IMPERIAL CHEMICAL INDUSTRIES LIMITED
PETROCHEMICALS DIVISION

SAFETY NEWSLETTER No.99

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All the incidents described in this Newsletter had simple causes — no complex technology was involved.

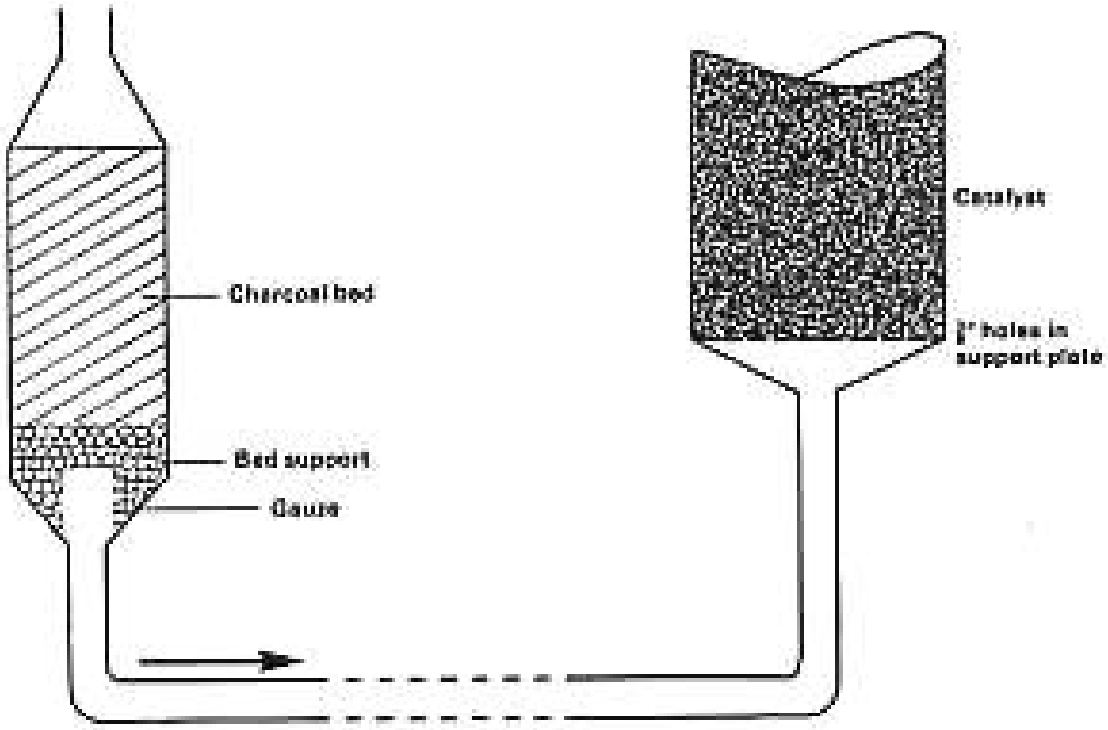
99/1 A SLIGHT CHANGE IN THE QUALITY OF A RAW MATERIAL CAUSES A MAJOR UPSET

Earlier Newsletters (97/6, 83, 71/7, 67/7d and 63/7) have described incidents which occurred because changes in the *design* of a plant had unforeseen results.

Now a slight change in raw material quality has caused a big loss in production.

A hydrogenation reactor developed a pressure drop. Various causes were considered — catalyst quality, size, distribution and activation; reactant quality, distribution and degradation — before the true cause was found.

The hydrogen came from another plant and was passed through a charcoal filter to remove traces of oil before it left the supplying plant. Changes of charcoal were infrequent, and the initial stock lasted several years. Re-ordering resulted in a finer charcoal being supplied and charged without the significance of the change being recognised. Over a long period the new charcoal passed through its support into the line and small amounts of the charcoal partially clogged the 3/8 inch distribution holes in the catalyst retaining plate.



The cause of the pressure drop was difficult to find as it was due to a change in another plant.

99/2 IDENTIFICATION OF EQUIPMENT FOR MAINTENANCE

Earlier Newsletters have stressed the importance of numbering pumps and all other items of equipment. On one of our overseas plants the pump numbers were painted on the coupling guards. One day maintenance work was started on the couplings of two adjacent pumps and both guards were removed and put down side by side.

You can guess what happened.

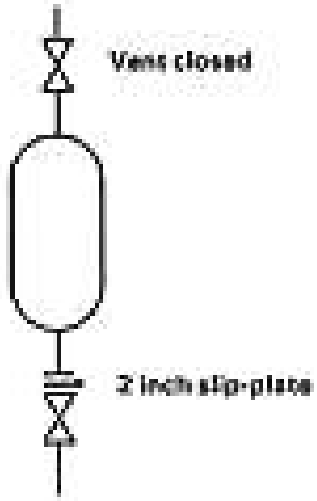
Now the pump numbers are painted on the pump bodies.

