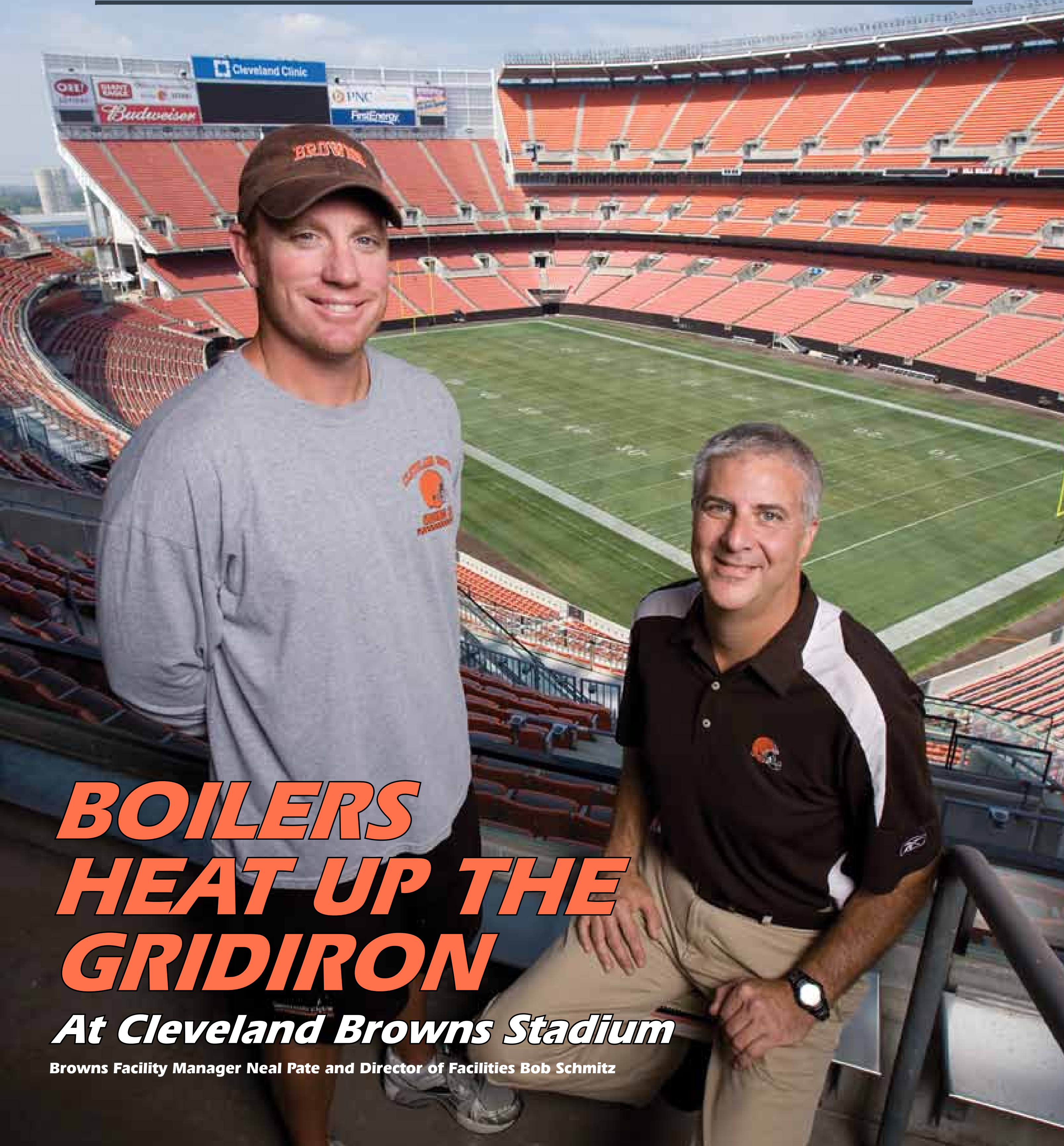
Technical Journal of The National Board of Boiler and Pressure Vessel Inspectors FALL 2010

NATIONAL BOARD BULLETIN



BOILERS HEAT UP THE GRIDIRON

At Cleveland Browns Stadium

Browns Facility Manager Neal Pate and Director of Facilities Bob Schmitz

NO OTHER MARK SAYS MORE ABOUT YOUR COMPANY

Owners, users, insurers, and regulatory authorities trust the integrity of the National Board R Certificate Program. The mark of the National Board R Certificate Program stamped on pressure-retaining items signifies strict repair and/or alteration requirements have been met and verified by a National Board Commissioned Inspector.

Knowledgeable owners and users demand it – even when not required – because of its established safety record. There is no better way to promote the quality of your company's work than by proudly displaying this trusted and enduring mark.

THE MOST-RECOGNIZED EMBLEM OF INTERNATIONAL QUALITY AND SAFETY FOR PRESSURE EQUIPMENT POST-CONSTRUCTION REPAIRS & ALTERATIONS

BULLETIN

FALL 2010 • VOLUME 66 • 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 ensuring acceptance and interchangeability among jurisdictional authorities empowered to ensure 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, *www.nationalboard.org*. Postage paid at Columbus, Ohio.

On the Cover: *Neal Pate and Bob Schmitz break down Cleveland Stadium's turf system*

Read more on Page 18. BULLETIN photograph by Greg Sailor

Cover Story

Features

Departments

What Cost Inspections?

BY DAVID A. DOUIN, EXECUTIVE DIRECTOR

In a previous Executive Director's Message, I noted the struggle many jurisdictions are enduring to maintain services to their constituents in the current era of tight budgets.

Government cutbacks are not surgical. Often they are applied across the board with precious little regard to the public trust. But what is lost in this approach to decision-making – particularly when it involves safety – is the ability to maintain a reasonable level of oversight. It is for this reason I advocate sparing pressure equipment programs from the budget ax.

Since we're talking dollars and cents, it is only logical to question *cost*. It may be more pragmatic, however, to examine the *value* of a jurisdiction's pressure equipment safety program.

Since the National Board began officially collecting data in 1999 for inservice inspections, over 6.3 million pressure equipment inspections have been performed in North America. Of that total, there were more than 556,000 code violations noted. In some cases, these code violations represented potentially dangerous situations which – if not corrected – could have resulted in accidents involving death or serious injury. Fortunately in most cases, violations are addressed and risk is neutralized.

But here is the alarming part of the violations-to-inspection ratio: almost *one out of every 10* pieces of equipment inspected is found in violation of code.

Currently, we are in the midst of the startup season for boilers laid up last summer. During the next several weeks, thousands of boilers across the nation will be put back into service for the winter heating season. As is the case every fall, some of these units will experience some type of problem.

But imagine if there were no oversight and no inspections conducted. And the resulting cost.

Envision how much time would be needed to clean up debris from an accident. And resources: what would be needed in dollars and manpower? Following cleanup, how much would be required to replace both the damaged equipment and surrounding structure? How long would the company be down while repairs were being made? How much would the company lose financially while it was non-operational? How would such an incident impact the company with both its public and employees? Would worker and compensation costs increase? How much would be expended on litigation? And then there is the cost of financial settlements. What if an individual got hurt, or was killed? What is a life worth?

So, what is the value of an inspection program to businesses? To the general population? To government jurisdictions?

I have heard very few complaints from the business community. And I certainly haven't come across any criticism from the general public, especially since over 90 percent believe it is the government's responsibility to protect them.

That leaves the jurisdictions. What does it cost to administer an effective pressure equipment inspection program?

Nothing!

With rare exception, most jurisdiction inspection programs pay their own way through fees collected from equipment users. In some cases these programs even generate additional revenue deposited into the general fund. Name another government program that doesn't require an infusion of taxpayer dollars yet saves lives, limits injury, and protects against property damage.

While I respect government officials charged with the delicate process of determining financial priorities, those priorities must be predicated on *value*.

It may be prudent to know the price of *everything*. It is another to know the value of *nothing*.

2010 Registrations

National Board Certificate of Authorization to Register ensures a third-party inspection process, providing for uniform acceptance of pressure-retaining equipment by member jurisdictions. This important safety process is documented via submission of data reports by the manufacturer to the National Board. These are the only reports carrying the National Board registration 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 2010 reporting period was 45,713,776.

