

IMPERIAL CHEMICAL INDUSTRIES LIMITED
PETROCHEMICALS DIVISION

SAFETY NEWSLETTER No. 59

59/1 DRUM STORAGE - DO WE TAKE THE SAME CARE AS WE DO WITH TANKS?

If we had to build a new tank to store 100 tons of a highly flammable liquid we would take a number of precautions. We would make sure the tank was well away from sources of ignition such as roads and furnaces. To decide how far away it should be we would work out how far the vapour from the vent or from any spillage would spread.

We would also work out the radiation from the tank if it caught fire, and we would make sure that no buildings or key items of equipment were so near that they could be affected by the fire.

All this is taken for granted and is included in our design codes. Of course, we do not need to do the sums every time — we have certain standard distances.

Suppose that instead of storing the 100 tons of highly flammable liquid in a tank we have to store it in drums. Would we still take care that the location was safe or would we just put the drums on any spare piece of ground that was available?

Obviously we ought to take the same care as we would with a tank, but sometimes we do not. Drum storage tends to grow unplanned. Six drums are left on a patch of spare ground “for a few days”. The few days stretch, more drums are added and before long we have a drum park.

Earlier this year a stack of drums in another Division caught fire. There were a number of buildings within a few hundred feet of the stack and the heat radiation was sufficient to set them alight. The result of the fire is illustrated on the cover of the magazine “Fire” for July.

Perhaps we had better have a look at our drum stacks.

59/2 QUESTION

What is the commonest cause of fires in oil tankers?

Answer on page 6

59/3 IT IS NOT ONLY PLANT PEOPLE WHO CAN STOP ACCIDENTS

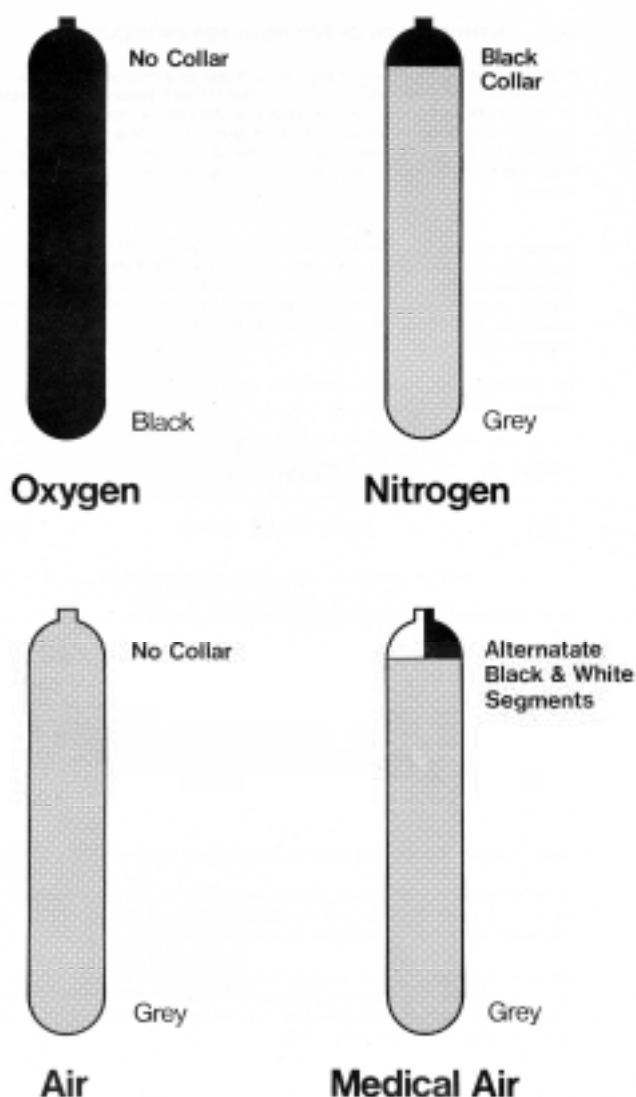
One of the plants in the Division uses large cylinders of nitrogen. One day a lorry driver had to deliver a cylinder of oxygen to another plant. The cylinder was the same size and almost the same colour as the nitrogen cylinders so he delivered it to the plant which he was accustomed to visit. The plant supervisor noticed that the colour of the cylinder and some of the fittings were different; he also thought it was unusual that only one cylinder had been delivered — usually several come at a time. Nevertheless he accepted the cylinder. He did not notice that the invoice said ‘oxygen’.

