

IMPERIAL CHEMICAL INDUSTRIES HEAVY ORGANICS DIVISION

SAFETY NEWSLETTER NUMBER 6

By Trevor Kletz

6/1 PNEUMATIC CUTTER GRINDERS AND THE ISOLATION OF EQUIPMENT FOR MAINTENANCE

In Newsletter No. 2 I said, "Sparks produced by cutter grinders are not usually considered hot enough to ignite an explosive mixture of gases other than hydrogen. Nevertheless sparks from a pneumatic cutter grinder recently ignited some oil soaked ground Cutter grinders must now be considered a serious source of ignition".

A report on a fatal accident in another firm makes the same point. A reactor had been prepared for maintenance and washed out. There was no welding to be done and no entry was required, so it was decided not to slip-plate off the vessel but to rely on valve isolations. Some flammable vapour leaked through the closed valves into the vessels and was ignited by a high speed abrasive wheel which was being used to cut through one of the pipe-lines attached to the vessel. The reactor head was blown off and killed two men. It was calculated that 16 lb. of hydrocarbon vapour could have caused the explosion.

Following the accident, demonstration cuts were made in the workshop and it was found that as the abrasive wheel broke through the pipe wall a small flame occurred and the pipe itself glowed dull red.

The accident could have been prevented by the H.O.C. policy of isolating by slip-plates, or other positive means, items of equipment on which Maintenance are working, unless fitting the slip-plates will take as long and be as hazardous as the main job.

6/2 TRAPPED PRESSURE

Even though equipment which has been given to Maintenance is isolated by slip-plates and the pressure blown off through valves or by cracking a joint, there may still be trapped pressure elsewhere in the equipment. During the last few weeks three men have been injured on Teesside by pressure trapped in this way.

The first case occurred on an all-welded line. The valves were welded in and to clear a choke a fitter removed the bonnet and inside of a valve; he saw that the seat was choked with solid and started to chip it away. As he did so a jet of corrosive chemical came out under pressure from behind the solid, hit him in the face, pushed his goggles aside and entered his eye.

In the second case an old acid line was being dismantled. The first joint was opened without trouble but when the second joint was opened acid came out under pressure and splashed the fitter and his mate in the face. Acid had attacked the pipe, building up gas pressure in some parts and blocking it with sludge in others.

In the third incident, a joint on an acid line, known to be choked, was carefully broken, but only a trickle of acid came out. More bolts were removed and the joint pulled apart, but no more acid came. When the last bolt was removed and the joint pulled wide apart a sudden burst of pressure blew acid into the fitter's face.

In all three cases the lines were correctly isolated from operating equipment; the Permits-to-Work specified that goggles should be worn and stated "Beware of trapped pressure".

The only way of avoiding injuries of this sort is to use protective hoods or updraught helmets when breaking joints on lines which are liable to contain corrosive liquids trapped under pressure, either because the pressure cannot be blown off through a valve or because lines are liable to contain solid deposits.

6/3 FAULTY EXPLOSIMETERS

Our Workshops have warned me that many of the explosimeters which are brought in for overhaul are found to be faulty. This means that if an explosive mixture had been present they would not have detected it. Before using an explosimeter the operator should check it on a sample of fuel gas or some other process material to make sure that it is working correctly. Is this in your plant instructions and do all your operators understand the reason for this precaution and carry it out?

6/4 ELECTRIC WRIST WATCHES

I have been asked if electric wrist watches can be used in no smoking and de-matching areas. The answer is "Yes". They are quite safe.

6/5 FILLING LPG TANKERS

When tankers are filled with LPG and similar low-boiling materials the vapour is vented to a stack or back to the plant through a vapour return line which is fixed to the top of the tanker. The Annual Report of the Inspectors of Explosives for 1967 describes a fire at a large oil refinery which occurred because the fillers had not bothered to connect up the vapour return lines and were venting tankers to atmosphere. Seven men were severely burnt.

Within the last few weeks it has been found that the fillers on a H.O.C plant were also forgetting to connect up the vapour lines.