SIZE		FY 2010	FY 2009	FY 2008	FY 2007	FY 2006
BOILERS						
square feet of heating surface						
≤ 55	(A)	156,129	161,041	156,766	139,435	106,285
> 55 and ≤ 200	(B)	30,884	32,371	39,115	30,235	28,999
> 200 and ≤ 2000	(C)	8,032	9,084	10,680	10,050	9,225
> 2000 and ≤ 5000	(D)	420	720	689	891	641
> 5000	(E)	650	766	1,021	916	738
TOTAL		**196,115**	**203,982**	**208,271**	**181,527**	**145,888**
PRESSURE VESSELS						
in square feet						
≤ 10	(A)	680,873	774,899	819,791	856,421	825,423
> 10 and ≤ 36	(B)	183,449	214,107	338,811	356,659	363,092
> 36 and ≤ 60	(C)	35,798	43,648	59,371	57,587	58,987
> 60 and ≤ 100	(D)	11,039	14,714	14,983	13,123	11,729
> 100	(E)	13,783	18,509	18,239	16,490	13,160
TOTAL		**924,942**	**1,065,877**	**1,251,195**	**1,300,280**	**1,272,391**
NUCLEAR VESSELS						
in square feet						
≤ 10	(A)	481	494	700	712	519
> 10 and ≤ 36	(B)	30	38	98	182	71
> 36 and ≤ 60	(C)	7	13	19	63	9
> 60 and ≤ 100	(D)	5	5	27	13	23
> 100	(E)	14	9	19	34	24
TOTAL		**537**	**559**	**863**	**1,004**	**646**
ATTACHMENTS*		90,117	86,961	103,336	89,815	76,707
GRAND TOTAL		1,211,711	1,357,379	1,563,665	1,572,626	1,495,632

*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

History of the National Board Headquarters and Facilities

1920s—The first National Board office is housed in the Comstock Building, Columbus, Ohio. Helen Smithhisler is hired as the first employee and later becomes Mrs. C.O. Myers. Helen serves the National Board for nearly 50 years and retires in 1971.

Courtesy of the Columbus Metropolitan Library

1920

April 1955—The National Board moves into its newly constructed building at 1155 N. High Street, Columbus, Ohio.

September 7, 1955—The building is dedicated.

1955

1915 1920 1930 1950

1919

September 1919—Four chief inspectors, Joseph F. Scott of New Jersey, John C. McCabe of Michigan, C.O. Myers of Ohio, and James Neil of Pennsylvania meet and draw up tentative plans to form an organization as proposed by Myers. Although no official name or constitution had been given the proposed organization, temporary headquarters are established at the office of C.E. Gorton, chairman of the Administrative Council, American Uniform Boiler Laws Society, 95 Liberty Street, New York, New York.

December 1919—At a meeting on December 2, it is agreed the name of the organization will be "The National Board of Boiler and Pressure Vessel Inspectors."

1930

1930—Due to the need for additional space, the National Board office facilities are moved to the Brunson Building, 145 N. High Street, Columbus, Ohio.

Courtesy of the Columbus Metropolitan Library

1950

1950s—The volume of data report registrations increase and C.O. Myers recognizes need for expansion. He receives approval of membership to build the National Board headquarters.

The year 2010 marks the 35th anniversary of the National Board's headquarters building. Since establishing the main offices in 1975, a second story and three additional buildings have been built. National Board celebrates the milestone and looks back at the humble beginnings that paved the way "home."

April 1973—Office facilities on N. High Street become inadequate due to rapid increases in National Board activities from 1955 through the early 1970s. S.F. Harrison, executive director, is authorized to purchase land and have a new, larger headquarters built. A site of 3.3 wooded acres is selected in north Columbus.

1973

1975—National Board staff moves into the 11,000-square-foot modern office building at 1055 Crupper Avenue. The building and its surroundings win "City Beautiful" and architectural awards presented by the City of Columbus and the American Institute of Architects.

1975

March 1991—A new National Board Pressure Relief Department and Testing Laboratory is opened on an acquired six-acre site located five-minutes from National Board headquarters.

1991

May 2010—The National Board headquarters building is celebrated as the primary location for 35 years of service to safety in the boiler and pressure vessel industry.

2010

1960 1970 1990 2010

1963

May 1963—On May 6, C.O. Myers, founder of the National Board, dies suddenly while attending the General Meeting in Baltimore. Myers served as the executive officer for more than forty years.

1978

1978—Construction begins on a second story to the existing building.

2007

August 2007—On August 28 the National Board breaks ground for an Inspection Training Center next to the Training and Conference Center.

1974

1974—Construction begins on a new building for the National Board headquarters and for a new testing laboratory.

1997

April 1997—On April 9 the National Board breaks ground for a new Training and Conference Center on a 2.5-acre site adjacent to the headquarters.

New Inservice Commission Testing Method

BY JAMES MCGIMPSEY, SENIOR STAFF ENGINEER

Following its January 2010 development of the Inservice and New Construction Commission, The National Board of Boiler and Pressure Vessel Inspectors introduced a new computer-based exam to supplement the traditional written exams administered by National Board Member Jurisdictions.

The new testing method is offered through Applied Measurement Professionals (AMP) at over 180 test center locations in the United States and Canada, with an additional 40 locations worldwide. Applicants for the Inservice Commission can access AMP's Web site at www.goAMP.com and review the Candidate Handbook provided to assist in the application process.

Focus of the Inservice Commission Examination reflects inservice situations related to installation, inspection, and inservice repairs and alterations of boilers and pressure vessels. The examination consists of 85 questions and is administered in one day in two (2) three-and-a-half (3 ½) hour sessions (not the 1 ½ days previously required).

National Board publication *Body of Knowledge National Board Inservice Inspector Commission Examination* (NB-331-I) serves as an outline providing the inspector candidate with 15 specific areas of knowledge to be included in the Inservice Commission examination. *Boiler Feedwater Guidelines* (NB-410) has also been developed to assist the inspector in recognizing normal and abnormal boiler feedwater conditions (included by reference in the *Body of Knowledge*).

Both NB-331-I and NB-410 can be accessed on the National Board Web site at www.nationalboard.org under the Commissioned Inspectors tab and then clicking Examination Information.

The Inservice Examination is administered by appointment only Monday through Friday between 9:00 a.m. and 1:30 p.m. Payment can be made by credit card (VISA, MasterCard, American Express or Discover), cashier's check, or money order made payable to AMP. Examination fees are non-refundable and non-transferable and expire one year from purchase.

Candidates using the new AMP testing method have given the process high ratings.

There are two ways to schedule the examination. Applicants can schedule online at www.goAMP.com. Click the "Candidates" box and follow the simple step-by-step, 1-2-3 instructions:

1. Select a category ("Other")
2. Select a program ("National Board of Boiler and Pressure Vessel Inspectors")
3. Select an examination ("National Board Inservice Commission Exam").

After completing these steps, applicants will have access to the Candidate Handbook, testing center locations, registration, and other pertinent information.

Applicants can also register by calling AMP at (888) 519-9901. This toll-free number is answered 7:00 a.m. to 9:00 p.m. (central time) Monday through Thursday, 7: 00 a.m. to 7:00 p.m. on Friday, and 8:30 a.m. to 5:00 p.m. on Saturday.

When scheduling an examination appointment, applicants should be prepared to confirm a location, preferred date and time for testing, and his or her unique identification number or Social Security Number. Applicants will be notified of their time to report to the Assessment Center during the registration process. Those providing an email address receive an email confirmation notice.

Appointments can be rescheduled only once, at no charge, by calling AMP at (888) 519-9901 at least two business days prior to the scheduled appointment. Additional rules concerning missed appointments and cancellations can be reviewed in the Candidate Handbook.

Applicants do not need computer experience or typing skills to take the examination. On the appointment day, applicants must report to the Assessment Center no later than the scheduled testing time. Those arriving more than 15 minutes after scheduled testing time will not be able to take the exam.

Upon arrival, applicants should look for signs indicating AMP Assessment Center check-in. To gain admission to the center, applicants must present two forms of identification, one with a current photograph. Both forms of identification must be current and include name and signature. Name on the identification must match name used for registration. Applicants will also be required to sign a roster for verification of identity.

AMP administration and security standards are designed to ensure all candidates are provided the same opportunity to demonstrate their abilities. National Board and AMP comply with the Americans with Disabilities Act by providing reasonable accommodations for candidates with disabilities.

If special accommodations are requested, applicants must complete the Request for Special Examination Accommodations form (included in the Candidate Handbook) for submission to AMP at least 45 days prior to desired examination date.

AMP provides a process for inclement weather, power failure, and emergencies. An applicant may visit AMP's Web site at www.goAMP.com prior to the examination to determine if any Assessment Centers are closed.

After finishing the exam, candidates are asked to complete a short evaluation and report to the examination proctor for a final review of referenced materials. Results of the examination are reported to candidates by the National Board within 2-3 business days of the exam, either by telephone or email. A score of 70 percent or higher is required to pass in order to meet the requirements of *Rules for National Board Inservice and New Construction Commissioned Inspectors* (NB-263).

Passing the Inservice Commission Examination is but one step toward attaining a National Board Inservice Inspector Commission. Candidates must also meet certain education and experience criteria and be employed by a National Board recognized Jurisdiction, an accredited/accepted Authorized Inspection Agency, or an accredited Owner-User Inspection Organization.

