AUSTRALASIAN INSTITUTE OF ENGINEER SURVEYORS INC.

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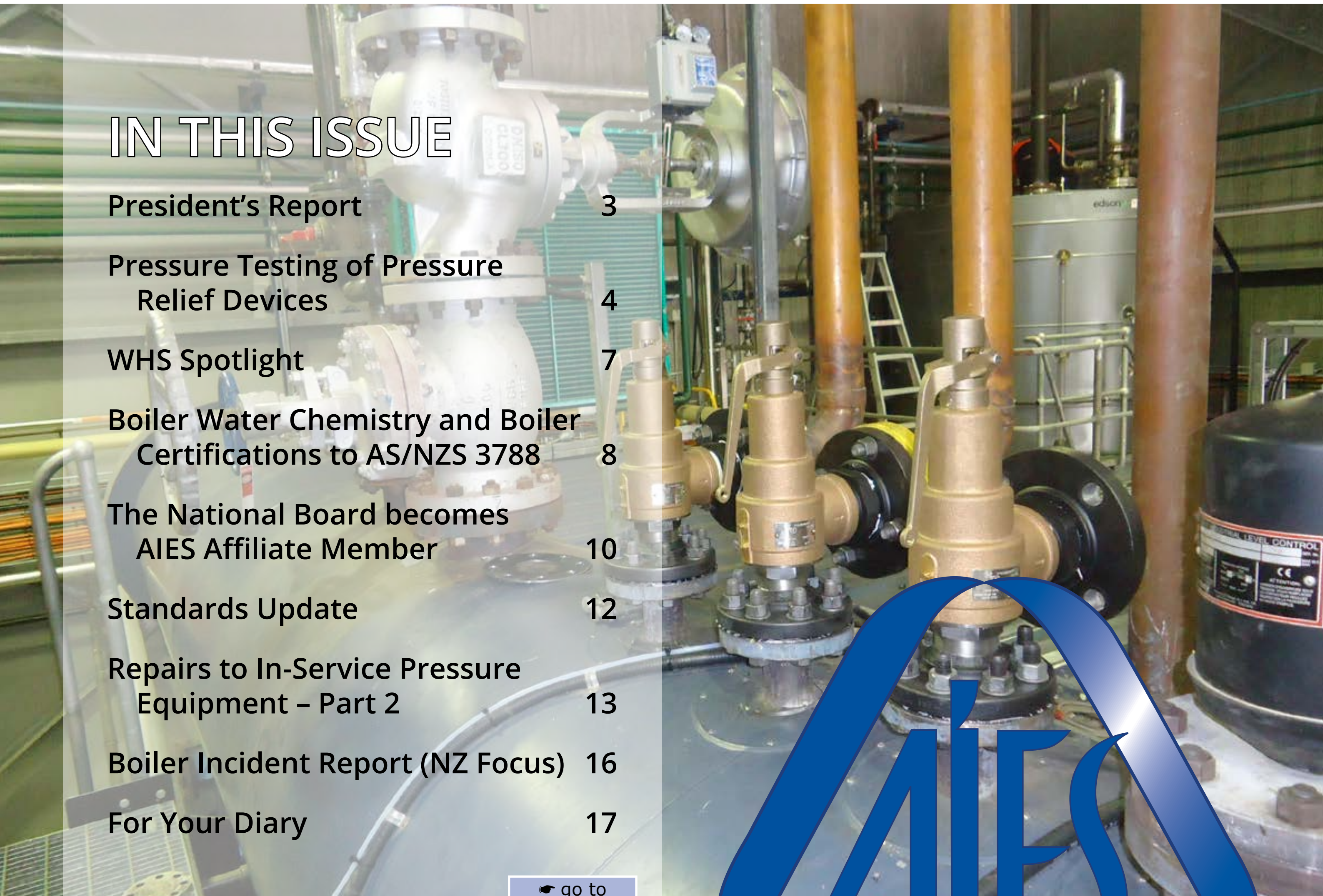

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NOTICE OF

AIES MEETINGS

Meetings are held at

The Ryde Eastwood Leagues Club

117 Ryedale Road, West Ryde, Sydney

5.30 pm Refreshments

6.00 pm General Meeting

2019 Meetings

Tuesday 5 March

Tuesday 4 June

Tuesday 3 September (AGM)

December TBA

Closing Date for material for the next issue of the AIES Gazette is 26 August 2019

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All contributions should be sent to the Editor at the contact details above for compilation and presentation to the Editorial Committee for consideration.

Articles should be submitted in Word document format, with separate (not embed-ded) high quality jpg files. Captions for all images should be provided and images should be free of copyright or other restrictions.

Submissions may include technical papers, case stud-ies, success stories, letters to the Editor, news or any items which would be of interest to AIES members and readers. If recommending material from another publication or source, please include the name of the source, date of publication and contact details so that permission to republish can be sought.

AIES would also like to establish a library of copy-rightfree images for use in the Gazette, so please send to the Editor any that you are happy to share, and hold the rights to, with a brief description of the subject.

CLOSING DATE FOR NEXT GAZETTE:

26 AUGUST 2019

COVER PICTURES:

Front: TAYLOR Safety Valves installed on saturated steam boiler main drum. Back: MAXIFLOW Safety Valves, set pressures 35,000 kPa on steam, installed on main boiler in power station
(Photos courtesy JPS Valves & Service Pty Ltd)

Statement of Objectives of the

AUSTRALASIAN INSTITUTE OF ENGINEER SURVEYORS INCORPORATED

ABN 52 887 542 957

The objectives of the Australasian Institute of Engineer Surveyors Incorporated (AIES) are to:

1. Promote the development and practice of inspection of plant and equipment and coordinate its activities throughout Australia and New Zealand. Equipment shall include boilers and pressure vessels.
2. Advance the interests of all those engaged in the profession and safeguard their status and character.
3. Establish, promote, form, regulate and control any division of the Association in each State or Territory of Australia or New Zealand pursuant to the objectives of the Association.
4. Foster fraternal sympathy amongst members and stimulate discussion of all matters related to hazardous equipment.
5. Promote a uniform standard for inspectors throughout Australia and New Zealand.
6. Promote self regulation by the adoption of relevant Regulations and Standards and recognition of those accepted as members of the Association.
7. Encourage industry in the use of member's services for hazardous equipment inspection and all related activities to ensure safety in the workplace.
8. Promote public and environmental safety in the design, fabrication, testing, installation and inspection of hazardous equipment.

David Dowling
AIES President 2018-19

PRESIDENT'S REPORT

MARCH 2019

With all projects governance, quality control and compliance are paramount in Management's mind.

Australia has been through a decade of major projects, many of which are now in production.

So, what are the lessons learned from all of this experience and how can we get the knowledge out to our Members?

This is often a contentious issue as company confidentiality must be respected but, in general discourse, the problems and solutions for frequently-observed non-conformances can be topics of discussion at AIES meetings and training sessions.

How was quality controlled at manufacture in the various jurisdictions – at receipt on-site for installation?

It is important for Inspectors to get involved, contribute to the bank of knowledge, attend meetings and converse with colleagues.

Experience and knowledge are hard won by those actively involved with pressure equipment manufacture, servicing, production and qualification in Australian industry – it appears that this basic foundation can be bypassed when personnel are becoming qualified or certified in the Inspection Industry.

We need to review what is happening in the industrial sphere and ensure Inspection Qualification and Certification Systems reflect what is required by our customers while still being open to considering new approaches.