On another plant the vapour line was connected in error to another filling line instead of the vapour return line. As a result while the tanker was being filled the filling flex burst. There were no excess flow valves on either the filling line or the tanker and so considerable quantities of liquid were spilled before the tanker and filling line could be isolated. The report on the incident recommends that excess flow valves are fitted and that the vapour return lines are fitted with a different type of coupling to the filling lines.

6/6 LABELLING OF ROAD TANKERS

When road tankers carry flammable substances it is now necessary by law for the name of the product to be displayed on the sides of the road tank wagon.

It is the standard practice in H.O.C. Division to display the name of the material (together with an emergency telephone number and some brief instructions on the action to be taken if a fire or spillage occurs) on the sides and back of the vehicle. We should certainly continue to do this, as if a tanker falls on its side one of the side notices is underneath, the other is up in the air and neither can be seen. This happened in two incidents recently. An ethylene tanker (not I.C.I.) crashed into Dewsbury Town Hall last year and fell on its side. Although the word "Ethylene" was printed on its side in letters about one foot high, these could not be seen and the police and fire brigade did not know what was in the tanker as the driver was dead.

The other incident occurred a few months ago when a phenol tanker (again not I.C.I.) crashed near Penrith, and again the driver was killed. The back of the tanker was labelled "Phenol" but the telephone number was displayed only on the sides. As a result there was many hours delay before the firm concerned was notified.

In this incident the tanker split in four places as a result of the crash. Sixteen tons of phenol was washed into a nearby stream. Farmers were warned not to allow their animals to drink from the local rivers.

6/7 THE TOP BLOWS OFF A UNION BONNET VALVE

A plant was being pressured with ethylene. When the pressure reached 500 psi a bad leak developed on a 4-inch Union Bonnet needle valve made by the Clockhouse Engineering Co. When the valve was touched the bonnet blew off completely. The jet of vapour was 4 or 5 feet long, but fortunately it did not fire.

The body of the valve was welded into the pipe-line and the moving parts had been removed during welding. When the valve was re-assembled the union was screwed on two turns only, possibly because the valve was re-assembled with the moving parts in the closed position. The valve must be re-assembled with the moving parts in the open position, and this should be made known to men who may have to re-assemble these valves.

On the plant concerned the unions on all similar valves have been secured by a locking nut or by spot welding.

6/8 EXERCISING EMERGENCY VALVES

When a leak occurred recently the operators tried to shut an emergency valve which had been installed solely in order to isolate the leaking pump from a distance if a leak occurred. It was found to be very stiff and hard to operate and was closed only with difficulty.

It is good practice to exercise emergency valves regularly, say every Sunday morning. If the valve cannot be closed without upsetting the process, it is often possible to partially close it; particular attention should then be paid to exercising it at shut-downs.

6/9 SAFETY TRAINING

The Chemical & Allied Products Training Board has now published details of the grants it will give to industry. To qualify for a grant, training, courses in general must last three or more days (though the three days need not be continuous). An exception has been made, however, for short courses dealing with Safety, Health, Fire Prevention, and First Aid. There is no time limit for these courses and even training sessions of an hour or half-an-hour can qualify for grants. Records should, therefore be kept of all men attending training sessions of this sort so that claims can be made.

6/10 TANK VENTS

In Newsletter No. 5, Item 2, I said "If the tank contains flammable vapour so that a flame arrestor has to be fitted in the hole then the ideal arrangement is one in which the flame arrestor can be lifted out by hand and both the vent and the flame arrestor seen to be clear".

Somebody has pointed out that if the flame arrestor is easy to remove it may be removed and not put back. I feel that the system described is better than relying on fitters to remove flame arrestors because then inspections may be delayed by pressure of work. But if flame arrestors can be lifted out it is important not only to have a regular checking procedure to ensure they are clear and in position - preferably with a check-list that is ticked off by the inspector - but there should also be a rule that flame arrestors must not be removed from the tank altogether without a permit to work or some similar authorization.