Candidates using the new AMP testing method have given the process high ratings. Positive feedback includes prompt score reporting, choice of testing location, and testing within 2-3 days of registration.

NEW, National Board

> [It will be hard not to notice some obvious changes

Take, for instance, the new color scheme and graphics. What won't be hard is accessing the industry's most comprehensive and free online source of technical information on the Web. Come November, things will get a whole lot easier.

"Content on the new Web site will be the same," explains Jay Mayhorn, web programmer/analyst for National Board, "but it's been reformatted." In other words, this site is smarter. The information from the current site has been reorganized for optimal usage.

Consider the reconfigured menu bar and take a moment to use the advanced search feature. Click on a popular resource. "Visitors will have a smoother time navigating and finding what they need," says Brandon Sofsky, manager of publications for National Board. "All of the information was there; it was just a matter of stacking it differently to make it more accessible."

A Work in Progress

The National Board's Web site has evolved continuously since 1996 when it was officially launched at the

DYNAMIC Web Site Launched

when logging on to National Board's new Web site.]

65th General Meeting in Louisville, Kentucky. Original goal: provide visitors free access to the latest information on boiler and pressure vessel safety, which included technical documents, the latest in industry news, and member contact information. The Web site was ahead of its time in its simplicity and collection of materials offered. It quickly became a leading industry resource on the World Wide Web.

As Web site technology has progressed, more features such as video, animated graphics, and site navigation tools have been integrated into National Board's Web site to keep it up-to-date and easy for visitors to use. The current redesign is in step with both Web advancements and National Board's standing as a leading resource for people involved in the boiler and pressure vessel industry.

Professionals from all over the world utilize the site for information pertaining to boiler and pressure vessel rules and regulations, upcoming training courses, *National Board Inspection Code* data, and the latest industry news, just to name several of the features.

In 2006, more than 90 countries accessed the site. Currently, the National Board Web site regularly receives hits from 160 countries worldwide, including visitors from Asia, Europe and South America. On average, the site receives about 700-800 visitors a day, and in 2009, the site had approximately 196,000 hits. Pages with the most traffic include the Members tab and Manufacturer and Repair Directory.

"Users will not need to click through several links to get information they seek. Multiple pages of information and resources will be consolidated onto a single page, making content easier to find," says Sofsky.

Take the *National Board Inspection Code* section for example. Currently, boxes of links are presented on both the left and right sides of the page. Future links will be listed on the left – a seemingly subtle change, but one that makes viewing and accessing information effortless. Print and email options are also more visible and positioned on the top left side of the page. This new formatting is standard on all pages throughout the site. The result? An organized, clean look for easier navigation.

Flash, Ticker, and Snippets

A more noticeable change is the site's animation – a feature National Board will continue to develop. "We've set up the new design for future use of multimedia," Sofsky says. Eventually the site will feature video clips of training and highlights from the General Meetings.

Really Simple Syndicate feeds (RSS feeds) will be available on the site in the near future. "RSS feeds, video and media clips, flash animation – these are all stepping stones to adding more modern features to the site," says Mayhorn.

"This is a media-oriented site now," Mayhorn continues. "For instance, the Industry News section is no longer static. It's dynamic and interactive. The eye is drawn to it." Current news stories are front and center on the home page and are accompanied with graphics.

The home page will have rows of menu bars to choose from. The main menu bar has been reformatted and expanded to include more options. The bottom row features a drop-down menu of subtopics. All of the buttons are larger and industry acronyms are expanded; many times acronyms can be cumbersome, especially to industry newcomers.

Beneath the double-stacked menu bar will be a scrolling ticker tape that features quick news bits, snippets of industry information, new training course dates, and other real-time announcements.

Archive Accessibility

The National Board Web site provides visitors free use of its comprehensive archive of boiler and pressure vessel information. With the redesign, the extensive archive is conveniently located on the menu to the left of Industry News.

By clicking the *BULLETIN* Archives button, users can instantly search and read entire copies of the National Board *BULLETIN* dating from 2002 to the most current issue. Click the Technical Articles button and over 70 technical articles (previously published in the *BULLETIN* and/or from proceedings of past General Meetings) are readily available.

The new left-side navigation bar also gives quick access to other pertinent information. The Report Forms button provides users with National Board report forms in PDF format for downloading. The Stamps & Marks button contains descriptions of scope, requirements, and estimated cost of the three accreditation programs and one authorization program the National Board offers for stamps and marks. Finally, the Online Ordering button directs guests to a section of the Web site where all National Board hard-copy publications, DVDs, forms, and data reports are available to purchase.

Training, Resources, and Members

Across the bottom of the revised home page are three more separate sections of information. The first section, Featured Training Courses, provides instant access to information about the National Board's training courses. Immediately visible are upcoming classes. Click on any class to view the training calendar where course descriptions, tuition, and registration are quickly accessed.

The middle section, Resources, is where the Manufacturer & Repair Directory is located, along with other industry documents, such as *NB-18 (Redbook); NB-136, Replacement of Stamped Data Form; NB-370, National Board Synopsis;* and *NB-57, National Board Guide for ASME*. All documents are offered for free.

The third section, Members Corner, is a new addition. Here, visitors can access a variety of essential information on each member including contact data and a direct link to the jurisdiction Web site. A photo of each member is featured along with an email address link.

More Details

Other highlights on the upcoming home page include a graphic panel on the right featuring seasonal announcements, reminders, and other information. This space is also designated for video clips that can handle a wide range of formats, including Flash and You Tube.

National Board members will now have quick access to their login because the Members Only button is located on the menu bar. When a member is not logged on to the site, the button is turned "off," indicated by grey lettering. Logging on turns "on" the Members Only button, making the area accessible.

Throughout the entire Web site the Search box is visible and has improved searching capabilities, including "predictive typing" for more accurate results. PDF "fillable forms" – which allow users to fill out a form electronically and then print it – are now offered.

"We also rebuilt the site administration page, so not only is the new Web site easier for guests to navigate, it's also simpler for our staff to implement changes and add or remove content," says Sofsky. The security of the site remains intact. "We've audited the security of the site to ensure continued, optimal protection," says Mayhorn. Visitors can register for classes and order materials on the Web site with confidence.

Continued Leadership

Through its on-line collection of free materials and resources, the National Board continues to provide its members, industry professionals, and the general public with information pertaining to the boiler and pressure vessel industry. National Board's newly designed Web site remains a tool of the trade that visitors have relied upon for nearly 15 years.

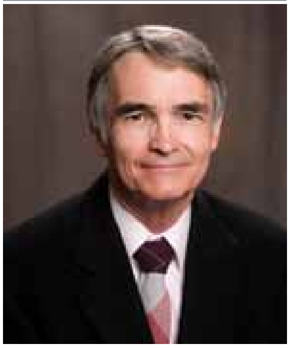
nationalboard.org

Call for Articles

The National Board of Boiler and Pressure Vessel Inspectors announces a call for articles to appear in future issues of the *National Board BULLETIN*. The articles should be 500 to 1,000 words and address issues relative to the safe operation, maintenance, construction, repair, and inspection of boilers and pressure vessels. Additional topics may include safety valves as well as other unit components, testing codes and standards, risks and reliability, and training. Presentations of a commercial or promotional nature will not be accepted.

Those interested in submitting articles for consideration should send an abstract of no more than 200 words in English to:

The National Board of Boiler and Pressure Vessel Inspectors
Wendy Witherow,
Publications Editor
1055 Crupper Avenue
Columbus, Ohio 43229.
Abstracts may also be emailed to wwitherow@nationalboard.org.



Pressure Vessel Fatigue

BY FRANCIS BROWN, SENIOR STAFF ENGINEER

FEATURE

Section VIII, Division 2 of the *ASME Boiler and Pressure Vessel Code* (ASME 2010) defines fatigue as "… conditions leading to fracture under repeated or fluctuating stresses having a maximum value less than the tensile strength of the material."[1] Fatigue damage in a metal is a progressive, localized, permanent structural change. This article takes a more detailed look at metal fatigue including testing for fatigue, conditions affecting fatigue life of a pressure vessel, and examining vessels for signs of fatigue.

According to Harvey,[2] the important factor is number of stress repetitions, not time in service. Fatigue in metals is a progression beginning with submicroscopic changes in grain structure of the metal, and consists of three main stages: crack initiation, crack propagation, and rupture. Once initiation of a crack occurs, the crack grows a finite amount with each stress cycle until the remaining cross-sectional area is so small rupture occurs. Straightening the wire in a paper clip and bending the wire back and forth about a point until failure is a common example of fatigue.

