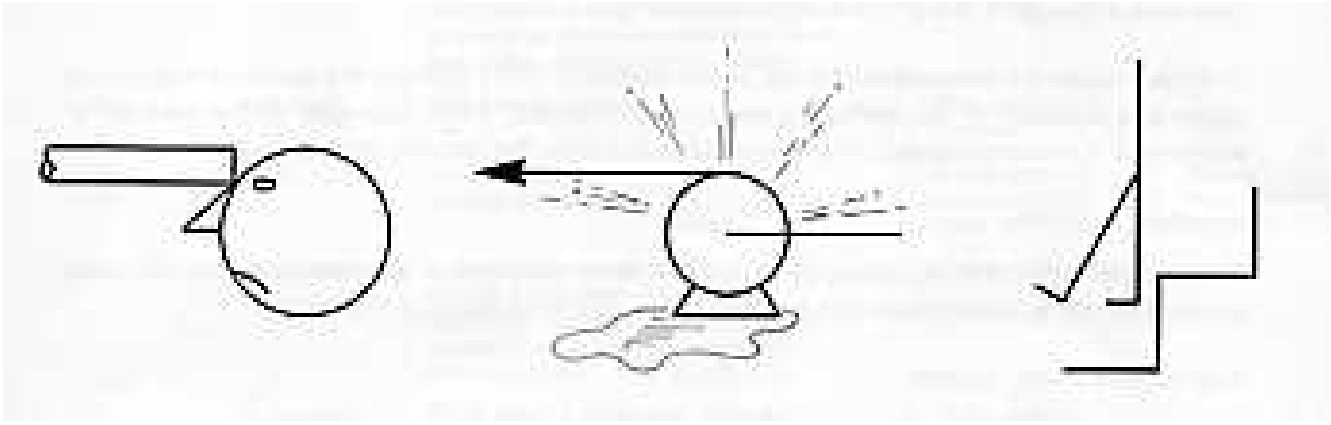
SAFETY NEWSLETTER

No. 116

A RANDOM SAMPLE OF ACCIDENTS



116/1 A random sample of our accidents suggests that we need to improve our software more often than our hardware.

116/2 Another explosion in a steam main.

116/3 Different sorts of trapped energy.

116/4 A crane was used to pull a line into position - this caused a leak of flammable gas.

116/5 What methods should Governments use to influence industrial safety?

116/6 Staying indoors prevented injury from an ammonia leak.

An Engineer's Casebook — Spiral wound gaskets.

IMPERIAL CHEMICAL INDUSTRIES LIMITED
PETROCHEMICALS DIVISION

116/1 A RANDOM SAMPLE OF ACCIDENTS

Are the accidents described in these Newsletters typical of those occurring in the Division or have they been chosen, perhaps unconsciously, to support a particular point of view.

Returning from three weeks holiday, I found seventeen accident reports waiting for me to read. They are summarised below and will give you an idea of the sort of incidents that occur in the Division. You can judge for yourself whether or not they support the views expressed in past Newsletters.

The following points stand out:-

Out of seventeen accidents:

In two cases the cause could not be found.

In four cases changes in the **hardware** were recommended. In three of these, changes were recommended to **mechanical** equipment (a tool, a handrail and a pump seal) and only in one case was a change in the process recommended.

In eleven cases no reasonable change in the hardware could prevent the accident happening again and changes in the **software** were recommended, either changes in the method of working or a recommendation that people should follow the existing procedures.

Out of seventeen incidents:

Five caused reportable accidents of which four were mechanical (slipped on a step, hit head on scaffold, hit eye with pliers and trapped finger) and only one was chemical.

Four caused minor injuries.

Eight caused no injury at all.

For the benefit of our overseas readers, **reportable accidents** are those causing absence of three or more days, **minor accidents** are those causing less than three days absence, usually no absence at all. Although all of these are investigated, only reports on the more serious or significant ones are typed out and circulated.

Details of the individual accidents are as follows:-

Serial No.	Injury, if any	What happened and why	Recommendations	Comments
1	None	The chart drive and channel selector motor on a 6-point temperature recorder was left switched off after a trip test. As a result the chart was not stamped and the trip could be operated by only one of the six points. **This went unnoticed for a month**.	Charts will be date-marked daily.	
2	Minor	A man was splashed in the eye while taking the cover off a filter. **Goggles should have been worn. The filter should have been drained**.	Follow instructions.	
3	None	An electrician cut through a live cable. **He did not check to make sure it was dead as the equipment it supplied had been out of use for several years.**	Follow instructions.	
4	None	Joint leaked and fired. Cause of leak and ignition unknown.	-	
5	Minor	While a man was unscrewing a nut splitter a part flew out and hit him above the eye.	A small change in the design of the splitter.	Hardware changed.
6	Minor	A man was affected by a leak of toxic gas nearby.	Gas tests will be carried out before any work is done in the area.	

