

IMPERIAL CHEMICAL INDUSTRIES PETROCHEMICALS DIVISION

SAFETY NEWSLETTER NUMBER 43

By Trevor Kletz

43/1 DAMAGE CONTROL

Damage Control has been mentioned before in these Newsletters; see Newsletter 25, Item 10.

The essence of damage control is that attempts are made to report every incident that causes damage to plant or loss of material, however small.

We have always investigated accidents that cause injury.

During recent years we have been reporting more and more of the incidents that cause damage — but only the bigger ones.

Now one section of the Division has decided to go a step further and report and cost all incidents that cause damage or loss of any sort — Total Loss Control. The number and cost has surprised them.

Last year the incidents that were reported cost the Works concerned £25,000, including consequential losses. They guessed that if they included the unreported incidents the total would be about twice this — £50,000.

The first two months of Total Loss Control has shown that the real loss is probably about £350,000 per year!

You may be losing money at the same rate. The first step in Total Loss Control is to find out where and how the money is being lost. Then it may be possible to do something about it.

If you are interested I can put you in touch with the people who are carrying out the experiment.

43/2 ISOLATION OF EQUIPMENT FOR MAINTENANCE: ISOLATION VALVES MUST BE LOCKED SHUT AND DRAIN VALVES LOCKED OPEN

A pump needed repair. The job was a quick one so it was decided not to slip-plate it off but to rely on valve isolations. The suction and delivery valves were closed and locked off. The drain valve was opened. Twenty minutes later two men started work on the pump. They unbolted the cover and as they removed it they were sprayed with liquid.

Fortunately some other men were working nearby. They helped the injured men under a shower and fortunately their injuries were slight. Afterwards it was found that somebody had closed the drain valve. Either the suction valve or the delivery valve was leaking and this allowed the pump to fill with liquid.

Obviously the drain valve should have been LOCKED OPEN.

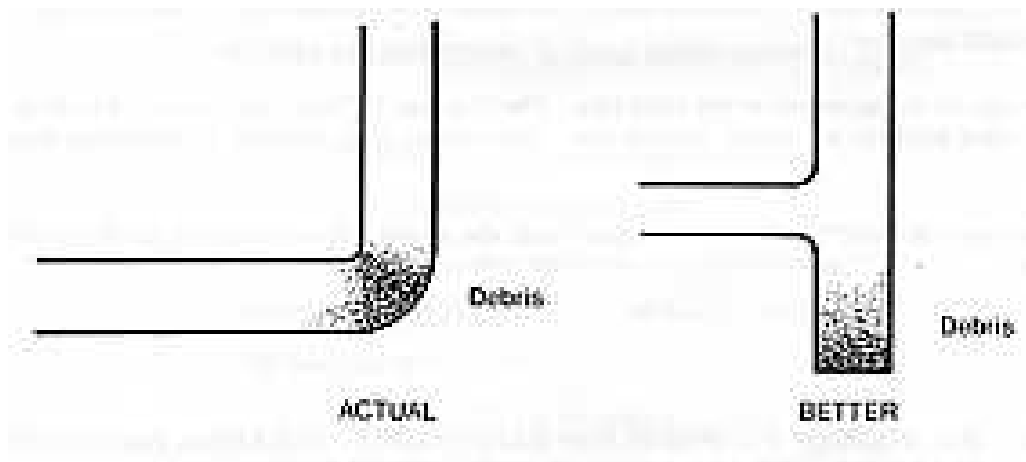
This incident is rather similar to a serious fire which occurred five years ago in which three men were

killed. (The fire is described briefly in Newsletter 27, Item 6 and Newsletter 11, Item 2 and more fully in Report No.0.21,100/B). Maintenance workers were dismantling a pump; when they removed the cover, hot oil, above its auto-ignition temperature, came out and caught fire — the suction valve on the pump was open and the drain valve was shut. Following this fire we decided that before any joint is broken, even to insert a slip-plate, the valves isolating the equipment must be locked shut with a padlock and chain. It is equally important that drain valves are LOCKED OPEN.