Our Institute can contribute in many ways and, with active participation from the Membership, all will benefit.

Hope to see you at the next General Meeting.

Regards

David Dowling

Pressure Testing of PRESSURE RELIEF DEVICES

The pressure test of a newly manufactured boiler or pressure vessel is a key milestone during pressure equipment manufacturing. Leak tightness testing of the vessel and verification of integrity of the welds are performed at this time. If there is a gross error in the design of the vessel, the pressure test will hopefully make this evident. The testing at an overload condition guarantees the capability of the pressure vessel, which should never again operate at a pressure that high.

By Joseph F Ball PE

Director, Pressure Relief Department,
The National Board

First published in The BULLETIN, the technical journal of The National Board of Boiler and Pressure Vessel Inspectors, Fall 2018 issue, volume 73

Pressure relief devices are pressure-retaining items whose primary function is to release pressure from a piece of pressure equipment and prevent the increase in pressure above the maximum allowable working pressure (MAWP). For most of the working life of a pressure relief device, it should sit silently installed on the pressure vessel, where the pressure-retaining integrity of the pressure relief device is its primary function. How the pressure-retaining integrity of a pressure relief device is determined is the focus of this article.

At first, one might think that a pressure relief device would be pressure tested exactly the same as a pressure vessel; however, over time the product rules have evolved, and the pressure test requirements are different because of this history.

Test pressure

Where pressure testing is mandated by the ASME *Boiler and Pressure Vessel Code* (ASME Code) for the new construction of a pressure relief device, the first difference is the pressure at which the test is performed. A pressure vessel is tested at a pressure of 1.3 x MAWP, multiplied by the stress ratio of the allowable stress at room temperature divided by the stress at the design temperature. Since most pressure vessels are designed for unique design conditions, the test pressure is individually determined for each pressure vessel, and recorded on the data report for that pressure vessel.

The pressure tests for power boilers and most heating boilers (cast iron and 30 psig* boilers are tested at a higher pressure) are performed at a pressure equal to 1.5 x MAWP with no additional stress multiplier.

Pressure relief devices are designed differently. While there are a few custom designs, most devices are designed as a family of products that will be listed in a catalogue. A device is selected from the catalogue based on a particular application and the design pressure of the selected device is equal to or higher than the set pressure needed. Until the set pressure is known, which could be a long time after the parts are manufactured, a test pressure based upon set pressure will not be known. Therefore, ASME Code rules for Sections I and VIII are based upon the 'design pressure of the parts'. The basic ASME Code requirement is that the pressure test of the valve shell shall be performed at 1.5 x the design pressure of the parts. This value applies when the test is completed hydrostatically. A lower pressure of 1.25 x the design pressure of the parts applies when the test is done pneumatically.

A lower pressure is used for pneumatic tests because of the stored energy concerns that always are present for this type of test. The lower pressure can also be justified because a pressure test with air is more sensitive than a test with water because the smaller gas molecules should be able to detect the same small defect at a lower pressure.

Testing process

The pressure test of a pressure relief device is simple. For a hydrostatic test all holes are plugged, it is filled with water, and air pockets are vented away. The test pressure is applied with a pump, and a calibrated pressure guage is attached to the part or device being tested. After being held at the test pressure for a length of time specified in the test procedure, the part is examined for any sign of leakage. Any leakage indicates the part or device needs to be repaired or rejected.

For a pneumatic test, air pressure is applied and then an indicating fluid is used to show the presence of leaks. This can be either a fluid (such as soapy water or 'snoop') that will create a bubble where a leak is present, or the part being tested is submerged in a water bath and bubbles show a leak is present. The second method lends itself to operations where large numbers of parts need to be tested.

A few pressure parts are exempt from pressure testing entirely. If parts are made from bar or forgings, and the stress level at hydrostatic test pressure is half of the allowable stress, no test is required. Valve parts often need to be much thicker than necessary to hold pressure

* psig = pound-force per square inch.
1 psig = 6.89476 kilopascal (kpa)

so that they will not deflect during valve operation. Combined with knowledge about the low number of defects present in forgings or bar material, and the low stress during a pressure test which cannot 'open' a defect, parts can be both safely used and economically manufactured if the right materials are chosen.

All pressure testing must be undertaken with care because of stored energy concerns. Even water at very high pressure has some compressibility, and injuries could occur if a part fails catastrophically. There is more stored energy during pneumatic testing, and the entire testing process should be carefully examined for safety concerns. Testing with very cold parts or a cold test fluid should also be avoided due to the potential for brittle fracture.

Treatment of complete units and individual parts

Different from a pressure vessel test, a pressure relief device can be pressure tested as either a complete unit or individual components may be tested separately. Most pressure relief devices are designed where the inlet portion of the device is rated for a higher pressure than the outlet. Testing the two pressure zones separately simplifies the testing process.

Because parts may have been tested separately, the ASME Code specifies an additional test to verify integrity of the completed assembly. This test is performed after calibration of the device has been completed. At that time the final assembly of the cap is completed and all mechanical joints that were not previously tested are checked with air at a minimum of 30 psig. The test pressure could be higher if the user has specified a higher back pressure value. A leak detector fluid is applied to the assembly and any sign of leakage indicates where a correction needs to be made. Usually any problem can be rectified with a new gasket or O-ring, and another test is then performed to show the device is leak tight.

TAYLOR Safety Valves installed on saturated steam boiler main drum (Australian photo courtesy JPS Valves & Service Pty Ltd)

DEWRANCE Safety Valve installed on main steam drum in a power station. The valve was 55 years old and still in service (Australian photo courtesy JPS Valves & Service Pty Ltd, see article page 12)

Documentation and periodic testing

Pressure testing is documented as required by the manufacturer's quality programme. Most manufacturers mark tested parts as well, often using the letter 'H' in a triangle or using a 'HYD' stamp. If the customer wants specific documentation about the pressure test, they need to request a hydrostatic test report, which may not normally be prepared for standard production work.

Once a pressure relief valve goes into service, it needs to be periodically inspected and tested. Pressure testing is not normally repeated unless there is a specific pressure boundary defect that needs to be investigated. The *National Board Inspection Code* (NBIC) discusses performance testing of valves (set pressure, seat leakage) in quite a bit of detail, but pressure testing of valves in-service is not required. What is not obvious is that any time a valve is performance tested, it is also being pressure tested up to the set pressure. If there is a leak across the pressure boundary, it will be obvious during the performance test, and the actual set pressure will probably be hard to determine because of the leak.

When pressure relief valves are repaired following NBIC rules for use of the VR stamp, again, pressure testing is not mandated for standard repairs except when pressure parts are replaced, or when welded repairs are done to pressure-containing parts.

Replacement parts

Replacement parts must be tested as required by the original Code of Construction. For replacement parts, most repair organisations do not perform the pressure test themselves, but instead mandate that the part supplier perform that test. Since those parts are mostly produced by the valve manufacturer under the same quality process used for new construction, the pressure test is automatically done following the valve manufacturer's ASME Code quality programme (repair parts are treated exactly the same as parts for a new valve). A pressure test report or a hydrostatic test stamp on the part is usually the evidence of a completed test.

When a pressure part is welded during valve repair, the NBIC mandates a pressure test be performed, following the new construction rules. The VR stamp holder must determine the proper test pressure and prepare the appropriate test fixtures, such as flanges and plugs, to seal the part being tested. The test pressure is applied and a record of the test recorded on the repair traveller for that job.

