BULLETIN

FALL 2005 • VOLUME 60 • NUMBER 3

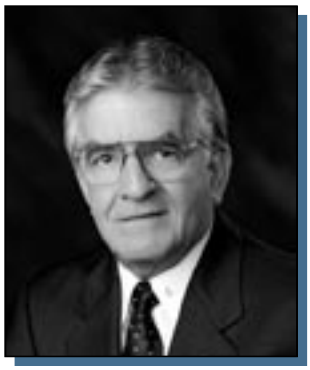
The National Board of Boiler and Pressure Vessel Inspectors was organized for the purpose of promoting greater safety by securing concerted action and maintaining uniformity in the construction, installation, inspection, and repair of boilers and other pressure vessels and their appurtenances, thereby assuring acceptance and interchangeability among jurisdictional authorities empowered to assure adherence to code construction and repair of boilers and pressure vessels.

The National Board *BULLETIN* is published three times a year by The National Board of Boiler and Pressure Vessel Inspectors, 1055 Crupper Avenue, Columbus, Ohio 43229-1183, 614.888.8320, *nationalboard.org*. Postage paid at Columbus, Ohio.

(Orlando) Magic Moment
The Orlando Magic Dancers got the crowd ready for the 74th General Meeting's Opening Session. Find out more on page 22.

Features

Departments



South Carolina's Boiler Law: A Time for Reflection

BY DONALD E. TANNER, EXECUTIVE DIRECTOR

And so the 30-year endeavor to pass a boiler law in South Carolina has come to a conclusion. The *Boiler Safety Act* (see page 5) became reality May 18 when Governor Mark Sanford permitted S. 581 to become law without his signature.

Although it has been a long — and at times arduous — journey, there are a number of individuals who were instrumental in establishing what is now a new era of boiler diligence in the Palmetto State. Considering S. 581 was the twentieth attempt at achieving a South Carolina boiler law and only the first to be voted out of committee for full legislative consideration, one can clearly appreciate the enormity of what has been accomplished. Consequently, the National Board salutes the good work of those who made a significant contribution in the passage of S. 581.

We are particularly appreciative of the efforts of S. 581 sponsor and newly elected state Senator Joel Lourie, who it should be noted, introduced proposed boiler and pressure vessel legislation as a member of the South Carolina House of Representatives during the 1999-2000 and 2001-2002 legislative sessions.

We are also indebted to Senator and "R" stamp holder Thomas Moore who was instrumental in both helping the National Board communicate the need for this critical legislation (through last year's Special Edition of the *BULLETIN*) and moving the *Boiler Safety Act* out of the Senate Labor, Commerce and Industry Committee for a full Senate vote.

Additionally, we convey our gratitude to Senator J. Verne Smith, chairman of the Senate Labor, Commerce and Industry Committee; Representative Harry F. Cato, chairman of the House Labor and Industry Committee; and committee member Representative Converse A. Chellis III for their support and resolve in navigating the *Boiler Safety Act* through a sea of uncertainty. And we thank Senate Labor, Commerce and Industry Research Director Martha Craig for helping negotiate many of the issues that precluded passage of earlier boiler legislation.

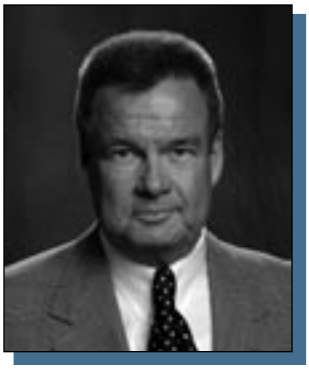
We also extend our heartfelt appreciation to the family of Tommy Jarvis, the boiler operator tragically killed during an explosion in Columbia March 30. Their efforts to promote S. 581 by attending legislative hearings and writing and calling legislators and the governor — all during a time of great tragedy in their lives — revealed exceptional courage and commitment.

We would be remiss in our acknowledgement of S. 581 without citing the outstanding personal perseverance of retired Columbia engineer Bob Woodward. For more than a decade, Mr. Woodward actively lobbied the state legislature for pressure equipment legislation. And despite facing constant indifference to his message of safety, he never lost hope or the will to fight the good fight.

It would also be imprudent to ignore the boiler repair organizations that stepped forth in 2003 to register their concerns for the condition of South Carolina pressure equipment. Through their efforts evolved the Special Edition of the *BULLETIN*, and hence, the first documented look at the state's boilers and the consequences that might have been.

Last but certainly not of any lesser importance, the National Board recognizes the 27 South Carolina senators and representatives who, over 30 years, introduced pressure equipment legislation. Indeed, theirs was not an exercise in failure.

And now the real work begins. ❖



South Carolina's New Boiler Law — *Why it Took so Long*

BY PAUL BRENNAN, DIRECTOR OF PUBLIC AFFAIRS

Although it has been several months since South Carolina's *Boiler Safety Act* became law, questions are still being raised as to why it took 30 years to achieve legislation.

While the answer may seem obvious, it is anything but.

Truth is, there were a number of critical missteps over the years that undermined well-intentioned efforts by both concerned South Carolinians and the boiler and pressure vessel industry. There is a lesson to be learned and it revolves around the legislative process.

So, why did it take so long to pass a South Carolina boiler safety law?

The easy answer: opposition from South Carolina pressure equipment users. The not-so-easy answer: failure to actively engage South Carolina legislators on supporting safety legislation.

Over the past 30 years, 20 different pieces of legislation were introduced by 27 sponsors. This legislation was often at the behest of the boiler and pressure vessel industry which put forth a variety of different regulatory approaches. And while the industry's intentions were noble, there were two very important pieces missing from the legislative puzzle: determining why South Carolina pressure equipment users opposed safety legislation and failure to work with legislators to proactively move the legislation forward.

Regrettably, most efforts by the industry to support safety legislation were limited to writing letters and testifying at committee hearings. But these admirable demonstrations of support were far from what was needed and expected by legislation sponsors. Without more aggressive involvement (i.e., face-to-face meetings with key senators and representatives) and grassroots support from legislator constituencies, each proposed safety bill prior to S. 581 was arguably doomed as not having the necessary political backing.

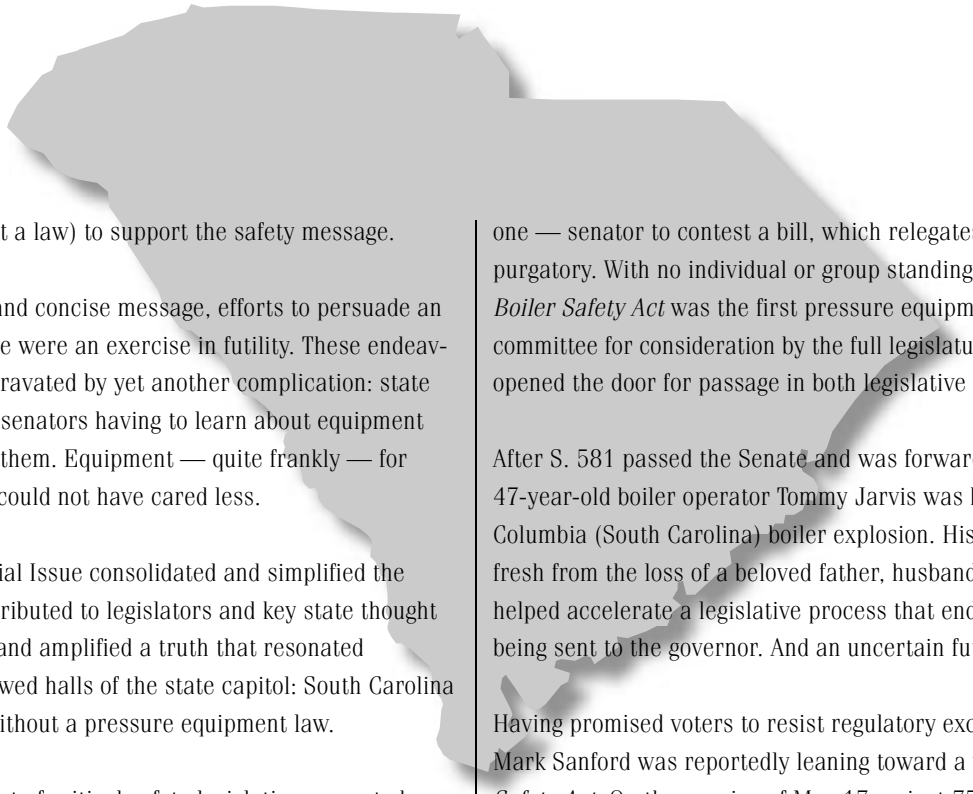
Of course, when it came to such backing, there was no group more important than the commercial users of pressure equipment. This influential entity not only opposed new boiler and pressure vessel regulation, but new regulation of any type.

Although somewhat reluctant to talk publicly about this safety issue, the commercial users were occasionally prompted to defend their position in the media. Unfortunately, this communication never extended to supporters of pressure equipment legislation. It is believed that up until last year there were never any formal meetings between legislation supporters and representatives of commercial users. And no dialogue to discuss how the two sides might work together.

The major hurdle was pressure vessels and a deep-seated reluctance on the part of pressure vessel users to be regulated. Fact is, had communication between users and supporters of safety legislation taken place earlier, South Carolina might have had a pressure equipment law years ago.

Instead, hearings continued to be held. More letters were written. And one-by-one, proposed pressure equipment legislation remained bottled up and eventually perished in committee.

The National Board became involved in 2003 at the request of boiler companies frustrated by the condition of equipment in South Carolina. We responded by compiling the winter 2004 Special Issue of the *BULLETIN*. While doing so, it became apparent there was no consistent message being sent to the legislature regarding boiler and pressure vessel safety. Perhaps more disheartening was a lack of South Carolina accident statistics



(not required without a law) to support the safety message.

Without a coherent and concise message, efforts to persuade an indifferent legislature were an exercise in futility. These endeavors were further aggravated by yet another complication: state representatives and senators having to learn about equipment totally unfamiliar to them. Equipment — quite frankly — for which most of them could not have cared less.

The *BULLETIN* Special Issue consolidated and simplified the safety message. Distributed to legislators and key state thought leaders, it revisited and amplified a truth that resonated throughout the hallowed halls of the state capitol: South Carolina was the only state without a pressure equipment law.

Being the lone holdout of critical safety legislation prompted some elected state officials to ask why. And when they expressed an interest in following in the footsteps of Alabama and its recent enactment of a safety law, it was decided to use the Alabama act as a model for South Carolina.

Following meetings with major stakeholders, the Senate Labor, Commerce and Industry Committee readied draft legislation designated S. 581 for introduction before the South Carolina Senate. Unlike all but one of pressure equipment bills preceding it, this one would have no pressure vessel regulation. And unlike all of the pressure equipment bills preceding it, this one would have no opposition from special interest groups.

Hence the solution to three decades of legislative frustration.

Passing a South Carolina boiler law was never about securing legislative votes. Antiquated Senate rules permit one — just one — senator to contest a bill, which relegates it to legislative purgatory. With no individual or group standing in the way, the *Boiler Safety Act* was the first pressure equipment law to exit committee for consideration by the full legislature. That, in effect, opened the door for passage in both legislative chambers.

After S. 581 passed the Senate and was forwarded to the House, 47-year-old boiler operator Tommy Jarvis was killed during a Columbia (South Carolina) boiler explosion. His family, their grief fresh from the loss of a beloved father, husband, and brother, helped accelerate a legislative process that ended with S. 581 being sent to the governor. And an uncertain future.

Having promised voters to resist regulatory excess, Governor Mark Sanford was reportedly leaning toward a veto of the *Boiler Safety Act*. On the evening of May 17 — just 75 days after S. 581 was introduced and only hours before the governor was required to either veto the bill, sign it into law, or let it become law without his signature — the Jarvis family joined legislation supporters in calling the governor's office to urge prudent consideration.

True to his promise, the governor did not sign the bill. And so, on January 1 of next year, all boilers covered by the South Carolina law will be subjected to regular inspections and registration.

Indeed, a journey of significant duration has concluded. Perhaps it should have been expected. South Carolina has long been regarded as one of the most difficult states in which to pass legislation — any legislation. And so, the seemingly undoable is done.

Of course, the objective of a journey — no matter how long — is to arrive safely. And while South Carolinians have arrived, few will fully understand what it took to get here. ❖

South Carolina
Boiler Safety Act

SECTION 1. Title 41 of the 1976 Code is amended by adding:

CHAPTER 14
Boiler Safety Act

Section 41-14-10. This chapter may be cited as the 'Boiler Safety Act' and, except as otherwise provided in this chapter, applies to all boilers.

