SAFETY NEWSLETTER

No. 106

IN THIS ISSUE

Best Wishes to all our readers for a Merry Christmas and a safe New Vear

IMPERIAL CHEMICAL INDUSTRIES LIMITED

PETROCHEMICALS DIVISION

106/1 A RELIEF VALVE WAS SET AT THE WRONG PRESSURE

During the commissioning of a plant extension, there was a high level of liquid in a blowdown drum and a number of small leaks. They were traced to a wrong setting on a relief valve — 270 psig instead of 700 psig.

The relief valve was originally ordered for use at 270 psig but, as the result of a design change, it was no longer required and the design contractor decided to allocate it to another duty for which the set pressure had to be increased to 700 psig. Due to an oversight, however, a new spring was not ordered. The valve remained in store.

Eventually the construction team withdrew the valve from store and installed it. They did not know that the valve needed a new spring. It was tested before installation, but only to the pressure marked on the plate fixed to the valve by the manufacturer, 270 psig.

Final checking by the commissioning team failed to spot the wrong setting.

During the pre-commissioning check of a new p/ant the set points marked on all relief valves should be checked against the relief valve register.

Reminder: Newsletters 54/3, 41/9 and 2/1 described other occasions on which the wrong relief valve was fitted.

106/2 A BREAK-IN WAS MADE AT THE WRONG PLACE

While investigating the incident described in the last item it came to light that a new pipe had been connected to an existing one at the wrong point. The line diagram was correct but the piping isometric was wrong. The construction team had, as normal, used the isometric.

During the pre-commissioning check of a new (or modified) p/ant, all lines should be checked against the master line diagram as well as the construction drawings.

106/3 A PIPE BURSTS DURING A PRESSURE TEST

A piping contractor had to carry out a hydraulic pressure test on a new 6 inch pipeline at 230 psig. The man carrying out the test told his foreman that he could not get above 200 on the gauge, using a hand-pump. The foreman told him to pump harder and he did, blowing the end off the pipeline. A pipe fitter working on another job was blown from the pipe-bridge and received serious injuries to his face.

The pressure gauge was calibrated in ats (atmospheres) and not pounds per square inch (psig). The word “ats” was written in small letters; the man carrying out the test did not notice it and, even if he had noticed it, he might not have understood what it meant.

At one time most of our pressure gauges were marked in psig, although high pressure plants used atmospheres (1 at =14.7 psig). On some of our new plants pressures are being measured in bars (1 bar = 14.5 psig, so a bar is almost the same as an atmosphere). If you use a bar gauge instead of a psig one, your pressures will be 15 times higher than you think. Care is needed that bar and psi gauges do not get muddled. Are the units written in big enough letters? Should we use a different coloured face for bar gauges? Is everyone on your plant aware of the danger of confusion? Even if you use only psi gauges on your plants perhaps one day you might borrow a gauge from another plant and they may give you one marked in bars.

A somewhat similar but less serious incident to that described above occurred in another Company. A bursting disc blew during a leak test, although two pressure gauges were showing pressures below the bursting pressure. Afterwards it was found that the impulse lines to both pressure gauges were partly choked.

Reminder: For the difference between psi gauge and psi absolute see Newsletters 76/5, 79/1 and 80/10.

106/4 A LOOK BACK AT NEWSLETTER 6 (DECEMBER 1968)

The official report on a fatal accident and fire at Esso's West London terminal on 1st April 1967 makes interesting reading. Automatic equipment had recently been installed for loading road tankers. The grade and quantity required were set on a meter; the driver inserted a card which indicated that he was authorised to draw product and then pressed the start-button; an automatic valve then opened; when the required quantity had been delivered, it closed. The filling arm had first to be lowered as the pump was started by a switch attached to the arm.

A manual valve was installed in each filling arm for use when the automatic equipment was out of order. To use the manual valves the automatic valves had first to be opened and this was done by operating a series of special switches in the control room. These were kept in a locked cupboard and a notice on the cupboard door reminded the operators that before they opened the automatic valves they must first check that the manual valves were closed.

