

IMPERIAL CHEMICAL INDUSTRIES LIMITED
PETROCHEMICALS DIVISION

SAFETY NEWSLETTER No. 61

61/1 A CRANE TOPPLES ONTO A PLANT



In October last year, a 25 ton telescopic jib crane overturned onto a plant. The photograph illustrates the incident which was mentioned in Newsletter 59, Item 8 (b). A full account and recommendations are given in Report No. 0.200,795/A, available from Division Reports Centres.

A relief valve weighing 258 lb. was being removed from the plant when the incident occurred. The crane fell on to some process pipework and, to recover the machine, the plant was de-pressurised, thus interfering with production.

The crane was working with a jib length of 124 feet and the maximum safe radius for this jib length is 80 feet. The driver omitted to observe this and, in fact, went out to 102 feet radius. The crane was fitted with a safe load indicator of the type that weighs the load through the pulley on the hoist rope: it does not take into account the weight of the jib. Because of this, the driver got no warning of an unsafe condition and, as he lifted the valve, the crane overturned. Although the driver had been driving telescopic jib cranes for several years, he did not seem to appreciate the need not to exceed the maximum jib radius.

The investigation highlighted a number of needs, the most important of which are:-

- 1The need for effective training of crane drivers;
- 2The need for an audible warning when the crane approaches unsafe conditions, such as a radius greater than that for which the machine has been designed;
- 3The need for all those concerned with lifting operations to be kept up-to-date with developments in the type of crane available. (A series of teach-ins covering this has since been held at Wilton)

The incident can be demonstrated very effectively with the "Dinky Toy" model hydraulic crane (price £2.45) using a weight of 2.5 ounces (70 grms) on the hook.

61/2 WHAT SHOULD WE DO IF WE CAN'T GET THE RIGHT MATERIAL?

As a result of the present shortages, we may not always be able to get the specification material for a repair and we may be tempted to use something else, a different grade of steel or a different class of pipe.

Sometimes an alternative material maybe just as satisfactory, but we must make sure we get expert advice before we use it.

Sometimes an alternative material is satisfactory for a temporary job, but will have to be replaced in a month or a year. We must make sure that we do not forget to replace it.

61/3 SOME MORE ROAD TANKERS ARE OVER-FILLED

On two occasions recently road tankers have been over-filled because the operator thought they were single compartment wagons when, in fact, they were two-compartment wagons. The operator tried to put the full load through one manhole.

Some single compartment tankers are fitted with two manholes, so the number of manholes is not a guide to the number of compartments. You can tell the number of compartments from the number of foot-valves or the number of outlets.

Note that if a tanker has to be moved in order to fill another compartment, the manhole lid on the full compartment should be closed first.

Tankers are frequently over-filled for a variety of reasons, and this has been responsible for a number of fires, some of them serious, in other companies. Safety Note 72/12 discusses the problem and the action required.

61/4 SIMPLE SOLUTIONS ARE BEST

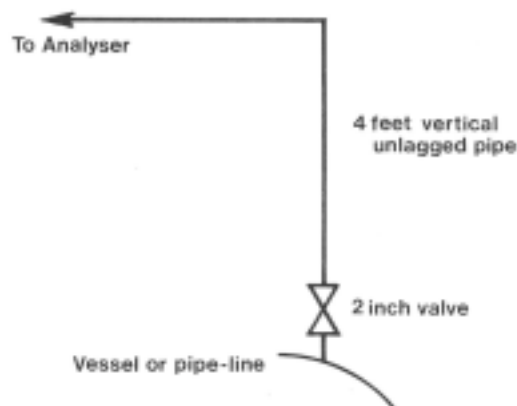
In most oxidation plants it is necessary to measure the amount of oxygen in some of the gas streams. If there is too much oxygen present an explosion can occur.

Measuring oxygen in a dry gas stream is straightforward but if the gas stream contains liquid or vapour this has to be removed first and this is often difficult.

One of our plants was supplied with an elaborate and expensive system for scrubbing the gas with water. It did not work and the oxygen analysers fell into disuse.