Before fatigue life of a pressure vessel can be determined, fatigue life of the material(s) of which it is constructed (number of cycles at a given stress level) must be known. Fatigue life of a material is determined by testing many identical samples to failure. Test samples are highly polished round bars as identical to each other as manufacturing can make them (see Fig. 1). A test bar is rotated with load applied so a fiber at the surface of the bar is in tension and then in compression as the bar rotates such that there is a full reversal of stress as shown (see Fig. 2).

FIGURE 1 Test Bar

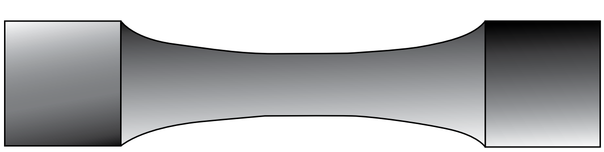
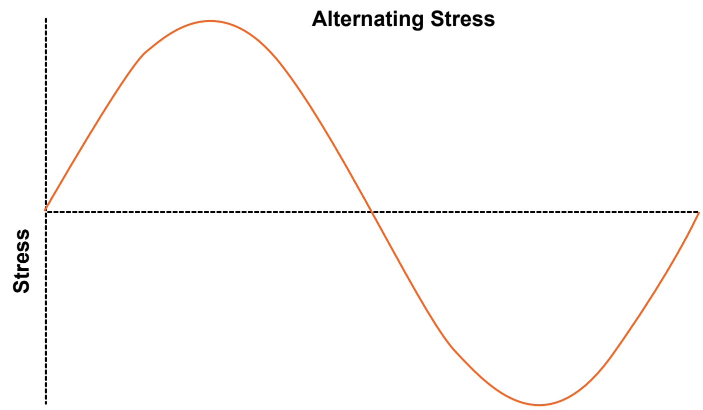
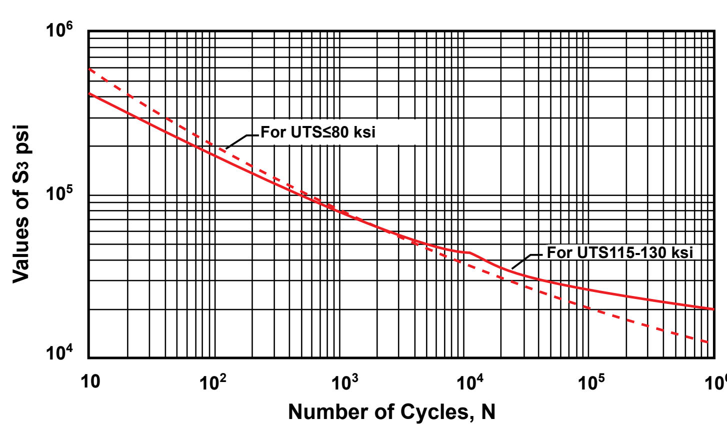


FIGURE 2 Stress Reversal



First bars are tested at high stress so failure occurs relatively quickly. Succeeding bars are tested at lower and lower stress until the number of cycles reach 10 million. Most pressure vessel steels are considered to have infinite life at the stress level at which the number of cycles reach 10 million. It should be noted there is considerable scatter in data, with scatter increasing as the number of cycles to failure increases. Stress vs. number of cycles curve (S-N curve) is generated from test data (see Fig. 3). It is common practice to reduce stress by a factor of 2 or number of cycles by a factor of 20, whichever is more conservative when generating the S-N curves for design purposes. Reduction factors used for S-N curves cover scatter in the data, environmental effects, and size effects.

FIGURE 3 S-N Curve*[3]



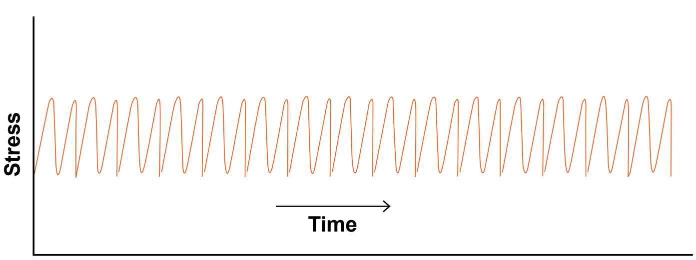
A number of conditions affect fatigue life of a pressure vessel. Some conditions listed below have a greater effect on fatigue life than others, but all affect fatigue life of vessels in some manner.

- Cyclic stress state: number of stress cycles and the stress range
- Geometry: sharp corners, small radii, and small fillets decrease fatigue life of a vessel component
- Surface quality: polished surfaces increase fatigue life compared to non-polished surfaces
- Weld quality: any defect in a weld decreases fatigue life. Weld surfaces are machined to increase fatigue life of a part
- Material type: some materials are more fatigue-tolerant than others
- Residual stresses: stresses resulting from the manufacturing processes such as forming, welding, etc., decrease fatigue life
- Size and distribution of internal defects: inclusions such as sulfides in steel decrease fatigue life
- Grain size: fine-grain steels are more fatigue-tolerant than coarse-grain steels
- Environment: a corrosive environment decreases fatigue life
- Temperature: extreme high and low temperatures decrease fatigue life

Review of the preceding list indicates any design feature or fabrication process that increases stresses, either globally or locally, in a pressure vessel may decrease the fatigue life of the vessel. Vessel design begins with selection of a fatigue-tolerant material, if possible. Features that minimize stresses in the vessel are incorporated into the design. Sharp corners are eliminated, large radii are used in place of small radii, and transitions from one geometric shape to another are made as gradual as possible. If stresses are low enough, vessel life can be considered infinite. Vessel design is considered preliminary until completion of fatigue analysis.

Assume a simple case of a single fluctuating load on a pressure vessel with an equivalent stress of 250,000 psi for 30 cycles (see Fig. 4). From the S-N curve (Fig. 3), the number of cycles before failure at that stress level is 40 cycles, which exceeds the specified number of cycles, indicating the design is acceptable for the specified fatigue service.

FIGURE 4 Stress Cycles

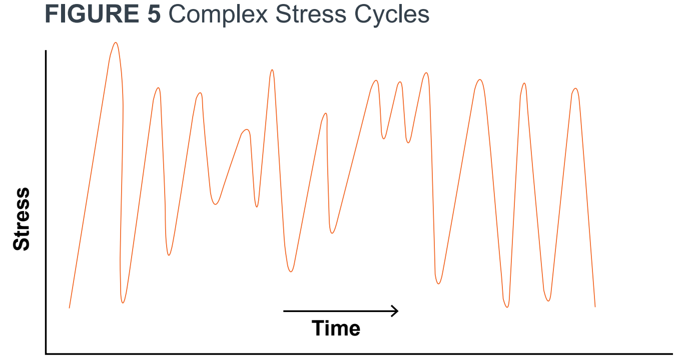


In reality, pressure vessels are subjected to varying pressures, temperatures, and external loads. The user of a pressure vessel specifies all operating conditions and cyclic events to be considered in design of the vessel. A load histogram is prepared from information contained in the user's design specifications.

From the load histogram, total equivalent stress amplitude at a location is calculated. Total equivalent stress amplitude is defined as one-half of the total equivalent stress range per Section VIII, Division 2. The equivalent stress range is the sum of the average stress across the solid section, bending stress in the solid section, stress at a structural discontinuity, thermal expansion stress, and stress from notches. Equivalent stress is calculated for each set of loads defined on the load histogram. Number of cycles specified for each equivalent stress is compared to number of cycles shown on the S-N curve for that stress. If the number of permissible cycles from the S-N curve is greater than the number of specified cycles, the vessel design is acceptable.

The stress induced in a pressure vessel shell as pressure goes from atmospheric to operating pressure and back to ambient pressure is one stress cycle. Between increasing and decreasing pressure may be many pressure fluctuations (see Fig. 5). Stresses associated with pressure fluctuations and number of cycles must be determined. As complexity of loadings on the vessel increases, difficulty of counting stress cycles increases and becomes increasingly onerous. Rainflow counting algorithm, or other methods complying with ASTM E1049, *Standard Practices for Cycle Counting in Fatigue Analysis*, is used to count stress cycles and combine partial cycles into complete cycles.

FIGURE 5 Complex Stress Cycles



There are multiple stress cycles with different stress magnitudes and associated number of cycles. Fatigue damage from each stress cycle is cumulative, and the effect of all stress cycles must be determined. Miner's rule is used to evaluate effects of all stress cycles on vessel fatigue life. Miner's rule:

$$\frac{n_1}{N_1}+\frac{n_2}{N_2}+\frac{n_3}{N_3}+\ldots\leq 1.0$$

Where n_1 is the number of specified cycles at stress level 1, n_2 is the number of specified cycles at stress level 2, and n_3 is the number of specified cycles at stress level 3, and so on. N_1 is the number of permitted cycles at stress level 1, N_2 is the number of permitted cycles at stress level 2, and N_3 is the number of permitted cycles at stress level 3, and so on. If the sum of the ratios is less than or equal to 1.0, vessel design is acceptable for that point in the vessel. This process must be repeated at other points in the vessel where there are high stresses. Vessel design is acceptable when all points in the vessel satisfy Miner's rule.

