IMPERIAL CHEMICAL INDUSTRIES LIMITED
PETROCHEMICALS DIVISION

SAFETY NEWSLETTER No.92

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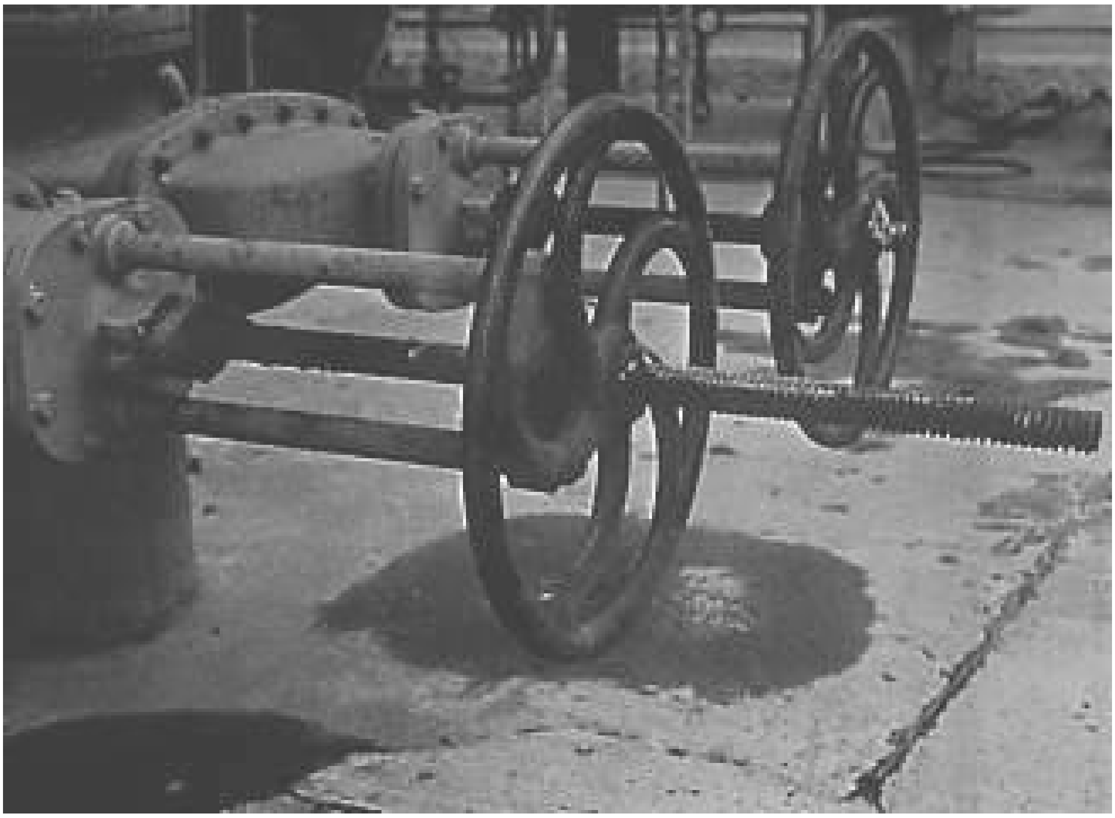
92/1 IS ONE OF THESE VALVES CLOSED?



Answer on page 7.

92/2 A SCREWED BRANCH IS FITTED DURING CONSTRUCTION - ITS FAILURE CAUSES A SERIOUS FIRE

Another company have sent us a report of a fire last year which caused extensive damage. It started when a 1 inch screwed nipple and valve blew off a heavy oil line operating at 350°C. Most of the plant was covered by an oil mist 100 feet deep; it was sucked into the control room by the ventilating equipment, making it difficult for the operators to shut the plant down. However, they managed to do so before the mist caught fire about 15 minutes later.

The nipple that failed was installed in 1955 during construction; it was intended for pressure testing and was not recorded on any drawing. If its existence had been known it would have been replaced by a welded plug.

After the fire the refinery carried out a detailed survey of all its plants, looking particularly for the following:-

1 Vents, drains and other connections with no obvious functions.

2 Control valve manifolds with unplugged or unblanked drain connections.

3 Steam-out connections that are not blanked or not double blocked with a bleeder (particularly where the vessel or line pressure is greater than the steam pressure).

4 Unusually long runs of small pipe for pressure gauges and sample connections (particularly where there is no block valve at the original connections).

