IMPERIAL CHEMICAL INDUSTRIES LIMITED
PETROCHEMICALS DIVISION

SAFETY NEWSLETTER No.91

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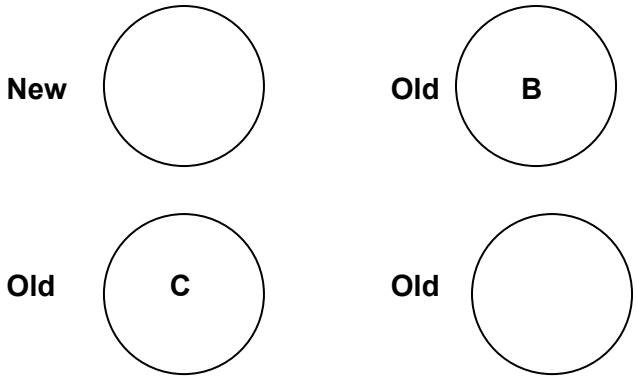
This Newsletter reports a number of incidents which occurred because insufficient thought was given before issuing a clearance certificate or preparing equipment for maintenance.

91/1



Which is A?

91/2 Five men were killed when the wrong valve was opened. It had not been locked shut or slip-plated.

91/3 A permit was issued to wire up a new electric light near the end of a ventilation duct. No-one thought of the hazard from the fumes.

A clearance was issued to repair a broken window from the outside. No-one remembered there was live electric equipment inside.

Other incidents described are:

91/5 A pipe had been vibrating so long that no-one noticed it.

91/6 Frequent errors in filling road tankers with petrol were due to the design of the loading notes.

91/7 Can you see what is wrong with this trip system?

91/8 Do we really need operability studies on straightforward projects?

91/9 Tests have shown that light water is not very effective for fighting fires in polar liquids such as acetone or methanol. Simultaneous application of Monnex dry powder and water spray is recommended.

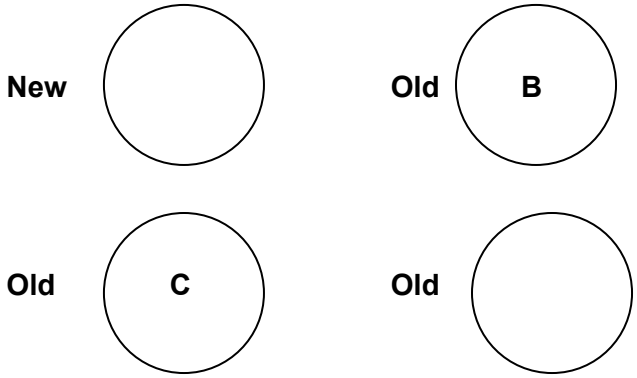
91/10 Two new reports have appeared on the application of quantitative methods to safety problems.

91/1 IDENTIFICATION OF EQUIPMENT FOR MAINTENANCE

Earlier Newsletters (80/2, 59/5, 54/5, 47/1, 44/9, 41/4 and 37/1) have described incidents which occurred because equipment given to maintenance was not properly identified.

Another incident occurred recently in the Division.

There were three pieces of equipment on a plant and a fourth piece under construction. They were actually crystallisers, but might have been pumps, heat exchangers or anything else. Two of them were labelled B and C, but the label on the third was missing and the label on the fourth had not yet been fitted.



A man was asked to remove an instrument (actually a radioactive level controller) from item A. He went out onto the plant and saw the labels on B and C. He assumed that the other old crystalliser was A and that the new one, which still had scaffolding round it, would be D. He therefore removed the level controller from the old unlabelled crystalliser.

Unfortunately, the original items were labelled B, C and D and the new one was labelled A. When the plant was built, space was left for a possible future crystalliser and the letter A was left for it. Work was started on item D with the level controller still in position. Fortunately, the mistake was discovered before anyone was injured.

All equipment given to maintenance must be clearly labelled. If there is no permanent label it must be identified by tying a numbered tag on to the equipment and putting the tag on the clearance certificate (permit-to-work).

NOTE: Engineering Department Specification PR 0105 recommends that single rows of equipment should be lettered from north to south or east to west; if equipment is arranged in a block, the recommendation is to start at the north-east corner and work westwards, then do the same with the next row.