Actual life of a pressure vessel may or may not exceed the predicted life. If vessel operating loads are less than loads used in fatigue analysis it is probable vessel life will exceed loads used to predict vessel life. Conversely, if operating loads exceed predicted life it is probable the actual life will be less than the predicted life. An actual end of life date cannot be defined with a high degree of certainty.

Pressure vessels should be visually examined on a regular basis throughout their lives for impact marks, scrapes, corrosion, erosion, wear, cracks; anything that changes internal and/or external surfaces of vessels. Each finding should be evaluated for its effect on fatigue life of the vessel. For example, pitting corrosion can greatly increase local stresses and dramatically decrease fatigue life of the vessel. It is good practice to thoroughly examine by visual and appropriate Non-Destructive Examination (NDE) methods the interior and exterior surfaces of the vessel when it has reached 50% of its predicted life. Results of this half-life examination are used to determine if the vessel is in condition for operation to predicted end of life, or to revise predicted end of life.

As the vessel approaches predicted end of life, visual examination should be supplemented by other NDE methods in search of cracks in highly stressed areas of the vessel. The effect of any crack on fatigue life should be evaluated immediately as failure may be imminent. Failure may be a slow leak or may be catastrophic.

Regular examinations of vessels should be part of a plan to either replace the vessel at end of life, or to extend its life past its calculated fatigue life. A complete detailed history of the vessel is required to extend vessel life. History should include actual pressures and temperatures, inspection reports, etc. Actual operating loads may not have been of the magnitude used for fatigue analysis. It may be possible to extend vessel life when fatigue analysis is based on actual operating loads.

Obviously, not all parts of a pressure vessel are equally stressed. The most highly stressed areas occur at changes in geometry: nozzles, transitions in diameter, etc. Cracks can be repaired and cracked components replaced. Fatigue analysis of the repair or replaced component is required to ensure vessel life is extended past the original design life. Another alternative is to perform a fitness for service analysis per API[4] 579-1/ASME FSS-1. Fitness for service analysis provides an estimate of number of cycles to failure.

Of course, cost of replacing a vessel versus cost of examination, repairs, and analysis required to extend vessel life is always a consideration. But the planning and record keeping required to have the option to extend vessel life past its predicted life begins with purchase of the vessel.

References:

(1) *ASME VIII, Division 2 Alternative Rules, Rules For Construction of Pressure Vessels New York: ASME, 2010.*

(2) *Harvey, John F. Theory and Design of Modern Pressure Vessels. New York: Van Norstrand Reinhold Company, 1974.*

(3) **Modified version of ASME. VIII, Division 2 Alternative Rules, Rules For Construction of Pressure Vessels. New York: ASME, 2004 edition with the 2006 addendum.*

(4) *American Petroleum Institute*

ONE NIGHT ONLY

LORRIE MORGAN

MAY 11, 2011

GENERAL MEETING WEDNESDAY BANQUET

Not Just the "Test Lab"

BY JOSEPH F. BALL, P.E., DIRECTOR, PRESSURE RELIEF DEPARTMENT

The National Board Pressure Relief Department and Testing Laboratory is located off-site from National Board headquarters. Most phone calls we receive almost always ask for the "test lab." The Pressure Relief Department houses the test laboratory, but the lab works in support of National Board programs administered by the Pressure Relief Department.

These programs, created for the purpose of public safety related to overpressure protection, drive our activities and are justification for the investment National Board has made in the test laboratory. The purpose of this article is to describe pressure relief activities National Board is involved in and how the laboratory supports those initiatives.

Capacity Certification Program

The National Board is the ASME-designated organization responsible for capacity certification of pressure relief devices using technical requirements included in the *ASME Boiler and Pressure Vessel Code*. This product certification program was developed to ensure pressure relief devices are independently tested to demonstrate they will operate as intended by the Code and will achieve a reliable capacity protection of the equipment on which the device will be installed.

Products being tested include pressure relief valves for power boilers, heating boilers, hot water heaters, nuclear equipment, and pressure vessels. Power-operated pressure relief valves used for power boiler and nuclear applications are also tested, as are non-reclosing devices such as rupture disks, breaking bar valves, and buckling pin valves used for the protection of process vessels and piping.

We obviously cannot test every device made, so the program relies on inspections of the manufacturer's quality assurance system to ensure all items being built can be represented by samples actually tested. As part of the program, new designs are reviewed against Code requirements. A National Board representative conducts an audit of the quality program and witnesses manufacturing of the test samples to verify they were produced in a typical manner. At times, mass-produced valves are randomly picked from shelf stock. The sample valves or rupture disks are then tested at the National Board lab. If problems are found, the manufacturer must take corrective action and additional samples must be selected and tested.

The National Board became involved in capacity certification because it sponsored testing in the 1930s at The Ohio State University. Testing revealed valves built at that time often did not have reliable capacity ratings. The ASME Code was revised over time to include a formal test program, first requiring design testing of prototype valves, then testing of randomly selected production valves, and later adding retesting and recertification of designs. The National Board was designated as the organization responsible for the certification program.

Capacity certification, where final testing is done by an assembler (a separate organization which receives valve parts from a certified manufacturer), was added to ensure these organizations were capable of performing the testing function and making valves operate properly.

As the Code changed, testing needs increased, and National Board built its first lab in 1974 to support the growth. That building was replaced by the current facility in 1991.

Today the capacity certification program includes 113 manufacturers with 900 different design types, 128 assembler organizations, and over 2,230 separate capacity certifications – all of which require periodic testing and evaluation. We believe pressure relief devices available today are more reliable because of the evaluation, inspection, and testing done over the years as part of National Board's capacity certification program.

Valve Repair Program

In the 1970s National Board membership recognized the need to certify organizations performing repair activities. ASME Code rules were well-established to specify design, materials, testing, and quality control during new construction. However, service work was an area needing more attention to ensure continued safety of equipment in the field. Programs were established to address welded repairs of boilers and pressure vessels (R program) and nuclear equipment (NR program). At the same time the Valve Repair (VR) program was initiated by National Board's Board of Trustees to certify organizations repairing ASME Code-stamped pressure relief valves.

The VR program includes a review (by a National Board representative) of the repair organization's quality system, which includes a critique of its quality control manual; an audit of the program's implementation, including review of

associated records; and a demonstration of the repair process.

Valves repaired during the demonstration representing different test mediums (air, steam, and water) are then submitted to the test laboratory for operational and flow testing using the same testing standards applied to new valves. Tests must be successfully completed for the organization to be issued a VR Certificate of Authorization. If test problems are encountered, the company must demonstrate corrective actions and additional valves must be repaired and tested to show corrective action was successful.

At this time approximately 290 organizations have a VR Certificate of Authorization. We believe requirements to have a quality program for repairs – including requirements to demonstrate the repair process by a certified test at an independent lab – has led to significant improvements in the quality of repairs, providing additional inservice pressure relief valve safety. Because of this, many Jurisdictions and users of pressure relief valves require valve repair organizations to have a National Board VR Certificate of Authorization when this important equipment is repaired.

Investigation Testing

Unfortunately, incidents associated with use of boilers and pressure vessels still occur. When they do, Jurisdictional members are called upon to evaluate what may have caused the incident. National Board staff is available to assist the Jurisdiction in its investigation and provide help in evaluating installation, materials, operation, and other incident contributors.

One item always questioned when a boiler or pressure vessel fails is the pressure relief device and whether it has actuated. The test lab can perform tests of pressure relief devices involved in incidents. Results of these tests often assist the Jurisdiction in understanding what problems may have contributed to the incident. In some cases tests show insufficient equipment maintenance caused the pressure relief valve not to actuate. In other cases the valve was functional, thus pointing to a failure that may have occurred below the set pressure of the valve.

Training

Pressure relief department staff assist the National Board training department in developing teaching materials for the Valve Repair (VR) School and for sessions related to pressure relief topics taught at other schools for inspectors.

One component of the VR School is a tour of the test lab with live testing demonstrations of steam, air, and water pressure relief valves. In these tests, valve performance characteristics and setting techniques are demonstrated. School participants often comment the live testing demonstrations reinforce the topics discussed in lecture sessions and enhance their understanding of the subject matter.

Code Development

As the ASME Code has changed and evolved, different testing procedures and requirements have been suggested for inclusion in the standard. The National Board Testing Laboratory has been involved in evaluating these new concepts and procedures as an aid in standards development.

Laboratory Certification

Testing required under the ASME Code must be performed at an accredited test facility. While other organizations operate their own test facilities, an outside audit is required to be performed by the National Board (acting as the ASME designated organization). The audit requires sample items to be flow tested, and then retested at the National Board lab to demonstrate all certified facilities are obtaining similar results. In this way we act as a "hub" in the laboratory certification process, ensuring every facility is performing measurements in the same manner and achieving the same results.