It would be better to paint the number on the plinths.

99/3 TAKING SLIP-PLATES OUT CAN BE HAZARDOUS

When we have to insert a slip-plate, we are usually well aware that flammable or toxic gas or liquid may be present, even though the equipment has been swept out, and we approach the job cautiously.

When we have to remove the slip-plate, the same care is needed. Failure to realise this led to a fatal accident in another Company. While a fitter was removing a slip-plate he was overcome by a leak of gas and fell off the staging on which he was working.

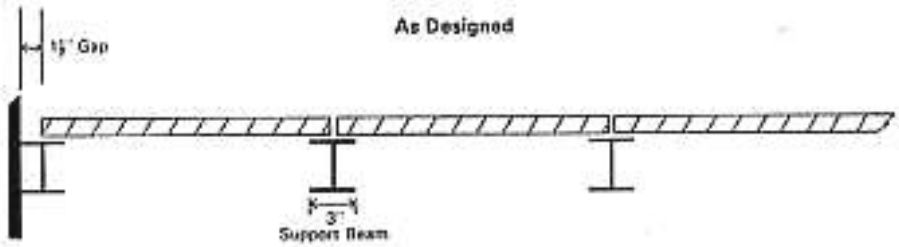


The source of the gas (hydrogen sulphide) is not certain but it may have been given off by sludge in the vessel. The vent on the vessel had been open the day before, when work was in progress, but had been closed later.

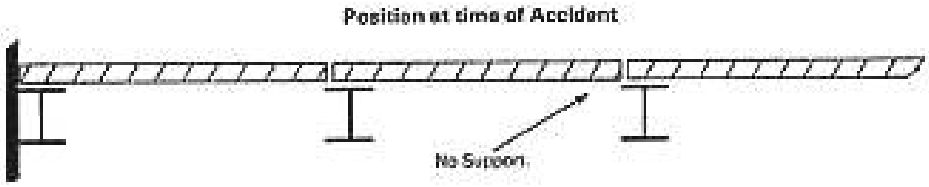
The vessel had been slip-plated for maintenance work but had not been prepared for entry.

99/4 A MAN FALLS THROUGH A FLOOR

A floor consisted of gratings resting on 3 inch beams. The width of the gratings was equal to the distance between the centres of the beams.



This left a gap at the end as shown. The gratings moved up to fill this gap, leaving one edge of each grating without support.



When a man stepped on one of the gratings he fell 8 feet into a pit.

99/5 THE DANGERS OF DEAD-ENDS

Newsletter 84/2 described several incidents which occurred because water settled out in a disused branch pipeline. In one case it caused corrosion and failure of the line. In another case the water was rapidly vaporised when a plant came back on line after a shutdown and this caused damage to the internals of a distillation column.

Now another company have described another incident. Water settled out in a dead-end branch on a naphtha system and froze, breaking the pipe. When a thaw occurred naphtha leaked out and was ignited by an unlagged 600 psig steam line.

Fortunately the fire caused little damage as the cable runs over the fire area had been protected with fibreglass and stainless steel.

The dead-end had been designed into the piping system so that at a later stage it could be used as a connection to another system.

Are there any dead-ends on your plant where water or corrosive materials may collect?

99/6 DON'T BE MISLED BY SIMILAR NAMES

The first incident described below occurred on the Wilton Site. A pump had to be cleaned by immersing in hot water to which washing soda had been added. A chit for *washing* soda was sent to the stores, but, as they were out of stock, they supplied *caustic* soda instead. The plant supervisor noticed the difference but assumed that caustic soda was a similar material.

Washing soda is, in fact, a harmless material that was once widely used in the kitchen before the days of modern detergents. *Caustic* soda is an extremely corrosive material. When it was added to the hot water bath there was a violent eruption and a man was splashed. Fortunately he received first-aid straight away and his injuries were slight.

Another instance of a confusion between materials having similar names was described in "Business and Society", Spring 1976, page 5.

A company manufacturing feeding stuffs for farm animals ordered a sack of a food additive called *Nutrimaster.* By mistake they were sent a sack of a fire-retardant chemical called *Firemaster.* The two different chemicals were packed in similar brown paper bags. Due to a paper shortage the manufacturer had not been able to get hold of the different coloured bags that were normally used.

The fire-retardant chemical got mixed into the animal feeding stuffs. The result was an epidemic of illness among the animals in the surrounding farms and a great deal of detective work before the cause was discovered. Thousands of animals and over a million chickens had to be destroyed and the total loss amounted to tens of millions of dollars.

What was the cause of the incident? A mistake by the men who sent the wrong bag? The failure to check the label by the people who received it? Such mistakes must be expected from time to time. Food chemicals should not be packed in the same sort of container as toxic chemicals and should not have similar names. Once again, as in the incidents described in Newsletter 86, an accident occurred as a result of the work situation. A trap had been laid for the men concerned.

