IMPERIAL CHEMICAL INDUSTRIES LIMITED
PETROCHEMICALS DIVISION

SAFETY NEWSLETTER No. 63

63/1 ARE THERE A LOT OF BATS NEAR HELMSLEY?

In the Yorkshire Museum in York there are a series of maps showing the distribution of various wild animals in Yorkshire. One map shows that very many species of bats have been seen near Helmsley.

This may mean that the Helmsley district is particularly popular among bats. It is more likely, however, that a number of enthusiastic students of bats live or have lived in the area.

In the same way, some Works supply more material for these Newsletters than others do. Readers in other Divisions (or Companies) may feel that they read more about dangerous occurrences in Petrochemicals Division than about incidents in their own Division (or Company). It is possible that more things go wrong in Petrochemicals Division, particularly on some Works. It is more likely that these Works are particularly good at bringing their dangerous occurrences out into the daylight so that other people can learn from them and take the action necessary to prevent them happening again.

63/2 HOW DO WE MAKE SURE THAT MODIFICATIONS ARE UP TO STANDARD?

There was a small leak of liquefied petroleum gas (LPG) on a Works. It came from a passing drain valve on a pipeline. The leak was soon stopped by closing a valve but the investigation brought the following to light:

1There should have been two valves in series or a single valve and a blank.

2 The valve was made of brass, which is not allowed for LPG, and was of a type which is stocked for use on central heating systems and other domestic uses.

3 The valve was screwed onto the pipeline, although screwed fittings are not allowed on new installations except for domestic water lines and certain small bore instrument lines.

4 Since the LPG fire at Feyzin in 1966, which killed 18 people and injured 81, we have drawn up standards for LPG, tried to publicise them and carried out numerous inspections to see if our equipment was up to standard. £30,000 was spent on the plant concerned on improving the safety of the LPG handling equipment. Nevertheless, subsequently someone installed a sub-standard branch. Neither the man who installed the branch nor the man who accepted the clearance back, none of the men who used the branch and none of the men who passed by, noticed anything wrong.

How do you make sure that, on your plant, any changes made — even minor changes such as an extra drain point — are up to standard?
How do you make sure that people know the standards that should be used?

On each works there is (or ought to be) a formal system for checking expenditure proposals to make sure the correct materials are specified and that there are no unforeseen effects on the relief and blow-down system, trip systems, area classification and other safety aspects.

These systems do not, as a rule, apply to small modifications which may be authorised by a foreman's chit. Yet, as we have just seen, these modifications can affect the safety of the plant.

Would it help to have printed on the clearance certificate or the workshops order words such as:

Is this a modification?
If so, 'have you checked the effects on
Relief and blow-down
Trip systems
Area classification
and Safety?

Have you specified the right materials of construction?

63/3 A VISITOR ENTERS A PIT WITHOUT AUTHORITY?

A sludge wagon was hired to empty a pit. The driver reported to the works gate. The gateman contacted the plant supervisor and the supervisor arranged for someone to show the job to the driver and stay with him throughout the day.

The next day the driver arrived to finish the job. As this was a continuation of the previous day's job, the gateman allowed the driver to go straight to the plant. The driver knew what to do and carried on by himself. As the pit was nearly empty, he found a ladder, put it in the pit and climbed in so that he could position the hose accurately. The atmosphere in the pit had not been tested and no entry permit had been issued.

Fortunately the driver came to no harm.

Until this happened, the works staff believed that it was impossible for a visitor to do anything like this. No one broke any rules, or any instruction they had been given, but there was a loophole in the rules. Are there any similar loop-holes on your plant?