Conclusion

The National Board Pressure Relief Department and Testing Laboratory is quite busy performing tests for the programs and activities described above. In our last fiscal year over 1,900 tests were performed. These tests permit manufacturers, assemblers, repair organizations, and test laboratories to qualify for various certifications. Additionally, the tests assist in incident investigations and contribute to training and standards development.

Cumulatively, this work supports National Board's continuing mission of maintaining and enhancing public safety in the area of pressurized equipment usage. We utilize test laboratory data and results to assist with this important mission.

TURF CONDITIONING SYSTEMS

A Unique Application of Modern Boiler Technology

PHOTOS BY GREG SAILOR & REHAU

Systems like Cleveland's give field managers control over live turf to ensure safe playing conditions year-round.

State-of-the-art turf conditioning systems are installed in over 15 NFL stadiums across the United States. At the heart of the systems are boilers that feed warm fluid through miles of tubing just inches beneath natural playing surfaces. Heat radiates through the soil to keep fields at desired temperatures at the root zone level. This prevents grass from going dormant and extends the growing season.

The goal of natural turf is to provide professional athletes safer and softer playing surfaces. Turf conditioning systems enable stadiums in cold-weather climates to maintain green, healthy fields well into late December and January.

Stadiums in Germany and other European countries began using turf conditioning systems in the 1980s. North American stadiums picked up the trend in the mid-1990s. Cleveland Browns Stadium, then newly constructed, was one of the first in line to install the system.

Courtesy of REHAU

Beneath the Browns' gridiron is 40 miles of 3/4-inch crosslinked polyethylene (PEX) tubing

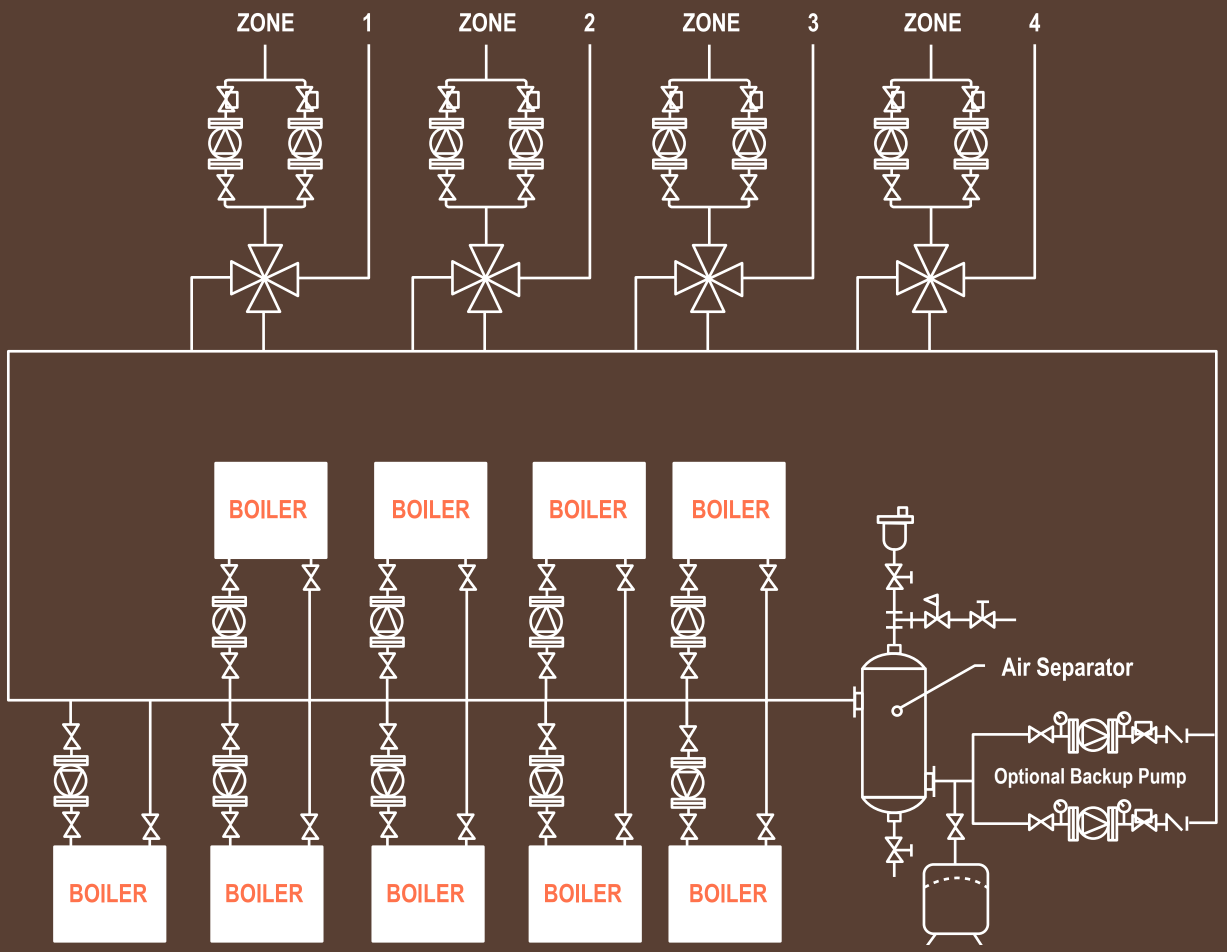
Cleveland Browns Stadium opened its doors in 1999, replacing Cleveland Municipal Stadium, which operated from 1946-1995. In keeping with tradition, the new stadium was built on the same Lake Erie shoreline as its predecessor. The field still runs east to west and the Dawg Pound remains on the east side of the stadium.

If the newly built Browns Stadium was robed in rich tradition, it's certainly crowned with 21st century technology—from architectural "gaps" providing soaring views, specially designed lighting, high-resolution ProStar VideoPlus display boards, and a recently installed phone substation (providing 70,000 guests fast access on their smartphones)—all the way down to the very roots in the soil.

Boilers Behind the Browns

Beneath the Browns' gridiron is 40 miles of 3/4-inch crosslinked polyethylene (PEX) tubing. The tubing is fed by nine boilers through 19 pumps. The system also includes 1,600 feet of supply/return manifold header piping, 2,460 feet of distribution tubing, and an advanced controls system. The 3/4-inch tubing holds about 0.0189 gallons per foot—over 4,000 gallons of fluid (a biodegradable water/propylene glycol solution) fill the tubes under the field.

Piping Schematic



The boiler room is located at field level just inside the tunnel where Browns players enter the field. Nine Ajax Ace B15 Series 'G' boilers dominate the space like ready linemen. Each boiler is rated at 36 BHP and 1,500,000 Btu/hr, has a maximum allowable working pressure (MAWP) of 160 psi, and contains a patented, self-supporting copper fin coil. Safety relief valves are set at 125 psi with a relieving capacity of 1,700,000 Btu/hr.

Jane Terry, president of Ajax Boiler Inc. of Santa Ana, California, explains why this series was the right system for the job. "The customer specified wanting commercial grade boilers with a long-standing reputation for consistent operations and good value over years of service. Our reputation for these boilers is very good—we have a known unit that has been in operation for 47 years now."

Terry's late father, Ed Cancilla, purchased the company in 1967. In 1969 he patented the innovative self-supporting copper cone coil, which solved the problem of sagging coils and extended the life of coils by decades. Currently, Ajax manufactures three brands of boilers used for commercial and industrial applications.

The Ajax boilers were installed in Browns Stadium in 1999 and are still going strong. "One interesting thing Bob Schmitz (director of facilities, Cleveland Browns Stadium) told me is that the boilers are used only part of the year, but they start up like new every time. And that is a good thing," says Terry— a good thing for Ajax and the Browns.

ABOVE: Piping schematic of Browns' boiler system.

RIGHT: Partial shot of boiler area. Note orange inspection stickers and state operating certificates (foreground). The State of Ohio requires an annual inspection.

LEFT: Installation of PEX tubing (white) to main manifold (black) at Browns Stadium.

RIGHT: Close-up look at the manifold. Also shown are the fixing rails.

Photos courtesy of REHAU

ABOVE: Tubing connections to the manifold.

Pure Engineering

The Browns' radiant heating system was designed by REHAU, an international provider of polymer-based innovations and systems in construction, automotive, and industry. REHAU has participated in more than 160 stadium turf heating systems in Europe.

"Cleveland was our first stadium in North America, although we had done different types of turf conditioning (greenhouse applications) prior to that. REHAU Europe has done dozens of German football (soccer) fields and they appear to be the leader in this area," says Bill Johansen, business unit manager, building technology at REHAU's North American headquarters in Leesburg, Virginia. Johansen was directly involved with the Browns' heat transfer system.