7	Reportable	A man slipped off a step and sprained his ankle.	Hand-rails to be fitted.	Hardware changed.
8	None	Hose leaked; cause unknown.	-	
9	None	Pump gland leaked.	Changes in design.	Hardware changed.
10	None	Insulation failed on portable grinder **Electricians are supposed to inspect all portable equipment before use but had not done so**.	Make instructions less ambiguous**.**	
11	None	A pin came out of a shackle and a load fell from a hoist. **The wrong type of shackle had been used and it was overdue for inspection**.	Follow instructions.	
12	Reportable	Hit head on scaffold.	Give publicity to incident.	
13	None	Acid got into an air blower causing corrosion.	Install extra trip and non-return valve,	Process design change.
14	Minor burn	A visitor, who had come to sample a ship, went into the laboratory, found a sample bomb and emptied the contents (butane) into a fume cupboard. They caught fire!	Improve procedures.	
1 5	Reportable	Pliers, used as a hammer, bounced and hit the man using them in the eye.	Give publicity to incident.	
16	Reportable	Compressor bearing keep lowered onto a man's fingers.	Look for better method.	
17	Reportable	Feet got wet and blistered. Rain water was probably contaminated. Rubber boots should have been worn.	Follow instructions.	

116/2 ANOTHER EXPLOSION IN A STEAM MAIN

A steam line was blown down and cold cut and then a plug was hammered into one of the open ends. A plumber struck an arc ready to weld in the plug. An explosion occurred and the plug was blown out of the pipeline, fortunately missing the plumber.

Acid had leaked into the pipeline due to corrosion of a heating coil and had reacted with the iron of the pipe, producing hydrogen.

Many other Newsletters (for example, 98/3, 98/2, 90/page 21, 79/2b, 51/7, 21/6 and 5/4) have described how steam, nitrogen, water and other service lines have been contaminated by process materials, and another explosion in a steam main was described in Chemical Engineering Progress, April 1974, Vol. 70, No**.** 4**,** page 80 (copy on request).

Before welding is allowed on a service line in a plant area, the inside of the line should be tested with a combustible gas detector. (This does not, of course, apply to hot tapping).

116/3 DIFFERENT SORTS OF TRAPPED ENERGY

We all know that when we shut down a plant, energy may be trapped inside it in the form of gas or liquid under pressure and we know that we have to get rid of this pressure safely before we take the plant to bits.

Electricians know that when high voltage electrical equipment is isolated from the supply a dangerous charge can be left in the circuit and they therefore earth the circuit before working on it.

A recent operability study drew attention to another form of trapped energy.

When mechanical equipment is stopped it may not be in a position of minimum energy. If so, things may fall when we start taking the machine to bits. For example, if a fork lift truck is in the raised position and we disconnect the chain, the forks will fall.

This example is obvious and no-one would take a fork lift truck to bits unless the forks were lowered, but other examples are less obvious, particularly on belt conveyors, palletisers, bucket elevators and skip hoists. If you have any such equipment on your plant:

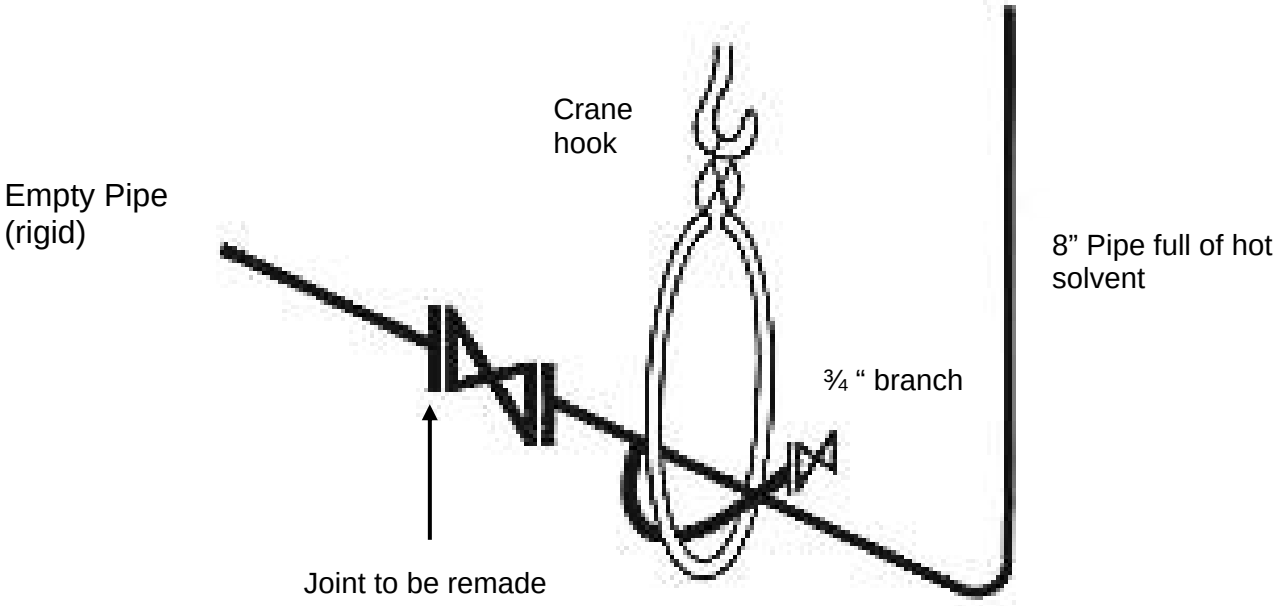
a) Is the hazard recognised by craftsmen and by supervisors, both those who issue clearances and those who accept them? Is it covered in the job instructions? Do you need a warning notice?

b) Can the moving parts be put into a minimum energy position before work starts or, if not, locked in position?

116/4 A LOOK BACK AT NEWSLETTER 16 (January 1970)

There was a bad leak when a 3/8 inch branch broke off and allowed a heavy solvent, saturated with C_4 hydrocarbons, to escape.

A joint on an 8 inch line had to be remade. The two sides were 3/8 inch out of line and as there was a crane on the job, it was used to lift one of the lines. The strap pulled on the branch and broke it off.



It is not a good idea to use a crane for a job like this on a live line.

The C_4 hydrocarbon formed a visible cloud of vapour about 10 yards across. Fortunately it did not ignite. Two men went into this cloud to close valves and stop the leak.

If anything like this happens again - and one day it will - remember that the cloud might catch fire and therefore:

Ca/l the Fire Brigade - so they are ready if it does.

If you have to enter the cloud, do so protected by water sprays from the Fire Brigade. I can lend you some American slides which show how this should be done.

116/5 OTHER MEN'S VIEWS No 10

HOW SHOULD GOVERNMENTS CONTROL INDUSTRY?

Everyone accepts these days that Governments should exercise some control over industrial safety but different methods are used in different countries. Here are a few views:

E W Langley, a senior member of the UK Health and Safety Executive, writes in “Occupational Safety and Health”, August 1978, page 8:

> *In general it is believed that it is better to maintain our traditional policy of steady progress towards improving the environment in the light of local circumstances and local needs than to operate through the formulation of rigid national standards which may in specific circumstances be either unnecessarily harsh or insufficiently restrictive. It also is believed that this flexible approach enables the best use to be made of resources which are not limitless, as some people seem to imagine in their demands to achieve a pristine Garden of Eden environment yet still retaining all the creature comforts of modern living.*

In contrast, T Alexander in “Fortune”, 3 July 1978, page 86, comments as follows on a recent announcement by the US Occupational Safety and Health Administration:

> *Absent from OSHA ‘s preamble is much indication that the agency gives a hoot for how much its standards would cost or for the benefits of substances it might effectively be banning. It gives no hint as to whether, in picking a “suitable” substitute or a “feasible” exposure level, any weight would be given to economic considerations as well as technological ones.*

Of course, the UK Authorities are not without their critics as the following quotation from a recent document shows:

> *The regulations discussed in the present consultative document suffer from being presented in a framework in which the Health and Safety Commission appears to be torn between placing responsibility for industrial safety on industry and seeking to control industry through regulations. To some extent these views are incompatible and the HSC should clearly indicate its position. If it wishes to control through regulation, it must come to accept responsibility for what is done under these regulations; on the other hand, if it wishes Industry to accept responsibility, then HSC should not seek to enforce by regulation or by bureaucratic procedures which divert effort from the accepted pursuit of safety improvement in the work place and its environment.*

116/6 AN AMMONIA LEAK IN FLORIDA

The US National Transportation Safety Board have published an account of a railway accident in Florida last year in which two tanks of ammonia were punctured. About 50 m^3 evaporated in 10 minutes, forming a narrow plume 15 miles long which showed up on radar screens. Two people were killed, 8 hospitalised and 38 less seriously injured. Vegetation was discoloured within a radius of 1000 feet. People who tried to escape were killed or seriously injured; most people stayed indoors, closed the windows and put towels over the cracks round the doors and windows; some breathed through wet towels. Those who stayed indoors were unhurt after 45 minutes, but received minor injuries when rescuers evacuated them.