The system was replaced by a system for scrubbing the gas with cold hydrocarbon. It worked, but was expensive to maintain.

Finally the system shown below was installed.



The vapour condenses in the unlagged pipe and runs back into the vessel. The system is cheap and simple and has a much shorter response time than the more elaborate systems.

Can you think of any other examples of simple solutions which were much better than complicated ones? If so, please let me know.

"What you don't have costs nothing and needs no maintenance" Prof. F.C. Williams.

61/5 MANUAL HANDLING

Extracts from a talk given by Ray Teigh of Agricultural Division to the Teesside Occupational Safety Group.

"Too often, Management, perturbed at the number of back injuries, believed that the panacea lay in introducing correct methods of manual handling. Too often, however, this was only part of the story. In the first instance, the layout and the design of areas where people have to work should be examined to make certain that they are the best possible. For example, he has seen an example of a man working with feet at different levels and lifting 30 lb. from a conveyor belt to staging behind him. In this particular instance a hoist was needed, not training of the man. In another example there were two almost identical conveyor layouts, yet back accidents occurred on one and never on the other. An examination showed the first one was close to very large doors so that, when men stopped for a rest after getting hot and sweaty, they were standing in a draught, with the not unnatural result that they suffered back trouble. In another example trucks brought loads from stores and deposited them in unoccupied areas near to but not at the actual place where the goods would be required, with the result that men were then called upon to manhandle over the last part. Very often the temporary resting place of these goods were pebbled areas and other unsatisfactory places so that men did not have a proper footing, with inevitable falls and strains as a result."

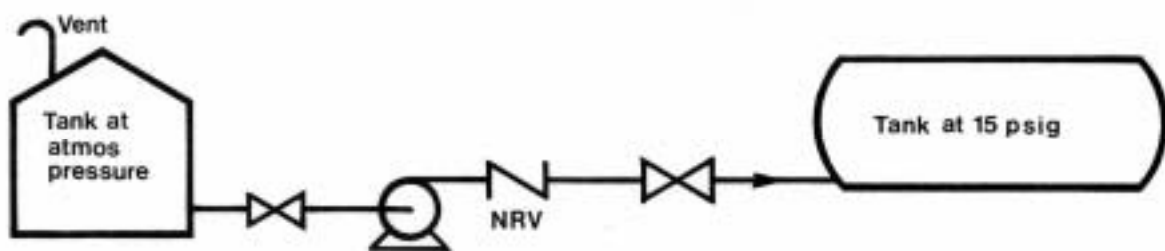
"In short, it is essential to examine the layout and planning of a task before considering training."

A film "Make Light of Lifting", price £120, a manual, price £1.75 and a wall chart, price £0.50, all based on Ray Teigh's methods, can be obtained from Millbank Films Ltd., Thames House North, Millbank, London, SW1.

61/6 NON-RETURN VALVES

Earlier Newsletters (17/1, 17/2, 19/2, 30/3 and 48/1) have described incidents which have occurred as a result of non-return valves failing and their reliability has been discussed (Newsletters 30/3 and 33/7).

Another incident was described briefly in Safety Note 73/3 "Three Weeks in a Works". Naphtha is pumped at intervals from a tank at atmospheric pressure to one at 15 psig. For many years the practice was not to close any isolation valves but just to rely on the non-return valve in the pump delivery. One day a piece of wire got stuck in this non-return valve, there was a back flow of naphtha and the atmospheric pressure tank overflowed. Fortunately the spillage did not catch fire.



This is a good example of an accident waiting to happen. Sooner or later the non-return valve will fail and a spillage is then inevitable.

The pump delivery valve is now closed between each movement, and in addition there is a high level alarm on the atmospheric tank.

Do we need a non-return valve at all? Most people think we do in case the pump trips out or the operator forgets to close the isolation valve. At first sight the chance of this coinciding with a failure of the non-return valve seems very small. But is this really so? Suppose the plant has a life of 10 years, and suppose that 5 years go by before the non-return valve fails. If the non-return valve is never inspected or never tested it will stay failed for the next 5 years. It will have protected the pump against back flow for only half the life of the plant. So if we want our non-return valves to protect our

equipment with a high degree of reliability, they must be tested or inspected regularly. A non-return valve is really a sort of trip and like all trips should be checked regularly, if we want to be sure that it will work when required.