6/11 OIL AND THE SKIN

The Annual Report of the Chief Inspector of Factories for 1967 contains a chapter on "Oil and the Skin" (pp. 105—115) which should be read by all managers responsible for plants on which residual oils or heavy oils of any sort are handled.

Oils can harm the skin in two ways. They can cause dermatitis and, if contact is prolonged, they can cause cancer. Regular contact of residual oils or tars with the skin should be avoided, and oil which does get on the skin should be washed off. Any men who regularly get residual oils or tars on their skin and will not use gloves should be considered for transfer to other jobs.

There is nothing, of course, particularly dangerous about any of the residual oils used in H.O.C. Division, but as with all tars, residual oils and heavy oils, prolonged contact with the skin should be avoided.

The hands are the parts of the skin most easily contaminated but dirty overalls and oil-soaked rags pushed into pockets can contaminate the other areas, particularly the scrotum.

There is a Factory Inspectorate leaflet on Dermatitis (SHW 367) which should be displayed in workshops and control rooms.

6/12 LACK OF TRAINING AND BAD DESIGN CAUSE A MAJOR FIRE

The official report on a fatal accident and fire at Esso's West London terminal on 1st April 1967 makes interesting reading. Automatic equipment had recently been installed for loading road tankers. The grade and quantity required was set on a meter; the driver inserted a card which indicated that he was authorised to draw product and then pressed the start-button; an automatic valve then opened and closed when the required quantity had been delivered. The filling arm had first to be lowered as the pump was started by a switch attached to the arm.

A manual valve was installed in each filling arm for use when the automatic equipment was out of order. To use the manual valves the automatic valves had first to be opened and this was done by

operating a series of special switches in the Control Room. These were kept in a locked cupboard and a notice on the cupboard door reminded the operators that before they opened the automatic valves they must first check that the manual valves were closed.

On the day of the fire the automatic equipment broke down and the supervisor decided to change over to manual filling. He asked the drivers to check that the manual valves were shut and then operated the switches to open the automatic valves. Some of the manual valves were not closed and petrol and other products came out of the filling arms and either overfilled the tankers or splashed directly on the ground. The petrol caught fire and as a result three men were killed and eleven injured and the whole row of eighteen filling points was destroyed.

The report includes the following:

“The decision to override the individual controls on the loading arms by means of a central switchboard, without the most rigid safeguards, was a tragic one. After its installation an accident from that moment on became inevitable sooner or later”.

“That this switchboard was installed, with the approval of the terminal management and with the knowledge of the Company’s Safety Officer, in a switch room from which the loading stands were not visible, suggests some failure to take into account the basic fundamentals of safety in operation of plant”.

“It would have been expected that the installation of sophisticated equipment would have demanded concurrently an organised system of training for all personnel ... On occasions even when training sessions were arranged no-one turned up, as personnel were unable to be spared from the daily operational tasks of the Terminal”.

“..... had the same imagination and the same zeal been displayed in matters of safety as was applied to sophistication of equipment and efficient utilisation of plant and men, the accident need not have occurred”.

“Some very curious beliefs were expressed to me during the course of the enquiry, notably by drivers. It would seem, therefore, to be of advantage to give all personnel some instruction in the properties of highly inflammable liquids, in the hazards to which they give rise and how they can be minimised. This would lead to a better understanding of the rules which are laid down to ensure safety in handling these liquids, and would probably promote a better acceptance and observation of the rules to the increased safety of all concerned.”

“Managerial instructions - Many of these, of necessity, have to be issued to staff. As the control staff are very busy people it would help in their control of plant, and have an influence on safety, if all instructions were codified and put in ready reference files so doing away with the bundles of unsorted documents that were handed to me for study”.

“Some systems of regular supervision of operations and regular inspection of equipment and services should be instituted in order to maintain proper safety standards’.

The whole report makes interesting reading for anyone interested in the way that accidents arise. It is published by H.M.S.O. and costs 9/-. In particular pp. 19 onwards should be read by all managers responsible for the operation of tanker filling points. They contain many detailed recommendations on the design and operation of these installations.

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