"Cleveland Browns Stadium was an interesting business and engineering case for us. We worked with Paul Franks (field contractor), Populous (design group formerly known as HOK Sport Venue Event), and others to come up with a properly engineered system. We got to know the world of sports turf science a little better through the process."

Johansen and staff had several objectives to meet. "We had to understand the exact expectations for the operation of the system, especially desired root zone temperature and under what operating conditions. Also, soil make-up had an enormous impact on performance, and this had to be defined fairly precisely." The Browns' heating system needed to keep the field from freezing but also control grass root zone temperatures. Meeting these objectives hurled Johansen into the competitive and complex realm of turf science.

"We discovered that each type of grass, as well as the type of over-seeding being used, required different design temperatures at either the root zone or grass canopy level," Johansen explains. Adding to the challenge, each sports field designer had a different, often proprietary, soil construction designed to properly protect players, support the type of turf being grown, and ensure proper drainage of fields.

"At that time, the NFL Players Association pushed for natural turf fields. There was a lot of discussion going on about real turf versus artificial. We were just heating engineers and we walked into all of this discussion—the science behind turf growth, liability concerns, and more. It was very interesting for us from an engineering-manufacturing point of view. A bunch of worlds came together—it was pure engineering and a lot of fun!"

Johansen continues. "While the science was quite fascinating, it was also a new area for us. To help, we relied on our own knowledge and engineering experience with heat transfer, but we could also draw upon our collective experience from Europe."

REHAU applied several analytical tools to determine exactly how heat would transfer through the soil and ultimately what root zone temperatures could be achieved under various weather and climatic conditions.

"Working with HOK Sports and the field contractor, we gained an understanding of the soil makeup, the type of grass, and the expectations for temperature at the root zone. Once we had this information, we used an analytical tool called Finite Element Analysis (FEA). This computer tool allowed us to create a 3-D model of the field and to define input "boundary" conditions, such as soil, surface, and tube temperatures; soil thermal conductivity; and operating parameters, such as weather and water conditions; to help evaluate heat transfer and steady state condition within the soil."

The 3-D model also helped Johansen understand how the field would behave given specific data and tube conditions (tube size, depth in the soil, fluid temperature in the tubes, etc.).

"It was interesting to take this data back to the turf specialist, who helped point out how our design would either accommodate their needs or not. For example, in one of our early iterations of the field, we achieved proper root zone temperatures, but our tubes were not located deep enough to accommodate the aerator tines used to condition the turf during the year. This pushed us back to the analytical tool to determine a better design."

A Better Design

The Browns' turf conditioning system is divided into four zones at the 50-yard line going across and down the middle. There are 189 loops per zone and each supply and return circuit is identical in length to ensure even temperature distribution throughout the field. Over 1,500 connectors are located at the manifolds. The fitting system is REHAU's proprietary EVERLOC® system. The fittings are stainless steel and each connection was covered with a specially designed protective barrier.

The system was installed in the following layers: drain tiles, 4 inches of pea gravel, forty miles of PEX tubing (laid sideline to sideline), 10 inches of sand-based root zone, and then the sod.

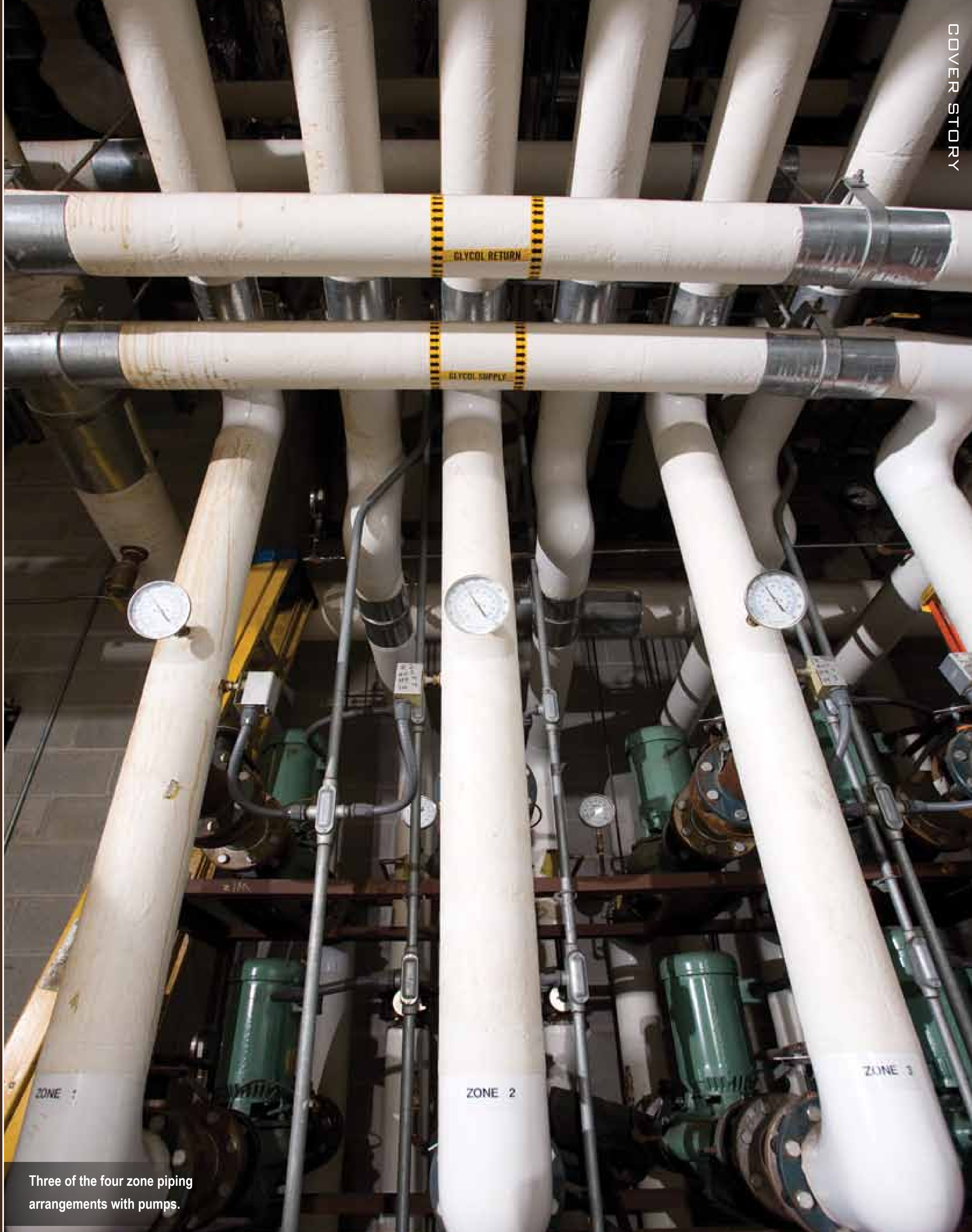
It took approximately two weeks to install the tubing using two crews of four people. The flexible white tubing was snapped into fixing rails to prevent bending and bowing while also keeping rows straight and even. REHAU provided the tubing and fixing rails and had representatives on hand to oversee the work.

Each zone has four sensors at the 3- to 4-inch soil depth and at the 7- to 8-inch soil depth. "The sensors are simple thermistors that react to temperature with a control wire that runs back to the mechanical room where temperatures are carefully monitored," explains Johansen.

Neal Pate, facility manager at Cleveland Browns Stadium, closely monitors the field. He has cared for it since the system was installed, which he remembers well. "I literally couldn't look at the field because it was so bright," he says, recalling the glare of the white PEX tubing.

Pate explains that if a zone doesn't get enough sunlight, a portion of turf could freeze. (For example, sunlight doesn't reach over part of the stadium's roof in October.) Pate relies on setpoint averages to maintain a healthy lawn.

He inputs a desired field temperature (the setpoint) into the computer system much like setting a home thermostat. Software reads the temperatures at the four 3- to 4-inch soil level sensors, adds them up, and divides by four to get the average actual temperature. It compares the average temperature to the setpoint. In the boiler room, each zone has its own pump. If the average temperature is below the setpoint, the system opens the mixing valve and adds more hot water. Likewise, if the average temperature is above the setpoint, the mixing valve closes to restrict hot water from being added to the system. The desired result? Well-balanced, healthy turf that optimizes player safety and performance.



Three of the four zone piping arrangements with pumps.

Safe Turf, Good Cuts

Players need both agility and stability on the field. That's why turf condition is critical. So critical, in fact, that in 1994 the first NFL Players Playing Surfaces Opinion Survey was conducted. AstroTurf dominated NFL fields and many players believed it was an unsafe surface.