91/2 ISOLATION OF EQUIPMENT FOR MAINTENANCE

Earlier Newsletters have described many incidents which occurred because equipment given to maintenance was not properly isolated by slip-plates (or physical disconnection) and locked valves. Now the United States National Transportation Safety Board has reported another serious incident.

While a natural gas line was being modified somebody opened the wrong valve. Natural gas and natural gas liquids at 700 psig came out of the open end of a 12 inch pipe into a ditch where seven men were working. The men's clothes became saturated with natural gas liquids and an open-flame heater set them alight. Five of the men were killed and the other two were seriously injured.

Before the modification started the operator and the contractor met together to discuss procedures and agreed which valves were to be closed and chained. The valves were not chained because no chains were available.

We do not consider chaining of valves to be sufficient for a job of this type. In addition, any pipe-line with an open end should be blanked or slip-plated.

For accounts of previous accidents which have occurred, many in the Division, because equipment given to maintenance was not adequately isolated, see Newsletters 68/6, 57/5, 37/1, 27/2, 25/1, 20/3, 19/2, 17/1, 14/7 and 8, 12/1, 11/2, 6/1, 4/1, 3/2 and 1/2.

91/3 VENTILATION SYSTEMS ARE INSTALLED TO GET RID OF FUME, SO DON'T BE SURPRISED IF IT COMES OUT OF THE VENTILATION DUCT

When wiring up a new light on the outside wall of a building, an electrician was affected by fume coming out of a ventilation duct two feet away.

When the job was planned the electrical hazards and the hazard of working on ladders were considered, but it did not occur to anyone that unpleasant fume might come out of the ventilation duct.

In a similar incident some years ago (see Newsletter 3/4) a man got an electric shock while repairing a broken window from the outside. While reaching in to pick up some broken glass he touched a live electric wire. The electrical equipment was guarded on the inside but protected only by the window on the other side.

When issuing a clearance certificate for the job, the hazard of broken glass was considered but not the hazard that lay inside the window.

A window is not sufficient protection against live electrical equipment. At the very least, a warning notice should be fixed to the window. It would be better to fix a guard inside the window.

91/4 UNUSUAL ACCIDENTS

No. 59 — EQUIPMENT SHOULD BE ISOLATED BEFORE CLEANING

A housewife was taken to hospital at Dommartement, France, with her tongue caught in an electric food beater. She was licking the blades after whipping cream when she accidentally switched on the machine.

Daily Telegraph, 22 June 1976

91/5 HAVE YOU GOT USED TO SOMETHING DANGEROUS BECAUSE IT HAS BEEN THERE FOR A LONG TIME?

A ton of flammable hydrocarbon was spilt when a pressure gauge on a pump delivery line broke off. The delivery pressure was 600 psig and it is estimated that a ton of hydrocarbon came out in less than 10 minutes through the quarter-inch pipe.

The fracture of the pipe was due to vibration which had been going on for several years. At first, attention was drawn to the vibration and some attempt was made to reduce it, but without success. Gradually everyone got used to the vibration; it became part of the scene and nobody did anything about it. The report on the incident recommends,

"A periodic rethink should be made of process irregularities which have become part of the scene in order to be certain that complacency does not permit an irregularity to turn into an incident."

91/6 ROAD TANKERS ARE OVERFILLED

There were an unusually large number of spillages due to overfilling at a loading station, not belonging to ICI, where petrol is filled into road tankers. Pre-set meters were used but this did not prevent overfilling. The wrong quantities were being set on the meters.

Why were people making so many mistakes?

Investigation disclosed the reason.

The tanker drivers arrived at the loading station with a “Loading Note” showing the amount and grade of petrol required in each compartment. The note looked like this.

GRADE	COMPARTMENT						
	1	2	3	4	5	6	7

A man at the loading station copied the information onto his own “Loading Note” which looked like this.

COMPART-MENT	GRADE			
	91/92	98/99	100	101
1				
2				
3				
4				
5				
6				
7				

On the first note the compartments are numbered along the paper and the grades downwards. On the second note they are the other way round. People were therefore making mistakes in transferring figures from one sheet to another.

Fill in some 4-digit figures (like 3637 or 3182) on the first form, transfer them to the second and see how often you get them right?

