

**IMPERIAL CHEMICAL INDUSTRIES LIMITED**  
**PETROCHEMICALS DIVISION**

**SAFETY NEWSLETTER No. 54**

**54/1 A PUMP GETS TOO HOT**

Everyone knows that if a pump is allowed to run against a closed delivery valve it may get too hot.

Not everyone realises that the same thing can happen if the delivery valve is nearly closed or the flow is restricted in some other way. A pump designed for 10 tonnes/hour was used to pump liquid at a rate of less than ¼ tonne/hour. The pump got too hot, the casing joint sprang, and liquid leaked out and caught fire. See also Newsletter 56, item 3.

If a pump has to be operated at a very low rate a kick-back line should be provided.

**54/2 FOUR YEARS AGO — AND TODAY**

Newsletter 2, Item 1 (reprinted in Newsletter 41, Item 9) reported that two relief valves identical in appearance were removed from a plant during a shut down and sent to workshops for overhaul. One relief valve was set to operate at 15 psig and the other at 30 psig. The pressures were stamped on the flanges. The tie-on labels on the two valves became interchanged and the valves were installed wrongly.

Now another incident has occurred. While a plant was being brought up to pressure after a shut down a relief valve lifted. It was found that two relief valves had been removed during the shut down and then put back in the wrong positions. The valves look the same but the test pressures are stamped on the valve bodies.

The report on the incident recommends that relief valve locations should be marked on the relief valves and that after relief valves have been removed and replaced an inspector should check that they have been replaced correctly and record this in his log.

What precautions do you take to make sure that your relief valves cannot be replaced in the wrong position?

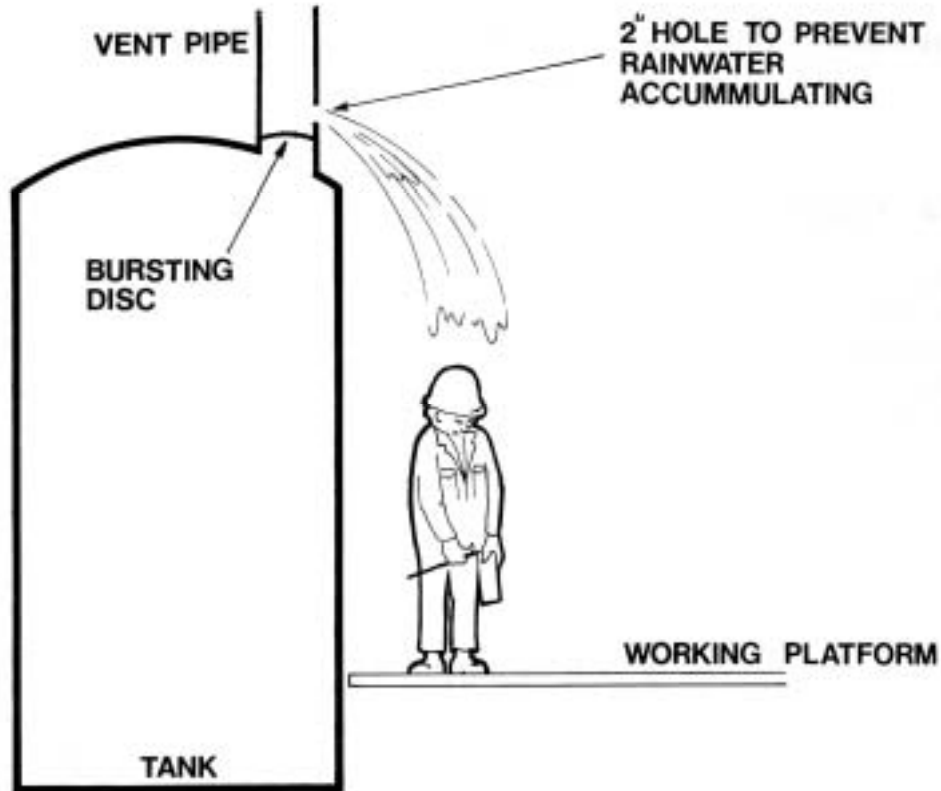
**54/3 A CHECK SHOWS THAT A RELIEF VALVE ORIFICE IS TOO SMALL**

A compressor had been extensively modified and was being put back into service for the first time. To check the adequacy of the relief valves the isolation valve on the compressor delivery was gradually closed. The final stage relief valve lifted at the correct pressure but the delivery pressure continued to rise and when it reached 20% above the design pressure the machine was shut down. A check then showed that the relief valve orifice had been machined 20% under the specified size and could not take the full flow.

