

# IMPERIAL CHEMICAL INDUSTRIES HEAVY ORGANICS DIVISION

## SAFETY NEWSLETTER NUMBER 25

By Trevor Kletz

### 25/1 PERMITS-TO-WORK

Several recent incidents have shown that on some Works there may be a need for some changes in the instructions on Permits-to-Work.

(a) In the first incident a job had to be done on a control valve. It was a quick job and so it was decided to isolate the control valve by locked valves and not fit slip-plates. The isolation valves on each side of the control valve were closed, the control valve was drained and a permit was issued. The fitter removed the base plate from the control valve and soon afterwards hot oil came out. One of the isolation valves had not been fully closed — as could be seen from the length of spindle showing — but the valve had been blocked by debris. While the fitter was working on the valve the debris suddenly cleared.

If the valves isolating a piece of equipment cannot be fully closed then slip-plates should be fitted even though the job to be done is a quick one.

(b) Sometimes when the drain valve on a piece of equipment is opened, only a little oil comes out. Is the equipment completely drained? If there is any doubt, you prove that the drain is clear by cracking open one of the isolation valves.

(c) Another change in Permit-to-Work procedures concerns work in switch-houses. Process supervisors do not know a lot about the electrical equipment in switch-houses and cannot decide what precautions should be taken. In such cases the accepting authority should decide what precautions are necessary and the following statement should be written on the Permit: "The accepting authority is the competent person to decide the precautions to be taken".

### 25/2 WHAT SORT OF GASKETS SHOULD WE USE IN FLANGED PIPES?

There have been several leaks recently on lines carrying hot petrol or similar materials and in each case the report has recommended the use of 'Metaflex' or 'Graphitoil' gaskets instead of compressed asbestos fibre ones. Compressed asbestos fibre gaskets are subject to "blow-outs" between bolts and thus substantial leakage of hazardous materials can occur. Leakage from Metaflex gaskets is also possible but "blow-outs" cannot occur and hence the quantity of leakage is much smaller.

The latest Engineering Department Specification (PD5) states:

"Compressed asbestos fibre gaskets to BS 1832, 'Oil resistant compressed asbestos fibre jointing' shall be used for all Class 150 steam, utility and process duties with the exception of Class 150 caustic, Thermex, high temperature gas, hydrogen duties or other particularly hazardous duties which shall have spirally wound gaskets.

Spirally wound gaskets to BS 3381 'Metallic spiral wound gaskets for the petroleum and petrochemical industry' shall be used for all Class 300 and above steam, utility and process duties and also for the exceptions listed above."

There are many old plants on which compressed asbestos fibre is used although the specification would now call for spirally wound gaskets. Wholesale replacement is out of the question but when joints have to be remade, a change to spirally wound gaskets should be seriously considered.

### 25/3 INERT GAS CAN KILL

Newsletter 22, Item I described how a man was affected by inert gas coming out of the open man-hole on a vessel. The item was headed, "LEAKING NITROGEN CAN KNOCK YOU OUT". Now another Division has described how a man was working near the open man-hole of a vessel containing inert gas (he was about to replace the manhole cover) when he fell in and died before he could be rescued. Whenever possible, men should not work near open manholes on vessels containing irrespirable or poisonous atmospheres. If work must be done near an open manhole in these circumstances then special precautions should be taken to prevent anyone falling in. If the vessel had contained poisonous gas more precautions might have been taken. Does everyone on your plant realise that inert gases like nitrogen and carbon dioxide can kill?

Whenever possible vessels which contain inert gas should be purged with air before anyone opens a top manhole (occasionally this cannot be done, for example because a catalyst has to be protected by inert gas.)

In the case described by the other Division, rescuers had difficulty getting through the man-hole with an ordinary Normalair rescue set.

In HOC Division we have a number of special Normalair sets on which the air cylinder is fitted with a carrying handle and a long length of hose connects the cylinder to the face-piece. A rescuer can go into a vessel wearing a facepiece and leaving the cylinder outside.

It is worth checking up to make sure you have enough of these.

The full report on the fatal accident (No. D.75079/B) can be borrowed from Division Reports Centres.

#### **25/4 LAY CABLES ABOVE OR BELOW THE GROUND, BUT NOT ON IT**

A small fire occurred in a pipe trench because electric cables, lying on wet ground, had been attacked by some oil which was present on the surface of the water.

Cables should either be buried or supported clear of the ground. If they are buried the type of insulation must be chosen so that it will stand up to any chemicals that may soak into the ground. (See item 26/3)

#### **25/5 IS YOUR ELECTRIC TRACE HEATING FITTED WITH EARTH PROTECTION?**

An explosion occurred recently in a fuel oil tank belonging to another Division. A fault occurred in the electric trace heating on the fill pipe and the pipe got so hot that some of the oil was vaporised and ignited. The report recommends that all electric trace heating should be fitted with earth leakage protection. The HOC electrical design engineer supports this recommendation.

#### **25/6 DETECTION OF CARBON MONOXIDE**

Sieger combustible gas detectors are used extensively in the Division to detect leaks of flammable gases. They can detect 5 % of the lower explosive limit, with a full scale deflection at 100 % of the lower explosive limit.

The gas detectors are also being used to detect leaks of carbon monoxide.

The toxic limit model that is used can detect down to 100 ppm, with a full scale deflection at 1000 ppm.