Closing thoughts

It is often asked why pressure testing is not mandated for normal valve repair work. The reason is that the valve will always be pressure tested up to the valve set pressure and the probability that a leak would not be detected at the set pressure, but would be detected at 1.5 times the design pressure, is extremely low. Machining could possibly uncover a defect, but the probability of uncovering a defect that would leak through the pressure boundary is again very low.

Pressure testing of pressure relief devices is a simple procedure for validation of parts or assemblies during device manufacturing and during some repairs. Differing design processes result in rules that vary a bit between those used for boiler and pressure vessel construction, but still the result is a product which is pressure tight for the end user.

Safety Valves in Australia

Paul Beazley
JPS Valves & Service Pty Ltd
AIES Corporate Member

THE AUSTRALIAN PERSPECTIVE IS VERY SIMILAR TO that of the ASME requirements discussed above. Under Australian Standard AS 1271 *Safety valves, other valves, liquid level gauges, and other fittings for boilers and unfired pressure vessels* there is reference to Hydrostatic Testing (Section 2.6) of Safety Relief Valves.

Our standard goes a little further than that of the ASME Code in that it lists materials of construction and states that Steel and Copper Alloy valves be tested to 1.5 times the design pressure, while Cast Iron needs to be tested at 2 times the design pressure. Of course, these tests are normally only performed at time of manufacture and, unless requested by the owner or the inspector, are never repeated when being serviced or repaired. When a valve comes in for its periodical test, it is normally only tested to the required set pressure which is usually a lot less than design pressure. It is assumed that the valve will never be subjected to any higher pressure because it is the primary relieving device should the equipment experience an over pressure episode.

Australian industry in general tends to keep their equipment in service for much longer periods than other developed countries and, therefore, as the equipment ages it may be time to consider performing a hydrostatic test at certain intervals of a valve's life to ensure the integrity of the valve and its components. We, as a safety valve repairer, often see valves come in for repair or certification that have been in service in excess of 30 years, with the expectation that they are going to be in service for another 30 years or longer depending on the pressure equipment they are bolted to.

Another consideration in Australia is that we have a combination of installed safety relief valves manufactured all over the world and regularly see European, Asian and American valves within our jurisdiction that may or may not have been tested in accordance with our Australian Standards prior to installation, generally because they fall under the manufacturer's country of origin standard.

WHS Spotlight

Incident notification

The SafeWork Australia Information Sheet on Incident Notification provides general guidance on mandatory reporting requirements for 'notifiable incidents' under Work Health and Safety (WHS) legislation. The sheet will help you decide whether the regulator needs to be notified of a work-related injury, illness or dangerous incident under the Act. Visit the ***SafeWork Australia website*** to download the sheet.

Here we extract some of the information most pertinent to people working in inspection and testing in the pressure equipment industry.

What is a 'notifiable incident'?

A 'notifiable incident' is:

- the death of a person
- a 'serious injury or illness' or
- a 'dangerous incident'

arising out of the conduct of a business or undertaking at a workplace.

'Notifiable incidents' may relate to any person—whether an employee, contractor or member of the public.

Dangerous incidents including 'near misses'

Some types of work-related dangerous incidents must be notified even if no-one is injured. The regulator must be notified of any incident in relation to a workplace that exposes any person to a serious risk resulting from an immediate or imminent exposure to:

- an uncontrolled escape, spillage or leakage of a substance
- an uncontrolled implosion, explosion or fire
- an uncontrolled escape of gas or steam
- an uncontrolled escape of a pressurised substance
- electric shock:
  - examples of electrical shock that **are not notifiable**:
  - shock due to static electricity
  - 'extra low voltage' shock (i.e. arising from electrical equipment less than or equal to 50V AC and less than or equal to 120V DC)
  - defibrillators are used deliberately to shock a person for first aid or medical reasons
  - example of electrical shocks that **are notifiable:**
  - minor shock resulting from direct contact with exposed live electrical parts (other than 'extra low voltage') including shock from capacitive discharge
- the fall or release from a height of any plant, substance or thing
- the collapse, overturning, failure or malfunction of, or damage to, any plant that is required to be design or item registered under the Work Health and Safety Regulations, for example a collapsing crane
- the collapse or partial collapse of a structure
- the collapse or failure of an excavation or of any shoring supporting an excavation
- the inrush of water, mud or gas in workings, in an underground excavation or tunnel, or
- the interruption of the main system of ventilation in an underground excavation or tunnel.

A dangerous incident includes both immediate serious risks to health or safety, and also a risk from an immediate exposure to a substance which is likely to create a serious risk to health or safety in the future, for example asbestos or hazardous chemicals.

CONTACT DETAILS FOR REGULATORS

To notify a 'notifiable incident' contact your local regulator:

Jurisdiction	Regulator	Telephone	Website
New South Wales	SafeWork NSW	13 10 50	safework.nsw.gov.au
Victoria	WorkSafe Victoria	1800 136 089	worksafe.vic.gov.au
Queensland	WorkSafe Queensland	1300 369 915	worksafe.qld.gov.au
South Australia	SafeWork SA	1800 777 209	safework.sa.gov.au
Western Australia	WorkSafe WA	1300 307 877	commerce.wa.gov.au/WorkSafe/
Australian Capital Territory	WorkSafe ACT	02 6207 3000	worksafe.act.gov.au/healthsafety
Tasmania	WorkSafe Tasmania	1300 366 322 (Tas) 03 6233 7657 (Ext)	worksafe.tas.gov.au
Northern Territory	NT WorkSafe	1800 019 115	worksafe.nt.gov.au
Commonwealth	Comcare	1300 366 979	comcare.gov.au

Reference: SafeWork Australia incident notification factsheet, November 2015
https://www.safeworkaustralia.gov.au/doc/incident-notification-fact-sheet

Boiler Water Chemistry and Boiler Certifications to AS/NZS 3788

Good boiler water chemistry can help to reduce the number of failure mechanisms that can occur in steam generation boilers. AS/NZS 3788 *Pressure equipment – In-service inspection*Table 4.1 Note 4 states the 'Extended interval is available only to boilers which have adequate water treatment facilities'. Additionally in Appendix F it is suggested 'Where appropriate, review of the boiler water treatment records to ensure that the boiler water and the boiler feed water are being effectively tested and treated'.

The In-service Inspector for boilers should have some understanding of the water chemistry treatments that are utilised in power stations in order to support overall condition assessment of the boiler and its suitability for continued safe (and reliable) service. Knowledge of water chemistry and the analysis of data will help identify potential damage mechanisms which will require monitoring by instrumentation or special inspection techniques.