Section 41-14-20. For the purposes of this chapter:
(1) 'API-ASME' means the American Petroleum Institute-American Society of Mechanical Engineers.
(2) 'ASME' means the American Society of Mechanical Engineers.
(3) 'Board' means the Contractors' Licensing Board.
(4) 'Boiler' means a closed vessel in which water or other liquid is heated, steam or vapor is generated, or steam is superheated, or in which any combination of these functions is accomplished, under pressure or vacuum, for use externally to itself, by the direct application of energy from the combustion of fuels or from electrical, solar, or nuclear energy. The term 'boiler' includes fired units for heating or vaporizing liquids other than water where these units are separate from processing systems and are complete within themselves. The term 'boiler' is further defined to include any of the following terms:
   (a) 'heating boiler' means a steam or vapor boiler operating at pressures not exceeding 15 psig or a hot water boiler operating at pressures not exceeding 160 psig or temperatures exceeding 250 degrees Fahrenheit; or
   (b) 'high pressure, high temperature water boiler' means a water boiler operating at pressures exceeding 160 psig or temperatures exceeding 250 degrees Fahrenheit; or
   (c) 'power boiler' means a boiler in which steam or other vapor is generated at a pressure of more than 15 psig.
(5) 'Department' means the Department of Labor, Licensing and Regulation.
(6) 'Director' means the Director of the Department of Labor, Licensing and Regulation.
(7) 'Owner' means the person or persons who own or operate any business operating a boiler required to be registered under this chapter.

Section 41-14-30.
(A) (1) The department shall promulgate regulations for the safe installation and inspection of boilers in this State.
   (2) All new installations shall conform to generally accepted nationwide engineering standards. Conformity with the most recent edition of the Boiler and Pressure Vessel Code or the ASME Code shall be accepted as conformity with generally accepted nationwide engineering standards.
   (3) The department shall promulgate regulations for installation and inspection of boilers which were in use in this State prior to the implementation of the statewide building code. The regulations must be based upon, and at all times follow, generally accepted nationwide engineering standards and practices and may adopt applicable sections of the Inspection Code of the National Board of Boiler and Pressure Vessel Inspectors.
(B) The regulations and any subsequent regulations promulgated by the department must be adopted pursuant to the Administrative Procedures Act.

Section 41-14-40.
(A) Any new boiler installed and operated in this State, unless otherwise exempted, must be designed and constructed in accordance with the ASME Code or a nationally recognized code of construction. Any new boiler installed in this State must be marked in accordance with the code of construction and must be registered with the National Board of Boiler and Pressure Vessel Inspectors. Copies of registration documents must be provided to the jurisdiction when requested.
(B) Only a boiler that conforms to the regulations of the department governing installation must be installed and operated in this State after twelve months from the date upon which the first regulations under this chapter pertaining to installation have become effective; however, the department may issue a special installation and operating permit for a boiler that is of special design or construction and that is not inconsistent with the spirit and safety objectives of the regulations. The department shall issue a special installation and operating permit after determining on the record and after an opportunity for inspection of the boiler or the plans for the boiler that the proponent of the special permit has demonstrated by a preponderance of the evidence that the special design or construction will provide an equivalent degree of safety to that of conformance with the regulations. The department shall accept comments from any interested party concerning the application for a special installation and operating permit. The permit so issued shall prescribe the conditions the owner or operator must maintain.

Section 41-14-50.
(A) The maximum allowable working pressure of a boiler carrying the ASME Code symbol must be determined by the applicable sections of the code under which it was constructed and stamped. Subject to the concurrence of the department, the boiler may be re-rated in accordance with the rules of a later edition of the ASME Code and in accordance with the rules of the *National Board Inspection Code*.
(B) The maximum allowable working pressure of a boiler which

does not carry the ASME or the API-ASME Code symbol must be computed in accordance with the Inspection Code of the National Board of Boiler and Pressure Vessel Inspectors.

(C) This chapter must not be construed to prevent the use, the sale, or the reinstallation of a boiler referred to in this section if the boiler has been made to conform to the regulations of the department governing existing installations and has not been found upon inspection to be in an unsafe condition.

Section 41-14-60.

(A) This chapter does not apply to:
  (1) boilers under federal control or under regulations of Title 49 of the Code of Federal Regulations, Parts 192 and 193;
  (2) hot water supply boilers equipped with ASME-National Board approved safety relief valves which are directly fired with oil, gas, or electricity when none of the following limitations are exceeded: heat input of 200,000 BTU per hour; water temperature of 210 degrees Fahrenheit; nominal water-containing capacity of 120 gallons;
  (3) boilers in the care, custody, and control of research facilities and used solely for research purposes which require one or more details of noncode construction or which involve destruction or reduced life expectancy of those vessels so long as a timely inspection report is filed pursuant to Section 41-14-120;
  (4) boilers operated and maintained for the production and generation of electricity so long as a timely inspection report is filed pursuant to Section 41-14-120;
  (5) boilers operated and maintained as part of a manufacturing process so long as a timely inspection report is filed pursuant to Section 41-14-120;
  (6) boilers that are subject to OSHA standards of compliance so long as a timely inspection report is filed pursuant to Section 41-14-120;
  (7) boilers operated and maintained by a public utility or the Public Service Authority including, but not limited to, boilers operated and maintained for the production of electricity so long as a timely inspection report is filed pursuant to Section 41-14-120.

(B) The following boilers are exempt from the requirements of Sections 41-14-120 and 41-14-130:
  (1) boilers that are located on farms and used solely for agricultural or horticultural purposes;
  (2) heating boilers that are located in private residences or in apartment houses of less than six family units.

(C) All pressure vessels are exempt from regulation under this chapter.

Section 41-14-70.

(A) The director shall appoint a chief boiler administrator who has passed the same type of examination prescribed in Section 41-14-90.

(B) The director must be charged, directed, and empowered to:
  (1) take action necessary for the enforcement of the laws and regulations of this State regulating the use of boilers;
  (2) keep a complete record of the name of each boiler owner or user and his or her location, the type, dimensions, maximum allowable working pressure, age, and the last record inspection of all boilers; and
  (3) publish and make available, upon request, copies of the department regulations.

Section 41-14-80.

(A) The director shall promulgate regulations for the certification of special inspectors. Before receiving his certificate of competency, each inspector shall satisfactorily pass the examination provided for in Section 41-14-90 or, in lieu of the examination, shall hold a commission or a certificate of competency as an inspector of boilers from a state that has a standard of examination substantially equal to that of this State or possess a commission as an inspector of boilers issued by the National Board of Boiler and Pressure Vessel Inspectors.

(B) The expenses or salary of special inspectors must not be paid by the State.

(C) The special inspectors may inspect all boilers insured or operated by their respective companies.

Section 41-14-90. The examination for chief boiler administrator or special inspectors must be in accordance with the requirements of the National Board of Boiler and Pressure Vessel Inspectors.

Section 41-14-100. The board shall discipline certified inspectors in the manner authorized by Chapter 1, Title 40. The Department of Labor, Licensing and Regulation on behalf of the board shall investigate complaints and reports of violations of this chapter as provided for in Chapter 1, Title 40. In addition to other remedies provided for in this chapter, the board in accordance with Chapter 1, Title 40 may issue a cease and desist order or may petition the Administrative Law Court for equitable relief to enjoin a violation of this chapter.

Section 41-14-110. If a certificate of competency is lost or destroyed, a duplicate certificate of competency must be issued without further examination.

Section 41-14-120.

(A) Owners and operators of all boilers must file with the department evidence of timely inspection as provided in this section. Evidence of timely inspection may be in the form of a certification of insurance, which contains evidence that the boiler was inspected and approved or it may be an inspection report from a certified special inspector.

(B) The director or the chief boiler administrator shall give twenty-four hours' notice to enter any premises in the State where a boiler is being installed or repaired for the purpose of ascertaining whether the boiler is being installed or repaired in accordance with the provisions of this chapter.

(C) (1) After December 31, 2005, each boiler used, or proposed to be used in this State must be thoroughly inspected as to their installation and condition as follows:
    (a) Annually, a certificate inspection must be conducted

on power boilers and high pressure, high temperature water boilers and this inspection must be an internal inspection; however, if it is not possible to perform an internal inspection, the inspection must be as complete an inspection as possible. The boilers must also be externally inspected while under pressure, if possible.

(b) Biennially a certificate inspection must be conducted on low pressure steam or vapor heating boilers and an internal inspection must be conducted every four years where installation permits.

(c) Biennially a certificate inspection must be conducted on hot water heating and hot water supply boilers and an internal inspection must be conducted at the discretion of the inspector.

(2) A grace period of two months beyond the periods specified in items (a) and (b) of subsection (B)(1) may elapse between certificate inspections.

(3) The department may provide for longer periods between certificate inspection in its regulations.

(4) Pursuant to this chapter, the department has jurisdiction over the interpretation and application of the inspection requirements as provided for in regulations of the board. The person conducting the inspection during installation or repair shall certify as to the minimum requirements for safety as defined in the ASME Code. Inspection requirements of operating equipment must be in accordance with generally accepted practice and compatible with the actual service conditions, which must include all of the following:

(a) previous experience, based on records of inspection, performance, and maintenance;

(b) quality of inspection and operating personnel;

(c) provisions for related safe operation controls;

(d) interrelation with other operations.

(5) The department may permit variations in the inspection requirements based upon documentation of the actual service conditions by the owner or user of the operating equipment.

(D) The inspections required in this chapter must be made by a special inspector provided for in this chapter.

(E) If the inspector determines that a hydrostatic test is necessary, it must be made by the owner or user of the boiler.

Section 41-14-130.

(A) If a report filed pursuant to this section shows that a boiler fails to comply with the regulations of the department, the department may issue a written order directing that the deficiencies be corrected and setting a date for correction.

(B) The department may issue a written order for the temporary cessation or operation of a boiler because of faulty installation or incorrect repair if the boiler has been determined after inspection to be hazardous or unsafe. Operations must not resume until the conditions are corrected to the satisfaction of the director or his designee.

Section 41-14-140.

(A) Any person or entity that fails to comply with the provisions of this chapter or the regulations promulgated pursuant to this chapter may be assessed a civil penalty of not more than five thousand dollars for each violation. When considering the assessment of penalties, consideration must be given to the good faith actions of and the history of prior violations by the person or entity as well as any other relevant circumstances.

(B) Any person or entity that fails to timely comply after written notice by the department of a violation is subject to a penalty of up to one hundred dollars per day for such noncompliance.

Section 41-14-150. A fee not to exceed fifty dollars per facility or per certificate filed with the department in the format prescribed by regulation may be assessed, collected, and adjusted by the Department of Labor, Licensing and Regulation in accordance with Chapter 1, Title 40.

Subclassification licensure requirements

SECTION 2. Section 40-11-410(4)(o) of the 1976 Code is amended to read:

"(o) 'Boiler installation' which includes those who are qualified to install, repair, and service boilers and boiler piping including the boiler auxiliary equipment, controls, and actuated machinery and dryer rolls. To qualify for this subclassification, a person must pass a technical examination administered by the board or must be the holder of the American Society of Mechanical Engineers (ASME) 'S' stamp or hold the National Board of Boiler and Pressure Vessel Inspectors (NBBPVI) 'R' stamp and meet the requirements for licensure according to this chapter."

Severability

SECTION 3. If any section, subsection, paragraph, subparagraph, sentence, clause, phrase, or word of this act is for any reason held to be unconstitutional or invalid, such holding shall not affect the constitutionality or validity of the remaining portions of this act, the General Assembly hereby declaring that it would have passed this article, and each and every section, subsection, paragraph, subparagraph, sentence, clause, phrase, and word thereof, irrespective of the fact that any one or more other sections, subsections, paragraphs, subparagraphs, sentences, clauses, phrases, or words hereof may be declared to be unconstitutional, invalid, or otherwise ineffective.

Time effective

SECTION 4. This act takes effect upon approval by the Governor.

Ratified the 11th day of May, 2005.

Became law without the signature of the Governor -— 5/18/05. ❖

2005 Registrations

National Board Certificate of Authorization to Register guarantees the third-party inspection process, providing for uniform
ac
data -
tion number. Once registered, each report is maintained in a permanent file by manufacturer name and National Board number.

The list below identifies boiler, pressure vessel, and nuclear vessel registrations by size for the past five fiscal years. The National Board fiscal year is from July 1 to June 30.