Even if the drain valve on a piece of equipment is locked open, the drain valve may be choked so the equipment should still be dismantled with care. Do not remove all the bolts at once, but slacken the bolts furthest away and release any pressure that is trapped.

43/3 A CHOKE IN A FLARE STACK

A high pressure in a vessel was found to be due to a choke in a 14" diameter flare stack, caused by a deposit of refractory debris from the tip. The flare stack had no boot at the bottom to catch debris.



A contributory factor was the cementing of the debris together by ice — condensate from the steam sparge pipe at the top of the stack found its way down the stack and was frozen by cold gas.

Any similar flare stacks should be modified so that there is a boot to catch the debris.

On stacks which handle very cold gas, the use of steam should be kept to a minimum when the flare rate is low. At high flare rates the upward flow will prevent condensate travelling down.

Earlier Newsletters have described other ways in which flare or vent stacks have been choked:

- (a) By passing steam and cold gas along the same pipe (see Newsletter 12, Item 4g).
- (b) By discharging materials such as benzene or cyclohexane which freeze or very thick oils which set solid (see Newsletter 31, Item 3). Steam has frozen in very cold weather (see Newsletter 12, Item 4g).
- (c) By not supporting the vent pipe sufficiently so that it sags in a fire (see Newsletter 41, Item 7).
- (d) By the choking of molecular seals (see Newsletter 7, Item 3).
- (e) By allowing a dip in the pipe where liquid can accumulate.

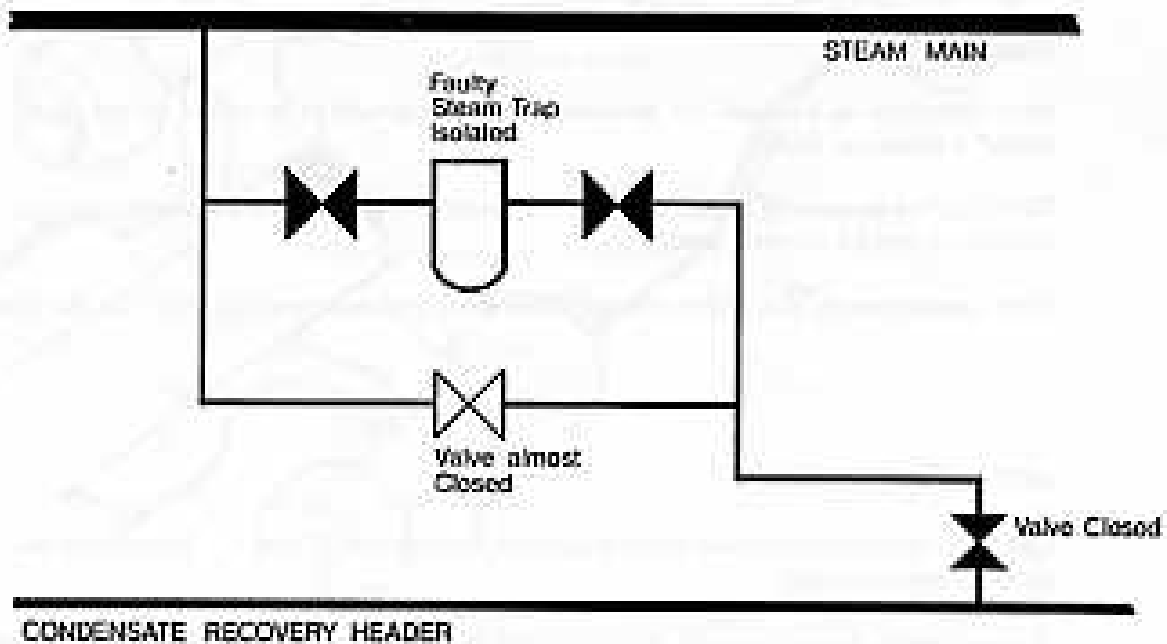
43/4 A STEAM MAIN EXPLODES

A 10" diameter steam main operating at 600 psi suddenly ruptured, injuring several men. The failure

occurred because the main was grossly overstressed by water hammer.