The common boiler water chemistry guidelines were developed by the following organisations:

1. **Electric Power Research Institute (EPRI)** – Comprehensive Cycle Chemistry Guidelines for Fossil Plants
2. **International Association of the Properties of Water and Steam (IAPWS)** – Steam Purity for Turbine Operation
3. **American Society of Mechanical Engineers (ASME)** – Consensus Operating Practices for Control of Feedwater/ Boiler Water Chemistry in Modern Industrial Boilers

These guidelines will typically provide limits for the following parameters:

- Dissolved oxygen
- pH
- Total iron
- Total copper
- Silica
- Total alkalinity
- Total dissolved solids

Below – Figure 1 Gross oxygen pitting on tube bore

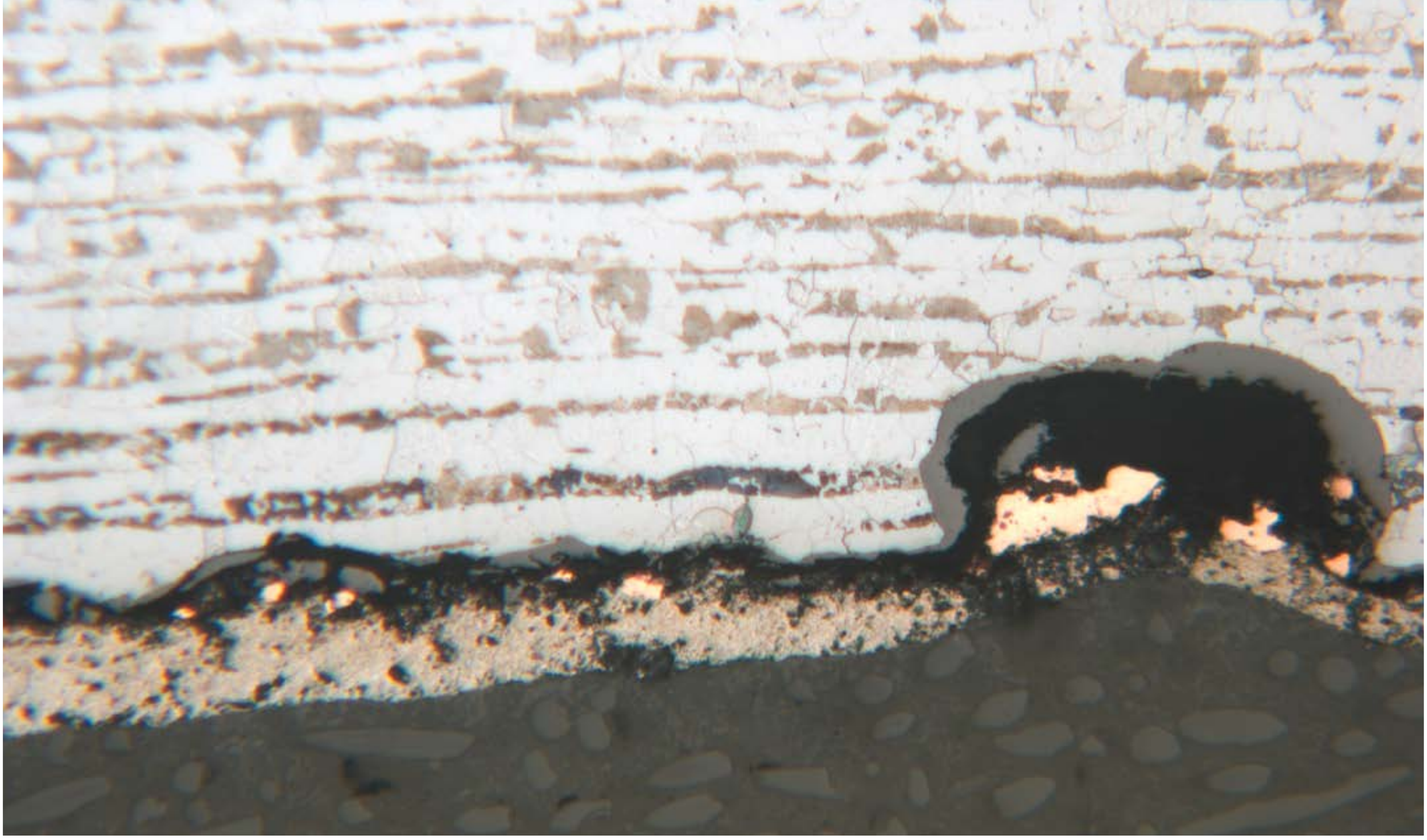

Figure 2 Shallow corrosion pit on tube bore

If these parameters are not within the designated limits, depending on the severity and duration of exposure, the potential damage mechanisms may become active in many areas of the boiler, deaerator, piping and the turbine.

The presence of dissolved oxygen can lead to pitting, typically found in the steam drum and water tubes. If there is a deaerator present this should help to reduce the level of oxygen in the system. If a deaerator is not present then an oxygen scavenger chemical is typically used. Dissolved oxygen is found at higher concentrations at lower temperatures. At 60°C there are typically 5 ppm present whilst at 100°C there should be theoretically 0 ppm.

Figure 1 shows an example of gross tube bore-side oxygen pitting from offload corrosion. Figure 2 shows a photomicrograph of a tube bore in cross section with a shallow pit also with thin surface oxide and minor copper contamination.

Maintaining pH within limits will help to reduce the likelihood of corrosion or caustic cracking. The optimum pH range is usually 7.5 to 9.8, although this range may vary depending on the operating pressure of the boiler.

When reviewing the water instrumentation and sampling data, if the pH is regularly out of range then this should be a prompt to conduct targeted thickness testing or other techniques to examine the bore-side of tubes and other pressure components.

Total iron and copper limits will be an indication of the amount of deposition onto the boiler. If there is excessive accumulation of these deposits then it increases the likelihood of overheating and under-deposit corrosion. Total copper is only important if the plant contains mixed metallurgy (e.g. copper tubes are present in boiler feed water heat exchangers). Copper can often deposit into tubes and contaminate the normally protective bore-side oxide. Furthermore, if overlay pad welding is required for a temporary repair of thinned boiler tubes, the copper deposits can lead to liquid metal embrittlement.

Silica deposits will not typically show up in the boiler but can occur as deposits on steam turbine blades and offset the balance of the blades. Silica is highly soluble in steam especially in the superheater and, if not monitored by water and steam sampling, can lead to issues for the turbine.

Total alkalinity needs to be controlled to prevent corrosion and scaling. Below acceptable levels, these parameters can contribute to corrosion. The higher the pH, the more alkalinity is present in the carbonate species (such as CO_3, HCO_3 and OH), which can react with calcium in the water to form scale. Total alkalinity can also lead to caustic cracking or caustic gouging.

Total dissolved solids will also promote deposition into the boiler leading to the possibility of corrosion and overheating.

In conclusion, effective water treatment and monitoring of water chemistry parameters are critical to the integrity of the water and steam circuits in boilers, and an important element to consider when setting inspection intervals. If the parameters are found to be outside acceptable limits, the risks of potentially active damage mechanisms such as cracking, pitting or scaling, need to be considered in the inspection plan for continued safe (and reliable) service.

Further information relating to the content of this article can be obtained from:

Kate Suppel, ALS Asset Care, Newcastle
Email: Kate.Suppel@alsglobal.com

ALS Industrial Pty Ltd is an AIES Corporate Member

THE NATIONAL BOARD *becomes AIES Affiliate Member*

Many AIES Members are aware of the role and credibility of The National Board of Boiler and Pressure Vessel Inspectors based in Ohio, USA, which is concerned with all issues relative to the safe installation, operation, maintenance, construction, repair, and inspection of boilers and pressure vessels. We welcome The National Board as an AIES Associate Member and celebrate with them 100 years of service to the pressure equipment industry worldwide.

The National Board of Boiler and Pressure Vessel Inspectors is an organisation comprised of Chief Inspectors of governmental jurisdictions in the United States and Canada. It is organised for the purpose of promoting greater safety to life and property by securing concerted action and maintaining uniformity in the construction, installation, inspection, operation, repair and alteration of boilers, pressure vessels or other pressure retaining items and their appurtenances, thereby assuring acceptance and interchangeability among jurisdictional authorities.

Participants include boiler and pressure vessel inspectors, mechanical engineers, engineering consultants, equipment manufacturers, representatives of repair organisations, operators, owners and users of boilers and pressure vessels, labour officials, welding professionals, insurance industry representatives and government safety personnel..