An on-line test was carried out in this case because, for various reasons, it was difficult to be sure that the orifice size had been calculated correctly. Normally it is sufficient to check the size of the orifice (and to check that the set pressure is correct by a test in the workshops). The incident shows the need for a check.

**REMINDER:** Newsletters 15/3 and 18/4 described dangerous incidents which occurred because machines were supplied with relief valves that were too small.

**54/4 A HOLE IN A VENT PIPE LEADS TO AN ACCIDENT**

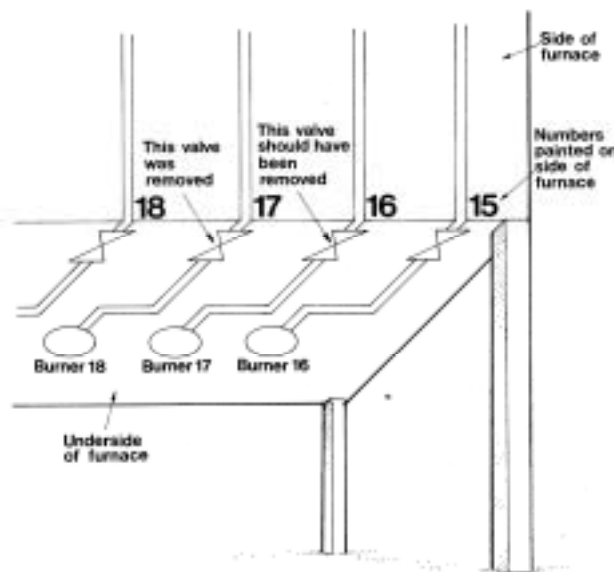


When the bursting disc burst, a corrosive liquid came out of the 2 inch hole onto the man on the working platform.

To be fair, the vent pipe was designed to pass vapour, not liquid, but the possibility of liquid passing might have been foreseen. Fortunately the vent pipe was big enough to take the liquid rate.

**54/5 POOR AND MISSING LABELS CAUSE ACCIDENTS**

Two accidents have occurred as a result of poor or missing labelling. In the first a man was given a clearance to change a valve on burner No. 17 on a multi-burner furnace. The burners are underneath the furnace and the number of each burner is painted on the side of the furnace, as shown below. As the numbers were painted on the furnace a numbered tag was not tied onto the valve.



However, the fuel oil valve to burner No. 17 is in line with burner No. 16 and the valve to burner No

18 is in line with burner No 17. The man, who was a stranger to the plant, removed the valve from burner No. 18.

This incident could have been prevented by tying a numbered tag on the valve to be changed.

The second incident occurred when someone opened the rear door of a container carrying bulk powder in a plastic bag. The weight of the powder resting on the doors caused them to burst open as soon as the latch was lifted and the man only escaped injury by leaping aside. The containers are supposed to have labels fixed to the doors pointing out that it is dangerous to open them. This container was not labelled. However, labelling alone is not sufficient to prevent incidents of this sort. Similar incidents have occurred on labelled containers. The doors should be fixed in some way, for example, with padlocks.

#### **54/6 WHAT WOULD YOU DO IF THE FIRE BELL RANG?**

A factory inspector rang the fire bell in a Teesside office block. Nothing happened until 2<sup>1</sup>/<sub>2</sub> minutes later when a secretary appeared and asked what the noise was.

The firm was fined £100 for failing to take effective steps to see that employees knew their fire drill.

*From the Middlesbrough "Evening Gazette" 13 June 1973.*

NOTE. In some office blocks the correct drill is to stay in your office until told to leave.