Reminder: *Ice* and *dry ice* confused — see Newsletter 5/5.

99/7 QUICK METHODS FOR ESTIMATING FIRE AND EXPLOSION DAMAGE

In an article in Loss Prevention, Vol 10, 1976, page 135, Bill Brasie gives some rules for quickly estimating the effects of fires and explosions. Here are some examples:-

1 Pool fires

Flame height = pool diameter (other writers say 2 x pool diameter).

The radiation level one diameter from the edge of the pool is sufficient to ignite wood and produce 2nd or 3rd degree burns (other writers say two diameters).

The liquid level falls at 4-8 mm/minute.

2 Vapour cloud fireballs (outdoor)

Diameter (in feet) = 9.7 (weight in lb)$^{1/3}$

Duration (in seconds) = 0.23 (weight in lb)$^{1/3}$

The radiation level one diameter from the edge of the flame is sufficient to ignite wood and produce 2nd or 3rd degree burns. 1st degree burns will be produced two diameters away.

A pessimistic estimate of the volume of the cloud (in m^3) between the upper (f_2) and lower (f_1) limits of flammability, for stable weather and low wind speeds (2 m/sec), is:

$$3 \times 10^4 \quad Q^{1.52} \left[\left(\frac{1}{f_1} \right)^{0.55} - \left(\frac{1}{f_2} \right)^{0.55} \right]$$

where Q = leak rate in m^3/sec.

f_2, f_1 = upper and lower limits of flammability (% by volume)

99/8 SOME QUESTIONS I AM OFTEN ASKED—

30 CAN WE GET THE MONEY WE NEED FOR SAFETY?

Yes, a good case is never refused. Your expenditure proposal may be queried; it may be sent back for more information, but, if you answer the queries patiently and have a reasonable case, you will get your money in the end.

Unfortunately, some faint-hearted people give up hope as soon as their proposal comes back with a few questions. They say to themselves, “They don’t want to spend the money, so why should I bother”.

It is right that proposals to spend money should be probed thoroughly. It is right that the director or head of department who sanctions expenditure should ask about alternative ways of dealing with the problem, what other companies do and so on. But if you answer the queries and your case is sound you will get the money in the end.

At one time, once the money was sanctioned, the hurdle was over, the system took over and the job rolled on to completion.

Nowadays, even though we have got the money, there is another hurdle to overcome. We have to make out a case for a share of the resources. These are allocated by different people but the same arguments apply — if your case is sound and you are persistent, you will get your job done in the end.

99/9 UNUSUAL ACCIDENTS No 66

The November 1976 Safety Report from one of our overseas companies included the following three incidents.

1 A labourer used a crowbar to clear a spillage of ash. He did not realise that an electric motor was completely buried by the ash and he moved that as well.

2 A golf ball came through a hole in the fence from the practice range next door and early hit an employee.

3 A fork lift truck driver tried to move a 12 feet 6 inch load through a 9 feet 11 inch door.

99/10 RECENT PUBLICATIONS

"What are the Causes of Change and Innovation in Safety?"

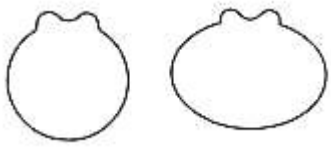
"The Design of Water Spray Barriers for Chemical Plants"

Two papers to be presented at the 2nd International Symposium on Loss Prevention and Safety Promotion in the Process Industries to be held in Heidelberg on 6/9 September 1977.

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

May 1977

"Safety Matters", published by Organics Division, reports that the Health and Safety Executive has issued new specifications for vessel manholes, so that they comply with the Equal Opportunities Act.



Who's Who in Safety?

No. 14— DR S BEAUMONT

Stan Beaumont was born on Merseyside and studied chemistry at Liverpool University in the intervals between playing music and rugby. Called up in 1939, he was released almost immediately to complete his studies. He gained practical experience in fire-fighting during the Liverpool 'blitz' as a part-time fireman.

Stan moved to the relative quiet of Billingham Research Department in 1942 and later managed various plants on Oil Works, including the high-pressure creosote hydrogenation plants. He moved to Wilton in 1963 where he was involved in commissioning new plants and extensions on Olefine Works.

In 1971 Stan was appointed Technical Safety Manager of Olefine Works, a works with large, potentially high risk plants and a major expansion programme. He has taken an overall interest in interworks pipelines, but his special concern is the involvement and development of people to enable them to gain confidence and satisfaction at work.

Stan is at present Chairman of the Newcastle section of the Society of Chemical Industry, is connected with the Stockton YMCA and still takes a keen interest in music. He is married and has a daughter who lives abroad and two sons, one a mathematician and the other a future mathematician and both, like Stan, rugby hookers.