63/4 A MAN FAILS TO NOTICE AN UNUSUAL READING ON AN INSTRUMENT AT THIGH LEVEL

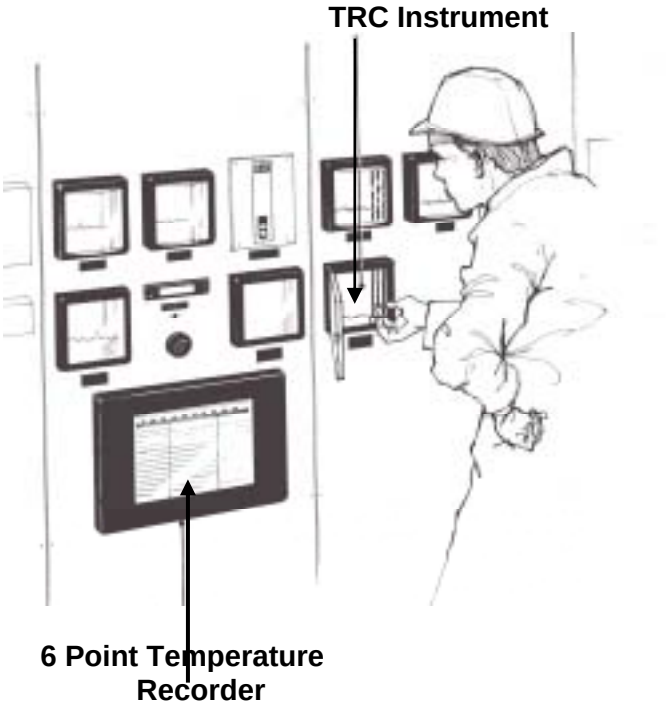
A recent incident illustrates the way in which people work.

A reactor was being started up. It was filled with reaction mixture from another reactor which was already on line and the panel operator started to add fresh feed, gradually increasing the flow while he watched the temperature on a recorder conveniently situated at eye level. He intended to start a flow of cooling water to the reaction cooler as soon as the temperature started to rise — the usual method.

Unfortunately, there was a fault on the temperature recorder and although the temperature actually rose this was not indicated. Result: a runaway reaction.

The rise in temperature was, however, indicated on a six-point temperature recorder at a lower level on the panel, but the operator did not notice this.

Fortunately the runaway was not serious because a high temperature alarm on the six point recorder alerted the operator before the temperature got dangerously high



An interesting feature of this incident was that no-one blamed the operator. The plant and section manager said they would probably have made the same mistake because the check instrument was

at a low level (about 3 feet above the floor) and because a change in one temperature on a six-point recorder in that position is not obvious unless you are actually looking for it — it is not the sort of thing you notice out of the corner of your eye.

The incident illustrates the need to realise that men have certain limitations and to design accordingly. We should not blame a man because he makes the sort of mistake that most people would make in the same circumstances. Situations can be accident prone as well as men, or, as the Americans say, accidents arise out of the work situation.

63/5 ANOTHER FAILURE OF A LEVEL GLASS

The level glass on a storage tank at a brewery broke and 1800 gallons of beer were spilt.

The level glass was not fitted with ball check valves, a type of valve that operates as an isolation valves as well as a non-return valve.

The operators were supposed to keep the level glass isolated outside normal working hours, but they had not done so.

Safety Note 72/20 gives our recommendations on level glasses:

They should not be used for liquids which are stored above their atmospheric pressure boiling point.

For all other hazardous liquids, level glasses should be fitted with ball check valves. These prevent liquid running out if the glass breaks Note that these check valves must be fully open or they will not operate when required.

Reminder: Newsletter 38, Item 11 described how a wooden beer tank burst, spilling 600 m^3 and flooding the neighbourhood.

63/6 ACCIDENT REPORTS — SOME NEW IDEAS

Last year one of the Works in the Division made two changes to their reports on accidents and dangerous occurrences.

First, each report not only says <u>who</u> is responsible for carrying out the recommendations but <u>when</u> they are expected to be complete. The report is then brought forward at this time.

Second, the report states the resources needed to carry out the recommendations, for example, two fitters for one day or one electrician for half-a-day. The safety officer adds up the totals and this makes it easier to see the total effort that is required. It also makes report writers ask themselves if their recommendations are practicable or if it might be better to think of another solution.

Most of the reports recommend some changes to the plant, very often the introduction of an extra alarm or trip. Often this is really the best solution. But sometimes altering the hardware will not make another accident less likely. For example, if an alarm has been ignored or allowed to get out of order, will it help to install another alarm?

Many people seem to feel that an accident report is incomplete unless it recommends a change in the hardware. But often the best action would be a change in the method of working, or more training, or better instruction, or more regular testing of alarms and trips — changes in the "software".