Visit The National Board website at www.nationalboard.org to find out more about their services and activities, free-access recent and archived Bulletins and board publications, purchase ASME Boiler and Pressure Vessel Code Manufacturers' Data Reports and learn more through The National Board Education Center.

Over recent years, a strong relationship has grown between the AIES and The National Board with an emphasis on the sharing of technical information relevant to Members in their day-to-day roles.

This relationship has been recently strengthened by The National Board becoming an Associate Member of AIES. This beneficial link will be fostered through the sharing of articles (see article page 4)between the AIES Gazette and the board's BULLETIN publication and heightened awareness of the two organisations' roles.

History of The National Board of Boiler and Pressure Vessel Inspectors

By David A. Douin
Executive Director, The National Board of Boiler and Pressure Vessel Inspectors

AT THE TURN OF THE 20TH CENTURY, THE United States did not have a uniform boiler construction standard in place, and yet, this was a time when manufacturing was booming, boilers were in high demand, and boiler accidents were widespread, causing damage to life and property. Regulators faced unimaginable challenges when trying to evaluate equipment that was built to many different specifications.

By 1910, manufacturers, boiler users, and insurance companies sought the help of the American Society of Mechanical Engineers (ASME). They wanted safer boilers and a single code of construction that could be standardised and ultimately adopted as law by the states and jurisdictions. In 1915, ASME fulfilled this request and published the very first standard for boiler design and construction: the ASME Boiler Code.

While major progress was made with the publication of the ASME Boiler Code, there were still many problems: across jurisdictions, the qualification and examination requirements for inspectors were not uniform; some jurisdictions did not enact boiler laws, leaving the task of inspection to insurance companies whose qualifications also varied; the process for how jurisdictions adopted the ASME Boiler Code differed; and some jurisdictions even changed or added their own rules to it.

Carl Owen Myers

These inconsistencies created a growing need for uniform enforcement and regulation of the boiler code. One individual had a vision and mission to bring about industry reform.

Carl Owen Myers was the chief boiler inspector for the state of Ohio. He experienced firsthand the difficulties that came from a lack of standardisation across jurisdictions. As chief inspector, he was regularly approached by boiler manufacturers who wanted to sell and install boilers in Ohio. The problem: these boilers were built to many different rules and specifications. Not only were

(Continued on page 12)

For further information or to submit comments or suggestions regarding relevant standards, please contact Darren Sullivan, AIES committee representative for ME-001 Pressure Equipment or the AIES Secretary.

Standards Australia Pressure Equipment Committee – ME-001

The ME-001 Committee has not met since 8-9 November 2017. There was to be planned a meeting in October/November 2018 however this did not occur and there has been no date for the next meeting set as yet. Although there has been work progressing on the nominated standards, at this stage there are minimal changes to report since the last report in October 2018.

AS/NZS 3788 Pressure equipment – In-service inspection

The review of AS/NZS 3788 is continuing with the industry-based working group and is well underway under the leadership of Mr Roger Griffiths. Sub-working groups have been formed to develop work on various sections of the standard with some at drafting stages. The last meeting for the working group was held in Sydney on 6-7 March and it is reported that the meeting was very constructive on the path forward but still some way to go. As yet it is not an official project under Standards Australia.

AS 2593 Boilers – Safety management and supervision systems

The standard is currently being updated in draft with work by the sub-committee members progressing. At this stage I don't have any report on the project to be able to advise members.

AS/NZS 3992 Pressure equipment – Welding and brazing qualification

The project to further amend and revise this standard is coming to the final stages with editing for release for public comment ongoing. I will advise members when it is available for public comment. This is being led by representatives from Weld Australia (WTIA).

Contributions and comments

If any AIES member wishes to contribute comments or information to Standards Australia, the ME-001 Committee or its Sub-committees please contact me directly by phone or email. This is of particular importance when any standard is being revised such as those listed above.

Darren Sullivan
AIES Representative – Standards Committee ME001
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History of The National Board of Boiler and Pressure Vessel Inspectors

(Continued from page 11)

the formulae for determining safe working pressures different, but the materials of construction and the joint designs were different as well. Some boilers were not constructed to any rules and were simply 'homemade'.

This was CO Myers' everyday world – and it was the norm in every state and jurisdiction in the United States. This lack of uniformity was a nightmare for all involved – manufacturers, jurisdictional authorities, insurance companies, and boiler users.

CO Myers believed in the strength and logic of uniformity. He knew the set of rules formulated by ASME would benefit the boiler industry. He also recognised that lawful jurisdictions would not accept a new set of rules unless there was uniform qualification and commissioning of boiler inspectors throughout the United States.

With these issues in mind, Myers led the charge to bring about uniformity by uniting chief inspectors from lawful jurisdictions to form an organisation in which members would voluntarily recognise and accept the ASME boiler code and a set of uniform rules for inspector qualifications. This new organisation was called The National Board of Boiler and Pressure Vessel Inspectors and was founded on December 2, 1919, in New York City.

Not only would The National Board provide a forum for the exchange of opinions regarding inspection and enforcement procedures, but also for approval of specific designs and appurtenances with the primary objective of maintaining uniformity throughout jurisdictions represented by its members. This strategy of uniform rules encouraged interchangeability of boilers and pressure vessels across all jurisdictions. In time, The National Board's careful work would receive both national and international attention and attract authorities that had yet to act on boiler safety.

This year, The National Board celebrates its 100th anniversary. A century of success began with CO Myers' perseverance and dedication to making the boiler and pressure vessel industry safer and more effective. Remarkably, his system has endured for 100 years.

Since its inception in 1919, The National Board has become the premier boiler inspector safety organisation in the world. Thanks to CO Myers' vision and the cooperation of key stakeholders, pressure equipment uniformity has benefitted the industry for a century and has made communities and workplaces safe. It is a legacy the National Board is proud to be a part of and will continue to maintain for years to come.

Repairs to In-Service Pressure Equipment

PART TWO

by Darren Sullivan

Quality Assurance & Conformity Assessment: Quality Plans & Inspection & Test Plans

This Guidance Note presents the key considerations related to Quality Assurance and Conformity Assessment for Repairs to Pressure Equipment, and outlines a practical application of the process to assist in ensuring that repairs or replacement have adopted the same, similar or suitable application to that of the original construction/manufacture. The ultimate aim is to apply an acceptable level of controls in Quality Assurance relative to the safety of plant and personnel. Further Guidance can be obtained from Australian Standard AS 3920 Pressure Equipment – Conformity Assessment.

The subject matter is predominantly written around Australian Standards however in parts the information can be soundly applied to other international standards not withstanding their own special conditions or requirements.

Repairs to In-Service Pressure Equipment Part One 'Identifying the Repair Path' was published in the AIES Gazette, October 2018, Vol. 28 Issue 2 pp 7-11. The Guidance Notes are intended to encourage open discussions or consideration in general terms and should not be applied as a sole reference as the subject matter can have wide and differing circumstances.

1.0 Introduction

Quality Assurance (QA) – the most common descriptive definition of Quality Assurance in Pressure Equipment is 'a programme for the systematic monitoring and evaluation of the various aspects of a project, product, service, or facility to ensure that standards of quality are being met as referenced in specific standards, codes or specifications'. QA with regard to repairs of pressure equipment gives a level of confidence in the service provider for the works or tasks and provides some systematic pattern to control the quality as works proceed.