Head shields on the tankers would have prevented the punctures or reduced their size.

The derailment was due to bad track and to incorrect assembly of the train - empty vehicles were put at the front. Although this was against the railway company’s rules, these were considered only as guidelines and were not enforced. The Report comments, “These ‘You may or may not’ company procedures circumvent and render useless the special rules”.

The full Report, No RAR-78-4, is available from the NTSB, Washington, DC 20594.

116/7 UNUSUAL ACCIDENT No 81

One of our overseas companies reports that a fitter carrying out maintenance work on a gas main slipped and lost his footing. Somehow the ear muffs he was wearing wedged between two small bore pipes and he was suspended by his head. He suffered strain to his neck and chest.

From Mond Division Safety Report, April 1978.

For more information on any item in this Newsletter please ‘phone ET (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.

October 1978

An Engineer's Casebook No 16

SPIRAL WOUND GASKETS — ½ inch to 1½ inches nominal size

Metallic spiral wound (SW) gaskets to BS 3381 : 1973 are in widespread use throughout the Division and in pressure ratings of Class 300 and above have largely replaced compressed asbestos fibre. Many engineers may be unaware of the BS since the use of brand names such as 'Metaflex' and 'Flexitallic' have become synonymous with SW gaskets.

In the size range ½ inch to 1½ inches NS there is a problem in as much as the standard gaskets to BS 3381 are suitable only for welding neck flanges. With slip-on or screwed flanges, where the bore of the flange is larger, a standard gasket protrudes beyond the flange faces into the pipe itself even when correctly centred by the centring ring within the bolt circle. At the inside diameter of an SW gasket are three or so turns of the metal strip which are wound on to each other and spot welded together before further winding and introduction of the filler strip. These turns form the foundation of the gasket and are intended to be gripped between the flanges when the joint is bolted up. The application of the flange bolt load results in an inward radial force on the SW gasket. When using a standard gasket between a pair of slip-on flanges in which the inner turns are not compressed this force can break the metal strip and allow the sealing element to unwind into the bore. The exposed turns are also being buffeted by the pipeline fluid. Both BS 3381 and manufacturers' catalogues contain warnings that the standard gaskets should be used only with welding-neck flanges in the sizes ½ inch to 1½ inches. However, since no other gaskets are listed in BS 3351 or catalogues, standard gaskets tend to be the normal supply. Unfortunately most of the flanges used on our plants in the 1½ inch to 1½ inches NS are slip-on flanges; consequently many SW gaskets are in service in these sizes under non-ideal conditions.

Manufacturers can supply special SW gaskets which are dimensionally suitable for slip-on or screwed flanges in which the whole of the sealing element is trapped between the raised faces. Manufacturers identify these specials by stamping 'SO' on the outer guide (centring) ring. Standard gaskets carry no flange identification, only size, class and material. Nominally at least, SW gaskets supplied as specials for slip-on flanges should be suitable for use with welding neck flanges since the bolt loads are exactly the same. Manufacturers, however, seem reluctant to recommend their use, perhaps because they do not conform to the dimensions of standard gaskets in BS 3381.

An attempt is being made through BSI to have a suitable range of SW gaskets in sizes ½ inch to 1½ inches for slip-on flanges detailed in BS 3381. Meanwhile tradesmen should be aware of this problem. Your SW gasket stocks should predominantly be specials stamped SO or wholly this type, thereby eliminating the chance of incorrect selection.

E H Frank

WHO'S WHO IN SAFETY

No.27 W B PEARSON

Eric Hunt (Who's Who in Safety No 2, Newsletter 85) retired at the end of August and was replaced by Bill Pearson.

Bill was born in a small mining village in County Durham and joined the old Billingham Division as a laboratory assistant in Research Department in 1954.

After serving in the RAF as an air wireless fitter for three years he returned to the Research Department of HOC Division, now Petrochemicals Division, as an experimental officer, where he stayed until joining Safety Group in mid-1978. He is taking over most of the safety surveying work of the Group, and will be spending a lot of his time on the Works looking at trip testing, clearance certificates, electric equipment, sampling and so on.

Bill's past hobbies have included magic (handy in A & D) and breeding tropical fish. He now shoots small bore for Wilton and enjoys driving his Lotus Elan. He is married with a son aged 19 and a daughter aged 17. His wife works in Distribution Department.