

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

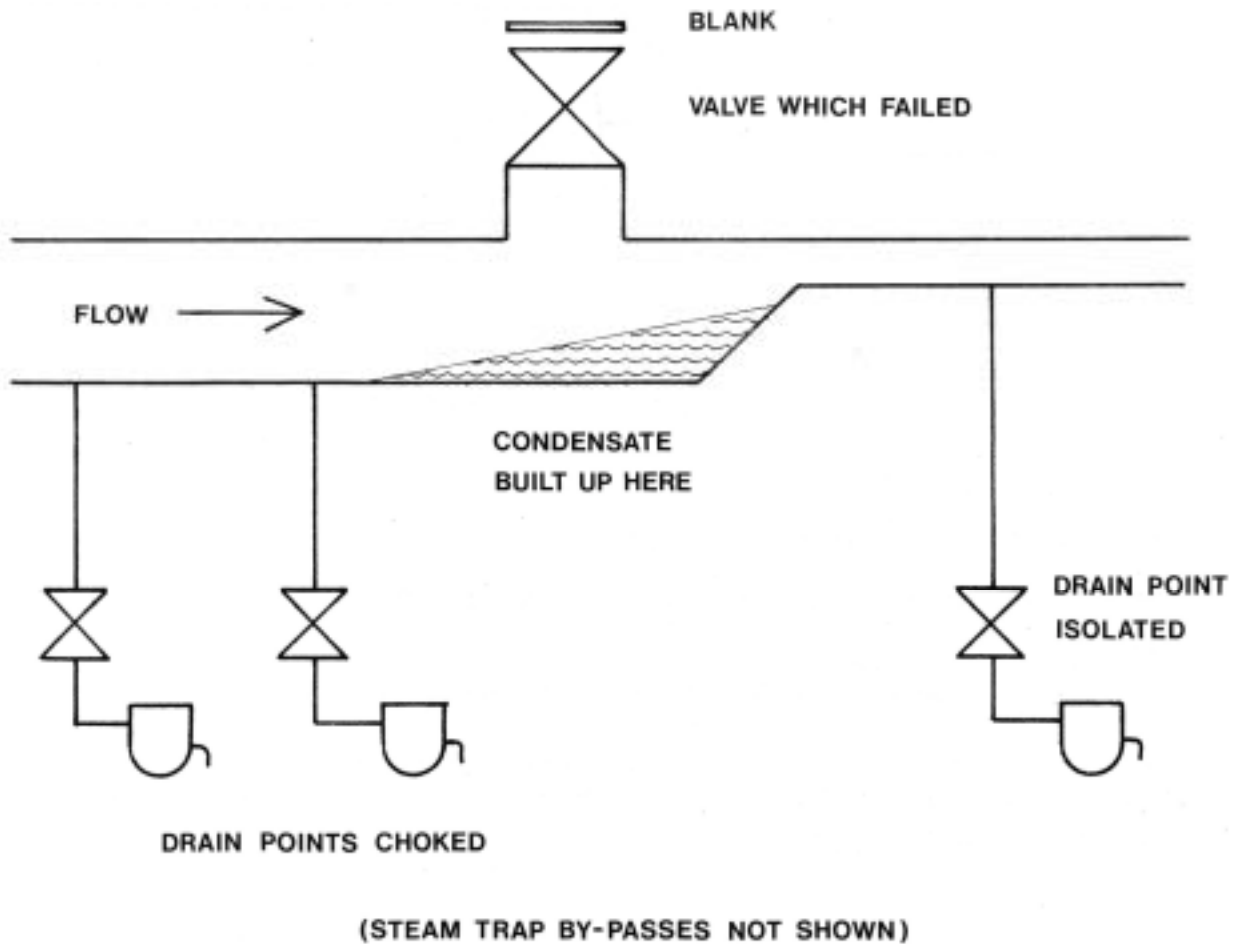
**SAFETY NEWSLETTER No. 57**

**57/1 WATER HAMMER AGAIN**

Newsletter 43, Item 4 and Report No. 0.200,760/A describe how a 600 psi steam main burst as a result of water hammer, seriously injuring several men. Another incident was described in Newsletter 48, Item 2.

Now a third incident has occurred. An 18 inch valve mounted on the top of a 20 psi steam main fractured causing a big steam leak. There was no one in the area at the time so fortunately no one was injured.

There was nothing wrong with the valve — the casting was of good quality — but two drain points upstream of the valve were partly choked with scale and the drain point downstream was isolated. In addition there was a reducer just after the valve, shaped as shown below, and this allowed condensate to accumulate.