Of course, many non-return valves are in situations where it does not matter very much if they fail, or fail to shut-off completely. But if failure can affect the safety of the plant then the non-return valves should be listed and inspected regularly, say every year or two on clean duties, more often if there is rust or scale about.

61/7 CONTRIBUTIONS FROM READERS

- 1 The rear window shelf of your car is not a good place to keep your safety helmet. If the car stops suddenly the helmet could shoot forward and hit you on the back of the neck.
- 2 Don't keep petrol in your house. According to a newspaper report, a house caught fire because 13 gallons of petrol were stored in the cellar in bottles and cans.
- 3 The tyres on an ICI vehicle were inflated to 40 psig instead of the recommended 25 psig; a tyre burst and the vehicle skidded into a hut. On the Works concerned, recommended tyre pressures are now painted above the wheels of all vehicles.
- 4 A mild steel valve painted with aluminium paint was used by mistake instead of a stainless steel valve. It failed in service.
- 5 Newsletter 59, Item 6, described how hydrogen formed by corrosion can diffuse through steel. Some years ago, another Division found that mercury-in-steel thermometers were reading high. The outsides of the steel bulbs were corroding and the hydrogen was diffusing into the thermometer. The remedy was to coat the steel bulbs with another metal.
- 6 Newsletter 58, Item 8, described the precautions that should be taken with cartridge operated tools. A reader points out another hazard. The tools are very noisy and men who are using them should wear ear protection. Tests show that the tools produce 120 dBA.

61/8 UNUSUAL ACCIDENTS NO.31

A few years ago a young lady boarded a works bus. When she tried to get up she found herself stuck to the seat. A small quantity of solvent had been left on the seat from the overalls of the previous passenger and this had dissolved her nylon tights. She left her tights behind and was treated at the medical centre for irritation-of the skin.

