September 2008
Presentation on Gas Safety in the Workplace
Terry Broughton, Managing Director, Gas Safe Consultants Ltd.

Terry got his presentation off with a bang, with a series of photographs of a fire on a vehicle carrying gas cylinders. He emphasised the ferocity of the flames and the power of the subsequent explosions, which sent cylinder fragments **100 metres *behind*** the spectators, who were 40 metres away from the fire! The lesson there was that, even though you think you are a safe distance away, sometimes the fire develops so rapidly and with such force, you need to think very carefully indeed about your assessments! Terry went on to comment about one spectator, about 30 metres away from the vehicle, who seemed to have supreme confidence, beforehand, in the stopping power of a plastic Keep Left bollard in the central refuge at the traffic lights! He wasn't around, afterwards, to say what he thought!

Terry added that this incident demonstrated why the Fire Service established an exclusion zone of 200m around LPG cylinders in a fire and extended this to 3 - 400 metres for Acetylene cylinders. He commented that it was vital that escaspe routes avoided gas stores and quoted examples of so-called 'experienced operators' who did inexplicably stupid things when confronted with a gas hazard. Like the lighting a match when he could hear gas escaping and the person who attempted to seal an Oxygen regulator leak with PTFE tape, completely unaware of its flammable potential!

Just to keep us on our toes about the characteristics of gases, Terry gave us a little test about the chemical make up of the air we breath. Although oxygen deprivation can kill if it falls below its normal 21% level, he said that leaks can be dangerously flammable, if not explosive. For instance, he said, soapy water, if used to detect leaks, can be lethal and only approved leak test kits should be used.. If a heavy gas had leaked, then it was crucial to extract it using Local Exhaust Ventilation at a low level.

Continuing on a theme of causes of accidents, Terry referred to the incorrect actions of people like fitters who had grease on their hands but still connected regulators to Oxygen cylinders, despite the real risk of fire. Then there was the incorrect design of vans that did not have high and low vents to prevent a build up of flammable vapours inside the vehicle where there were many potential sources of ignition. Added to this was the lack of secure fixing for cylinders that could easily lead to a

damaged regulator and possible accidental release of gas. The golden rule here was to always fix cylinders at the top. The root cause of many of these issues was a widespread lack of risk assessments, very often carrid out by persons remote from the job who did not have direct experience of the hazards involved!

Terry went on to discuss the correct use of regulators. He said that they had a lifespan of 5 years and had to inspected annually, with satisfactory records, serial numbers and "next inspection date" tags to ensure traceability. It was also necessary to monitor them to carry out any manufacturer's modifications in service. At the end of their lifespan they must be professionally refurbished! Very often, he added, firms did not have any standard operating procedures to put these requirements in place!

Performance of equipment was also compromised by poor selection, Terry added. He quoted the need to select the correct size of oxy-acetylene nozzle to suit the thickness of material to be cut. This information was easily available from the British Compressed Gas Association (BCGA) **Nozzle Data Chart**, which quoted sizes and gas pressures required to decrease the risk of flashbacks. He said that correct selection also affected the lighting up procedures, where it was vital to purge the system first. Then it was important to have a specific spark igniton lighter for light gases **(Acetylene)** and a different design for heavier-than-air gases (Propane), remembering to hold the torch upwards for the former and down for the latter! Very often, he warned, operators had been using dangerous start-up and shut-down procedures for years! Terry also warned us against using worm-drive clips (aka Jubilee) and said that crimped clips were purpose-made and, hence, more reliable.

An underlying cause of all these problems is poor training, he added, where competence was 'assumed' because an operator was 'time-served', sometimes many years ago, or had learned the job informally on the "sitting-with-Nellie" principle. This was compounded by the absence of standard operating procedures, or method statements. Another problem, Terry added, was the confusion caused by the changes in colour codes about two years ago and he recommended the procurement of a chart from the gas cylinder supplier.

On the subject of regulators, he said that it was totally unacceptable to interchange regulators between types of gas, nor to release gas to blow out dust before fitting them. They should also be the correct design (i.e. Bottom Entry for BOC cylinders or Side Entry for other suppliers) to suit

a specific cylinder. Cylinders should not be transported or used without having the correct labels attached.

All gas systems were subject to the **Pressure systems Safety Regulations 2000 (PSSR),** which required, amongst other things, a Written Scheme of Examination (WSE) to be in place before it is operated. A WSE should include: -

- identification of the items of plant or equipment within the system;
- those parts of the system which are to be examined;
- the nature of the examination required, including the inspection and testing to be carried out on any protective devices;
- the preparatory work needed for the item to be examined safely;
- where appropriate, the nature of any examination needed before the system is first used;
- the maximum interval between examinations;
- the critical parts of the system which, if modified or repaired, should be examined by a competent person before the system is used again;
- the name of the competent person certifying the written scheme of examination;
- the date of certification.

Terry then mentioned common human errors, which sometimes caused problems: -

- Connecting two blue hoses to Oxy-Acetylene cylinder rigs
- Wrapping the hoses around the cylinders, whilst in use, instead of fully extending them
- Taping together to make them easier to deploy

He went on to relate an incident where a fire occurred because a leak had developed near the head of a torch and the correct shut-down procedure had not been followed, with a purge of the system. This had taken

Colour-coded pipes on an Oxy-Acetylene rig

place inside a box and a dangerous atmosphere had built up by the start of the next shift. He added that even though fires near Acetylene cylinders may have been extinguished, the gas can often burn inside for some time, which explains the reason for imposing an exclusion zone up to 200 metres afterterwards.

Terry also referred to another aspect of working with gases that was overlooked and that was the risk from manual handling the cylinders themselves. He strongly recommended the use of a well-designed trolley, particularly where site work was concerned. He said that if ever a cylinder over-balanced it was infinitely preferable to let it go, rather than risk a severe injury by trying to control it! The moral was that small, light cylinders should be used to 'eliminate the risk'!

On a slightly different note, Terry referred to the transportation of cylinders in vehicles by mobile engineers and the storage overnight, particularly at domestic premises. He warned that if ever a fire broke out, the presence of the cylinders would definitely feature in the Fire Officer's report and this would be the first thing an Insurance Company would request, in the event of a claim. The undeclared presence of the gas could well invalidate the insurance, with disastrous consequences for the property owner!

Terry spoke briefly about the handling of cryogenic gases that are commonly decanted from one vessel to another. The gas's extremely low storage temperatures introduce some unique risks and make standard operating procedures an important provision.

A Liquid Nitrogen Decanting Rig

Terry did not produce a handout of his talk but, instead, distributed a copy of a very detailed **"Working Environment Safety Assessment for Compressed Cylinder Gases"**. This addressed the key safety issues and good practices relevant to the safe use of gases in the workplace. Key topics are: -

- General Issues
- Gas Regulators
- Flashback Arrestors, Hoses and Torches
- Safe Handling of gas cylinders
- Self Assessment – Safe storage of gas cylinders

As there were no other questions, the chairman added that in his experience as an HSE Inspector, he had seen that even small amounts of oil contamination on overalls could ignite an oxygen leak. He warned that the lack of an insurance inspection is no defence after an accident and that Standard Operating Procedures are exxential to prove due diligence in complying with the law.

The meeting was then closed, with the audience showing their enthusiastic appreciation for Terry's lively, practical and informative presentation.

Further advice:

Gas Safe Consultants Ltd.
01270 758890
admin@gassafeconsultants.co.uk
www.gassafeconsultants.co.uk