One of these instruments is installed, for example, in an analysis caravan where carbon monoxide is handled. At 100 ppm an alarm light comes on and at 400 ppm an alarm sounds and the power and carbon monoxide sample are cut off. The alarm also sounds in the next building.

The detector operated recently 'in anger' when a leak occurred.

The Sieger detector is more sensitive than a canary. 400 ppm of carbon monoxide will not affect a canary but it will make a man feel ill if it is breathed for 40 minutes.

The disadvantage of the toxic limit detector is that it will detect small amounts of other flammable gases which may not be toxic — but it is useful to know that they are leaking.

#### **25/7 A LEAK IN A PIPELINE**

A bad leak occurred in an inter-Works pipeline. It was due to external corrosion - the result of laying the pipeline on the ground.

The metallurgist's report recommends, "Lines should not be laid along the ground unless a relatively short life is acceptable".

#### **25/8 CALCIUM OXIDE**

Newsletter 24, Item 7, reported that several glass bottles containing calcium oxide had exploded. We now think we know the cause—the calcium oxide had absorbed moisture, forming calcium hydroxide, and this led to an increase in volume.

#### **DO NOT STORE CALCIUM OXIDE IN GLASS BOTTLES.**

#### **25/9 SAFETY SURVEYS**

The purpose of this item is to tell you what we have done in HOC Division about safety surveys.

We have two safety surveyors for the Division (and another two for the Wilton site). Their job is to go round the works looking at particular subjects in depth and suggesting ways in which plant or methods might be changed. So far the HOC surveyors have looked at electrostatic hazards, the testing of alarm and trip systems, the filling of road tank wagons, sampling, and the registration and inspection of relief valves, flame traps and vents.

The surveyors are not policemen who want to catch you out and tell the boss. They want to help you by pointing out hazards which you would like to know about but may have missed due to overfamiliarity, pressure of work, or perhaps because you did not know they were hazards. In fact the surveyors have always been welcomed by people on the Works.

The survey reports are normally circulated only to the Works concerned. If you work on an HOC Works we can let you have reports on any of the subjects listed above, for your Works. We have also prepared a few summary reports which are available generally — Safety Note 69/11 on electrostatic hazards, Report 0.200 669/A on the testing of alarms and trips (available from Division Reports Centres), and Safety Note 70/19, Part I on the filling of road tank wagons.

A couple of special survey reports have been prepared by senior engineers seconded for the purpose. Report No. 0.21 110/B describes a survey of the maintenance of electrical equipment for use in hazardous areas and Report No. 0.21 182/B describes a survey of the registration and examination of pressure vessels and relief valves. Both are available from Division Report Centres.

Some ICI Divisions are carrying out audits instead of surveys. An audit is a quick look at everything on a plant, a survey is a thorough detailed look at a particular activity or type of equipment. There is room for both, though in HOC we feel that on the whole surveys are the 'Best Buy'.

#### **25/10 DAMAGE CONTROL**

What is Damage Control?

"The child that burns itself learns not to touch flame, and grown-ups in industry investigate all serious injuries to learn how to stop them happening again. But the child's experience of fire teaches it nothing useful about an acid burn. If, however, we see from spots on the carpet that the child has begun playing with acid there is a chance we may be in time to prevent it being burned in this new way.

The near-misses, the spots spilled on the carpet instead of on the skin, point to the kind of injuries which may happen in the future. Most often such slips are over in a second and forgotten as soon as the man who nearly caught it has recovered his breath. But some leave a trace, when whatever misses the person comes to land, in the damage it does to plant and equipment. Investigate these damage-only accidents as you do the ones that cause injury and you are widening your investigation of what may happen in the future, for none can tell which near-misses will be repeated, with someone in the way.

This is done by asking supervisors to report damage in the same way that they report injuries, and on almost the same form".

From "Safety" the accident prevention magazine of the British Steel Corporation, November 1970

#### **25/11 RECENT PUBLICATIONS**

- (a) "Recommended Code of Practice for Operation of Diesel Engines in Areas Where Flammable Vapour May Be Present", available from Miss E. Crane, Services Works, Wilton (W.6963).
- (b) "Putting Knowledge to Use", a reprint of an article from "Education in Chemistry" describing the Division's safety discussions.
- (c) A description, by George Barker, of the glands recommended for hydrocarbon pumps and, in particular, of the methods used for venting gland leaks to a safe place.
- (d) A red "souvenir programme" for all those who attended the discussions held at Billingham in 1970 on the overpressuring of vessels. Let us know if you came to one of the discussions and have not received the red booklet.
- (e) A bibliography of reports on high integrity protective systems.
- (f) "An example of the Quantitative Evaluation of a Risk which affects the Population at Large: The Height of Storm Dikes in the Netherlands", Report No. 0.200,685/A, available from Division Reports Centres.
- (g) "Repair and Demolition of Large Storage Tanks", Technical Data Note 18, available from the Factory Inspectorate. This is a useful review of the various methods that can be used but please remember that in HOC Division flammable concentrations of gas must not be removed by blowing with air.

For copies of (b) — (e) or for more information on any other item in this Newsletter, please write to Miss M. N, Organic House, Billingham or 'phone 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.

Finally, a date to mark in your diary. The Institution of Chemical Engineers is holding a Symposium on Loss Prevention in the Process Industries at Newcastle upon Tyne from 6—9 July 1971. Details from Miss G. A. M or from Frank Hearfield, Nylon Works, Wilton (N.247).

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