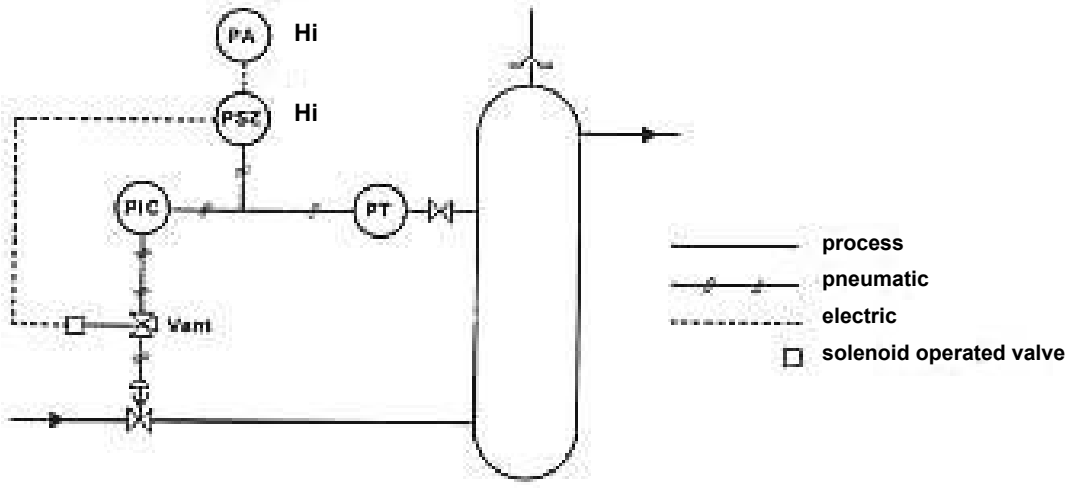
Reminder: Safety Notes 72/12 and 74/12 discuss the overfilling of road tankers and the action required.

91/ 7 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.

Answer in our next issue.

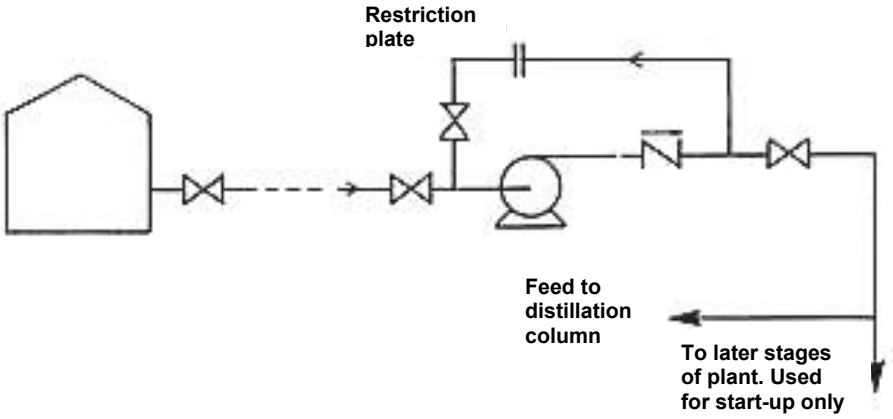


91/8 SOME QUESTIONS I AM OFTEN ASKED

No 23—DO WE REALLY NEED TO DO AN OPERABILITY STUDY AS THIS IS ONLY A VERY SIMPLE PROJECT (OR IT IS VERY SIMILAR TO THE LAST ONE)?

I shudder when I hear this question. So many of the things that go wrong occur on small, simple or repeat projects where people feel that the full treatment is unnecessary. “It is only a storage project and we have done many of these before”; “It is only a pipeline and a couple of pumps”; “It is only steam handling equipment”; “It is similar to the plant we’ve got already”.

Here is an example of such a plant. An operability study team leader visited one of our overseas companies to assist in a study. The design team queried the need, as the plant was so similar to the one back home. They agreed to a trial study on one line; the line selected was the feed line to the plant from the storage tank.



Twelve points which had been overlooked came out of the study. Here are four:-

If the pump stops, the back flow will occur through the kick-back line. The non-return valve should be downstream of this line.

If the pump stops, back flow may occur through the start-up line. Should there be a non-return valve in this line?

The restriction plate in the kick-back line might be replaced by a flow controller to save power.

No provision had been made for slip-rings or spectacle plates so that the pumps can be isolated by slip-plates for maintenance.

The overseas company agreed that a full operability study was necessary.