At the end of the safety courses on one Works, those present are asked to set themselves a personal safety target — a definite task they then undertake to try to accomplish. It is encouraging that most of the targets are for changes in the software. The following are some examples:

1 To initiate a series of safety talks for my shifts, using experts from within the Company to lecture on their particular subject. I have in mind such items as hazard analysis, Works Doctor, road tanker emergencies, Pyroban, electrical safety, scaffolding standards etc.

2 My objective from the course is to set up a training programme for safety and emergency procedures. The programme will involve full scale emergency incidents, fire-fighting and breathing apparatus training.

3 I will carry out a weekly survey, over a period of approximately 3 months, of all hazardous chemicals in use in the laboratories. I will determine the extent to which the hazards associated with these chemicals are appreciated by laboratory personnel and the extent to which adequate

precautions are taken when handling and storing these materials.

4 (a) To develop a personal expertise in the field of hazard analysis, particularly on protective systems.

(b) To apply this technique to new projects starting with ……

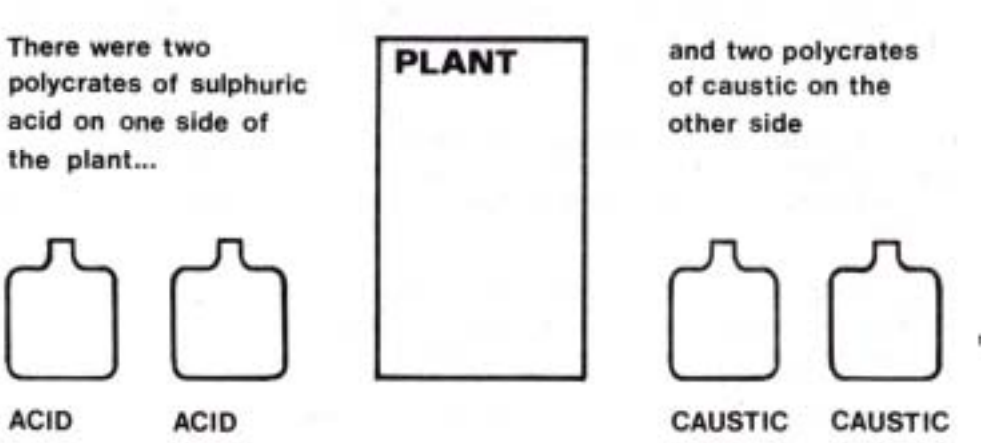
5 My objective is to study the detrimental and hazardous effects of $Si0_2$ in demineralised water, particularly in high pressure water tube boilers with high temperature surfaces, where, if it goes unchecked, it can then become a danger to operational personnel. Part of this exercise is to educate personnel on the above hazards and to further train them in effectively dealing with this problem at the source.

6 To produce slide/tape sequences and training documents on “The Safe Use of Steam”.

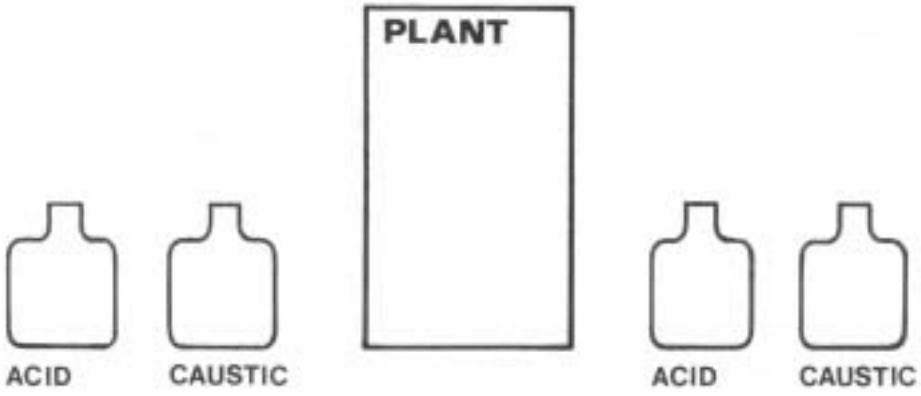
Another new idea is followed in another Division. Some weeks after a supervisor has filled in a minor accident report, the safety officer writes to him asking what he has done about it. The supervisors like the “personal touch”.