#### **54/7 OVER 30 YEARS AGO**

*No. 4 in a series describing some incidents which occurred in the early years of the Billingham factory.*

In November 1940 a fatal accident occurred in part of what is now Petrochemicals Division. Some liquefied petroleum gas was accidentally spilt and entered the drains. The gas came out at the oil/water separator and diffused into a closed pumphouse where it ignited. The source of ignition was never found.

The reports on the explosion (A.1 17,068 and A.1 17,072) made a number of recommendations on drainage and it is interesting to compare them with our present practice.

*1 Manholes on drains should be luted "to prevent gas being carried from one manhole to the next"*

We now fit lutes on every inlet to a manhole. This allows oil to pass through to the oil/water separator but prevents gas passing. If an explosion occurs in the drain it will be confined to the section between one manhole and the next and the lutes will prevent it travelling further along the drain.

On our latest plants the drains are fully flooded (surcharged) so there is no space for vapour to accumulate and it is impossible for an explosion to occur. This is the best system.

*2 Flammable vapours "may come out into an area where they are dangerous. We propose to seal manholes in all danger areas".*

Our practice now is to seal manhole covers and fit a tall pipe so that vapours are discharged about 15 ft. above ground level. If there is a structure near the manhole then the vapours are discharged at the top of the structure.

The vent pipes are fitted with flame traps and these should be inspected regularly to make sure they are not choked.

*3 Consideration should be given to "some kind of MSA alarm system in the drains and other places where hydrocarbon vapours may collect".*

It was many years before this recommendation became a practicable proposal but we now have many Sieger combustible gas detectors on our plants and there are a number in some of the main drains on the Wilton site.

How do you know if flammable liquids or gases get into your drains? Particularly drains which do not normally contain oil? Do you need any more gas detectors in your drains or at your oil/water separator?

- 4 *"We pointed out that this explosion had made us realise that a number of our buildings were not well situated, that no precautions had been taken to prevent hydrocarbon vapours entering buildings and that in only a few buildings was there any positive method of removing them. Thus it is very bad design for us to have put the storm water separator immediately adjacent to the cooling water pumphouse; and we shall now erect a low wall to prevent the possibility of vapours entering the doorways, and arrange ventilation so that if vapours do enter, they cannot collect in the well. We shall arrange ventilation in a number of other buildings, especially all the new control rooms which are like the demolished cooling water pumphouse, of Air Raid Precautions standard and have no ventilation as a (war) gas precaution. Trenches also must be protected from vapours descending into them"*

Nowadays electrical area classification identifies the areas where flammable gas or vapour may occur. Whenever possible these areas have open construction so that there is good natural ventilation. If equipment has to go into a closed building, we make sure that the ventilation is good enough to prevent gas diffusing in from outside and disperse any leaks that occur inside.

If you have any queries on drainage problems, advice can be obtained from A.W. Ext. B.3883.

#### **54/8 MR J.H.BANKS**

Jack Banks retired at the end of June after 34 years service, the last seven as Fire and Safety Officer at North Tees Works.

No one in the fire and safety field, in ICI or outside, has put more energy and enthusiasm into the job. His attitude is infectious and a day with him is a tonic for any safety man who is feeling bored or frustrated.

Jack has seen the Works grow and most of the early difficulties overcome. He went to a new site and leaves a keen and established team behind him.

Though retiring from ICI, Jack is not going to be idle and we wish him well in his new career.

#### **54/9 WHAT THE LAW SAYS NO. 11**

In *Uddin v. Associated Portland Cement Manufacturers Ltd.*, a workman in a packing plant went, during working hours, to the dust extracting plant — which he had no authority to do — to catch a pigeon flying around in the roof. He climbed a vertical steel ladder to a platform where he apparently leant over some machinery and caught his clothing on an unfenced horizontal revolving shaft, as a result of which he lost his arm. The trial judge found that the workman's action was the height of folly, but that the employer had failed to fence the machinery. The judge apportioned 20 per cent of the blame to the employer.

In upholding the award, Lord Pearce, in his judgement in the Court of Appeal, spelt out the social justification for saddling an employer with liability whenever he fails to carry out his statutory obligations. The Factories Acts, he said, would be quite unnecessary if all factory owners were to employ only those persons who were never stupid, careless, unreasonable or disobedient or never had moments of clumsiness, forgetfulness or aberration. Humanity was not made up of sweetly reasonable men; hence the necessity for legislation with the benevolent aim of enforcing precautions to prevent avoidable dangers in the interests of those subjected to risk (including those who do not help themselves by taking care not to be injured).