5 Inadequately supported small connections, pressure gauges, etc.

6 Brass valves in hydrocarbon service.

7 Unused sample coolers.

8 Pumps, exchangers, pipes etc no longer needed.

9 Changes in flange ratings in a line.

10 Screwed pipes in hydrocarbon service.

11 Cast iron fittings in hydrocarbon service.

12 Unusually large liquid draw-off and sample connections.

13 Control and electric cables exposed to possible fire damage.

14 Hidden connections under insulation.

15 Relief valve discharges that could impinge on other equipment.

16 The position of control room air inlets.

17 Are lines whose failures could cause a serious fire scheduled for regular inspection?

The survey was carried out first by a team of headquarters staff with the process foreman. The foreman was then asked to involve the operators in further checks.

A more detailed report is available on request.

A leak of naphtha from an inter-plant pipeline on the Wilton Site earlier this year was caused by the corrosion of a site-arranged test branch. The branch had corroded and then broke off when the pipeline was pushed off its supports by thermal expansion.

Our Engineering Department are preparing a standard for site-arranged test branches. As these cannot be pressure tested after closure, good control is essential.

Reminder: Newsletter 30/4 described how a support installed for construction purposes might have caused a pipe failure if it had not been spotted in time.

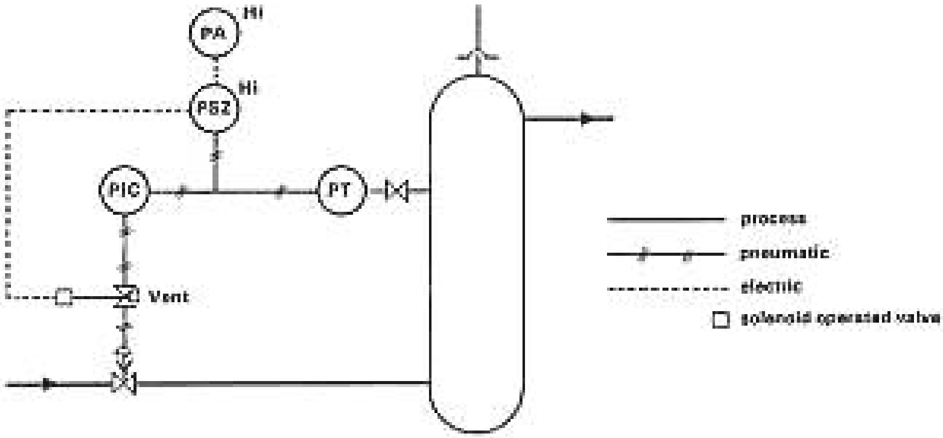
92/3 ANOTHER SCREWED PLUG BLOWS OUT

Newsletter 85/1 described a number of incidents which occurred as a result of screwed plugs blowing out. Another is described in a recent Railway Inspectorate report summarised in “Railway Magazine”, September 1976, page 532.

A 1½ inch screwed fusible plug blew out of the boiler of a steam locomotive, badly scalding the men on the footplate. The plug had been badly fitted by an unskilled man. The tapers on the plug and the hole into which it fitted were different so that the plug was held by only a few threads. It was not examined by the insurance surveyor after fitting but successfully withstood a hydraulic test.

The fusible plug, which is fitted in the crown of the firebox, is made from brass and has a hole about 5/16 inch diameter through the centre. This hole is filled with a lead alloy which melts if the boiler water level gets too low to cool the plug. The steam pressure is then discharged downwards through the 5/16 inch hole, together with some water, and extinguishes the fire. In the incident described above the ejection of the whole plug caused such a large discharge of steam and water that the firehole door was blown open and the fire ejected onto the footplate along with clouds of steam.

92/4 THE ANSWER TO THE PROBLEM IN OUR LAST ISSUE WHAT IS WRONG WITH THIS TRIP SYSTEM?



The pressure in the vessel is measured by the pressure transmitter (PT) and controlled by the pressure indicator controller (PIC) which adjusts the setting on the motor valve.

If this control system fails to work and the pressure rises above the set point, then the high pressure switch and trip (PSZ^{Hi}) operates to close the motor valve. At the same time the high pressure alarm (PA^{Hi}) operates.

This trip system is almost useless.

The most likely causes of the pressure in the vessel getting too high are:

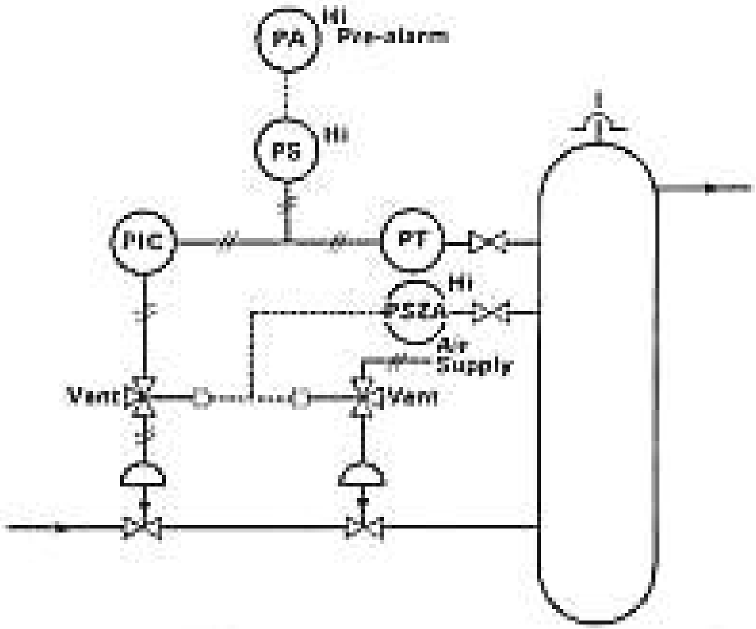
1 Failure of the pressure transmitter (PT). If this occurs the trip will not know there is a high pressure in the vessel.

2 Motor valve sticks open. In this case the trip will know that there is a high pressure in the vessel and will send a signal to the motor valve, but the motor valve will not respond.

3 Failure of the pressure indicator controller (PIC). In this case the trip will work.

The trip will therefore operate on only about one-third of the occasions when we want it to operate. Such a trip is not worth having. It may do more harm than good as we may expect it to operate and not watch the pressure so closely.

The system shown below has a high reliability. The high pressure trip and alarm ($PSZA^{Hi}$) has an independent connection to the vessel and operates a separate motor valve. There is cross connection to the control valve. A high pressure switch ($PS^{Hi)}$ and pre-alarm (PA^{Hi}) give a warning that the pressure is approaching the trip setting and allow the operator to take action. This pre-alarm will operate if the rise in pressure is due to failure of the pressure indicator controller (PIC) or motor valve but not if it is due to failure of the pressure transmitter (PT). If a high pressure occurs the pre-alarm will operate on about two occasions out of three and the trip on almost all occasions.



Reminder: If there are two trip valves in series, make sure they can work independently. See Newsletter 58/1.

92/5 WHO IS RESPONSIBLE FOR AN ACCIDENT?

The following appeared in Safety Newsletter 11/11 July 1 969:

"A newspaper recently asked a number of clergymen for their views on mini-skirts. One of them was reported as saying that he could not comment as he never looked at girls' skirts and did not know how long they were.

This is the attitude that many managers and engineers used to have towards clearance certificates and Permits-to-Work They did not know whether they covered everything or not as they rarely looked at them.

When an accident occurs it is unlikely that a short-cut was taken for the first time. It is more likely that short-cutting has been going on for weeks, months or even years, not just by one man, but by many. Regular inspection of clearances by the manager would have shown up and stopped the irregularities before the accident happened.

Nowadays most managers and engineers look closely every week at many clearances and in Petrochemicals Division there is a Board instruction that they should do so."

I was reminded of this item when I read the official report on a railway accident which occurred at Chester General Station on 8th May 1972. A goods train ran out of control down a hill and crashed into an empty passenger train in the station. At the front of the train were tank wagons containing paraffin and petrol and the resultant fire caused serious damage. Fortunately, nobody was killed or seriously injured.

The train should have been provided with a "fitted head". This means that at least the first five wagons are connected to the engine's vacuum brake system, but the rest of the train is unbraked apart from the handbrake on the brake van at the rear. It is the responsibility of the guard and the driver to make sure that the fitted head is connected and then to check that the vacuum brake is working. They did not do this. The train set off without any braking on these wagons; the braking on the engine was insufficient to hold the train on a hill and it ran out of control.

The driver and the guard had received papers saying quite clearly that a fitted head should be connected to the engine's brakes and the report concludes that the accident was caused by the failure of the guard to connect the vacuum pipe between the locomotive and the train.

The questions which are not answered in the report are "How many times have guards and drivers allowed trains to leave without the brakes being connected?" 'Why did no-one notice this, or did managers and supervisors turn a blind eye?" "If so, who is really to blame?"

The official report can be obtained from Her Majesty's Stationery Office, price 55p.

92/6 SOME QUESTIONS I AM OFTEN ASKED—

24— WHAT SHOULD WE DO TO IMPROVE THE SAFETY RECORD?

In olden times men hoped that one day someone would discover a philosopher's stone which could turn base metals into gold. Today many managers and safety officers hope that one day they will find a wonder-working recipe, which will turn a poor safety record into a good one. Many recipes have been suggested - safety sampling, damage control, incentive schemes, safety auditing, but none of them has done the trick.

Alas, there are no magic remedies which will improve the safety record. Only the methods we know already such as following up the particular problems we have - and they differ from plant to plant - with enthusiasm and intensity. Safety sampling, damage control and so on, are useful and can play a part in a total safety programme if pursued with enthusiasm, but the enthusiasm matters more than the gimmick. By themselves the techniques are of little value.

