SOLUTION TO THE POTENTIAL PROBLEMS AND RISKS WHEN USING, TRANSPORTING AND STORING OXY ACETYLENE EQUIPMENT

Paper Presented by:

Robert Palmer & Ken Barker

Authors:

Robert Palmer, *Services and Maintenance Co-ordinator,*
Ken Barker, *Water Operations Attendant,*

Port Macquarie-Hastings Council

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Robert Palmer, *Services and Maintenance Co-ordinator*, Port Macquarie-Hastings Council
Ken Barker, *Water Operations Attendant*, Port Macquarie-Hastings Council

ABSTRACT

Port Macquarie-Hastings Council is leading by example in addressing potential workplace safety issues when using, transporting and storing oxy acetylene equipment and gas cylinders.

Rather than respond to a potentially life-threatening incident, Council has taken a proactive approach by identifying potential risks and finding solutions through changed work practices and new technology to ensure the safety of its staff, the general public and operational worksites, while also improving the quality finish of its water supply infrastructure.

1.0 INTRODUCTION

Port Macquarie-Hastings is located on the Mid North Coast of New South Wales and is a local government area that has a number of small villages and the three main townships of Port Macquarie, Wauchope and Laurieton. The total population exceeds 75,000 with more than half living in the Port Macquarie precinct.

Port Macquarie-Hastings Council has emerged as a national leader in total water cycle management, investing more than $150 million in water storage, treatment and reclamation technology, and encouraging a community that continues to be pro-active and well-informed.

As a Council, leading by example is a priority of the organisation's mission statement of creating a sustainable high quality life for all. In all areas of its operation, the water supply division values innovation and forward thinking and aims to exceed best practice outcomes that not only achieve sustainable results at a community and environmental level, but also to improve workplace productivity, operational efficiencies and safety.
An example of this is the organisation's review of the potential problems and risks when using, transporting and storing oxy acetylene equipment and cylinders. Acetylene is commonly known fuel gas used extensively in gas welding but has extremely volatile qualities if used incorrectly.

The water supply crew uses and transports oxy acetylene extensively on the job, more specifically in the construction and repair of copper pipe joints that are more often than not in restricted or confined spaces and under water.
The improper handling and storage of compressed gases such as oxygen and acetylene can have serious and life threatening consequences including fire, explosion or reactivity with other materials. Adverse outcomes such as these are disastrous for any organisation valuing workplace and occupational safety, especially when working in such close proximity to the general public.

2.0 DISCUSSION

2.1 Potential problems and risks

Aware of these potential risks, Council invited 3D Safety Services on-site to conduct a two-day training workshop to identify potential risks and develop workable solutions and organisational change. This included a review of Council's compliance with Australian Standards including; AS 4839 – 2001 The safe use of portable and mobile oxy-fuel gas systems for welding, cutting, heating and allied processes.

There were several significant issues identified during the workshops. These included:

1. Insufficient air circulation around the gas cabinets in several vehicles. Vents were incorrectly connected inhibiting air flow, increasing the risk of gas compression and explosion.
2. Holes were drilled in gas cabinets defeating purpose of cabinet, to isolate gases from the vehicle's internal spaces.
3. Hoses perished throughout with the inner braid exposed. Units in this condition are non-compliant with Australian Standards.
4. Torch handle was leaking from the valve.
5. Acetylene regulator damaged (not zeroing) and therefore non-compliant.
6. Several regulators were older than five (5) years. Australian Standards for compliance direct that from five years from the date of manufacture, regulators should be replaced or refurbished.
7. Torch and attachments older than five (5) years and therefore non-compliant.
8. Incorrect fittings on hose ends, making them unsuitable for use.
9. No identification tags stating when equipment was last checked and due for next scheduled review/testing.
10. Equipment requires a consistent scheduled maintenance review. Recommend equipment be inspected six (6) monthly as per *AS 4839*.

Of all the issues identified, perhaps the most significant was the incorrect and insufficient installation and ongoing maintenance of the gas cabinets in the operational vehicles. It would only require the opening of an attachment, the spark of a car lock or an open flame, where acetylene gas has been stored without proper ventilation, for a life threatening incident to occur.

2.2 Improvements in response to identified issues

- The existing gas cylinder storage facility at the Water Operations Centre **(WOC) urgently** required reconfiguring. The existing caged enclosure which contained both oxygen and acetylene cylinders, was located on the ground right outside the lunchroom. Separate caged enclosures for the oxygen, acetylene and other flammable products were installed three (3) metres apart in an appropriate location always from any normal work/lunch areas Additional safety signage was also erected to ensure all staff understood the compliance storage requirements.

- A review of scheduled maintenance for the organisation's oxy equipment was conducted. In light of the inconsistencies in the maintenance review period (between 6 months and 12 months, depending on the maintenance company used by each division), a decision was made to make all scheduled maintenance six-monthly in accordance with *AS 4289 Oxygen & Acetylene Gas Reticulation Systems & AS 4839 The Safe Use of Portable & Mobile Oxy-fuel Gas Systems*.