The incident occurred soon after a shut-down. The main had been up to operating pressure for several days but there was no flow along it. The failure occurred while the operators were starting the flow of steam.

The steam trap was known to be faulty and had been isolated for maintenance. It is believed that the amount of live steam entering the condensate recovery system had made it necessary to gag the remaining valves to the point of closure. The arrangement is shown below.



Condensate had thus accumulated in the steam main. When a flow of steam was started this caused the condensate to move with very great force, fracturing the main.

A full report of the incident, No. 0.200,760/A has been issued and may be obtained from Division Reports Centres. A number of recommendations are made about steam trapping on steam mains and the report highlights the hazards of steam mains with no flow and of operating with pressurised condensate recovery systems.

43/5 EYE PROTECTION IN LABORATORIES

For some years spectacles (or other eye protection) have been worn at all times in the Division's laboratories.

The wisdom of this rule has been demonstrated by a recent incident. A rubber tube, which had been used to join two parts of a vent line together, came off the main pipe. A man who had entered the laboratory without wearing spectacles was sprayed with corrosive chemicals in the face and eyes. His eyes were washed out at once and he was later sent to hospital where he was detained for ten days. Fortunately, his eyes have not suffered any permanent damage.

43/6 A VALVE ARRIVES IN THE WORKSHOP FULL OF LIQUID

While a valve was being dismantled in a workshop some liquid came out and the smell was so bad that the workshop had to be evacuated. There was a warning label on the valve but, as the report states, "nearly all labels warn of a hazard that is rarely met and this leads to complacency"

What procedure do you have for decontaminating equipment to be moved off the plant, before it leaves the plant?

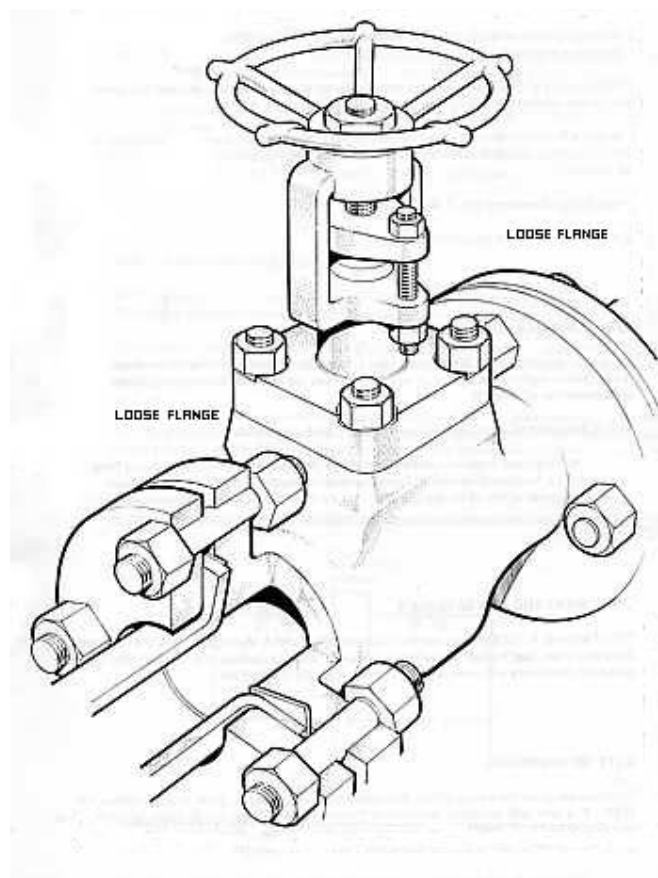
What method do you use to warn the men receiving the equipment that despite your precautions it may be contaminated?