The invoice was sent on to the Purchasing Department. The young lady who dealt with it was surprised that this particular plant had received oxygen as they had never done so before. She queried it with her supervisor. He telephoned the plant and the mistake came to light. Fortunately the cylinder had not been connected up to the plant.

The prompt action of this young lady prevented what might have been a serious explosion. She has since been married and on behalf of all our readers we would like to give her our best wishes for her future happiness.

The diagram shows the usual colours for our nitrogen and oxygen cylinders.

A similar incident happened in another Company a few years ago. They used to receive caustic soda in rail tank wagons and acid in road tank wagons. One day some caustic soda arrived in a road tank wagon. The tanker was labelled 'caustic soda', and the papers said 'caustic soda', but the people on the plant were so used to receiving acid by road tank wagon that they spent two hours making a special coupling and then pumped the caustic soda into the acid tank!



59/4 RESCUING PEOPLE FROM CONFINED SPACES.

Many people have been overcome by gas because they entered a vessel or confined space to rescue another man without proper breathing apparatus. If we see another man overcome in a vessel there is a very natural temptation to dash in straight away and rescue him, but it is not wise to do so without breathing apparatus. Misguided bravery of this sort can mean that other people have two men to rescue instead of one.

A particularly tragic incident of this type has been reported by another company. A ship's officer noticed that the pumpman was not on deck and went to look for him. He saw the man in the pumphouse, overcome by gas. He raised the alarm, but without waiting for the rescue team to arrive, he went down into the pumphouse to rescue the man. He was overcome himself and passed out on a platform at mid-level. The rescue team arrived, assume that the officer was the man they had come to rescue and rescued him, but did not notice the other man at the bottom of the pumphouse. It was sometime later before anyone noticed that he was missing. The officer recovered, but when the pumpman was found he was dead.

59/5 IDENTIFICATION OF EQUIPMENT FOR MAINTENANCE

Some old pipelines were being dismantled and due to a misunderstanding a man broke into a pipeline that was full of a highly flammable liquid. Fortunately, before starting to cut up the line he broke a joint to check that the line was empty. Similar incidents have happened many times before and have been described in these Newsletters. They can be prevented by fixing a numbered tag on to the pipeline which has to be cut. On the Works concerned the instructions state that this must be done but the instructions were not followed.

Perhaps it was the first time this instruction had not been followed. More likely, the instruction had been ignored on many occasions before the inevitable accident happened. This should have been picked up by the plant manager's regular checks. In Petrochemicals Division all plant managers and engineers are expected to inspect a number of clearances every week. One of the points they should check is whether or not the equipment is properly identified.

On the Wilton Works clearance certificate there is a column headed "Tag Nos.". This serves as a useful reminder.

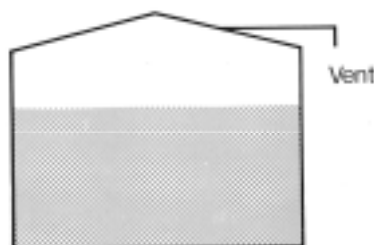
Part B	Operation	
B.1	JOBS TO BE DONE	Tag Nos

Next time you are writing out a clearance, accepting a clearance or checking a clearance remember that this may be one of the occasions when insisting on a tag may prevent an accident.

59/6 SOME INCIDENTS DUE TO HYDROGEN PRODUCED BY CORROSION

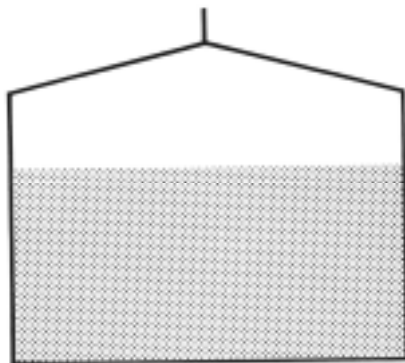
Small quantities of hydrogen are usually produced when corrosion occurs. If the hydrogen cannot escape and accumulates in the plant, an explosive mixture may be formed. This has caused some fires or explosions in surprising places.

Some years ago an explosion occurred in another Company on a plant handling phosphoric acid for fertilizers. The hydrogen produced by corrosion throughout the plant was carried into a particular tank. The tank vent discharged downwards near a walkway so the hydrogen could not escape easily.



A welding spark ignited the escaping hydrogen and blew the roof off the tank.

The tank was modified so that the vent was in the centre of the roof and the hydrogen could escape easily.



The hydrogen could escape as soon as it entered the tank; it could not build up to an explosive level and there was no need for nitrogen blanketing.

The hydrogen produced by corrosion is formed as atomic hydrogen which can diffuse through iron and come out on the other side. This has caused hydrogen to turn up in some unexpected places.