The total number of registrations on file with the National Board at the end of the 2005 reporting period was 38,512,763. ❖

Size		FY 2005	FY 2004	FY 2003	FY 2002	FY 2001
BOILERS						
square feet of heating surface						
≤ 55	(A)	111,360	109,064	98,312	78,695	87,681
> 55 and ≤ 200	(B)	31,331	30,642	32,927	25,445	24,670
> 200 and ≤ 2000	(C)	9,325	9,322	9,797	9,130	8,959
> 2000 and ≤ 5000	(D)	651	629	846	689	765
> 5000	(E)	733	912	2,105	1,184	1,057
TOTAL		**153,400**	**150,569**	**143,987**	**115,143**	**123,132**
PRESSURE VESSELS						
in square feet						
≤ 10	(A)	741,220	718,214	745,601	671,433	816,778
> 10 and ≤ 36	(B)	399,534	449,968	370,780	340,818	297,047
> 36 and ≤ 60	(C)	58,447	64,790	50,263	60,992	41,149
> 60 and ≤ 100	(D)	10,160	9,794	9,628	10,343	10,503
> 100	(E)	10,626	10,426	12,975	11,585	12,121
TOTAL		**1,219,987**	**1,253,192**	**1,189,247**	**1,095,171**	**1,177,598**
NUCLEAR VESSELS						
in square feet						
≤ 10	(A)	553	702	1,725	565	1,053
> 10 and ≤ 36	(B)	5	90	137	424	669
> 36 and ≤ 60	(C)	1	1	33	45	89
> 60 and ≤ 100	(D)	5	132	14	15	19
> 100	(E)	15	15	17	17	19
TOTAL		**579**	**940**	**1,926**	**1,066**	**1,849**
ATTACHMENTS*		70,736	77,715	100,136	79,272	82,745
GRAND TOTAL		**1,444,702**	**1,482,416**	**1,435,296**	**1,290,652**	**1,385,324**

*An attachment is any type of additional information to be submitted with the primary data report.

For more information on the Authorization to Register Program, access the National Board Web site at **nationalboard**.org.

Remembering the 1905 Grover Shoe Factory Explosion

100 YEARS

Many familiar with the background of boiler regulation point to the R.B. Grover & Co. shoe factory explosion as a pivotal historical event that prompted an urgent response to the turn-of-the-century boiler explosion tragedies that occurred daily.

It was in March 1905, in Brockton, Massachusetts, that a factory full of shoemakers was devastated by an exploding steam boiler. Fifty-six people were killed on the spot; two others died within days. Another 150 suffered serious injuries.

The morning of the explosion, an old reserve boiler was reluctantly put into use. It became overheated and blew apart. A resulting fire was helped along by a broken gas line, creating a roaring inferno that consumed the wooden structure and numerous surrounding buildings in a matter of moments.

Mark Mooney, Massachusetts Assistant Chief of Inspections, at the disaster site with Brockton Mayor John T. Yunits Jr. (right).

Provoked Massachusetts lawmakers, boiler inspectors, and boiler manufacturers alike came together to take action so that this all-too-common scenario would never take place again — or at the very least, stop happening with regularity. After two years of legislative work, a framework emerged that would go on to become the first — and to this day the strongest — legal entity to regulate boiler manufacture, repair, and maintenance in the entire nation: the Massachusetts Board of Boiler Rules.

Important for a variety of reasons, this legal council was the impetus for a national boiler code that would establish uniform manufacturing standards from state to state. In 1915, the first nationwide set of rules for the construction of stationary boilers and allowable working pressures was put into place.

The events from that March day in 1905 touched nearly everyone in the town of Brockton. It was for this reason that the Brockton Historical Society planned a centennial memorial March 20. The sunny Sunday morning was filled with remembrances of those who perished in the explosion.

The first tribute of the day took place at the site of the shoe factory, where approximately 50 people were on hand. Those in attendance included city officials, firefighters, relatives of those killed, and Massachusetts Assistant Chief of Inspections Mark Mooney, representing the National Board.

Church bells tolled 58 times — once for each life lost — at 7:50 a.m., the precise moment the explosion had taken place 100 years prior. A wreath of red and white carnations was placed on a fence nearby. Photographs of the R.B. Grover factory completed the makeshift monument. As part of the solemn ceremony, Mr. Mooney read a letter from National Board Executive Director Don Tanner commemorating the event.

Following the emotional on-site observance, a local church hosted a memorial service and reception. Additional photographs and mementos from the tragic event were displayed. Later, a wreath was laid at a monument in Melrose Cemetery that is dedicated to the victims, forty of whom are buried there. A salute and moment of silence preceded the wreath-laying.

In a fitting move, the Massachusetts legislature passed a resolution proclaiming March 20, 2005, an official day of observance of the R.B. Grover & Co. shoe factory tragedy. ❖

The Grover Disas

Brockton, Massachusetts, was once the center of the world's shoe manufacturing industry. A medium-sized city, Brockton claimed 35,000 skilled shoe workers with a total population of 60,000. A railroad passed through the heart of the city, and the local government was notably pro-business. Each of these factors made Brockton attractive to industrialists like Captain Robbins B. Grover. Capt. Grover served in the Army of the Potomac during the Civil War. Upon returning home he entered the shoemaking business. Grover chose the south side of Brockton to locate his main factory.

By the end of the nineteenth century, R.B. Grover & Co. was manufacturing the popular Emerson Shoe while Capt. Grover was becoming a wealthy man. The reputation of the Emerson was justified: designed to be fashionable yet affordable, each Emerson shoe was made from the finest leather. The shoe was designed with a custom last "providing maximum comfort and durability." By early 1905, R.B. Grover & Co. had 33 stores and skyrocketing sales.

Sales of the Emerson Shoe were so good that Capt. Grover added an entire floor to his Brockton factory to keep pace with demand. In the construction, however, the original boiler was not removed. The 1890 boiler, into its second decade of hard service, was kept alongside newer boilers. The older boiler was used sparingly, not only because the newer boilers could generally meet the demands of the factory, but also because Chief Engineer David Rockwell didn't trust it. After the explosion it was said that Rockwell had only used it reluctantly and with great apprehension.

ter: 100 Years

by Derek A. Canavan

Courtesy of the Brockton Historical Society Museum

Compounding the problem of a possibly unsound boiler, the Grover factory was made totally of wood. Most factories in Brockton were constructed so because masonry construction was cost prohibitive and took too long to complete. As was common practice in these large, wooden factories, the thousands of square feet of pine flooring were treated with oil every night to help keep dust in the factory to a minimum.

The Grover factory was a tinderbox just waiting for somebody to light a match.

David Rockwell would light that match. March 20, 1905, was a cold, damp day. The steam radiators that heated the building were working hard to thaw the newly arrived day shift workers. At 7:45 in the morning the plant manager called Mr. Rockwell to inquire about some "peculiar humming" sounds coming from the radiators along the plant's north wall. The plant manager was told that Rockwell had just left the building but that before he had gone, Rockwell had reconnected the 14-year-old boiler to generate added steam. The assistant boiler engineer reassured the plant manager that everything was in good order. The plant manager accepted this explanation for the strange noises coming from the pipes and went back to the production floor thinking everything was fine.

Less than five minutes after that phone call, the timeworn boiler succumbed to age and poor engineering and exploded at its seams. The boiler ripped itself from its stanchions and tore a path through the four-story building, turning it into a crematorium. Investigators estimated the force of the explosion was equal to 300 kilos of dynamite. The structural integrity of the wooden factory was compromised even before the fire took hold. The factory roof collapsed and the floors crashed down on each other. Those workers who survived the explosion and collapse were now entombed beneath heavy timbers, flooring, and thousands of pounds of the latest shoe manufacturing equipment. Screams of trapped workers could be heard from the street.

Onlookers and would-be rescuers rushed to the site only to arrive as a massive fire, fed by broken gas lines, overtook the building. The more than 300 windows, which had bathed the factory floor in sunlight, now contributed to the chimney effect. Oxygen was pulled in causing the fire to burn hotter and faster than any fire the city's fire department had ever

Courtesy of the Brockton Historical Society Museum

encountered. The combination of air, gas, and ventilation — the last due to the lack of a roof on the factory — turned this factory, and the buildings around it, into a four-acre cauldron of death.

Of the more than 300 workers who were in the building, roughly 100 made it out unscathed. Fifty-eight people were killed, including some from surrounding buildings that also burned to the ground, and an additional 150 people were injured. Besides the steamship *Sultana* explosion in 1865, the Grover disaster had one of the largest death tolls of any boiler explosion in American history.

A full account of the disaster published in 1907 makes specific mention of Mr. George E. Smith, an employee of the shoe factory, his feet trapped and pinned to the floor. Unable to move or escape the flames, Smith, "large of frame and big of heart" still managed, using only his arms, to rescue his nephew and pull a Mrs. Lena S. Baker out from under some debris. Mrs. Baker owed her life to her rescuer but would never get the opportunity to thank him — Smith burned to death in the flames. Olive Smith was left to explain to her and George's three young daughters why their father was not going to come home from the factory that day. They were three of 55 dependent children who lost a mother or father that day.

The site of the disaster was searched for bodies. The Hon. Edward H. Keith, Brockton's mayor at the time, personally supervised the search, and ordered one more inspection of the pyre to soothe the dozens of grieving family members who had kept a rain-soaked vigil at the site for days. Human flesh stood no chance in a fire that melted iron pipes and radiators. The remains were taken to a central location downtown for the mostly impossible and grisly task of identification.

In the wake of this tragedy, the entire city mourned. There were funeral marches and church services all around the city. In the days following the fire, local churches held countless services, administered to the bereaved, and cared for those in need. The city of Brockton was united in tragedy.

Brockton City Council approved expenditure for a grave and memorial at Melrose Cemetery on Pearl Street on the city's west side. The victims have been laid to rest with their bodies arranged like spokes in a wheel pointing toward the granite monument.

Though the shoe industry in Brockton would recover from the Grover disaster, Capt. Grover was left a broken man. He was out of the shoe business within a year and, though he remained active within the business community, he made it his life's work to secure aid to the survivors and the dependents of those who perished in his factory. The catastrophe left Grover, who was one of only a handful of factory owners to provide free medical care to his employees, unable to bear the guilt that weighed heavily upon his shoulders. He lived as an emotionally tormented and financially ruined man until his death a few short years after the disaster.

In March of 2005 the Brockton Historical Society held a solemn and well-attended observance of the disaster. Through the efforts of the Brockton Historical Society and others, the tragedy of March 20, 1905, will not be forgotten. ❖

About the Author

Derek Canavan was born and raised in Brockton. Mr. Canavan teaches history at Brockton High School and is the assistant curator of the Brockton Historical Society. He resides in Brockton with his wife and two children.

Pressure Relief Valve Repairs
Can You Bet Your Life on Them?

by Fred Harrison, P.E., Director, Pressure Relief Department and Testing Laboratory

The *National Board Inspection Code* defines the repair of a pressure relief valve as the replacement, remachining, or cleaning of any critical part, lapping of seat and disk, or any other operation that may affect the flow passage, capacity, function, or pressure-retaining integrity. Even the disassembly, reassembly, and/or adjustments that affect a valve's function are considered a repair.

What are the possible effects of an improper repair to a pressure relief valve? An improper repair can reduce a valve's relieving capacity. After all, the primary function of a pressure relief valve is to provide relief at a certain capacity so as to prevent exceeding a specific value of the maximum allowable working pressure of the vessel. An improper repair can also shift the valve's set pressure or blowdown outside specified tolerances of the code. Operationally the valve's moveable components may hang up, flutter, or chatter. Leakage or excessive simmering may be present or the valve's lift might be restricted in some way.

Improper repairs to pressure relief valves can be divided into two basic categories: the first category can be attributed to workmanship; the second to failure to identify and correct problems prior to returning a valve to service.

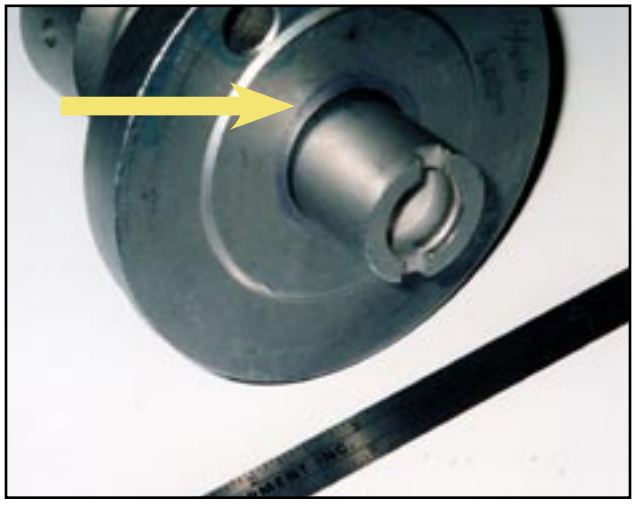
Workmanship

Machining and fabrication of a valve's component parts top the list of the industry's concerns regarding workmanship. Improper remachining and alteration are common examples of poor manual skill. Machining may place the component's dimensions out of tolerance and completely alter its intended design characteristics. Inadequate preparation of seating surfaces may lead to leakage and possible steam cutting. This can include machining or lapping the seating surface to a flat condition when the manufacturer's specifications call for a slight bevel, such as three to four degrees on the seat.

Altering the structure of special disks for high-pressure steam service is another concern. The disks are designed so the inlet pressure aids in providing a more effective seal at the seating surface area. They can be improperly modified during repair by filling the inner cavity with weld metal, removing the disk's sealing characteristics.

To ensure proper valve function, parts should be fabricated to the original valve manufacturer's specifications, which include material, dimensions, tolerances, surface conditions, and manufacturing processes such as heat treatments.