What precautions do you take in the workshop when you receive equipment from the plant?

43/7 LOOSE FLANGES

I am sorry there was a mistake in the diagram in Newsletter 42, Item 4. The correct diagram is shown opposite

If loose backing flanges are used, then when the bolts are slackened there is nothing to hold the valve in position, and it can swing over, injuring anyone who happens to be in the way.



43/8 THREE YEARS AGO — AND TODAY

“A level indicator on a still base was reading ‘empty’ although there was ample evidence that there was a level in it.

“Radiography of pipe-welds was in operation 70 yards away from the still and the gamma-ray source was shining in the direction of the still detector.

“Before a Permit-to-Work is issued to carry out any radiography, the issuing supervisor should therefore check round to see if there are any radioactive instruments in the-area which might be affected.”

From Safety Newsletter No. 8, March 1969

Another such incident occurred recently.

43/9 UNUSUAL ACCIDENTS NO. 13

On several occasions these Newsletters have stressed the importance of isolating sources of power before working on a piece of equipment. See for example, Newsletter 37, Item 2(c) and Newsletter 42, Item 2.

This is illustrated by a report in "The Guardian" for 8 July 1972.

"A fairground engineer escaped with minor back and leg injuries after being fired from a fairground cannon at Loughborough yesterday. He was half-way down the barrel of the 16 ft. cannon adjusting the mechanism when it accidentally went off".

43/10 WHAT THE LAW SAYS NO.4

"The Factories Act is there not merely to protect the careful, the vigilant, and the conscientious workman, but, human nature being what it is, also the careless, the indolent, the inadvertent, the weary and even perhaps in some cases the disobedient".

43/11 40 YEARS AGO

Someone has given me a copy of the Billingham Safety Handbook, given to all employees in 1929. It is very well produced with lots of illustrations but there are 96 pages which suggests that people had more time for reading then than they do now. Most of the advice is very good, has not dated and is equally applicable today. For example:

"Do not rely absolutely on a gasholder valve or any other valve for that matter, a slip-plate should be inserted"~

We introduced this rule after a serious fire in 1967. Apparently it existed in 1929 but had lapsed.

However, one page of the 1929 safety handbook now seems very quaint. This is a section headed "Keep Fit" and it reads as follows:—

- 1 Eat good wholesome food. Include fruit and vegetable. DONT EAT BETWEEN MEALS
- 2 Get enough sleep — at least eight hours. Avoid extreme fatigue. Stay at home sometimes instead of going to every cinema and dance.
- 3 Take up some form of sport. It is the easiest way to mental and bodily fitness
- 4 A cold sponge bath every morning, followed by vigorous rubbing with a towel, will harden you against colds.
- 5 Avoid constipation.
- 6 Use toothbrush and mouth wash daily

43/12 RECENT PUBLICATIONS.

- (a) Report No.0.21,402/1/B!, available from Division Reports Centres, describes 20 explosions in hydrocarbon oxidation plants, including explosions caused by the decomposition of the products of oxidation.
- (b) Report No. 0.200,761/A, available from Division Reports Centres, describes a simple example of the application of logic trees to quantitative safety assessment. It includes an estimate of the time required for the study.

- (c) Incidents in the Oil Industry No. 6, sent to us by one of the major oil companies, will interest all those concerned with storage, tanker filling and emptying, and jetties. In one of the incidents described a quantity of petrol was lost because the drain valve had been removed from the tank compound. As the report states, a bund with holes in it is not much of a bund!
- (d) A note dated 18 July 1972 describes some accidents which have occurred recently during rigging operations.
- (e) A note dated 23 July 1972 describes methods of estimating the mass and velocity of the fragments formed when a vessel explodes.
- (f) An index to Newsletters 32—43

For copies of (c) — (f) 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.

August 1972