- *AS 4839* states transportation of cylinders in closed cars or vans is not recommended. However if they must, the cars or vans must be properly ventilated at all times. As a result, all vans were taken directly to the depot mechanics to improve the ventilation system.

- An oxy acetylene equipment database has been developed for the organisation recording all equipment purchases and scheduled maintenance. All non-compliant equipment has now been replaced or repaired to meet Australian Standards.

- The *AS 4839 "Guidance on Maintenance"* is now available to all and kept with the oxy equipment for easy reference.

- Research was conducted into alternative methods to oxy acetylene that improved workplace safety, were more cost efficient and did not compromise the quality of the region's first-class water supply infrastructure.

2.3 Outcomes achieved

As a result of the organisation's review of workplace practices, an alternative copper pipe joining system has been applied with great success.

Council has invested in the Viega Propress cold-press copper pipe joining system which has proven to be a practical, reliable, safe and cost/time efficient alternative to the traditional oxy acetylene method.

The Viega system, which was chosen for its availability through a local TradeLink distributor, is a safe, reliable, and economical copper pipe installation system that uses modern cold press-connection technology.

2.4 System Benefits

- It's fast and easy to use. While there is an initial substantial monetary investment in this new technology, the cost benefits in terms of its ease to use, time saving and safety improvements will quickly see this cost recouped..
- The system is flameless and requires less rigid storage/transport/maintenance regulations.
- Creates strong, permanent and rigid connections.
- Can be used with on a large selection of fittings and in confined/difficult situations. Traditional oxy acetylene repairs, particularly on water mains/pipes can require significant site clearing. Using cold-press technology eliminates the need to remove existing infrastructure (eg: footpaths) to gain access and cause disruption to residential water supply.
- Produces a neat, consistent professional appearance.
- Less equipment is required onsite.
- It's an environmentally friendly connection system.
- Offers a versatility of fittings for variety of applications.

The new system allows for greater flexibility on the worksite, eliminates the need to store and transport potentially volatile gas cylinders, offers greater practicality in difficult or confined situations and significantly reduces the amount of time required on the job.

The new technology includes a battery powered electro-hydraulic hand tool which can be utilised in both gas and water installations. Compared to silver soldering or brazing, this technology allows for fast installation without compromising either the strength or finished appearance of the joints.

2.6 An Example

An example of how the new Viega system has helped our staff to overcome a difficult water service problem can be demonstrated by a recent project to replace an old 50mm dia water meter at the El Paso Motor Inn in downtown Port Macquarie. This project had been put off on numerous occasions because of the many difficulties associated with this work and no-one had been able to come up a practical way to complete this replacement work.

The existing water meter was originally installed in the 1960s and had become a source of long-term concern regarding the need to replace this water meter, due to its age, lack of accuracy for low flows and corrosion was also occurring with the flange connection bolts (particularly as this unit is location right next the sea air environment of the Hastings River).

This water meter was located in a small recessed wall cabinet which made access to the meter and connecting pipework extremely difficult. It would not be possible to effectively use an oxy torch within the wall cavity and would have presented many problems with both a lack of oxygen and also potential gas accumulating in this confined space. To make the wall cavity larger would have impacted upon the structure of the building and stability of the wall and was not an option.

Other issues of concern to water staff included; an inability to completely isolate water back-flowing from the premises, thus making it impossible to achieve an effective soldering joint.

By utilising the new Viega system water staff were able to first remove the old water meter at the flange connections and then by cutting off the vertical copper pipe sections attached to these flanges, this provided sufficient space for a pre-manufactured water meter and gate valve assembly to be positioned into the wall cavity and the two final joints made with the Viega tool with out introducing gas to the cavity and the small water flow in the joints posed no issues with the cold joint system being used.

As one of a few local government organisations to embrace this new technology, Council has also encouraged local sub-division contractors to adopt the new copper pipe joining system in a collaborative approach to ensure the best outcomes for its customers. In doing so, work performance, site safety and the quality of the water supply network passed on to Council in new development areas remains consistent with existing water infrastructure and work practices.

3.0 CONCLUSION

What was initially identified as a potential major workplace safety issue for Port Macquarie-Hastings Council has resulted in an organisational change inspired by innovation and best practice outcomes.

The decision to move away from the traditional use of oxy acetylene was a proactive move based on identified potential risks. The fact that Council was prepared to invest in safer, more efficient technology based on a risk assessment, is a testament to its commitment to improving workplace safety.

Investigating and investing in new technology to replace traditional systems has eliminated potentially costly risks for the organisation, improved workplace safety, identified the need for a more consistent and efficient works maintenance program and resulted in a consistent method for water infrastructure construction and repair.

4.0 ACKNOWLEDGEMENTS

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5.0 REFERENCES

Australian Standard AS 4839 – 2001 The safe use of portable and mobile oxy-fuel gas systems for welding, cutting, heating and allied processes.

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