63/7 HOW DO YOU TELL PEOPLE ABOUT THE CHANGES MADE WHILE THEY WERE AWAY?

An effluent is neutralised before it leaves a plant. Sometimes sulphuric acid has to be added, sometimes caustic soda. The acid and caustic soda are supplied in similar plastic containers called polycrates.



While an operator was on his days off someone decided it would be more convenient to have a polycrate of acid and a polycrate of alkali on each side.



When the operator came back, no-one told him about the change. Without checking the labels he poured some excess acid into a caustic crate. There was a violent reaction and the operator was

sprayed in the face.

Fortunately, he was wearing goggles. The morals of this story are:

1. Always check labels.

2. How do we make sure that people know about changes made during their days off? Far more complicated changes may be made than the one described in this accident.

From IP Safety News No. 3, Petroleum Review, Januaty, 7974.

63/8 UNUSUAL ACCIDENTS NO.33

Not many people have experienced the same accident on successive days. A famous case of this is described in "Electrostatics in the Petroleum Industry" by A Klinkenberg and J L van der Minne. In 1954 a large tank at Shell's refinery at Pernis in Holland blew up 40 minutes after the start of a blending operation in which one grade of naphtha was being added to another. The fire was soon put out and the naphtha was moved to another tank.

The following day they started the blending operation again; 40 minutes later another explosion occurred!

The storage tanks were not nitrogen blanketed and there was an explosive mixture of naphtha vapour and air above the liquid in the tanks. The source of ignition was static electricity — generated because the pumping rate was rather high.

"Electrostatics in the Petroleum Industry" analyses a large number of explosions which have occurred in hydrocarbon storage tanks and have been ignited by static electricity.

Static electricity is generated whenever hydrocarbons are pumped into a storage tank. In Petrochemicals Division we therefore insist that all fixed roof storage tanks, 100 m^3 or more in size, containing hydrocarbons above their flash points, are blanketed with nitrogen. Regular checks must be made to make sure that the nitrogen blanketing is in operation.

Shell's approach is rather different. They add anti-static additives to the hydrocarbons in the tank. These make the liquid conducting and there is then little or no danger from static electricity. We feel that the additives might interfere with many of our processes.

Liquids like acetone and isopropanol, which contain oxygen, are already conducting and there is little or no danger from static electricity, provided all equipment is earthed so that the static electricity can drain away to earth.

If you would like to know more about static electricity see Safety Note 69/11, "Precautions to be taken against static, lightning and stray currents", an article by H Strawson in "The Chartered Mechanical Engineer", November 1973, page 91, or Loss Prevention Guide No. 6.

63/9 TEESIDE'S FIRST SERIOUS INDUSTRIAL ACCIDENT

The following appeared in Safety Newsletter No. 8, March 1969:

When an accident occurs we take it for granted nowadays that first-rate medical attention is available for the injured. Matters were very different when Teesside's first serious industrial accident occurred over 100 years ago.

"On a summer's day in 1858 a terrific explosion occurred at the waterside rolling mill of Snowden and Hopkins One of the standing boilers, that supplied steam for the working of the mill and the steam hammer, burst with a tremendous report. Part of it hurtled into the river carrying with it several workmen, part tore, with terrific violence, through a thick wall scattering debris on the men working below, and a workaday boiler room was made a horror of scalding steam let loose. Some seventeen men were injured, and the nearest hospitals were at Newcastle and York. Two men died on the way to Newcastle, one or two were taken home, and some too bad to move were p/aced in the stables of the Ship Inn, Stockton Street where the stench from the nearby Stell was unbearable. One man died through sheer fright"

From "The History of Middlesbrough" by W. Lillie, 1966, p. 173.

Following this incident Teesside's first hospital, which later became Ormesby Hospital, was founded.

For more information on any item in this Newsletter please write to Mrs P. H, Organic House, Billingham or ring B 3927. If you do not see this Newsletter regularly and would like your own copy, please ask Mrs H to add your name to the circulation list.

April 1974