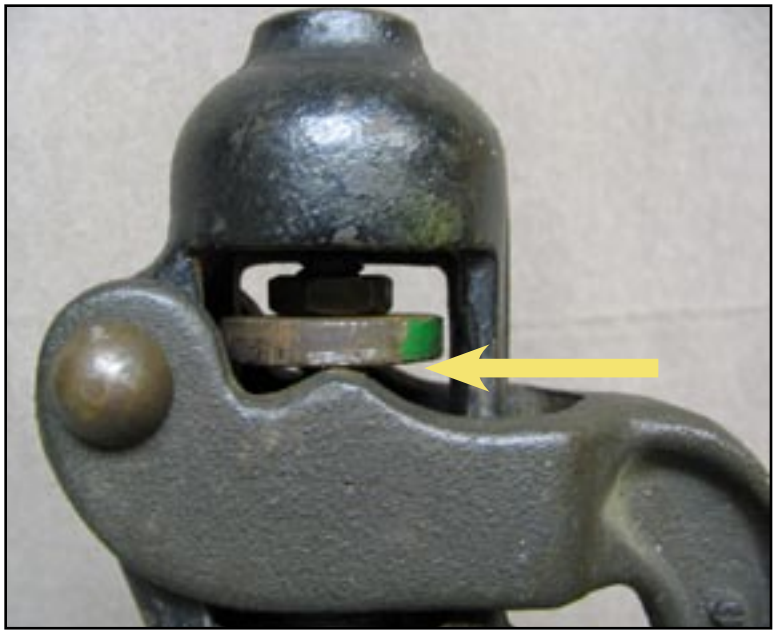
Using the wrong springs for a repair is a common mistake. Springs typically are designed to be used over a narrow set pressure range. To ensure proper function of the valve, it is essential the correct spring, with a designated spring rate, be used for the desired set pressure. Failure to do this results in restriction of the valve's lift and an inability to meet set pressure and blowdown specifications, not to mention reduction of the valve's relieving capacity.



Excessive clearance between the disk holder and the guide.

Using springs made of a material not suitable for the service conditions of the valve can present a problem as well. Failure to use springs that meet original manufacturer's specifications and failure to follow designated spring charts contribute the most to poor valve performance characteristics.

Improper assembly of the bonnet to the body.



Insufficient clearance between the lift lever and the lifting nut.

Repair welding in which neither the welder nor his or her procedures have been qualified in accordance with Section IX of the *ASME Boiler and Pressure Vessel Code* violates NBIC requirements. A repair that does not meet this NBIC requirement can lead to premature failure of the part exposed to stresses from pressure and reaction loads during operation. Recent revisions to the NBIC now permit "VR" stamp holders to utilize "R" certificate holders for weld repairs on pressure relief valve parts.

In many cases, assembly of the pressure relief valve can be as important as the fabrication of the components themselves. Each manufacturer has a specified procedure by which a valve should be disassembled and reassembled. Failure to follow these procedures may result in the improper placement or orientation of the valve's components. For example, if the ring locking pin bends on an adjusting ring, misalignment and possible hangup of the valve disk may result.

General sloppiness in the assembly process may also contribute to valve dysfunction and damage, such as cross-threading of nozzle ends of a body which results in cracking. Poor shop cleanliness practices and conditions in the assembly area may allow foreign material to be lodged between the disk and the seat. This may result in leakage and possible steam cutting of the disk and seating surfaces.

Setting of external adjustments to pressure relief valves is essential. A repair organization should have adequate setting facilities to ensure proper operation and function of a valve. For example, if the setting facility does not include an accumulation vessel of an appropriate size, it may be difficult to establish the correct blowdown for a valve. If the accumulation vessel is undersized, the valve may give the appearance of having short blowdown when in fact it may have a very long blowdown when tested on a stand with an

adequate accumulation vessel. All instrumentation used for setting a valve should be properly calibrated to a national standard. Test gages should be installed in such a way that will provide accurate results.

Using the proper test medium is of equal importance. Valves intended for steam service should be tested on steam. It may not be sufficient to set a valve for steam service on air due to the possible thermal expansion of the components when subjected to steam temperatures and the differences between properties and characteristics.

Since most repair organizations do not have testing facilities capable of measuring the actual capacity of the valve, it is imperative they follow manufacturer's recommendations when setting pressure relief valves. It is not unlikely for a valve with an adjustable blowdown to be adjusted such that both set pressure and blowdown are within tolerance. But due to the configuration of the blowdown adjustment rings with one another, it is possible the valve may not get its rated lift, and consequently will not relieve at its rated capacity.

Failure to Identify and Correct Problems

The second basic category of improper repairs relates to the failure to identify and correct deficiencies with one or more components of pressure relief valves. This negligence can result in a number of transgressions.

One of the most commonly overlooked issues is cracked components. Undetected material cracking will lead to part failure, such as a spring collapse or the failure of a primary pressure-containing part with catastrophic results. Cracks may be identified by the use of a simple liquid penetrant examination.

Another common problem is failure to identify a spring in a valve that does not meet manufacturer specifications. Considering the number of repair organizations in existence today, it is quite possible for a valve to be repaired numerous times after being placed into service. There is no guarantee a spring, or other components in the valve, was replaced by parts meeting the original manufacturing specifications. Same goes for detecting part machining conducted by a previous repairer on the valve's components.

Untrue or bent spindles, whether they have gross deformations or only a slight imperfection not detectable by the naked eye, can set a valve up for failure. Even the slightest amounts of untrueness could prevent a valve from attaining its full lift and rated capacity. Worn or galled guiding surfaces may cause the valve to bind or hang up when left uncorrected.

So, what contributes to continual improper repairs, and what can an organization do to correct this pattern? The two biggest contributing factors seem to be lack of knowledge of the pressure relief valve design, operation, maintenance procedures, and basic repair techniques, as well as failure to have an effective quality control system.

The NBIC has been revised over the past two decades to reflect the industry's consensus on the administrative and technical requirements in order to meet the performance goal. The National Board's "VR" program requires each repair organization to establish and document an in-house training program for those involved in the repair of pressure relief valves, ensuring its personnel are knowledgeable and fully qualified. To aid in this goal, the National Board provides coordinated training courses for people engaged in pressure relief valve repair. The courses give attendees basic knowledge to identify and prevent improper repairs.

It is essential each repair organization establish an effective quality control system to ensure the repaired valve's condition and performance are equivalent to the standards for new valves. By combining the use of competent repair personnel with an effective quality control system and conducting repairs in accordance with the provisions of the National Board "VR" program, it is possible to provide the industry with the best assurance that every National Board/ASME-stamped pressure relief valve repaired will perform as expected when called upon to do so. ❖

Water Hammer in Steam Systems

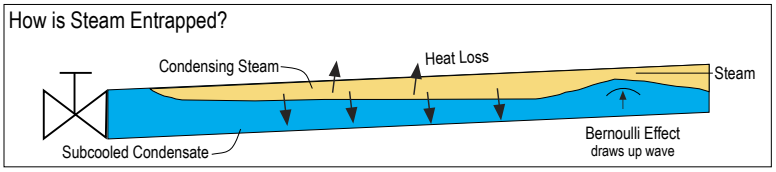
Understanding what's really happening

by Wayne Kirsner, P.E.
Kirsner Consulting Engineering

Condensation-induced water hammer in steam systems kills people. Its initiating mechanism is much different than the image most engineers and operators have of what causes water hammer — fast-moving steam picking up a slug of condensate and hurling it downstream against an elbow or a valve. Condensation-induced water hammer can be 100 times more powerful than this type of event. It's most often initiated by a steam worker cracking open a valve to admit steam to an isolated steam line, or opening a drain to remove accumulated condensate from a pressurized steam line. The overpressure from a condensation-induced water hammer event can easily exceed 1000 psi. This is enough pressure to fracture a cast-iron valve, blow out a steam gasket, or burst an accordion-type expansion joint.

Steam workers, their supervisors, and design engineers should understand what really causes water hammer in steam systems if they are to avoid procedures and designs that enable it. The quiz below is designed to alert steam professionals that they may not know all they need to know about what causes life-threatening water hammer in steam systems.

1. To have a water hammer event, you must have a large mass flow of fast-moving steam. (True or False)



2. To have water hammer in a steam system, there must be water in the system. (True or False)

3. When steam becomes totally enveloped in cool condensate so that it rapidly condenses, its pressure drastically increases or decreases?

4. Fast-flowing steam picking up a slug of condensate and flinging it against an elbow is not, technically, water hammer. (True or False) Can a collision of this type actually rupture a pipe? (Yes or No)

5. Is water hammer more, less, or equally likely in an uninsulated steam line? Why?

6. You have two replacement valves to choose from in the shop — a Class 150 valve and a Class 250 valve (both of which are labeled on the valve body casting). Which is more resistant to failure in the event of a water hammer?

7. Saturated steam flowing over pooled condensate will eventually evaporate it, if given enough time. (True or False)

8. You're replacing a 3/4" bucket trap with another from the same manufacturer. The cast-iron bodies are identical and marked with raised letters on the castings indicating their maximum operating pressure is 250 psi. The older trap worked just fine in your 125 psi steam system until it failed. The new trap should work just fine, too. (True or False)

9. You're about to activate a cold steam line by admitting steam into it from the main. You suspect you may have condensate filling a portion of the pressurized line upstream of where you're about to open the isolation valve. There is a drain valve upstream of the valve. You should:

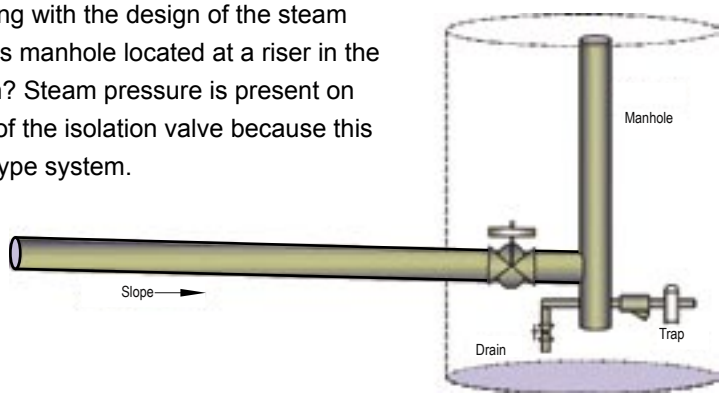
A) just "crack open" the isolation valve
B) open the drain to see if there's condensate present and, if so, bleed it
C) check the temperature of the bottom of the pipe near the low point to determine if it's below the saturation temperature of the steam

10. Before opening a valve to admit steam into a cold steam line, you determine there *is* pooled condensate residing in the pressurized line. To drain the condensate, you don't need to shut off steam pressure before draining the line. (True or False)

11. In 9(C), you elect to use an infrared gun to measure pipe temperature. What two factors must you be aware of to get an accurate temperature measurement using an infrared gun?

A) color of the object
B) emissivity of the object
C) field of vision of the gun
D) temperature of the surrounding ambient air

12. What's wrong with the design of the steam piping in this manhole located at a riser in the steam main? Steam pressure is present on both sides of the isolation valve because this is a "loop" type system.



13. The water surrounding a steam main in a flooded manhole is boiling. What's likely going on inside the steam main?

A) pipe is expanding due to rapid boiling
B) steam is leaking from pipe
C) pipe is beginning to corrode
D) condensate is filling the pipe

14. When a boiler pump activates to a certain boiler, water hammer is heard in the boiler feedwater line. What's most likely wrong?