91/9 FIGHTING FIRES ON OXYGEN-CONTAINING LIQUIDS

Tests have been carried out at Wilton on the use of light water for fighting fires on polar solvents such as methanol and isopropanol. Although the manufacturers have claimed that light water is much more effective than foam on these polar solvents, our tests showed that this was not the case.

Light water is effective on a very thin layer of solvent because the solvent becomes diluted, but it is not effective on a thick layer.

The best method for fighting fires of polar solvents is to use Monnex dry powder and water spray simultaneously. If the spillage is a small one it can, of course, be diluted with a large volume of water so that it is no longer flammable.

Light water is, of course, very effective for extinguishing hydrocarbon fires or for sealing a spillage of hydrocarbon so that evaporation does not occur.

NOTE: 'Light water' is a surface-active agent that can be used with normal low-expansion foam equipment. It spreads rapidly over the surface of a burning liquid, shielding it from the air, and if the cover is broken it reseals very rapidly.

91/10 RECENT PUBLICATIONS

Two new reports have recently appeared on hazard analysis - the application of quantitative methods to safety problems in order to help us decide priorities - which risks are so great that we should do something about them straight away - which can be left, at least for the time being.

The first paper, presented to the World Congress on Chemical Engineering in July, deals with the overall philosophy and summarises the work of recent years. We can let you have a copy.

The second paper describes the methods used. It is a do-it-yourself kit for those who wish to carry out their own calculations and can be obtained from Division Reports Centres by asking for Process Safety Guide No 4, Report No HO/SD/740010/4. A list of failure rate data is included as an Appendix.

For more information on any item in this Newsletter please 'phone E.T. (Ext. P.2845) or write to her. 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.

September 1976

THE CONTROL OF MAJOR HAZARDS

After the Flixborough explosion the Government appointed two committees. The first was asked to investigate the immediate cause and it reported in 1975. The second was asked to look into the wider issues and it issued its first report in September 1976.

The following are some of the recommendations made:-

A Company which operates a "*notifiable hazard*" (for example, an installation from which more than 10 tonnes of chlorine or 15 tonnes of flammable gas or vapour can be released) "*should be required to make a survey of the hazard potential of its p/ant and to inform the Health and Safety Executive not only of the hazards identified but of the procedures and methods which have been or will be adopted to deal with them"*

(Chapter 3, paragraph 29).

"*In some cases, following study by the Executive of this initial survey, a more elaborate assessment will be called for, particularly in those cases offering the highest risks or involving novel or rapidly changing technologies*"

(Chapter 3, paragraph 31).

"*It should be made mandatory for a company which operates or proposes to operate an installation offering the highest risk, to demonstrate to the Executive that it has the appropriate safety philosophy, the technical and human resources (in particular competent and experienced managers) and a sound* management *system. The responsibility must be for* ***management*** *to satisfy* ***itself*** *that its arrangements are adequate"*

(Chapter 4, paragraph 50).

"Given the current level of technology and rate of advance of modern industry, we see no prospect of adequate control being achieved merely by production of regulations of the traditional type"

(Chapter 4, paragraph 52).

"*We support the Robens view that encouragement should be given to the production of codes* of *practice"*

(Chapter 4, paragraph 53).

The full report ("Advisory Committee on Major Hazards, First Report), is available from Her Majesty's Stationery Office, price £1.00.

WHO'S WHO IN SAFETY

No. 7 - J Woodcock

Jack Woodcock was born in 1924 in Fifeshire, but spent most of his youth in Stirlingshire.

He studied chemistry at Glasgow University and during the war joined the Research Department of Metropolitan-Vickers Electrical Company in Manchester where he worked on the development of heat-resisting alloys for the jet engine that Whittle was developing at the time.

In 1948 he joined ICI Dyestuffs Division at Huddersfield and, apart from a short spell in the Experimental Department, has been associated with nylon production ever since, at Huddersfield, Billingham and Wilton, and, for a brief time, at the Works of the Celanese Chemical Company in Texas.

Jack became involved full-time in safety matters in 1972 when he was appointed safety manager for Nylon Chemical Works, Wilton, where he now heads a team of safety advisers. He believes strongly in the importance of people's attitudes to safety and has tried to develop a spirit of safety consciousness throughout the Works.

He is spending the Autumn of this year in South Africa helping to set up a safety organisation in a new factory.

Jack is married with a son and daughter, both now grown up. His hobbies are golf, oil painting, Scottish dancing, cabinet-making and trying to play the organ.