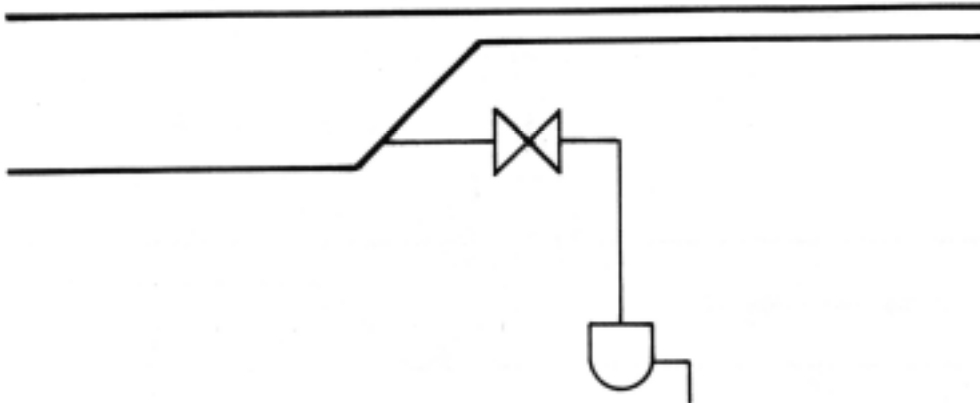


The reducer should have been fitted like this:



Steam lines should always be designed so that they are self-draining; then it does not matter if one steam trap chokes.

As it was difficult to modify the steam mains, an extra trap was fitted, as shown below:



This incident, like the earlier ones, shows that:

We must make sure that steam mains are fitted with enough traps and we must check steam traps from time to time to make sure they are in working order.

In addition, the report of the recent incident recommends that at vital points, such as the blank ends of steam mains, drain points should be designed so that, if they choke, they can be drilled through under pressure.

## 57/2 CONTROLLING AMMONIA SPILLAGES WITH WATER

Ammonia is very soluble in water so at first sight it seems obvious that if there is a leak or spillage we should try and dilute it with as much water as possible. A recent report, No. H/11, from Agricultural Division, Safety Services Dept., shows that this is not the case and that sometimes the maximum amount of water that is likely to be available can increase the rate of evaporation and make matters worse.

As a general rule water should not be sprayed directly onto liquid anhydrous ammonia as the heat of reaction will cause more ammonia to evaporate. Instead the water should be used to control the spread of vapour. Agricultural Division recommend "Fantail" spray equipment; each spray uses 200 gpm of water and can reduce, to a non-toxic level, the evaporation from a liquid pool two or three metres in diameter or a gas release of 20 litres/second (72 m<sup>3</sup>/hr).

If there is a much larger spillage or leak, the available water should not be used close to the spillage or leak, where it will have little effect, but should be used instead to protect particularly vulnerable places.

Of course, if there is a small leak and it can be diluted 100 times, or if there is a small spillage and it can be diluted 100 times within, say, 10 minutes, the best action would be to dilute with as much water as possible.

The final decision must always be left to the man in charge at the time, but anyone who may have to deal with an ammonia spillage should become thoroughly familiar with the Agricultural Division report. Copies can be obtained from the author, B.H. (Ext. B.4348).

### **57/3 A CHEAP WAY OF INCREASING THE RANGE OF A FIRE-FIGHTING MONITOR**

Congratulations to the Wilton Site Fire Service on a cheap way of increasing the effectiveness of their fire-fighting equipment. A bracket has been designed and made so that a lightweight Jet Master monitor can be mounted on the end of the 60 ft. jib of one of the site cranes. The bracket will fit six cranes all of which are normally available round the clock — whichever one is most readily available can be sent to the scene of a fire.

Tests with this equipment have shown that water and foam can be thrown further or to greater heights than when the monitor is on the ground. The water and foam can be aimed with great accuracy and it should be possible with this equipment to aim foam into a tank in which there has been a codmouth explosion (an explosion which is not strong enough to blow the roof off a tank but just lifts it a few feet on one side so that it looks like a fish's mouth).

### **57/4 PREPARATION FOR ENTRY AND MAINTENANCE**

One of the plants in the Division has prepared a brochure which shows exactly how each vessel on the plant should be prepared for entry. Sketches show where slip-plates should be fitted and the method of cleaning each vessel is described in detail.

Another brochure describes how each pump, compressor, filter, etc. on the plant should be prepared for maintenance.