ANSWERS

1. **FALSE.** Generally a steam isolation valve is closed or just in the beginning stages of being "cracked" open to allow steam to flow when water hammer strikes.
2. **TRUE.** It is the rapid halting of water, generally in a collision, that causes water hammer.
3. **DECREASES.** A condensation-induced water hammer event begins with an "implosion" where water rushes in to the void left by extremely rapidly condensing steam and slaps together.
4. **TRUE.** If the condensate is not forced to compress on itself in a collision (because it's able to slosh around the elbow), then the collision will not result, technically, in a water hammer (although it is often referred to as such). This is not a distinction without a difference. The formula used to calculate the overpressure due to a steam-flow-driven slug flow as described in this question is different than that used to calculate the overpressure due to a water hammer. An event of the type described, in general, is of insufficient magnitude to rupture a pipe, although it could shift or damage pipe supports.
5. **MORE LIKELY.** A condensation-induced water hammer requires the condensate be subcooled more than 40°F below the saturated steam temperature. If the condensate doesn't have time to cool because a line is well-insulated, condensation-induced water hammer will not happen.
6. **CLASS 150.** It's a steel valve. A Class 250 valve, even though rated for higher steam pressure, is cast-iron and thus more likely to fracture due to water hammer.
7. **FALSE.**
8. **FALSE.** It is critical that the orifice within the bucket trap be rated for the pressure at which the bucket will operate. An orifice rated for a pressure below the actual operating pressure will cause the trap to fail closed. The orifice pressure rating, while critical to operation of the bucket trap, is not stamped on the body of the trap.
9. **C)** (Actions A and B can get you killed!)
10. **FALSE.** Opening a bleed valve or cracking open a steam valve to bleed subcooled condensate under steam pressure can — and has — killed steam workers. It will continue to do so as long as steam workers and their supervisors misunderstand what causes water hammer in steam systems.
11. **B), C)** Proper operation of an infrared temperature measuring gun is more complex than most operators realize.
12. If the isolation valve were closed, the trap would not be able to drain condensate from the left side of the valve. This piping configuration has resulted in operator death.
13. **D)** Heat transfer from the outside of the steam pipe to the surrounding ground water will be two orders of magnitude greater than that when the insulated pipe is surrounded by air. The steam trap draining the line will, as a result, likely be overcome. (For more details see *http://www.kirsner.org/pages/articlesAlt.html*)
14. The check valve at the boiler in the feedwater line is leaking. Other possibilities are discussed in "Banging in the Boiler Plant" at *http://www.kirsner.org/pages/articlesAlt.html*. ❖

About the Author

Wayne Kirsner is a professional engineer who specializes in investigation of industrial steam accidents. He is an ASHRAE Distinguished Lecturer and author of 11 feature articles on water hammer in steam systems and chilled water design. Kirsner teaches the seven-hour seminar *Understanding Water Hammer in Steam Systems*. This quiz is excerpted from that training and is available at *kirsner.org*.

Under Pressure

The Temperature Management System Brings Relief

Heat is one foe every football player has trouble lining up against. Even for the grittiest players, two-a-day practices in August can be brutal. The same scenario can many times extend well into football season, where September and October afternoons can still see glaring sun, humid conditions, and unseasonably warm temperatures.

No matter the amount of conditioning, heat stress and dehydration are constant threats to a player's health. It goes beyond fatigue and illness — heat exposure can result in coma and even death. According to the National Center for Catastrophic Sport Injury Research, between 1995 and 2004, 24 players died from heatstroke during or immediately after football practice. One of the more infamous cases of a player dying after practicing in sweltering July heat was that of Korey Stringer of the NFL's Minnesota Vikings. When Stringer was attended to after falling ill, his body temperature had reached 108.8 degrees.

Many measures have to be taken to help players fight heat and the perils it brings. These include acclimatization, conditioning, proper hydration and rehydration, and monitoring for early signs and symptoms of heat-related illness. While there is no cure-all to the dangers of heat, now those health risks can be further minimized with a product created to bring cool relief to players from the inside out — via air-cooled football shoulder pads. The equipment involved is not revolutionary, but the way it's used is.

The stand-alone Temperature Management System (TMS) is connected to football shoulder pads that have ventilation channels which open up next to the chest and back of the player. The system is comprised of an air compressor that delivers air at a controllable flow rate and pressure; a Core Cooler that conditions the air and removes any water; filters

The entire Temperature Management System, consisting of (from left) the Core Cooler; the manifold, air regulators, and hooktubes; and the air compressor.

Scott S. Smith Photographic LLC, *www.sssphotographic.com*

The Core Cooler, showing the outgoing temperature gage, the secondary filter, and the temperature control valve alongside the copper tubing.

that remove remaining water and oil; and air regulators and a manifold that distribute air to the pads. The Core Cooler acts as a heat exchanger, and has a series of copper pipes through which air travels. When the cooler is filled with ice and water, the air in those pipes is chilled. (Conversely, when filled with hot water, the system can warm players when cold air affects their safety and productivity.)

TMS is the result of years of research, design, and testing by scientists with the University of Florida Research Foundation. Dr. Nikolaus Gravenstein and his associates began development on the idea in 2002. A professor at UF and chairman of the school's anesthesiology department, Gravenstein worked with UF premed student Dasia Esener, UF professor of anesthesiology Dr. Samsun Lampotang, and Dr. Michael Gilmore, a UF resident in orthopaedics and rehabilitation, to improve the product.

The temperature on a football field can easily reach 120°F. A player's tight-fitting game-day uniform aggravates the ambient heat because it creates an insulating effect, impeding the evaporation of sweat. According to Gravenstein, this is the heart of the problem. "Evaporative heat loss is affected by heat and humidity — even more so with insulated clothing such as a football uniform. On a humid day, the single most important thing to temperature preservation is evaporation."

In other words, dry heat speeds up evaporation, which in turn cools the body quicker. Gravenstein focused on finding a way to get dry air between the uniform and the player's skin. Cooling underneath the pads seemed to be the answer. If evaporation of sweat could be increased, a player's core temperature could be kept in check. Gravenstein and his team glued tubes to a shoulder pad's underside and piped air through them. They then simulated game conditions — a warm room with heavy blankets — on a volunteer and got the response they were looking for. As Gravenstein puts it, it was an 'oh wow!' reaction.

Once the design was in place, the scientists approached Fred Williams of Williams Sports Group (a division of TMS Company) of St. Augustine/Jacksonville to develop a prototype. WSG was chosen because of its experience with designing protective pads and vests for other sports.

Within months a pad had been created that satisfied the group's requirements. Now it was back to testing. The idea was to get immediate feedback from those who would benefit from the product. The researchers had the best guinea pigs possible — Jacksonville University football players. The pads were a hit, so to say. "A player who has never experienced the airflow before will grin and exclaim 'it really works!'" says Williams.

The shoulder pads look and feel like regular pads because they are just that — foam pads with vertical air flow channels running through the protective cushion beneath the hard exterior. On the back of the pads is a port where a player can be immediately connected to a "hooktube" as he comes off the field. The 50°F to 60°F air is circulated around a player's chest, back, and shoulders via the ventilation channels that deliver air right next to the skin. Manufactured by Douglas Protective Equipment in Houston, Texas, and known as the TMS Pad, the pads are available for any position on the football field and are used in practices and games.

Cooling down the players begins with the air compression unit. The air compressor is built by Vanair Manufacturing in New Buffalo, Michigan. The industrial-type, self-contained mobile compressor is engine-driven with a Sullair rotary screw compressor. Depending on its specifications, it can supply air at 60 to 80 cubic feet per minute. With 25 horsepower, the V-twin Kohler engine and compressor unit is less than four feet

long. One compressor can deliver cool, dry air to as many as 11 players at once.

The Vanair compressor has an inlet control valve that knows when airflow is needed and when it isn't. The valve opens within milliseconds of a player hooking up to the system, offering relief at nearly 100 psi, operating in what is known as a loaded condition. The valve closes when there are no players hooked up (an unloaded condition). This ensures the compressor is not making air unnecessarily. The system is protected with a pressure relief safety valve in the event the inlet control valve fails and the internal plumbing becomes overpressurized.

It is the compressor that keeps air under pressure in and continually moving around through the core cooler's copper tubing. The tubing transports the air, acting as a method of conveyance. When a player wants a shot of air, he is connected to the cooler by a ball valve on the end of a coiled delivery tube hooked to a manifold. When attached to his hooktube, the connection disperses the conditioned air. The ball valve has a push lock with a quick-release connection. When the player needs to return to the field, he can disconnect on his own by just pulling away, which in turn stops the airflow. Research has shown that the evaporative heat loss with the pads is high. Air under the pads is exchanged at 500 times a minute. The manifold has a dial that can deliver 8-10 cubic feet of air a minute per pad, at 40-45 psi.

WSG's Williams explains that a number of college and NFL teams are trying out the system. One of those NFL teams is the St. Louis Rams. Rams' Equipment Manager Todd Hewitt thinks the product is a good one. "We intend to use the system when we travel to warm weather places such as Arizona. It is valuable in training camp, too. When a player seems to be having trouble cooling down — especially some of our bigger guys — we give him a rest, put him in the shade, and hook him up. We don't even have to take his pads off. It helps players cool off while maintaining a higher level of play."

Williams says that similar products are in development for baseball umpires and NASCAR drivers. Vocational and military uses are coming also.

Without more investigation, U of F Research Foundation scientists aren't ready to say exactly how much the TMS reduces core body temperature. This could happen if a $96,000 grant from the NFL is approved; the scientists have applied for the grant to conduct more rigorous medical tests. However, there is a hunch that significant physical changes do indeed take place in response to the heat when a player wears the air-cooled pads. For example, Jacksonville U. players who wore the pads during a game experienced fewer cramps than players who were not utilizing the equipment.

Gravenstein hopes the pads can ultimately save lives while improving a player's ability to compete. "We believe it is a very worthwhile advancement." ❖

The air regulators and delivery tubes, with a hooktube connected to a shoulder pad.

Scott S. Smith Photographic LLC, *www.sssphotographic.com*

safety 2005 • ORLANDO PROTECTION through inspection

2005 General Meeting Highlights

Registration Affirmation
Paul and Joan Ciancarelli were ready for the fun to begin after registering.

Tennessee Trouble Long-time Tennessee friends (from left) Bob Harrison, Don Tanner, Morris Snow, and Eslie Rogers meet again.

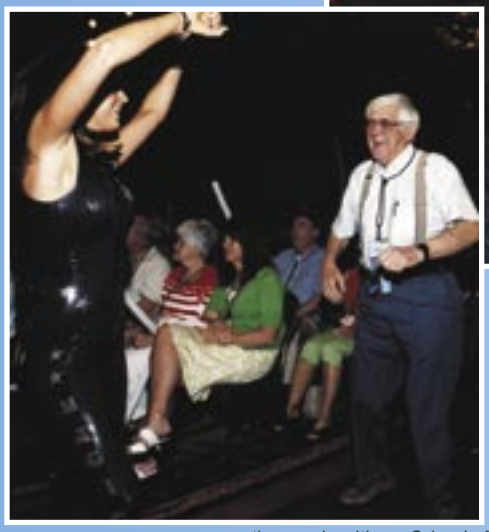
Canadian Connection Canadian members (from left) Steve Donovan of the Northwest Territories, Ken Hynes of Prince Edward Island, and Chuck Castle of Nova Scotia at check-in Sunday.

When You Wish Upon a Star The sky and the water were lit up by fireworks at Sunday night's members dinner.

Marquee Meeting National Board members and their guests received a big greeting at Atlantic Dance Sunday evening.

Winning Words of Wisdom
Legendary NFL Coach Don Shula addressed the Opening Session.

Dragon Me Down A frenzied Stuff the Orlando Magic mascot really got down at the Opening Session.



Getting the Show Started
Morris Snow moved to the music with an Orlando Magic Dancer at the Opening Session.

Sean Casten
Turbosteam Corporation

Safety Medal Moment Duane Gallup was posthumously honored with the 16th Safety Medal Award. Mrs. Jean Gallup was presented the award by Chairman of the Board Dave Douin.

John Puskar
Combustion Safety

Plaque Presentation National Board Executive Director Don Tanner presented ASME's Guido Karcher (right) with a plaque to commemorate ASME's 125th anniversary.

Ray Shook
American Welding Society

Saying Thanks
Retired Executive Director Albert J. Justin (right) was honored by Executive Director Don Tanner (center) for his outstanding service to the National Board. He was presented a certificate and a pin. On hand was Mr. Justin's daughter Barbara.

Shrimp Snackin' Deanna and Jerry Sturch (left) and Bill and Maxine Wagley surveyed the spread at the Monday evening reception.

Catching Up, Winding Down
Folks kicked back and relaxed after the General Session at a reception at the Renaissance's Poolside Terrace & Lawn.

Steel-ing the Show
Tropical Steel kept the party lively at the Monday evening reception.

Command Configuration Groups that toured NASA's Kennedy Space Center got a peek at Apollo's original command station.

High Flying Horticulture Visitors can take a stroll through NASA's Rocket Garden.

safety 2005 • ORLANDO PROTECTION through inspection

Hat in Hand
Connecticut Member Alan Platt, wife Elizabeth, and daughter Jennifer — with the infamous railroad cap — enjoyed the Wednesday evening reception.

Over or Under? Victoria Addison played along with magician Giovanni at the Wednesday banquet.

Card Shtick Captivated by magician Giovanni's card trick at the Wednesday banquet are willing participants Maria Montesino (left) and Judy Mooney.

An Evening of Elegance The room was set and the hotel staff ready for the Wednesday banquet.

Out of This World
Astronaut Jon McBride shared his galactic insight at the Wednesday outing's lunch at NASA.

See you next year at the
Desert Ridge Resort and Spa in Phoenix May 15–19

Vancouver's Gastown District

Vancouver, British Columbia

Vancouver
Named 2008 General Meeting Site

The National Board has announced Vancouver, British Columbia, as the location for the 2008 General Meeting.

The date of the 77th annual meeting will be April 21-25 at the Sheraton Vancouver Wall Centre. Considered one of the city's premiere hospitality venues, the Sheraton is located in the heart of Vancouver's shopping and entertainment district. The distinctive modern hotel features spectacular architectural design highlighted by guestrooms with extraordinary floor-to-ceiling panoramic views.