Conformity Assessment (CA) – The ISO/IEC Guide 2:1996 definition of Conformity Assessment is 'any activity concerned with determining directly or indirectly that relevant requirements are fulfilled'. In more tangible terms, CA refers to a variety of processes whereby goods and/or services are determined to meet voluntary or mandatory standards or specifications.

Why is Conformity Assessment important?

The main areas of concern are user and product safety, consumer health and the environment. CA encompasses the areas of:

- Testing
- Surveillance
- Inspection
- Auditing
- Certification
- Registration
- Accreditation

CA is important to suppliers, consumers, and regulators. It enables producers to demonstrate that their product/s meet relevant design and safety standards and gives consumers confidence when selecting products in the marketplace. The CA process used to provide this confidence must be as cost effective as possible to maximise its value for both the supplier and the consumer.

What's the difference between QA and CA?

In this discussion, in simple terms for manufacture and repair of pressure equipment, ***Quality Assurance*** is the management of systems and processes applied by service providers or suppliers to give a level of assurance of compliance throughout the entire process for their product and services. This management is aligned with standards, including technical standards that encompass safety, and ensures that technical and environmental expectations are identified and achieved. ***Conformity Assessment*** is determining by strategic surveillance of processes to ensure that the relevant requirements have been met and is usually based on the hazard levels of the product. The lower the hazard level the lesser requirements – the higher the level the more stringent requirements. For example, repairs to a critical vessel will have much more stringent controls or surveillance than repairs to a small air receiver in most cases.

1.1 Inspectors' role

An inspector's role in CA is central to the main tasks and responsibility expected from industry as the basis of approval or rejection when reviewed against particular standards. It is important that an inspector can act without any prejudice or influence and remains impartial when carrying out inspection, witnessing or reviewing verification of processes as a third party or on behalf of the owner. The tasks involved require that the inspector to be experienced and diligent, to ensure that ultimately the equipment has been repaired in line with the design and maintains the same level of safety as provided initially, or as otherwise engineered such as the case in derating of equipment or fitness-for-service.

It is important to apply diligence and attention to detail and to have the skills and knowledge to identify any triggers that could contribute to non-compliance of the conformity. ***Look in depth***, as cases are continually reported by inspectors that some Manufacturers Data Reports are compiled or collated in their information, but not necessarily reviewed at stages along the way. If left until the last verification or sign-off stage this often

(Continued on page 14)

(Continued from page 13)

creates difficult circumstances at the end of the project or works when errors or omissions are found and schedules are tight. Therefore the reviews and verifications should be stringent throughout the entire process.

2.0 Quality Plans and Inspection & Test Plans

Two key aspects used for QA and CA by providers are the Quality Management System and the Quality Plans. These are usually supported by the task- or project-specific Inspection and Test Plans (ITPs), their associated checksheets, registers, reports, certificates and other relevant documentation.

The management system or plans will provide reference to the management of the processes and procedures and is usually meant for top-level overview and commitments. The ITPs and their documentation are key documents for inspectors as this is the specific information of most relevance to actiTons in the field or workshop to control conformity of that particular task or product.

ITPs can vary in composition however they should all have the key common items addressed in some manner:

- The ITP document should detail as much as possible the project key tasks and provide traceability.
- It should be signed off, approved usually by manufacturer and client, and tracked by a revision number and/or unique document number.
- The ITP should break the task or project down into logical steps and sequences and then provide for each step the following (see the columns shown in Figure 1):
  - Clearly define in summary each step (Column B)
  - Define the acceptance standard or acceptance criteria (Column C)
  - Nominate and detail the verifications necessary (Column D)
  - Detail the reference or document to support the action or verification (Column E)
  - Nominate, by agreement between all parties, the relevant inspection points (Columns F)
  - Determine the suitable actions at the inspection points, what should have surveillance, witnessing, review/report, or an Inspection Hold Point relevant to each stakeholder for that step (Columns F)
  - Have a place for signature and date by all parties (usually 3 or 4 – Manufacturer, Subcontractor, Client, Third Party/Authorised Inspector) (Columns F)
  - Space for comments or notations (Column G or in a subsection of the document if space does not permit).

The adoption of the ITP must be flexible, especially in repair cases, as sometimes the planned path may not happen and there needs to be adjustments or variations.

A typical flow of an ITP for repairs to pressure equipment (entered in Column B) might be:

Identification of repair boundary, engineering approvals, permits to work, weld procedure qualification, welder qualification, material certification, welding consumable controls, fit-ups and joint preparations, forming, welding surveillance, visual inspection, non-destructive testing, heat treatment, dimensional checks, testing (such as hydrostatic), surface treatment, final inspection and document review, commissioning or return to service checks or dispatch/release and final sign off.

- **Identification of repair boundary** – Refer to the scope of repair and a physical inspection to ensure that the boundary has encompassed all items scoped. In some cases scope may change during repairs.
- **Repair approvals** – Check that the repair has been duly authorised or, in cases where an alteration is applied, design verification and/or any engineer's certificate is recorded.
- **Welding Procedure Qualification (WPQ)** – Have the welding procedures been qualified? Does the qualification code match the product design or

Sequence	Operation/Description	Standard or Criteria	Verification	Record/ Document	Inspection (Initial and Date)			Comments
					Supplier	Client	Authorised Inspector	
A	B	C	D	E	F			G

Figure 1 Sample generic inspection and test plan (ITP) format showing column format

Key points from Figure 1 generic ITP.

Column A – Sequence – This column numbers the steps and sequence in the task or project for easy reference.

Column B – Operation/Description – Summarises the main and significant tasks as an outline for e.g. Welder Qualification.

Column C – Standard or Criteria – usually indicates the codes or standards for acceptance but may include other reference documents, procedures or technical documents to support acceptance or rejection.

Column D – Verification – The verification indicates by whom and how the verification is applied to the task.

Column E – Record/Document – Details the supporting document that records compliance or otherwise. It could be a supporting report, certificate or associated checksheets, or it may be just the signature on the ITP.

Column F – Inspection – This section applies the appropriate signature against the inspection points for approval. In most cases it could be from the manufacturer/repairer, the client, or a third party or authorised inspector, or combination of these. It is best that these columns are signed or at least initialled not just a name entered. The inspection points are by agreement from all parties.

Column G – Comments – Additional space for comments to be added before or at the time of the inspection

specification? Does the welding procedure specification (WPS) match the Welding Procedure Qualification Record (WPQR) and have they been approved with all the associated test results? Check any essential variables and that the WPS is correctly applied in the field or shop. Witness them in the field.