Is there a need for similar documents on your plant? If you wish, I can show you the booklets that have been prepared already.

### **57/5 NEARLY FIFTY YEARS AGO**

No. 5 in a series describing some accidents which occurred during the early years of the Billingham Factory.

Newsletter 42, Item 2 described the precautions necessary when a power operated valve is used to isolate equipment which is under maintenance.

If the power opens the valve

The power must be disconnected, that is, fuses must be withdrawn or air lines vented through valves which are locked open.

If the power keeps the valve closed

The valve must be held shut by a mechanical lock strong enough to withstand the loss of power.

Nowadays power operated valves are usually driven by electricity or compressed air but in the early days valves were often operated by oil under pressure; some of these are still in use.

On 9 September 1928 a pipeline was isolated by closing oil-operated valves and the line was then opened up for repair. The valves were held closed by oil pressure and the handles were removed from the oil valves to prevent anyone isolating the oil.

Unfortunately an error in operation elsewhere led to a loss of oil pressure. The oil-operated valves opened and allowed flammable gas to escape into the building. There was a mild explosion which broke most of the windows but this was followed by a fire which spread to a neighbouring structure; two men who came down the stairs into the fire were fatally burned. Another two men retreated to the far end of the structure and escaped without injury.

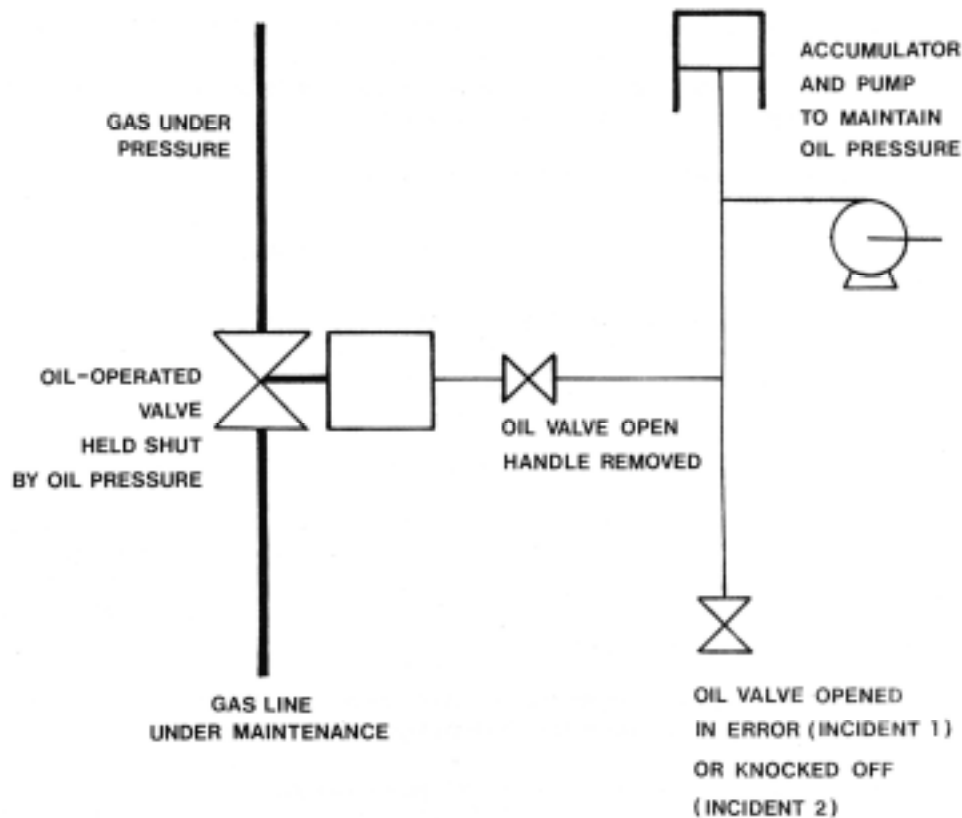
The source of ignition was probably a lighting fitting which was broken by the escaping gas. The recommendations made in the report are as true to day as when they were written.

*1 Always blank off open ends of pipes*

*2 All oil pressure control valves should be left shut*

*The oil pressure should be turned on to each valve periodically*

*This will ensure that the breaking of an oil-pipeline will not cause all oil operated valves to open.*



Today, we would insist that the valves are secured by a mechanical lock and, in addition, unless the job to be done is a quick one, the process lines should be slip-plated.