"The 2008 event will be somewhat earlier than traditional General Meeting dates," explained National Board Executive Director Don Tanner. "But Vancouver's mild weather will be conducive to getting outdoors and enjoying British Columbia's wonderful natural beauty."

The General Meeting is conducted each year to address important issues relative to the safe operation, maintenance, and construction of boilers and pressure vessels.

With a registration fee of less than $300, the General Meeting is considered to be an outstanding value for participants and guests. Past Opening Session speakers have included: astronauts Neil Armstrong, Jim Lovell, Alan Bean, and Pete Conrad; President Gerald Ford; sports greats Don Shula, Chuck Noll, Bill Russell, and Peggy Fleming; and legendary entertainers Charlton Heston and Jerry Lewis.

Next year's 75th General Meeting will take place May 15-19 at the JW Marriott Desert Ridge Resort & Spa in Phoenix.

For more General Meeting information, consult the National Board Web site at *nationalboard.org*. ❖

Sheraton Vancouver Wall Centre

Sheraton Vancouver's Café One

Another Reason to Give Thanks

BY ROBERT FERRELL, SENIOR STAFF ENGINEER

As energy prices continue to rise, people will be driven to save money through innovation. One example of innovation gone bad occurred in Montana on Thanksgiving Eve 2004.

A lady living in a wooded area occupied a home heated with hot water from a wood-fired boiler. The original setup circulated water from the boiler through the floor of the house to a 400-gallon collection tank and then to the baseboard heat. The system may have had a relief valve on the tank; no such valve was on the boiler.

The resident wanted a less labor-intensive heat source, so she had a new automatic propane-fired heating system installed. The installing contractor disconnected the water-filled wood-fired boiler from the new system by capping the copper lines for supply and return (over 30 feet away from the boiler). What neither the contractor nor the homeowner was aware of were the approximately 10 gallons of water trapped inside the wood-fired boiler and its lines. They also didn't know the unit had no ability to relieve pressure or temperature.

The night before Thanksgiving, the woman was sitting on her living room couch about 12 feet away from the wood-fired boiler, enjoying the evening and listening to the crackle of the fire. Without warning the boiler exploded, sending the main vessel (along with cannonball-size river stone from the mantel) more than 15 feet across the living room. The boiler-turned-rocket shot right past the homeowner, barely sparing her life.

The rear of the boiler was a flat plate that blew out of the living room, taking with it the back of the river-stone chimney, a porch column, and the rear garage wall. It bounced off her two cars, crashed through her garage door, and came to a stop approximately 100 feet up the driveway.

It was a miracle she was not injured or, worse, killed. The explosion shock wave went out the back of the stove and stone chimney, which explains the flight path of the 31-pound rear plate. It was the reaction force from the shock wave that sent the 250-pound boiler across the living room. If the main force of the explosion shock wave had gone through the living room, it would have collapsed three load-bearing walls, causing the roof to cave in on the living room and the homeowner.

This innovation gone bad cost nearly $150,000 to repair and replace the damaged structures and two vehicles.

◀ Rear plate weld failure.

The name of the wood stove manufacturer was not marked on the stove. Its design resembled a fireplace insert for heating air — but not water. There were only two water connections on the stove: one was used for supplying to the floor heating system and the other was the return. No rating information was found on the unit. None of the flat walls was supported by stays.

Evidence indicates the boiler was manufactured more than 40 years ago. Many manufacturers today sell

Front of wood boiler removed from window with only two water connections. Note lack of relief valve. ▼

wood stoves with water heaters that use a separate coil (water tube) to heat the water in addition to the air passages around the fire box.

The application of a wood-fired boiler is not uncommon. In Montana, Boiler Safety Supervisor Jim McGimpsey and his inspectors routinely conduct examinations of wood-fired boilers in commercial buildings. But because the boiler was in a residence, it was never evaluated and accepted by a jurisdictional inspector to ensure it had adequate safety equipment installed. An experienced inspector could have evaluated the system and, being pressure conscious, could have asked about trapped water in an old boiler that was being fired. A trained inspector would have a serious concern with dry firing a boiler, wood-fired or not.

This scenario had a number of red flags that would have been readily identified by a knowledgeable inspector. Unfortunately, the homeowner did not have the benefit of an inspection.

So how can we as inspectors prevent this type of accident from occurring?

The complete unit should have been removed. This would have prevented misapplication of the wood-fired boiler.

To even consider leaving the unit installed, it is important to understand the thermodynamics occurring inside this boiler when it is wet or dry and being fired.

Steel must be kept below 700°F or it begins to weaken and eventually collapses. Boilers use water to keep the steel cool. Steel fireplace inserts have fire brick between the fire and steel to reduce the temperature the steel is exposed to, and use air on the outside to keep cool. In both boilers and fireplace inserts, water (or air) removes heat, gives off heat to a room or radiator, then returns and cools the steel.

This wood-fired boiler had water in it but the water had no way to release heat because the copper lines were capped. The heated water then turned into superheated steam. As the steam formed, it increased the internal pressure in the boiler. This pressure caused the boiler's rear plate to fly off. The rapid release and expansion of the water and steam caused a shock wave that destroyed the chimney and garage wall — which was over eight feet away. The boiler was sent in the opposite direction.

Even if it had been completely empty of water, this unit still would have had a failure because of trapped air and the inability to release heat energy. If the copper lines had not been capped, the air circulation would not have been enough to keep the steel cool and prevent failure. Instead of a big explosion, the steel collapse would have probably caused a fire inside the wall and chimney.

In the end, the boiler removed itself from this misapplication. ❖

Robert Sullivan Retires From National Board

Robert P. Sullivan retired July 31 from his position as assistant executive director – technical with the National Board. Mr. Sullivan held the position since 1993.

"Bob's contributions to the National Board are many," commented Executive Director Donald Tanner. "We very much appreciate his years of dedication to the National Board, both as a member and assistant executive director. We extend to him our best wishes for a healthy, happy, and productive retirement."

From 1980 to 1993, Mr. Sullivan was chief inspector for the State of Maine, Boiler and Elevator-Tramway Divisions. He was approved as a National Board member in 1981. He also held the position of deputy inspector with the state, becoming an authorized inspector in 1968.

He served as secretary to the Maine Boiler Board and the Maine Elevator and Tramway Safety Board.

Previous to his employment with the State of Maine, Mr. Sullivan was a test engineer and project engineer for General Dynamics Corporation, Electric Boat. Prior to that, he was a marine engineer for American Export Lines. During that time, he served in the US Naval Reserve.

Throughout his career, Mr. Sullivan was a member of several Boiler and Pressure Vessel Codes and Standards committees and subcommittees including the Conference Committee, Section I Power Boilers, Section III Nuclear Power, Section IV Heating Boilers, Section V Nondestructive Testing, and Section XI Nuclear Inservice.

Mr. Sullivan was a member of the National Board's Board of Trustees, serving as member at large from 1990 to 1992. He also participated on numerous National Board committees and task groups, in addition to several *National Board Inspection Code* subcommittees.

A Chapter 4 treasurer for the National Association of Power Engineers, Mr. Sullivan was a member of the American Society of Mechanical Engineers, American Society of Nondestructive Testing, and the American Welding Society.

Mr. Sullivan received his bachelor's degree in marine engineering from the Maine Maritime Academy. Holding National Board Commission No. 6387, he is qualified as a National Board Team Leader and has "A" and "B" endorsements.

Mr. Sullivan and his wife Mary now reside in China Village, Maine. ❖

Manitoba Chief Mault Retires

National Board Member I. Wayne Mault, PE, has announced his retirement from the Province of Manitoba, effective July 1.


I. Wayne Mault

Mr. Mault served as director of the Mechanical and Engineering Branch of the Manitoba Department of Labour and Immigration since 1983. Mault began his employment with the department in 1971, serving as chief of engineering and technical services, then as assistant director. Previously he worked for James Bertram and Sons (Canada) Limited in The Pas, Manitoba, as junior production engineer.

A National Board member since 1984, Mr. Mault served the Board of Trustees as member at large from 1995 through 1998. He was chairman of the National Board Task Group on Nontraditional AIAs. Additionally, he held positions on a variety of committees, including those for nominating, constitution, and examination.

Mr. Mault was past chairman and member of Canadian Standards Association B-51 Boiler and Pressure Vessel Code Committee and of the Association of Chief Inspectors of Canada. He was a member of the Association of Professional Engineers and Geoscientists of the Province of Manitoba, American Society of Mechanical Engineers, the ASME Conference Committee, ASME's Section IX Committee, the ASME Subgroup on Qualifications, CSA's B-44 Elevators and Escalators Committee, the Association of Provincial Chief Elevator Inspectors, CSA's B-149 Gas Codes Committee, and the Interprovincial Gas Advisory Council.

The Swan River, Manitoba, native was graduated from the University of Manitoba with a degree in mechanical engineering.

Mr. Mault holds National Board Commission No. 7217 with "A," "B," and "N" endorsements. He resides in Winnipeg with his wife Cheryl. ❖

First Member in Idaho Elected

Michael Poulin has been elected to the National Board representing Idaho — the first member ever named in the state's history. He is chief boiler inspector for the State of Idaho, Division of Building Safety.


Michael Poulin

Mr. Poulin began working for the State of Idaho in 1988, first as safety inspector, then as boiler program manager.

He served in the US Air Force for more than 20 years. He received his undergraduate and graduate degrees from Troy State University. Mr. Poulin is a member of the American Society of Safety Engineers, American Society of Mechanical Engineers, National Association of Elevator Safety Authority, and is an IBC Commercial Building Inspector.

Mr. Poulin holds National Board Commission No. 12886. ❖

Oregon's Graham Chosen for Membership

Michael D. Graham has been elected to the National Board representing Oregon. He is interim chief boiler inspector for the State of Oregon, Building Codes Division.


Michael D. Graham

Mr. Graham began working for the State of Oregon in 1989, first as a boiler inspector for eight years, then as a boiler operator supervisor. Previously, he was a high-pressure boiler operator for the City of Tacoma (Washington).

He served in the US Coast Guard, Engineering Department, from 1968 to 1972. He completed a one-year stationary engineering course with Bates Vocational Tech.

Mr. Graham holds National Board Commission No. 12087. ❖

Board of Trustees Elections Held

The National Board Board of Trustees elections were held during the 74th General Meeting in Orlando.

The Board of Trustees reelected David A. Douin chairman of the board. He will serve a three-year term.

Mr. Douin is superintendent and chief inspector for the Illinois Office of the State Fire Marshal, Division of Boiler and Pressure Vessel Safety. He was elected to National Board membership in 1990.

Appointed to the Board of Trustees in 1997 as second vice chairman, Mr. Douin was installed as chairman in 2001.

David A. Douin

Donald J. Jenkins, chief boiler inspector for the State of Kansas, has been reelected to his position on the Board of Trustees as member at large.

Mr. Jenkins has been employed as chief inspector with the Kansas Department of Labor, Division of Workers Compensation/Industrial Safety and Health, Boiler Safety Unit, since 1996. He was elected to National Board membership in 1996.

His term will expire in 2008.

Donald J. Jenkins

Martin R. Toth, chief boiler inspector for the State of Tennessee, has been elected to the vacant position of member at large on the Board of Trustees. He became a National Board member in 2001.

Mr. Toth has been employed by the Tennessee Boiler Inspection Division since 1993, serving first as a commissioned boiler inspector, then chief inspector in 2001. From 1991 to 1993, he was a boiler and pressure vessel operator responsible for maintenance.

His term will expire in 2008. ❖

Martin R. Toth

Former Chief Inspectors Chosen for Honorary Membership

The Board of Trustees recently named two retired chief inspectors as National Board honorary members. Honorary membership is bestowed for dedicated service to the industry and to the National Board. A candidate must have served either as a member of the National Board or the Advisory Committee for at least six years.

Richard B. Barkdoll

Richard B. Barkdoll is a former chief boiler inspector for the State of Washington. He served in this role for the Department of Labor and Industries for more than 11 years. He joined the state in 1982, becoming chief in 1989. Mr. Barkdoll was elected to National Board membership in 1991.

In 1993, he was elected to the Board as second vice chairman and served a three-year term.

Prior to joining the State of Washington, Mr. Barkdoll was employed by Hartford Steam Boiler. He started his career in the industry as a boilermaker.

A veteran of the Coast Guard, he holds National Board Commission No. 9335.

Albert J. Justin

Albert J. Justin was the fifth executive director of the National Board, and a former chief boiler inspector for the State of Minnesota. Mr. Justin served as executive director from 1993 through 2001.

He joined the Minnesota Division of Code Enforcement in 1984 as assistant chief inspector and was promoted to chief inspector in 1986, retiring in 1993. He was elected to National Board membership in 1986.

Mr. Justin served as chairman of the Board from 1989 through 1991.