The accident in the pigeon case, it is true, would never have happened but for the unauthorised and stupid act of the employee. But then the accident would equally not have happened if the machinery had been properly fenced.

[Noted added later. The workman was not actuated by benevolence. He wanted the pigeon for the pot.]

*From the "Financial Times", June 1965*

#### **54/10 COMMENTS FROM READERS**

- (a) In Newsletter 49, Item 3, I suggested some ways of isolating pipelines in order to stop leaks or change valves. Several readers have suggested another method which can be used on low pressure gas lines. A special balloon, rather like a football bladder, is pushed through a hole in the pipe (if necessary a special hole is drilled) and then blown up with a pump, rather like a bicycle pump. After the job has been done the balloon is deflated and removed. These "air bag stoppers", as they are called, are made by a number of firms, for example, the Greenham Tool Co Ltd, make them in sizes from 3 inches to 48 inches~ 'Specials' have been made even larger. [For the report of an accident involving these balloons (inflatable bladders) see "Still Going Wrong: Case Histories of Process Plant Disasters and how they could have been Avoided" by Trevor Kletz", Section 9.1.
- (b) In Newsletter 48, Item 5, I mentioned that relief valves sometimes have to be slip-plated before a vessel is entered. (The best method is to disconnect the vent line, but this may be impossible if the vent line is large.)

A reader suggests that a better method is to turn the relief valve so that it vents to atmosphere.

#### **54/11 UNUSUAL ACCIDENTS NO.24**

The hand chain of a block and tackle was left hanging immediately above a centrifuge. The guard over the coupling between the motor and the centrifuge was not a good fit and when the motor was started the end of the chain got entangled with the moving parts.

#### **54/12 RECENT PUBLICATIONS**

- (a) R & D Departmental Paper 73/45 describes a method for designing blow-off roofs for bays housing semi-technical plant where leaks of flammable gas or vapour may occur.
- (b) Safety Note 73/13 describes the limitations of combustible gas detectors.
- (c) Incidents in the Oil Industry, Safety Bulletins Nos 8 and 9, received from one of the major oil companies, describe some incidents which have occurred during the storage and transport of hydrocarbons.
- (d) Newsletter 45, Item 1 summarised the precautions which should be taken to prevent fires or explosions in air compressors. Machines Panel Guidance Notes No. 3, "Precautions Against Fires and Explosions in Lubricated Reciprocating Air Compressors", available from Standards Section, Engineering Department, Ext. B.3373, or directly from Engineering Services Department, Head Office, gives more details. Report No. EDN 1342, available from Division Reports Centres, brings the guidance note up to date with a report on the advantages of Esso S53 lubricating oil.
- (e) Report No. O.200,786/A, available from Division Reports Centres, lists all the fires in the oil and chemical industries that were reported in the Press during 1972. The press cuttings are reproduced. The report has been prepared in order to draw attention to the large number of incidents that occur. Fire and explosion is an ever present risk in our industry if we do not take the right precautions. Report No. O.200,751/A gives similar information for 1970 and 1971.
- (f) The ICI Materials Handling Review for May 1973 describes a number of accidents which occurred on fork lift trucks. One man was injured because he cleaned the truck while the engine was running and another man was injured because he adjusted the battery lead while the truck was running. Electric fork lift trucks often have a switch under the seat so that they cannot operate unless the driver is in his place; some drivers have found a way of making the switch inoperative so that they can operate the truck while walking alongside; as a result a man was injured. Materials Handling Review can be obtained from Mr A P, Productivity Services Department, Organics Division.

For copies of (a) — (c) 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.

July 1973

### **SAFETY CALENDAR**

We had to disappoint many of the people who asked for copies of our 1973 safety calendar. So if you would like a copy of our 1974 calendar please let us know now.

If you got a copy of the 1973 calendar through your Works then you should get the 1974 one automatically. If you got your 1973 calendar directly from us, please let us know if you would like one for 1974. Please write or telephone B.3927.