On the day of the fire the automatic equipment broke down and the supervisor decided to change over to manual filling. **He asked the drivers to check that the manual valves were shut and then operated the switches to open the automatic valves.** Some of the manual valves were not closed and petrol and other products came out of the filling arms and either overfilled the tankers or splashed directly on the ground. The petrol caught fire and as a result three men were killed and eleven injured and the whole row of eighteen filling points was destroyed.

The report includes the following:

The decision to override the individual controls on the loading arms by means of a central switchboard, without the most rigid safeguards, was a tragic one. After its installation an accident from that moment on became inevitable sooner or later.

That this switchboard was installed, with the approval of the terminal management and with the knowledge of the Company's safety officer, in a switch room from which the loading stands were not visible, suggests some failure to take into account the basic fundamentals of safety in operation of plant.

It would have been expected that the installation of sophisticated equipment would have demanded concurrently an organised system of training for all personnel... On occasions even when training sessions were arranged no-one turned up, as personnel were unable to be spared from the daily operational tasks of the Terminal.

Had the same imagination and the same zeal been displayed in matters of safety as was applied to sophistication of equipment and efficient utiisation of plant and men, the accident need not have occurred.

Some very curious beliefs were expressed to me during the course of the enquiry, notably by the drivers. It would seem, therefore, to be of advantage to give all personnel some instruction in the properties of highly in flammable liquids, in the hazards to which they give rise and how they can be minimised. This would lead to a better understanding of the rules which are laid down to ensure safety in handling these liquids, and would probably promote a better acceptance and observance of the rules to the increased safety of all concerned.

Managerial instructions — Many of these, of necessity, have to be issued to staff. As the control staff are very busy people it would help in their control of plant, and have an influence on safety, if all instructions were codified and put in ready reference files so doing away with the bundles of unsorted documents that were handed to me for study.

Some system of regular supervision of operations and regular inspection of equipment and services should be instituted in order to maintain proper safety standards.

The whole report makes interesting reading for anyone interested in the way that accidents arise. It is published by HMSO and costs 9/- (45p). In particular pages 19 onwards should be read by all managers responsible for the operation of tanker filling points. They contain many detailed recommendations on the design and operation of these installations.

106/5 WHY CHECK IF YOU ARE CERTAIN?

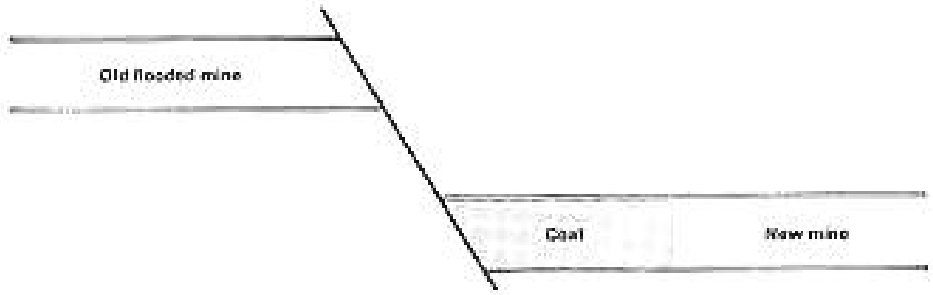
We can often learn from accidents in other industries. Because we are not involved we see the messages more clearly.

Some railway accidents were described in Newsletters 80/6 and 86/8, a mining accident in Newsletter 70/4 and a steel industry accident in Newsletter 88/1. Here is another mining accident.

"Disaster at Tynewydd — An Account of a Rhondda mine disaster in 1877", by K Llewellyn, published by apDafydd Publications, Cardiff, 1975, 8Op, is mainly a gripping account of a rescue that held the nation's attention for a week but the cause of the accident is also of interest:

It was a belief so strongly held that no checks were made

The abandoned mine next door was known to be flooded but it was believed that a fault would prevent the water reaching the new workings.



It was intended to work the coal until the fault was reached. So sure were the manager and surveyors that the fault would be there that without checking the position of the face they went 24 yards beyond the expected position of the fault and made none of the trial boring required by Law when water is expected. There was no fault and they dug into the flooded pit.