Prior to joining the state, Mr. Justin was employed for 30 years by Continental Insurance Company as an inspector and manager.

A veteran of the US Navy, he holds National Board Commission No. 3572. ❖

Retired Ohio Chief Richard Jagger Memorialized

The National Board regrets to announce the March 19 passing of former Ohio Chief Boiler Inspector and National Board staff member Richard E. Jagger. He was 79 years of age.


Richard E. Jagger

Mr. Jagger was the father of current Ohio Chief Boiler Inspector Dean Jagger.

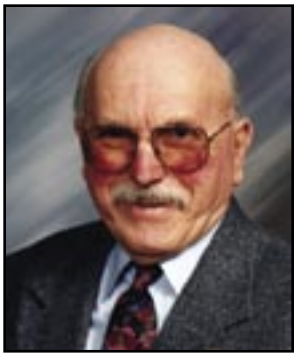
Awarded the National Board Safety Medal in 1995, Mr. Jagger served as Ohio chief inspector and National Board member for six years before joining the National Board in 1981 as assistant to the director of inspections. He later became director of inspections before leaving the National Board in 1986 to pursue consulting interests. In this capacity, he served as a consultant to NASA, ASME, and Indiana Vocational Technical College.

Prior to joining the State of Ohio, Mr. Jagger was employed by Hartford Steam Boiler Inspection and Insurance Company as assistant to the chief engineer.

Mr. Jagger is survived by his wife, Betty Jo; daughter, Judy; two sons, Jim and Dean; nine grandchildren; and one great-granddaughter. ❖

National Board Mourns Death of Bill Axtman

Former ABMA Executive Director William H. (Bill) Axtman passed away March 31 at his home in Culpeper, Virginia. He was 81 years of age.


William H. Axtman

Mr. Axtman taught the CSD-1 course in the Training Center's "B" school and the Manufacturers and Repair Organizations seminar. He was also a contributing writer for the *BULLETIN*.

A World War II Navy veteran from the Pacific Campaign, USS *Oglethorpe*, Mr. Axtman was a retired USNR Commander. He was also a retired executive director of ABMA.

Preceded in death by his wife, Gwendolyn, he is survived by his daughters, Marian Vollans, Kathleen Richman, Virginia Adams, and Madelyn Chappell; his son, Wendell Axtman; and 11 grandchildren. ❖

Len Staskelunas Remembered for National Board Service

Former National Board Advisory Committee member Len A. Staskelunas passed away June 1. A resident of Acworth, Georgia, he was 76 years old.


Len A. Staskelunas

Mr. Staskelunas represented pressure vessel manufacturers on the Advisory Committee from 1976 to 1992.

A founding member of the Pressure Vessel Manufacturers Association, Mr. Staskelunas was president and owner of the former Buckeye Boiler Company of Dayton.

He was the first president of PVMA, and PVMA's first representative to the National Board Advisory Committee. Mr. Staskelunas was instrumental in getting PVMA incorporated in January of 1975.

Mr. Staskelunas is survived by his wife, Loreen; a son, Dave; and two daughters, Anne and Susie. ❖

Call for 2006 Safety Medal Nominees

The National Board of Boiler and Pressure Vessel Inspectors is seeking nominations for the 2006 Safety Medal Award. This award, the highest honor bestowed by the National Board, will be presented at the 75th General Meeting in Phoenix, Arizona.

To be considered for the Safety Medal Award, letters of recommendation must be submitted by three individuals who are acquainted with the candidate and can attest to his or her safety contributions within the boiler and pressure vessel industry. At least two of the letters must be from National Board members.

Each letter of recommendation should include:

- The name, title, employer, and business address of the candidate.
- A listing of specific candidate contributions or achievements relative to the award.
- A brief biography of the candidate that includes positions held, National Board involvement, and participation in industry activities, including any honors and awards known to the individual making the nomination.
- The name, title, employer, and business address of the individual submitting the nomination.

Letters of recommendation must be received by December 31, 2005, and be addressed to the Executive Director, The National Board of Boiler and Pressure Vessel Inspectors, 1055 Crupper Avenue, Columbus, Ohio 43229. ❖

Gallup Named Safety Medal Winner

Duane R. Gallup, former chief inspector for the State of Illinois, has been posthumously awarded the 16th National Board Safety Medal. The National Board's highest commendation, the Safety Medal is awarded based on a nominee's extensive experience in the boiler and pressure vessel industry, as well as a demonstrated commitment to safety.


Duane R. Gallup

Mr. Gallup died January 15, 2003, at the age of 79.

Mr. Gallup served the National Board in several capacities, beginning in 1961 when he became a member of the National Board representing the State of Illinois. He held National Board Commission No. 3799, with "B," "N," and "S" endorsements.

He also served on the National Board Executive Committee, which later became the Board of Trustees, from 1973 to 1983. He held positions of both first vice chairman and second vice chairman before being elected chairman, a post he held from 1979 to 1981. He also served on the Executive Committee when the National Board's current headquarters were built, and was chairman in 1979 during the National Board's 50th anniversary.

During his tenure in the industry, Mr. Gallup was instrumental in the effort to pass legislation that included unfired pressure vessels in the Illinois Boiler Safety Act. He was responsible for the adoption of requirements for registration of boilers and pressure vessels with the National Board.

He served on various National Board committees and task groups, including the NBIC Committee, the ASME Conference Committee, and ASME Subcommittee Section IV.

Mr. Gallup retired from service in 1986 and was awarded National Board honorary membership in 1987. ❖

Mark Mooney

Assistant Chief of Inspections, Commonwealth of Massachusetts

Patience *is* a virtue. And those who disbelieve may want to speak with Mark Mooney.

Upon extended and thoughtful reflection, the Massachusetts Assistant Chief of Inspections is of the strong conviction that patience is responsible to a significant degree for his personal and professional success. That, and a solid Christian foundation.

"These attributes were instilled in me by my father," the Massachusetts National Board member is quick to reveal. "My mother passed away when I was 12, and it was my dad who raised me, my sister, and five brothers."

Growing up in Canton, a Boston suburb, Mark recounted an ordinary childhood with an extraordinary upbringing.

Memories revolve around his teenage years, mini bikes, and a passion for baseball and football. "As much as I loved football," he sighs, "I wasn't physically large enough in high school to excel at the game." But stature never affected his confidence or impeded his pursuit of opportunity.

"My father taught me the principles of life," Mark proudly discloses. "He was stern but always fair in how we were treated. And although he always kept me on my toes, he was also a great teacher — a good communicator. And someone who continually reinforced the importance of integrity." Retired corporate executive attorney John Mooney not only stressed higher learning, he made it a point to financially provide each of his children with an education beyond high school.

For Mark, that was attending Massachusetts Maritime Academy. "Although I had no real idea as to what I wanted to do professionally," he explains, "I always felt my faith would guide my career, and it has."

Mark's spiritual roots are the result of a religious childhood going back to before his mother's passing. "For as long as I can remember, I've always prayed for patience and divine guidance." In high school, those prayers included finding a wife shorter than himself who was "good with money."

It was during his sophomore year at the Academy that patience and prayer finally paid off. That's when he met Judy, his wife of 17 years, who was then a finance major at the University of Massachusetts at Dartmouth and a scant 3" shorter than her husband-to-be.

While sophomore year might have been memorable for the future Mr. and Mrs. Mooney, it was Mark's freshman year at the Academy that was pivotal to his career. Given a choice of engine or deck training, the Massachusetts official selected the former as a skill more conducive to his interests as well as a land-based career.

"I received a wide variety of exposure to different types of machines and equipment," Mark notes with an easy smile. "But the equipment that fascinated me the most was boilers."

He was graduated in the spring of 1986 with a 3rd Class Coast Guard Engineering License, qualifying him to work in a variety of professional capacities. For the next two years, he worked with his brother at their newly started heating company.

"After two great years, I decided to take advantage of a power plant opportunity," he continues. Just days before his wedding with Judy, the Massachusetts official eyed a newspaper ad for operations personnel at a new area power facility. "We got married on Saturday, I interviewed for the position on Monday, and we left for our honeymoon on Tuesday," he recalls with a grin.

Upon his return the following week, Mark discovered he had a new job and a new career. Employed by the plant from 1988 to 1996, the Canton native worked his way up from fireman to control room operator, to shift supervisor, to chief operator. But the transition came with its lessons.

"Early on, I had some problems with a supervisor who told me I would never be promoted within the plant," Mark explains. "While some might have taken those comments personally, I had a completely different reaction: maybe I *was* doing something — or perhaps *not* doing something — that frustrated this supervisor. Through better communication, a willingness to change, a lot of patience, and faith, I was able to alter his perception of me to the degree that I was finally promoted — several times."

In June of 1996, the plant was sold to a company that offered to retain Mark as the chief engineer. "Unfortunately, some things had changed that told me it would be best to explore new employment opportunities," he relates.

Again, Mark's faith was tested. "After prayerful consideration with my wife, I made the decision to leave the plant without a job. Within a day of that decision, the state called, out of the blue, with an employment opportunity. My faith told me to take the step, but I didn't know where my feet were going to land."

Mark joined the Commonwealth of Massachusetts in 1996 as a district engineering inspector. And while taking a substantial pay cut, "I was now working a five-day week and no longer on call." It is a decision he does not regret.

Six months after starting with the state, he advanced to his present position of assistant chief of inspections/chief boiler inspector. "I didn't have my National Board Commission when I was promoted," Mark explains, "and the insurance companies wanted to see Massachusetts return to the National Board. That wouldn't happen unless I had my National Board Commission." In October of 1997, Mark proclaimed at a public meeting with the insurance companies that he would have his commission by December. And he did. In February of 1998, Mark became a member of the National Board.

Mark is quick to give much of the credit for his success in the department to his staff and dedicated state inspectors. "If I can fulfill their needs to enable them to do their job better, it goes well for all. You reap what you sow."

In addition to overseeing boiler and pressure vessel inspections for Massachusetts, Mark is responsible for elevator inspections, inspection of amusement rides, as well as all state public safety licensing. Add to his responsibilities serving as both chairman of the Massachusetts Board of Boiler Rules and second vice chair for the National Board Board of Trustees, and the man with bountiful patience better be . . . well, patient. "There's so much to accomplish in so little time," he laments.

But that doesn't stop him from pursuing as hobbies his love of magic and woodworking. And spending time with Judy and their six-year-old twins Zechariah and Mikayla (both of whom have been known to try dad's patience on occasion).

"That," the state official beams from ear-to-ear, "is the most rewarding kind of patience."

Mark Mooney is a proud dad.

So is John Mooney. And rightfully so. ❖

Seeing Red

Meet Georgia's Eldest Boiler Inspector

To be told, most of us would admit to looking forward to retirement. Sure, there are some who love their jobs, but spending the day how you want is certainly appealing.

Mr. C.A. "Red" Rogers doesn't share that sentiment. He is an 81-year-old boiler inspector for the State of Georgia and retirement is not on his radar.

"I love working," he proclaims. "If I stopped getting out everyday, if I stopped working, I would surely lie down and die."

Mr. Rogers has been employed by the Georgia Department of Labor for more than 17 years. He holds one of the oldest active National Board commission numbers — 5537 — by becoming commissioned in early 1964. As a safety inspector, he is in charge of looking after boilers, amusement rides, and elevators. His territory spans 10 counties in and around Columbus, where he is a resident. A one-man crew, Mr. Rogers puts in nearly 50 hours of work a week.

Paul J. Welch, senior supervisor with the Department of Labor and Mr. Rogers' boss, had this to say: "Red is one of the most respected and liked inspectors we have. He has a vast amount of knowledge that everyone draws from. He will go out of his way to help anyone, always asking for more work or asking if anyone needs help in their territory. He has never slowed down and he can keep up with the best of them."

He is known to most of those people as "Red." With a hearty laugh, this 1941 high school graduate explains the nickname came from the red locks he had as a younger man — that have since faded to white. He is an engaging gentleman with a soft southern drawl and a playful disposition.

Mr. Rogers' wife Shirley understands and accepts his will to continue working. The two met on a blind date and have been married for 22 years. She is content to kiss him goodbye every morning on his way out the door, knowing he is doing what he loves.

For the foreseeable future, his position with the state will be filled for as long as he can manage. The Georgia native has retired three times before — once after 20 years with the Navy, and twice after a total of 23 years with Commercial Union Insurance, serving as inspection specialist and manager — but it didn't suit him, so he joined the workforce one more time. As he explains it, a man can't fish *every* day.

The secret to Mr. Rogers' successful career, fit physical health, and mental happiness seems to be simply that he takes care of himself. He is of the firm belief that staying active keeps one young. For him, staying active entails being a quality safety inspector.

"The best thing about my job is the people I work with and the people I meet every day. I love helping people. During an inspection, I try to get the person to understand I am there to help, not just to poke around the equipment. On a good day, I can con them into making the recommended improvements and leave 'em with a smile on their face."