- **Welder qualification** – Ensure that there is a register of any welder working on the job and they are appropriately qualified. Understand the difference between 'certified' (on-going competence) and 'qualified' (initial competence). Refer to qualification test reports or past production welds which are available. Validation is usually within a six month period under most codes.
- **Material certification** – Review the material certificates against the relevant material codes, match the certificates to the field by traceability using batch numbers, ensure there is control over material especially when alloy materials are involved or sections are cut from larger sections. Does the material align with codes? Is the grade correct and do the heat numbers match?
- **Welding consumables and control** – Review any registers, ensure storage and handling as per manufacturer's recommendations and that procedures are being applied. Check designation against the WPS including the applicable code.
- **Forming** – Ensure that the forming, rolling, bending etc. is in compliance to the nominated manufacturing code (e.g. AS 4458) and good workmanship and practice is being applied to the forming processes and handling, suitable to the material. Consider conditions especially for alloy materials.
- **Marking off and removal of material** – Check, where marking off and removal have been applied, that the workmanship in this task has also had the required surveillance to ensure what remains is appropriate and not damaged.
- **Joint preparations and assembly** – Generally in accordance with the design, drawings and code of manufacture and the WPS. Visually inspect the fit-ups as poor fit-ups can sometimes be welded with long-term detrimental results.
- **Welding setup** – Observe as per the welding procedures, code of manufacture and general workmanship. Most codes stipulate the requirements for adequate qualified supervision.
- **Welding** – Verify that the welding procedures have been followed by the qualified welder/s and appropriate supervision or surveillance has been provided.
- **Visual inspection** – An inspection to ensure that all welding is complete, appropriate finish, correct size and any forming or handling has not damaged the material. Alignment of sections or surfaces is correct, all components or sub-assemblies are in correct positions/locations.
- **Non-destructive testing** – The extent of testing applied and the methods should be in accordance with the code of manufacture and ensure that the tests have been carried out in accordance with their specific test standard, that staff involved in the test are currently qualified and the reports confirm compliance or where repairs are required. Is test equipment calibrated?
- **Heat treatment** – Post weld heat treatment should be in accordance with the code of manufacture for that material and that the treatment applied as per the agreed instructions or code. Review the charts for compliance.
- **Visual and dimensional Inspection** – Usually carried out after the testing, heat treatment and all work is complete. Most likely carried out by surveillance of supervision along the way to save rework but the final inspection is an important closure.
- **Pressure testing** (where applicable) – Ensure test has been applied in accordance with the procedure and there is no damage or distortion as a result of the test. Structures must be capable of supporting the additional weight of any fluid. Review of test procedure, setup and calibration.
- **Surface treatment** – Protective coatings, surface treatments or claddings have been applied correctly as specified.
- **Final inspection and document review** – General inspection to ensure completeness of the work aligned to the scope and any variations, manufacture code compliance, all test and inspections have been complete, all necessary documentation has been included in the Manufacturer's Data Record (MDR) or repair records and that it aligns with that provided or sighted during the works.

Note – This list above is guidance and not exhaustive and may vary for the circumstances of the project or work and the level of conformity required

References

1. AS/NZS 3788 *Pressure equipment – In-service inspection*
2. AS 3920 *Pressure equipment – Conformity assessment*
3. ISO/IEC Guide 2 *Standardization and related activities – General vocabulary*
4. ISO 9001 *Quality management systems*
5. Sullivan, Darren – Guidance Notes on Repairs to In-Service Pressure Equipment

BOILER *incident report*

NZ FOCUS ***Mike Jack**, AIES NZ Contact*

The following is a run down of an incident which recently occurred with an Under 15HP Shell Type Boiler in New Zealand.

The boiler was gas fired and had a current Operating Certificate issued by a New Zealand Inspection body to allow it to operate at a maximum Safe Working Pressure of 1034 kPaG. It was manufactured by Anderson Engineering in 1965, and had been significantly repaired in 1995.

It had been surveyed annually in the past.

New Zealand legislation allows owners of such boilers to operate them under the jurisdiction of a 'Competent Person' with a period of no more than two hours between operational visits. These types of boilers have to be operated and maintained in accordance with The Approved Code of Practice (ACOP) for Boilers and manufacturers' recommendations (Ref: Operational Supervision Requirements: Section 4.3). Daily checks of the safety cut-outs and low-levels are required as is the keeping of log books and water treatment records.

What happened?

On the evening of 17 January 2019 this boiler ran dry whilst in operation. It was only discovered when a team leader went to find out why the process water temperature to the site was dropping.

The Maintenance Engineer of the plant had accidentally/unknowingly pressed the boiler emergency stop switch with the boiler blowdown valve long handle 'T' bar and socket, and left the area.

The evening shift process plant operator had noted that the process temperature was dropping below the required setting and had gone to investigate the boiler and found the emergency stop had been activated. He re-set the emergency switch and found that both water level alarms activated. He then reactivated the emergency stop and checked the boiler, finding no water on the sight gauge glasses with the burner firing and immediately stopped the burner manually by switching it off at the burner controls.

Damage

As a result of the boiler being fired with dangerously low water levels, the tube plates and tubes had buckled and the boiler was damaged beyond repair.

Investigation

An owner's investigation is still underway, but it appears that a new burner unit was fitted to the boiler on 14 December 2018, and had been wired up incorrectly resulting in the bypassing of all the electrical safety relays.

An independent registered electrician checked the wiring system of the boiler control system, and found that the boiler burner controls were not connected to the any of the safety system in the boiler.

It is clear from this that several breaches of the ACOP for Boilers occurred.

The inspection body responsible for issuing a certificate of inspection to the boiler was not notified of the change in burner unit.

No operational safety checks were carried out following the change. Had the emergency stop been tried following the change it would have been found to be incorrectly wired up and this may have prompted a complete test of the boiler safety devices.

The boiler had been in operation for at least a month following the burner change-out, and evidence suggests that the routine safety checks were not being carried out. A review of the log book entries revealed that the last safety check had been conducted two months prior to the burner unit change out.

SGS New Zealand has been contracted to independently audit all the remaining boilers at the other facilities of the company in question.

WorkSafe NZ was notified by the owner and is currently investigating this incident.

VALE – CLARRY WALLIS

AIES Life Member Clarry Wallis passed away on 13 January 2019 aged 94, after a short illness.

Clarence James Wallis was born in Victoria in 1924. Later the family moved to New South Wales as his father, Ernest, was a Warrant Officer in the RAAF. They lived at Richmond Air Force Base – in those days there were only three houses on the base. The family later moved to Kogarah so that he could attend high school closer to home.

Clarry had three attempts at securing an apprenticeship. First, he was offered one at a tannery. He didn't see a big future in saddles and harness so started at Bennett and Woods in their bicycle workshop. Bicycles were apparently not a very exciting prospect either so he secured an apprenticeship at the CSR Sugar Refinery, Pyrmont as a fitter and turner.

Later he went to sea with CSR as a Marine Engineer. He also sailed with Adelaide Steamship Company and Australian National Line where he rose through the ranks, eventually obtaining his Chief's Ticket – 1st Class Marine Engineer (Steam).

FOR YOUR DIARY

National Manufacturing Week **May 14-17 2019, Melbourne, Vic** https://www.nationalmanufacturingweek.com.au/	**International Congress on Welding, Additive Manufacturing & Associated NDT** **June 5-7 2019, Metz, France** https://icwam.com/content/home
16th International Conference on Condition Monitoring and Asset Management **June 25-27 2019, Glasgow, UK** http://www.bindt.org/events/CM2019/	**72nd IIW Annual Assembly and International Conference** **July 7-12 2019, Bratislava, Slovakia** https://www.iiw2019.com/
ASME Pressure Vessels and Piping Conference **July 14-19 2019, Texas, USA** https://event.asme.org/PVP	**AINDT Annual Conference and Trade Exhibition** **November 3-6 2019, Adelaide, SA** https://www.aindt.com.au/Calendar
World Engineers Convention **November 20-22 2019, Melbourne, Vic** https://www.wec2019.org.au/	**Corrosion and Prevention 2019** **November 24-27 2019, Melbourne, Vic** https://conference.corrosion.com.au/
17th International Symposium on Tubular Structures (ISTS17) **December 9-12 2019, Singapore** http://www.ists17-singapore.org/	**73rd IIW Annual Assembly and International Conference** **July 19-24 2020, Singapore** https://iiw2020.com/

He met Valerie, who was working as a nurse, at Freemantle Hospital in Western Australia and they married and moved back to NSW.