Five men were drowned and another five were cut off for a week.

The manager was put on trial for "feloniously killing" but acquitted, the judge pointing out that there is a difference between gross neglect and an error of judgement.

Perhaps we should remember this mining accident next time we are sure that a pipeline is free from hazardous materials.

OTHER MEN'S VIEWS No 5

A commander-in-chief cannot take as an excuse for his mistakes in warfare an order given by his minister or his sovereign, when the person giving the order is absent from the field of operations and is imperfectly aware or wholly unaware of the latest state of affairs. It follows that any commander-in-chief who undertakes to carry out a plan which he considers defective is at fault; he must put forward his reasons, insist on the plan being changed, and finally tender his resignation rather than be the instrument of his army's downfall.

NAPOLEON, Military Maxims and Thoughts

For 'commander-in-chief'' can we read 'manage. For 'warfare' can we read 'industry'?

UNUSUAL ACCIDENTS No 73

Many Americans have bought old wooden whisky barrels which have been converted into bars and cocktail cabinets. Three of them have blown up.

When the barrels were in use 20 lb of liquid were absorbed by the wood. After the barrel is empty the whisky slowly evaporates from the wood and forms an explosive mixture inside the barrel. The remedy is to leave the bung out and then the vapour can disperse as it is formed.

From the Sunday Times, 5 December 1976.

106/6 RECENT PUBLICATIONS

(a) Agricultural Division Erigineering Design Note EDN 1393, available from Division Reports Centres, describes a recent fire in an instrument air drier. The drier was contaminated with lubricating oil and, due to abnormal operating conditions, it was not as cool as usual at the end of a drying cycle. A more efficient oil filter is recommended.

(b) Report No MD 19128, available from Division Reports Centres, summaries the failure rate data available in ICI.

(c) In Safety Note 77/14 a member of the Research Division of the Health and Safety Executive describes a year's secondment with ICI (See Newsletter 98, page 8).

For copies of (c) or for more information on any item in this Newsletter please 'phone Eileen Turner (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 Turner to add your name to the circulation list.

December 1977

THE WHEEL—A NEW INVENTION WHich spEEds traveL

In one of his novels H G Wells described an advanced civilization which had not invented the wheel; all transport walked on legs.

You are asked to imagine that wheels were unknown until invented recently at Wilton. There would be no advantage in putting plants on wheels so it was decided to fit them to fire engines and ambulances so that they can reach fires and accidents more quickly.

The following is part of the report on a Symposium at which the new invention was discussed.

Mr Brown congratulated the speaker on his ingenuity. However, he thought caution was needed. The value of the WHEEL could not be fully assessed until several years' experience had been obtained. There might be unforeseen snags which would not become apparent until it had been in use for some time. He drew attention to the unforeseen effects of other changes, such as the temporary bellows at Flixborough.

Mr Robinson-Smythe regretted that the authorities had been given details before the views of other works had been obtained. The authorities might expect other works to adopt the WHEEL. He could see that it might be useful on a large site like Wilton, but he did not think it was appropriate to the needs of smaller factories where fire engines and ambulances did not have to travel so far.

Dr Hackenschmidt asked how WHEELS would be fabricated? The production of continuously-rotating load-bearing devices presented difficult problems. What materials would be used? Little was known about the behaviour of metal when subjected to such unusual forces.

Mr Murphy asked if the problems of maintenance and lubrication had been considered. How could a WHEEL be removed for repair without the vehicle tipping-up?

Mr Bloggs felt that fire engines and ambulances should not be used as subjects for experimentation. Had the firemen been consulted? He was sure that their view would be that safety equipment should stick to well-proven designs. If smoother travel was needed why not dig canals between the fire station and the plants?

Mr McTaggert said that as WHEELS would operate only on smooth surfaces, he could not see how they could be economic when the cost of road improvements was taken into account.

Mr Puddle said that it was a mistake to assume that speedier transport to the scene of a fire was always desirable. Using present methods of travel, the firemen had time during the journey to formulate their plan of attack. There would be no gain if firemen rushed in unprepared.