3 All tower structures and gantries should have adequate access platforms and stairs.

4 All buildings where there is any danger of injury from falling glass as the result of an explosion should not be provided with glazed roofs.

This good advice has often been forgotten. Today we would add two more points:

Do not handle flammable gases in closed buildings.

All windows should be made from wired glass, or glass covered with plastic sheet.

Nine days later a similar incident occurred. An oil valve was accidentally struck by a hammer and necked off. This allowed the oil to escape and the pressure was lost. An oil operated valve opened and gas entered a section of plant which was opened up for maintenance. Fortunately, this time the gas did not ignite and no one was injured.

For further details see Report No. A.102,145, pages 8-10.

## 57/6 TYRES INFLATED WITH GAS

Another company has reported the following incidents:-

*A contractor's labourer pushed a trolley with one flat tyre up to a welder's torch which was not in use and proceeded to fill the tyre with gas — the nozzle made a perfect fit.*

*When the man was stopped and questioned it became apparent that this was a common procedure carried out by many people. Contractors' employees near the incident did not consider there was danger in using any of the two gases available — "as they are still confined". Further questioning produced the response from a man that he had "topped up a wheelbarrow and a couple of hand trucks". in the week he had been on the plant.*

*The trolley was taken to its proper area, all its tyres deflated and refilled with air; the same procedure was carried out with all other hand trolleys etc fitted with pneumatic tyres.*

Perhaps we had better make sure this does not happen on our plants.

### **57/7 CHEMICAL LIGHT**

On one of our plants temporary lights are needed when maintaining compressors. The approved torches are too big and clumsy for some jobs and rigging up temporary wired lights causes delay.

Chemical light sticks are, therefore, being used for inspections or quick jobs. These are plastic tubes about 6 inches long and about ½ inch in diameter. They contain two liquids. When the liquids are mixed by bending the tube it gives out a light bright enough to read by for three hours. These "Coolite" chemical lights can be obtained from Allen International, 3 Old Pye Street, London SW1P 2LB, price 40-50p each depending on the quantity ordered.

### **57/8 UNUSUAL ACCIDENTS NO. 7**

A platelayer at a steel works was using sodium chlorate solution to kill weeds. Some entered his shoes and dried inside.

A few days later he was repairing a railway wagon. A spark fell into his shoe. The sodium chlorate exploded and blew away the front of his shoe. His foot was burnt, but fortunately not seriously.

*From "Safety", the accident prevention magazine of the British Steel Corporation, February 1973.*

### **57/9 EXTRACT FROM THE MINUTES OF A SAFETY COMMITTEE**

*Miss . . . ., in the Library, was not classed as a Lone Worker as a sample survey showed that this was one of the areas visited most on the site by various personnel.*

### **57/10 RECENT PUBLICATIONS**

- (a) Report No 0.200,791/A, available from Division Reports Centres, reviews all the fired heaters in Petrochemicals Division and makes recommendations for their operation and for the design of future heaters.
- (b) Safety Note 73/18 describes two explosions which occurred in another Company because liquids were splashed into unearthed metal drums. The liquids were conducting, but because the drums were not earthed the electrostatic charges could not drain away to earth.
- (c) "Some Case Histories Loss Prevention", a paper to be presented to a meeting of the American Institute of Chemical Engineers, analyses a number of incidents more deeply than usual in order to bring out the defects in organisation and traditional ways of thinking that lay behind them. [This paper was later published in "Chemical Engineering Progress", Vol 70, No 4, April 1974, p 126.]
- (d) Another paper to be presented at the same meeting describes and illustrates the techniques used in the Division for operability studies — the line-by-line examination of flow sheets or line diagrams. Part II of the paper shows by example how a logic trees can be used to estimate the frequency of a dangerous occurrence.
- (e) The St John Ambulance Brigade have produced a glossy card on first aid in the home, suitable for hanging in the kitchen. We have a number which we will give to the first applicants.
- (f) The new edition of "Divisional Contacts for Some Engineering and Allied Subjects", available from Engineering Services Department at Head Office, lists ICI's experts on everything from Agitation to Workshop Technology.

For copies of (b) to (e) or for more information on any item in this Newsletter please write to me or ring B.3927. If you do not see this Newsletter regularly and would like your name added to the circulation list, please let me know.

Miss M.N., who for the past three years has helped with the Newsletter and dealt with your queries, has now left on transfer to ICI Europa in Brussels. We wish her luck in her new job.

October 1973



ring B 3944  
for Safety News

(Contributed by Mr Burton, Oil Works)