He had various jobs ashore and eventually settled on Boiler Inspection at the Queensland Insurance Co., at the time the biggest inspectorate in NSW. He stayed there for several years and inspected at places such as Ultimo Power Station (now the Powerhouse Museum), various meat works, steam powered sawmills and wool sheds. The more modern compressed air receivers were becoming more numerous in the 1950s.

He was one of the original parties to form the Boiler Inspectors Association (BIA) in 1957. He served as the first Secretary and also served as President and Treasurer in the BIA and its successors AIPEE and AIES.

He left Queensland Insurance in 1962 and worked in association with Bill Graber for several years while setting up his own business.

In those days there was a preponderance of riveted boilers and vessels. In fact welding was often a dirty word, especially if you were talking about an inserted patch repair. During his working life he saw a number of boiler companies come and go. None of the Australian air compressor manufacturers from the 1950s and 1960s appear to have survived.

Clarry retired reluctantly in 2004 aged 80. His 50 years as a Boiler Inspector is possibly an Australian record.

In honour of his outstanding long term service to the Institute he was awarded Life Membership. Recent tributes from members included comments such as 'a straight shooter', 'he was the Institute', and 'he took an interest in new members and welcomed them in'.

AIES extends their sympathy to Clarry's family, friends and colleagues – he was indeed a 'special man'.

AUSTRALASIAN INSTITUTE OF ENGINEER SURVEYORS INCORPORATED

AIES MEMBERSHIP AND FEES

PERSONAL MEMBERSHIP

BENEFITS

- Participation in the AIES Identifying Numbering Scheme (Members Grade S, M only) for the purpose of identifying in-service equipment, fabrications inspected or designs verified within their area of competence
- Free electronic copy of the AIES Gazette publication
- Access to AIES member website and LinkedIn group
- News on developments in Standards, technical matters, failures and legislation
- Opportunities to attend general meetings, special site visits and forums
- Possibility of publishing technical articles
- Opportunities for liaison with equipment inspectors throughout Australia and New Zealand

CRITERIA

Membership is available to people with an interest in the safety of hazardous equipment as defined in the Institute's Objectives. This includes boilers and pressure vessels and other pressure equipment.

The three main grades of personal membership are:

- Senior Member (Grade S)
- Member (Grade M) and
- Associate (Grade B)

Equipment Inspectors e.g. AICIP Senior In-Service Inspectors or Design Verifiers currently certificated at the senior level usually satisfy AIES criteria for Senior Membership Grade S. Documentation of qualifications, certifications and five (5) years suitable experience in inspection or verification is required.

Applicants for Member Grade M must hold a suitable certificate of competency or equivalent e.g. AICIP In-Service Inspectors. At the time of application they must hold employment in this area and supply documentary evidence.

People who may be entering the industry or who do not possess all the above credentials but who have some technical competence in the area of hazardous equipment are usually eligible for admission as Associate Member Grade B.

AFFILIATE/CORPORATE MEMBERSHIP

BENEFITS

- Free electronic and agreed number of hard copies of the AIES Gazette publication
- Annual certificate of membership for display and recognition
- News on developments in Standards, technical matters, failures and legislation
- Automatic bold listing in the AIES Gazette
- Opportunity every year to contribute one page of advertorial information together with a small listing in the AIES Gazette
- Opportunity to have educational material from your company disseminated by email newsletters
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- Opportunities for liaison with equipment inspectors
- Networking with companies of various backgrounds within the industry
- You will be supporting AIES's work for the safety of high-risk plant

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Grade C Affiliate/Corporate membership is available to organisations with an interest in the safety of hazardous equipment as defined in the Institute's Objectives. This includes boilers and pressure vessels and other pressure equipment.

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- Grade M — Member ....$ 180.00
- Grade B — Associate ....$ 170.00
- Grade R — Retired ....$ 35.00
  (must have previously been Grade M or S prior to retirement)
- Grade C — Affiliate/Corporate ....$ 700.00

APPLICATION FOR MEMBERSHIP OF ASSOCIATION

PERSONAL MEMBERSHIP (GRADES S, M & B)

AUSTRALASIAN INSTITUTE OF ENGINEER SURVEYORS INCORPORATED

Y11384 – 41 (Incorporated under the Associations Incorporation Act 2009) ABN 52 887 542 957

PLEASE COMPLETE THE APPLICATION IN FULL AND FORWARD TO secretary@aies.org.au

I, ____(full name of applicant)

of ____(home address)

& ____ (postal address)

(occupation) ____hereby apply to become a member of the above named incorporated association. In the event of my admission as a member. I agree to be bound by the rules of the association for the time being in force.

Signature of Applicant ________________________________ Date ________________________

I, ____ (full name) a member of the association, number -____________________ nominate the applicant, who is personally known to me, for membership of the association.

Signature of Proposer ________________________________ Date ________________________

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Signature of Seconder ________________________________ Date ________________________

APPLICANT DETAILS:

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Email ____ Date of Birth________________________

Employer ____ Position________________________

Please Note – if accepted for membership your email address will be used for contact including fees and issue of Gazette. Any changes of details should be notified by email to the Secretary as soon as possible.

EDUCATION:

Years Attended	School/College/University Name & Location	Course or Subject	Certificate, Diploma or Degree Awarded

FURTHER EDUCATION, TECHNICAL OR PROFESSIONAL QUALIFICATIONS:

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EMPLOYER, POSITIONS HELD & DATES:

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QUALIFICATION FOR MEMBERSHIP GRADES S, M (Please submit copies of certificates)

Personnel Certification Body, Regulatory Authority etc.	Type of Inspection, Design Verification	Reg. No.	Approvals, Levels, Category	Expiry Date

ANY OTHER RELEVANT INFORMATION:

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MEMBERSHIP GRADE APPLIED FOR ______________ (See *Information for Personal Members*)

For Grade S: Evidence of 5 years suitable experience? For Grade M: Letter from employer enclosed?

Privacy: I agree that you may collect my contact data and publish them. I agree that you may collect my qualifications: block numbers issued (for Grades M & S) annually and retain these together with my other details in your files. I acknowledge that I have the right to check these for accuracy if I so wish.

APPLICANTS SIGNATURE ______________________ **DATE** ______________

Note: You will be invoiced the appropriate fee after application approval by committee

OFFICE USE ONLY:

MEMB. GRADE AWARDED ______________ NUMBER (if applicable) ______________

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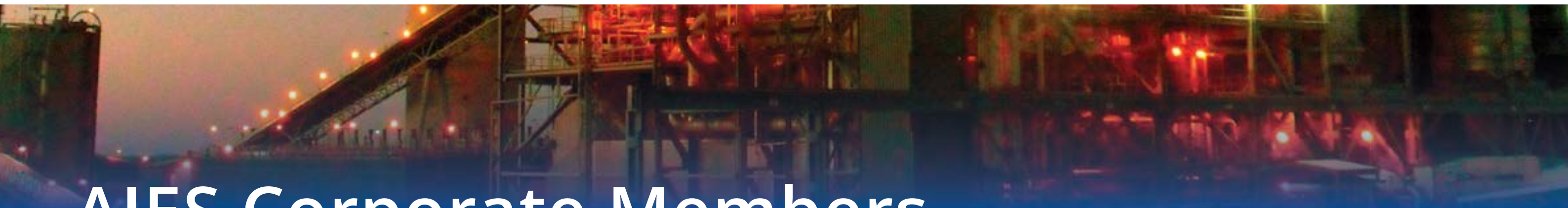

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