Mr Price-Jones said a similar device was in use at the Annisgrifiudwy-Cymysglyd factory when he worked there 30 years ago but he believed that it had fallen into disuse, perhaps because no-one had been able to devise a satisfactory method of stopping the vehicles.

Summing up, the Chairman said that the general feeling of the meeting was that it was early days. The trials at Wilton will be watched with interest. In the meantime, other works seemed to prefer to wait.

Reminder: Other discoveries were described in Newsletters 70 (coal) and 94 (water).

An Engineer's Casebook No 6— Oil Lubricated Bearings

Oil lubricated bearings consume oil whilst in use through spillage, vaporisation, leakage from reservoir etc., thus creating a need to replenish the reservoir where bearings are designed for continuous lubrication. A simple and convenient way of doing this on small reservoirs, such as those on most pumps and fan bearings, is to use a constant level oiler.

A number of different proprietary oilers are in use on the Division's Works and all use the same principle which is that of a bottle type chicken feeder. An inverted bottle has a tube secured to the centre of the bottle cap so that oil from the bottle can run down the tube. The tube, which may be from ¼ inch to ½ inch in diameter and ¾ inch to 3 inches long, depending on the design of the oiler, has its end chamfered at 45 degrees. The inverted bottle is mounted, usually adjacent to the reservoir, at a level such that the top of the

chamfer on the feed tube is at the oil level to be maintained in the reservoir. As the oil level falls the top of the chamfered feed tube is exposed and air enters the tube rising up into the bottle. An equal amount of oil is released, the process continuing until the pre-set oil level is restored when the chamfered tube is sealed off and oil feeding ceases.

In some cases the chamfered oil feed tube dips directly into the level in the reservoir or sees the same level through a partially full side branch. In others the surface fed by the bottle is entirely separate from that in the reservoir being one leg of a ‘U’ tube which connects the bottle to the reservoir. In such cases it is necessary to ensure that the surface fed by the bottle is open to the atmosphere and a vent hole(s) is provided for this purpose.

A recent pump bearing failure may have been due to the vent becoming blocked in a rather unusual way. The oil bottle was of ‘Denco’ manufacture and has a split brass sleeve surrounding the separate oil and air feed pipes which protrude from the cap. This sleeve is soft soldered into the cap and two vent holes, each about 1/16 inch diameter, are drilled through the cap and sleeve after they have been sweated together. The sleeve is quite a tight push fit in the body of the adaptor and it is likely that operators twist the bottle when inserting or withdrawing it. The sweated joint between the cap and sleeve had sheared allowing one to rotate with respect to the other thus blanking off the two small vent holes. The holes can be easily checked with a paper clip and when this was done on all Denco bottles on the Works concerned one further case of a rotated sleeve was found and another case where the vent holes had been painted over.

Some other potential causes of malfunction which may apply are:- Adjusting sleeve set too low on Denco bottles arranged for side feeding, chamfered tube set at wrong height, bottle fitting or adaptor loose where screwed into reservoir (should be positively locked against rotation), leaks in screwed fittings, faulty bottle to cap joints, occluded bottle preventing sight of true oil level etc. A careful check round all constant oiler installations might prevent unnecessary failures.

A specification based on the better features of existing oilers and designed to remove error producing features is being prepared and might be incorporated into the ICI Bearing Lubrication Specification El.

E H Frank

WHO'S WHO IN SAFETY

No 21 — DR A P WRIGHT

Peter Wright joined lCI in June 1977 as Senior Medical Officer for Petrochemicals Division and the Wilton Site.

He was born in Hull in 1928 and educated at University College, London. After hospital training, National Service and a short period in general practice he joined the steel industry in South Wales. In 1970 he joined the British Steel Corporation at Lackenby where he had to establish a medical service from scratch. So on joining Wilton all he had to do was to cross the road.

As Senior Medical Officer Dr Wright is responsible for the health care of all employees on the Site and in the Division.

His hobbies are hill walking and studying alpine plants. He is also interested in the Scout Movement and the St John Ambulance Service. He is married and has four daughters — two are teachers, one is at University and the youngest is still at school.