he became charged, and as soon as he touched a piece of bare metal an electric spark jumped from him to the metal. The spark, of course, was not serious enough to cause any injury, but it was unpleasant, and people tended, therefore, not to use the handrails.

Reminder: Newsletter 51/8 described another accident which at first sight we could do nothing about — a man hurt his back while removing some bolts.

81/8 TODAY AN OPTIONAL EXTRA, TOMORROW UNIVERSAL

In safety the new idea, the optional extra, becomes in time universally accepted, for example, for many years now no-one would ever think of installing a pressure vessel without a relief valve.

Other examples are provided by the history of the motor car. I have been reading "The Woman and the Car— a chatty little handbook for all women who motor or want to motor", by Dorothy Levitt, originally published in 1909 and recently re-issued by Hugh Evelyn. When the book was issued rear mirrors, windscreens and speedometers were all optional extras.

"The mirror should be fairly large to be really useful, and it/s better to have one with a handle to it. Just before starting take the glass out of the little drawer and put it into the little flap pocket of the car. You will find it useful to have it handy — not for strictly personal use, but to occasionally hold up to see what is behind you"

"A folding glass screen, with nickel or brass fittings, framed in stained wood, will cost £10."

"A speedometer is a very interesting accessory which tells you exactly the pace at which you are travelling

Some of the optional extras and practices recommended at the time have not become generally adopted.

"If you are going to drive along the highways and byways, it might be advisable to carry a small revolver".

"If you stop the night at a friend's house and your car is placed in your hostess's garage, you will find it spick and span in the morning with water in the tank and your petrol-tank also replenished."

Membership of the AA is recommended, but not for the same reason as today.

"It *is an association formed for the purpose of placing scouts on the different main roads to warn motorists of police traps".*

Which of the optional extras of today, used by some companies, but not by others, will be universal tomorrow. Will everyone use gas detectors — or will our plants be so reliable that they never leak and the need has passed; I think not. Will every company fit remotely operated emergency isolation valves and vapour de-pressurising valves on their plants?

What extras do you think will become universal?

81/9 SOME QUESTIONS I AM OFTEN ASKED

16— WHY DON'T "THEY" DO MORE ABOUT SAFETY (OR PLANT TIDINESS OR TRAINING)?

If I am talking to an operator "They" are the foremen and plant managers;

If I am talking to a plant manager; "They" are the works managers;

If I am talking to a works manager.

The only possible answer to the question is that it is your job to "do something", not "theirs"; why don't you do more about safety (or plant tidiness or training)?

Did I hear you say you don't have the authority? Rubbish. The advantage of the ICI system of not having rigid job descriptions is that you are free to do more than you did last week; the job can grow.

Of course, I know there are some things you can't do. But you can persuade someone else to do them. Better still, start with the jobs you can do, and set "them" an example.

81/10 UNUSUAL ACCIDENTS NO 51

An electrician was working on cable repairs while protected from the weather by a tent and from the equipment by rubber matting.

A friendly dog entered the tent and licked the electrician's face; the man and dog received an electric shock and the dog took off at high speed.

The electrician was unhurt until the dog returned and bit him.

From the "Electrical Times".

81/11 RECENT PUBLICATIONS

(a) Report No HO/SD/740009/4A, available from Division Reports Centres, reproduces the papers and discussion at an ICI Symposium held earlier this year on the application of quantitative methods to safety problems we cannot do everything at once, so how do we decide what to do first? There are papers on risks to employees, the public and customers, pollution and health are considered as well as accidents, two problems are considered in detail and there are papers on human error and data collection.

(b) Report No HO/SD/740009/5A, also available from Division Reports Centres, reviews the methods available for assessing the dispersion of vapours from “Vents, leaks and spills” and the consequential hazards such as explosion damage.

(c) Roger Strehlow, author of the well-known paper on “Unconfined Vapour Cloud Explosions” (see Newsletter 60/6) has now, jointly with Wilfred Baker, written a 90 page review of the present state of knowledge on explosions of all sorts chemical and physical, confined and unconfined.

For a copy of (c) or for more information on any item in this Newsletter please ‘phone E.T. (Ext. P.2845) or write to her at Wilton. If you do not see this Newsletter regularly and would like your own copy, please ask Mrs T to add your name to the circulation list.

Our 1976 Safety Calendar has now been published and copies are available from Mrs T.

November 1975