Lessons learned from not spending all of his time fishing. ❖

Donna Radcliff

Registration Processing Coordinator

It is hard to come up with one word to describe Donna Radcliff. There are just too many to choose from: Bookseller. Ballerina. Mother of four sons. Genealogist. Historian. Animal lover. Long-time National Board employee. Princess Pixie Royale.

Say what?

Ok, so that last one is self-anointed. It is her official "Red Hat Society" name. For the uninitiated, the Red Hat Society is a growing international group of women over the age of 50 who gather regularly in small chapters to share the experiences of life. Members wear red hats and purple dresses to their social gatherings. Their philosophy is that even grown-up girls need to play dress-up and go to tea parties with their friends.

As the many descriptions reveal, Donna is a busy person. Employed by the National Board since April 15, 1985, she has nearly always maintained a second job — mostly because she likes staying busy.

"I have driven a forklift, I have been a fish monger, I have sold fine jewelry, I have even delivered phone books," she says with a laugh.

It is easy to figure out why this Columbus native is crazy about her current second job — the books. An avid reader, Donna is a bookseller for Barnes & Noble. Working two evenings a week and Sundays — the other days of the week are filled with hobbies — Donna enjoys meeting new people and staying busy with the thousands of books that fill the store.

Monday through Friday, Donna works as a registration processing coordinator with the National Board. She is generally the first person a manufacturer encounters when calling with an Electronic Data Report registration question.

She started with the company as a receptionist, but admits that it was her willingness to learn — rather than her skill set — that gained her a permanent spot on staff. She credits former Executive Director Sam Harrison and current controller Marsha Harvey for giving her the opportunity to stick around. Late in 1988 she was asked to help out with data reports, and in 1994 she was promoted to her current position.

When her key hits the ignition following her workday, you can bet Donna is headed some place other than home. Twice a week she makes her way to her adult beginner ballet class, offered by BalletMet, Columbus's professional ballet company.

"I never had the opportunity to take dance lessons when I was a little girl. Ballet had always interested me. So when I turned 50, I thought, why not?" she says with a smile.

The other evenings are spent researching her family tree (she has traced her roots back to 1740), studying history (she wants to get a history degree when she retires, focusing on the pre- to post-Civil War era), visiting with her sons (which include twins), or matching wits with her two cats.

"It is important to me to learn something new every week," Donna proclaims. "I like to be able to say I did something. If you keep learning, you stay healthy. Old age can't catch you if you keep moving!" ❖

"Do You Know . . .?" is a BULLETIN *feature introducing readers to the dedicated men and women who comprise the National Board staff.*

From Concept to Classroom

BY RICHARD MCGUIRE, MANAGER OF TRAINING

Training programs don't just happen. Much time and effort goes into developing a quality program. The National Board likes to think we do it as well or better than others in the boiler and pressure vessel industry.

In order for students to get the most from their education dollars, they should expect to receive the best quality education available. The National Board goes to great lengths to provide this.

The first step in developing a course is to determine or develop the body-of-knowledge. This document defines what a person should know to have the proper qualifications to perform a specific task. The more thought given to the body-of-knowledge, the more complete the training program can be. Brochures or Web site advertisements that state what topics will be covered are like an abbreviated body-of-knowledge. National Board members and technical staff possess a wealth of experience and the Training Department calls upon that experience to help provide the bodies-of-knowledge for our training program.

Another method used to develop or improve training programs is obtaining critiques from attendees. These critiques allow students to have input into future courses and to suggest changes to existing ones. Critiques are used as feedback about the quality of current presentations and for ideas for future courses. This allows the National Board to offer students the latest industry thinking.

Classroom presentations are well planned and laid out in advance of the class. This provides the student the most efficient use of his or her time. The National Board continuously discusses with staff and students the best way to present material. In some cases, classroom lectures are the best way to present information. Lectures are used to impart knowledge of ASME and NBIC requirements.

Other lessons are better understood when demonstrations are made. This method is used in the "Repair of Pressure Relief Valves" seminar to effectively "show" how a relief valve should be disassembled, inspected, and repaired.

Because of the practical applications of some lessons, it is necessary to take field trips to locations where the equipment can be seen and touched. In the "Introduction to Boiler Inspection" course, students are taken to a local power house where they inspect one of the boilers. This method allows students not only to visualize things, but to physically apply the things they have learned in the classroom.

The value the instructor adds to a lesson cannot be overstated. The instructor's knowledge of the topic being presented and the presentation style used for delivery are paramount to a successful learning experience. The National Board not only strives to use instructors who are experts on the topics being taught, but who have experience teaching. Instructors must be animated, enthusiastic, knowledgeable, and good listeners. One of the most important questions on the critiques is "Did the instructor hold your attention?" If an instructor does not create interest for the student, little knowledge will be gained. Instructors are tutored in methods that gain and keep the students' interest. Group discussion is one way of doing this — small class sizes allow this to happen.

The National Board strives daily to improve courses in every way possible. We develop bodies-of-knowledge, we create interesting, quality course materials, we use the latest in delivery system technology, and we have the best instructors in the business.

To get the most for an education budget, check our Web site at *nationalboard.org* for current offerings. The site also has a description of courses and information on the Training and Conference Center. Visitors can register for classes as well. ❖

ENDORSEMENT COURSES

(A) **Authorized Inspector Course** — TUITION: $2,500
December 5–16

(B) **Authorized Inspector Supervisor Course** — TUITION: $1,250
February 6–10

Only time offered in 2005!
(NS) **Nuclear Supervisor Course** — TUITION: $1,250
November 28–December 2

CONTINUING EDUCATIONAL OPPORTUNITIES

(1-Day) **ASME Section I** — TUITION: $350
November 14 December 12

ASME Section VIII — TUITION: $350
November 15 December 14

ASME Section IX — TUITION: $350
November 16 December 13

How to Complete a Data Report and *National Board Inspection Code* Highlights — TUITION: $350
November 17 December 15

(CWI) **Certified Welding Inspector Review Seminar** —
TUITION: $1,250 (complete seminar with D1.1 Code)
$1,210 (complete seminar with API-1104 Code)
$405 Structural Welding (D1.1) Code Clinic ONLY
$365 API-1104 Clinic ONLY
$480 Welding Inspection Technology (WIT) ONLY
$365 Visual Inspection Workshop (VIW) ONLY
December 5–9 (Exam: December10)

(ISI) **Inservice Inspection Seminar** — TUITION: $1,250
January 9–13

(PEC) **Pre-Commission Examination Course** —
TUITION: $2,500 Full two-week course
$660 Self-Study (week 1) portion*
* self-study materials sent upon payment.
$1,190 Week 2 of course
November 7–18 February 13–24

(R) **Boiler and Pressure Vessel Repair Seminar** — TUITION: $400
January 18–19 (Texas) February 27–28

(VR) **Repair of Pressure Relief Valves Seminar** — TUITION: $1,250
December 5–9 February 6–10 (Texas)

(WPS) **Welding Procedure Workshop** — TUITION: $670
December 14–16

REGISTRATION FORM

Please circle the seminar/course(s) and date(s) you wish to attend. Please print.

☐ Mr. ☐ Ms. ☐ Mrs.

Name _____

Title _____

Company _____

Address _____

City _____

State/Zip _____

Telephone _____

Fax _____

Email _____

NB Commission No. _____

PAYMENT INFORMATION (CHECK ONE):

☐ Check/Money Order Enclosed
☐ P.O. # _____
☐ Payment by Wire Transfer
☐ VISA ☐ MasterCard ☐ American Express

Cardholder _____
Card # _____
Expiration Date _____

HOTEL RESERVATIONS

A list of hotels will be sent with each National Board registration confirmation.

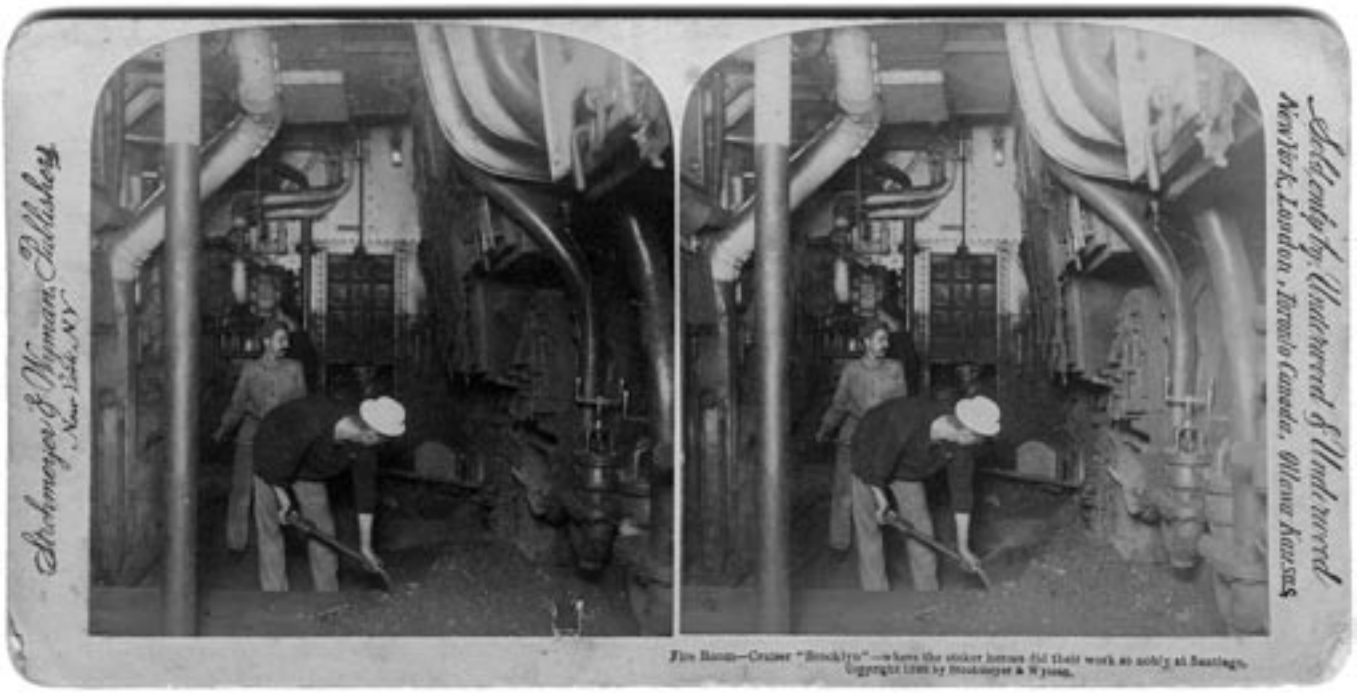
All seminars and courses are held at the National Board Training and Conference Center in Columbus, Ohio, unless otherwise noted, and are subject to cancellation.

For additional information regarding seminars and courses, contact the National Board Training Department at 1055 Crupper Avenue, Columbus, Ohio 43229-1183, 614.888.8320, ext. 300, or visit the National Board Web site at *nationalboard.org*.

Brooklyn's Voyage

If a picture is worth a thousand words, then how many words are two pictures worth?

The stereograph, a popular type of photography from the mid- to late-nineteenth century, created the impression of a three-dimensional figure when viewed through a stereoscope, a device designed just for viewing these types of photographs. The stereograph consisted of two almost identical pictures taken by two lenses separated by only a few inches. According to experts at the time, these photographs were the next "big thing," and there was even talk of building special libraries in which to house them.



This stereograph from 1898 shows the inside of the boiler room aboard the nineteenth century cruiser USS *Brooklyn*. Commissioned by Congress July 19, 1892, the *Brooklyn*'s first major undertaking was to transport US representatives to the Diamond Jubilee celebration, which honored Queen Victoria's reign in Great Britain.

The USS *Brooklyn* was best known as the armored flagship of the "Flying Squadron," which was part of Rear Admiral William Sampson's North Atlantic Fleet. In March of 1898 during the Spanish-American War, the Flying Squadron (led by Commodore Schley) was largely responsible for a blockade of the port at Cienfuegos, Cuba. From there, she and her crew continued to Santiago, Cuba, defeating the Spanish fleet and thus thwarting Spain's efforts. *Brooklyn*'s work in the Battle of Santiago helped bring about the loss of the Spanish fleet in the Caribbean, allowing for a US victory in the war.

After the war ended, the *Brooklyn* participated in the victory celebration as well as the Dewey Celebration, endorsed by future president Theodore Roosevelt to commemorate Admiral George Dewey for his leadership during the Spanish-American war.

Over the next 20 years, she served in various capacities, one of which was as flagship for the "Asiatic Squadron" in 1900. This squadron was the United States' Pacific fleet, allowing the US to maintain a naval presence and protect American interests off the coast of Asia. Additionally, the USS *Brooklyn* was a receiving ship at the Boston Naval Yard and served various diplomatic functions until she was placed out of commission in March 1921.

Have any information about this picture? We would like to know more! Email getinfo@nationalboard.org. ❖