In one incident a man was drilling a hole in the hollow piston of a steam engine; when the drill penetrated the shell, a 3 ft. flame shot out and injured him. The gas inside the piston was analysed and found to be hydrogen. (Case History No. 1807, published by the Manufacturing Chemists Association.)

In another case a glass-lined vessel was kept cool by an external water jacket. Acidic water was used to clean the inside of the jacket, i.e., the outside of the vessel. Some atomic hydrogen

was formed; it diffused through the wall of the vessel and developed sufficient pressure to crack the glass lining. (Chemical Engineering Progress, December 1971.)

59/2 CONTINUED

ANSWER TO QUESTION ON PAGE

The commonest cause of fires in oil tankers is smoking in bed.

The annual safety report for 1972 from a large oil company reported 32 fires in their tankers. Fourteen were caused by smoking in bed.

59/7 UNUSUAL ACCIDENTS No 29

Can discharges of static electricity from people ignite flammable mixtures of gas or vapour and air?

The answer is yes but the circumstances must be exactly right. Two recent incidents show what is necessary. The first is taken from the Mond Division Safety Report for September 1973.

An ICI employee on holiday in Scotland pulled into a garage to fill up his car with petrol. While the car was being filled he took off a woollen sweater and threw it into the car. He was wearing a 'Crimplene' shirt underneath the sweater. When the tank had been filled, he was about to replace the filler cap which he had been holding in his hand. A spark jumped from the filler cap to the end of the fill-pipe and a flame appeared at the end of the fill-pipe. Fortunately the flame was only about four inches long and he was able to blow it out and replace the cap.

When the man took off his sweater there was a charge of static electricity on it and this left an equal and opposite charge on the man. He was wearing rubber-soled shoes so the charge could not drain away to earth. When he went close to the car the charge caused a spark to jump from his hand to the end of the fill-pipe and this spark was sufficient to ignite the petrol/air mixture. Fortunately, the tank itself contained so much petrol vapour that it could not explode there was not enough air present.

Note that synthetic fibre clothing cannot cause people to become charged unless some clothing is removed. As long as the man was wearing his sweater there may have been a charge on the sweater and an opposite charge on the man but the man and the sweater as a whole had zero charge. Normally we are not likely to remove our clothing while dealing with a leak in the plant so synthetic

fibre clothing presents no hazard. However, if a person is continually sitting down and then getting up again he can leave a charge behind on the chair and an equal and opposite charge on himself but only if his footwear is non-conducting or the floor is non-conducting. Most footwear is conducting.

The second incident is described in "Design Engineering" for October 1973, page 199. A Japanese woman went to a public toilet of the old-fashioned bucket type. Some methane gas had accumulated in the bucket. When she took off her pants there was a separation of charge between her pants and herself and a charge passed from her to the toilet. The methane exploded with a loud bang.

59/8 RECENT PUBLICATIONS

- (a) US Bureau of Mines Report No. RI 7752 gives a detailed account of the damage caused by the detonation of a cloud of propane from a leaking pipeline.
- (b) Report No. O.200,795/A, available from Division Reports Centres, describes an incident in which a 25 ton hydraulic crane fell onto a plant while lifting a 250 lb. load. The telescopic jib was fully extended and at an angle of 50° to the vertical.
The investigation disclosed that many hydraulic cranes can be manoeuvred into an unstable position without any alarm sounding.
- (c) A handbook has been prepared for issue to the drivers of powered industrial trucks. Copies are available from Central Safety Department, Head Office.
- (d) ICI Engineering Codes and Regulations, Group B, Volume 1.4, "Registration and Periodic Inspection of Pressure Vessels" has been revised. Copies of the New Code can be obtained from Division Engineering Departments or Libraries (in Petrochemicals Division 'phone B.3675). A new section, not included in the old edition, deals with the testing of alarms and trips which prevent damage to a vessel from over-pressure, over-temperature, over-filling, corrosion, explosion or other hazardous condition.
- (e) "Incidents in the Oil Industry No. 10", a report from one of the oil companies, describes some incidents which have occurred during the storage and transport of oils.
- (f) If you attended one of the discussions earlier this year on furnace fires and explosions you should have received a souvenir booklet. If you have not, please let me know.
- (g) We have a few spare copies of our 1974 Safety Calendar. They will be given to the first people who write or 'phone.

For copies (e) — (g) or for more information on any item in this Newsletter please write to me or ring B.3927. If you do not see this Newsletter regularly and would like your name added to the circulation list, please let me know.

Trevor A. Kletz

December 1973