Here are three quotations in support of this view:

The first is from Brian Cornford of Plastics Division, written some years ago after a visit to the USA:

> *"The impression here is... that many techniques we have discussed including safety sampling, damage control, job safety analysis, all started in the USA. In discussion I was therefore surprised to hear that few of these were used and many used only parts of them. The stress lay on better design and layout coupled with training and supervision. In their words it was expressed that such techniques were not useful to a well-run outfit and, to improve a bad one, get better management rather than a technique."*

The second is by J V Grimaldi:

> *"(Improvement in safety) is more certain when managers apply the same rigorous and positive administrative persuasiveness that underlines success in any business function. … outstanding safety performances occur when the plant management does its job well. A low accident rate, like efficient production, is an implicit consequence of managerial control."*

From "Management and Industrial Safety Achievement", The International Safety and Health Information Centre (CIS), Information Sheet No. 13, 1966.

The third is from a report by two Inspectors of Factories:

> *"It also produced evidence to confirm that established and generally accepted methods of accident prevention did succeed; and several impressive examples were found of improvements achieved by the energetic and diligent application of principles which had long been advocated but which had not earlier been put into practice with sufficient thoroughness."*

From "Employment and Productivity Gazette", October 1968, p. 287.

92/7 UNUSUAL ACCIDENTS No.60

Two 9 volt batteries for a desk calculator were placed in an internal envelope and dispatched through the mail service. During transit, the metal casing of one battery shorted the terminals of the other, generating sufficient heat to char the envelope and the battery casing.

From Mond Division Safety Report, August 1976.

92/8 POINTS FROM READERS

(a) Newsletters 84/5d and 87/7d suggested fitting plastic balloons over the ends of relief valve tail pipes to show when the relief valve is leaking. A reader points out that this should not be done to relief valves which have a very low set pressure - a few psig - or the back pressure caused by the plastic balloon may overpressure the vessel.

(b) Newsletter 89/2 stated that, if a maintenance job is a quick one and is being done under valve isolations, without slip-plating or physical disconnection, and if there is a relief valve connecting the equipment to a blowdown system, any easing lever on the relief valve should be locked in the closed position.

A reader points out that on most designs of relief valve this will not prevent it lifting and some other type of gag is needed.

The problem will not arise very often as very few relief valves are fitted with easing levers and discharge into a closed system.

ANSWER TO THE QUESTION IN 92/1

Both valves are open. The spindle on the far valve has been knocked off by a lorry.

Despite this incident we like to use rising spindle valves whenever possible as normally it is easy to see whether they are open or shut.

92/9 RECENT PUBLICATIONS

(a) Institution of Chemical Engineers Symposium Series No 47, “Process Industry Hazards — Accidental Release, Assessment, Containment and Control”, includes a survey of instrument failure rate data by Professor F P Lees, a description of the Wilton Site emergency plan by Mike Diggle, and an article on plant lay-out by Dick Robertson.

(b) Technical Data Note 35, free from any office of the Factory Inspectorate, shows in 34 pages of pictures how to handle asbestos safely. Note 13 lists the concentrations of asbestos now considered acceptable.

(c) “Accident Data — The Need for a New Look at the Sort of Data that are Collected and Analysed”, a paper which appeared in the first issue of “The Journal of Occupational Accidents”, suggests that some of the effort spent in collecting traditional accident data might be better spent in collecting data on equipment reliability and human reliability.

(d) A booklet on “The Safe Use of Genklene” has been published by ICI Mond Division.

For a copy of (c) or (d), please write to ET at Wilton, or phone extension P.2845. If you do not see this Newsletter regularly and would like your own copy, please ask Mrs T. to add your name to the circulation list.

October 1976

Who's Who in Safety?

No.8 - M G FOSTER

Malcolm Foster was born and educated in Harrogate and started his working life in Manchester with the ICI Terylene Council — the precursor to Fibres Division — in 1954 as a laboratory assistant. He continued his studies part-time at Technical College.

He gained his safety knowledge during his twelve years in the Research Department at Harrogate, studying a wide variety of combustion phenomena. The Department, although primarily concerned with new processes for Fibres Division, provided an explosion hazards service for all Divisions of ICI and Malcolm's name became known throughout the Company. When the service was wound up Malcolm became a shift manager at Wilton but soon found that he was being asked to answer queries on combustion. This lead to his appointment in 1972 as Technical Safety Manager on Davies Works which had become part of Petrochemicals Division the previous year.

He is "mildly interested" in philately and dancing and describes himself as a lazy gardener. He is married with one daughter aged 8 years.