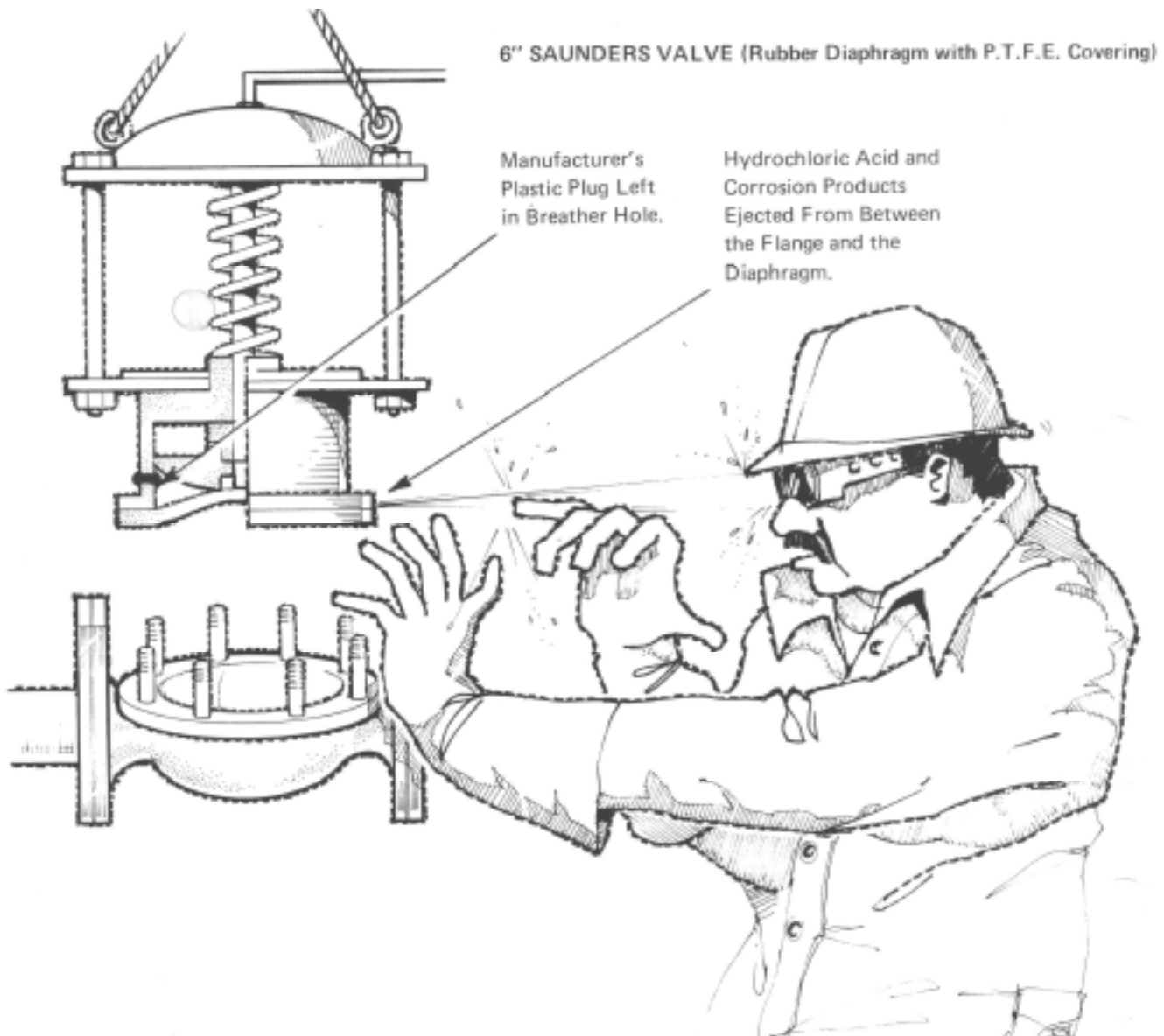
61/9 RECENT PUBLICATIONS

- (a) During the last five years there have been about twenty fires in the company which have caused serious damage to instrument or electric cables and where repairs to the cables were the limiting factor in getting the plant back on line. A Company report, No. HO/ENS/730,010/A, available from Division Reports Centres, describes methods of protection. It also describes ways of assessing the likelihood of damage and the consequences and how to decide whether or not protection is justified.
A recent Agricultural Division Report, No.A.128,243, gives a number of worked examples,
- (b) Agricultural Division Report No. H/12 shows that Komet Extrakt S synthetic fire-fighting foam at an expansion ratio of 75/1 substantially reduces the evaporation rate from pools of liquid ammonia. High water content foams, such as ordinary protein foam, are not recommended.
Copies of the Report are available from the author, B. H (B.4348).
- (c) Safety Note 74/4 reviews the extent to which plastic equipment has been used on plants handling flammable materials and makes recommendations.
- (d) Safety Note 74/2 describes in detail the method used for calculating the reliability of a high pressure trip which is being installed instead of a relief valve. The Safety Note can be used as an example by anyone who wishes to make similar calculations.

For copies of (c) or (d) or 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.

February 1974



FITTER SPRAYED WITH HCL WHILST DISMANTLING VALVE

The pneumatic actuator on a 6" Saunders Valve required to be changed. The valve was isolated and the line drained of 36% hydrochloric acid. The head assembly, supported by a crane, was removed from the body by splitting the flange which holds the diaphragm. The head was off when acid and sludge shot out and sprayed the fitter. Goggles and prompt action saved him from all but very minor burns.

It was subsequently discovered that the P.T.F.E. covering to the rubber diaphragm had split, allowing acid to find its way into the bonnet, where it corroded the cast iron internal fittings giving off hydrogen. Gas pressure was built up in the bonnet because the manufacturer's plastic plug had been left in the breather hole and the combination of soft rubber and P.T.F.E. sealed the diaphragm to prevent release of pressure back into the valve body.

When the valve was dismantled, all that held the diaphragm to the flange was a film of paint which quickly ruptured, allowing violent ejection of the contents.

The moral of this is CHECK THAT THE BREATHER HOLES ARE CLEAR.