The survey is given biennially at player union meetings in the fall and is completed by nearly 1,400 active players. The last survey in 2008 showed that 84.4% of athletes agreed artificial infilled surfaces were more likely to contribute to injury than natural grass fields. An overwhelming 91% agreed artificial turf caused more soreness and fatigue. Of the 31 NFL teams represented on the survey, 18 teams used grass fields and 13 artificial.

"Beyond anything—beyond the way the field looks—safety is our number one priority," says Pate, glancing at the Browns' field. "I want to make sure our players can get their feet in the turf and make good cuts."

Vibrant green grass looks good to thousands of fans watching from the stands or on TV, but Pate knows field conditions equate to player safety.

"The field gave them what they needed to play the game on Saturday—it gave good cuts," Pate says, referring to the August 7 practice game. Director of Facilities Bob Schmitz agrees. "We want the turf to be soft enough so spikes grab into the ground, but not so soft that they'll slide."

Schmitz says two common ways players sustain injury are directly related to field conditions. "If the field is too hard and a player makes a quick stop, there's a chance his spike won't grab and he can slip. If the grass is too soft and gives way when he stops, there can be injury."

Turf and cleats go hand in hand. "The players have jars of cleats, all different sizes, to choose from. Each player determines how he wants his shoes," says Schmitz. The position of the player, type of field (live or artificial), and even weather determine the type of cleat a player will use. Shorter studs may be used on a hard, dry surface and longer studs on a wet, soppier field. In any given game, a player could have five or six different pairs of shoes available.

Longtime kicker Phil Dawson offers the most feedback about field conditions. "He's the only player who's been here for every season since the new stadium was built in 1999. We've gotten to know him pretty well. And kickers have their routines—footing is extremely important to them," Pate shares. "But if we don't hear anything from players and the front office, it's good."

Systems like Cleveland's give field managers control over live turf to ensure safe, year-round training and playing conditions. Pate and Schmitz can't control the weather or the type of cleats players will use, but they do everything they can to provide an optimal playing field for the Browns and visiting teams.

Field Goals

The Browns' field is a Kentucky bluegrass irrigated field with a sand soil root. "The bluegrass is durable and stays green, but it doesn't grow very fast," says Schmitz, "so we supplement it with ryegrass."

Pate nods. "We constantly seed the field with ryegrass after each game. It's used as a supplement to add density to the bluegrass and fill in any thin areas on the field," he explains. Pate re-sods patches of turf on an as-needed basis. The section between the hash marks and goal lines is replaced mid-season.

According to Pate, after a Sunday game the field looks "beaten up" until about Wednesday. That's when new grass begins to spring up. "The bluegrass doesn't like this heat. This has been the longest recovery we've had in quite a while," he says, referring to sweltering August heat combined with wear and tear from the recent practice game.

The Browns' turf conditioning system is used only a couple of months each year. The fluid stays in the system year-round and doesn't need to be drained. "I may kick on the boilers in March and slowly bring up the soil temperature to jump-start the grass out of dormancy," says Pate. "I like to get a start over everyone else," he smiles.

Pate and crew must adapt to a changing climate in order to keep the field healthy and resilient year-round, but especially in frigid conditions. "The system tricks grass into thinking it's nicer weather during cold months," Pate says. "It also helps keep the field from freezing."

Anytime it rains or snows three to four days before a game, tarps are pulled out across the field. But tarps can also pull moisture out of the ground. On extremely cold mornings this can pose a problem. "There have been mornings when we've pulled back the tarps and the field looks like it's covered in snow," he says.

"Sometimes people wonder why there is still snow on the field (during a snowy game day) but they don't understand all that goes into finding the right balance. Players need to get their cleats into the field," Pate adds. "They would rather play in snow than in mud. They can get better footing and balance."

Turf can't be too soft or too hard, and maintaining that balance from week to week is both science and art. Johansen agrees. "A lot of science goes into running a field."

With over 40 miles of tubing buried beneath the field, detecting problems (such as leaks) is tricky. Pate can measure fluid levels with the sensor system and narrow a problem down to a specific zone, but pinpointing the exact location is a matter of good guesswork—and digging. Tubing is accessed only by stripping back the sod and digging through 10 inches of root zone soil.

A leak was detected after the first season in the new stadium. "We tried many ways to locate it. We narrowed it

The completed field, ready for game day.

down to a few areas and literally dug along until we found it. Luckily we haven't had any leaks since then," says Pate.

Browns Stadium is multi-functional and hosts other sporting events (such as international soccer), concerts, and more. The field is able to bear the loads of forklifts and cranes for venue setup. Fifty-ton cranes, two at a time, put down pressed plastic flooring for protection. Another reason turf conditioning systems are preferred is they promote faster grass resilience after the wear and tear of hosting large-scale events.

Final Score

"If a cow cannot eat it, we shouldn't be playing on it," remarked one athlete on the 2008 NFL Players Playing Surfaces Opinion Survey.

Players want and prefer the benefits of natural turf, but maintaining a suitable and safe gridiron for professional athletes is a bit more challenging than opening up pasture for grazing cattle. Professional playing fields endure hit after heavy hit year-round. Cleveland's field sustains such action as the Browns clawing out victory, frigid lake-effect conditions, and the wear of hundreds of concert-goers rushing a stage.

No matter the occasion, the on-field action may not be as important as what is beneath it.

Turf conditioning systems are a unique application of modern boiler technology. Without them, grass could not repair itself after heavy traffic nor withstand year-round usage. Players would likely sustain more injuries and professional football would not be what it is today.

As technology in turf conditioning progresses, Johansen believes advances in turf/soil engineering and in drainage of fields will lead the way. Pate says "stitching" procedures, a process whereby a machine stitches threads of artificial field material into the ground for added stability, is another option some stadiums use to obtain ideal playing surfaces.

Either way, natural playing fields are here to stay and rely upon the science of heat transfer systems fed by robust boilers—and the expertise of dedicated staff who maintain the turf in support of a safe and winning season.

FEATURE

Guide for Safely Restarting Boilers after Summer Lay-up

BY ROBERT FERRELL, SENIOR STAFF ENGINEER

It's that time of year when heating boilers should be prepared for the heating season.

Before moving the boiler power switch to the ON position, *survey the scene*. I've taken that command from my first aid training. It means, "Before rushing in to help a victim, ensure you're not about to become the second victim." Survey for potential hazards created by an improperly operating boiler or improperly stored material in the boiler room.

Your survey should ask the following questions: "What is the condition of the boiler system?" and "Has any work been performed on or near the boiler during the summer shutdown?"

If work has been done on or near the boiler, perform a system inspection tracing fuel lines, feed lines, steam and blow off piping, stack, and regulator vent lines. Check controls and control panels for evidence of damage and changes or loose connections. Inspect mechanical assemblies such as burner linkage and safety valve springs for paint, dirt, and rust accumulation which wouldn't allow easy movement. Make sure all ventilation and combustion air openings are clean and free from debris.

Review the Manufacturers' Instruction Manual for operation instructions. *In all cases the equipment manufacturer's recommendations should be followed*. Become familiar with the timing sequence of the automatic controls. The following list suggests a typical starting sequence:

- Verify water level in the boiler and test the low water fuel cutoff (LWFC).
- Verify the fuel train valve position.
- Clean the flame scanner.
- Verify peep sights on the burner and boiler are clean.
- For steam boilers, verify operation of the feed/condensate system.
- For water boilers, verify there is air in the expansion tank and make up water is available.
- Verify electrical power is available to both the blower (power burners and induced draft) and control circuit.

Start the boiler by moving the power switch to ON. Reset all manual reset switches, LWFC, fuel pressure switches, and pressure or temperature limits switches. Observe the start-up sequence. It may be necessary to isolate the boiler from the system to warm it up slowly.

Check the flame conditions in the combustion chamber.

On gas-fired non-condensing boilers a cold start may produce condensate leaking from the gas pass covers and casing. Once the boiler water temperature exceeds 150º F the condensate should stop.

Once the unit has warmed, turn power switch to OFF. Verify the shut down cycle. Then restart. Let it come up to full firing rate and open isolation/stop valves to put it into the system. Monitor it throughout the day, looking at the flame, stack outlet, controls, and linkage. Verify gasket tightness for both water side and fire side.

If any abnormal condition occurs during start-up, turn the power switch to OFF. Investigate cause before restarting the boiler.

Suggested Maintenance Log Program

The following article is from the National Board Classic Series

The following maintenance items, as appropriate to the specific boiler system, need to be considered for implementation on a regular basis (e.g., daily, weekly, monthly, semiannually, and annually). A checklist of items should be incorporated into a maintenance log with provisions for checking off the item for the appropriate period. A separate log sheet is suggested for each period. Log sheets can be filed in a loose-leaf binder and should be retained as a permanent maintenance record.

Log sheets can be used as a handy check-off system when establishing a facility maintenance program. *In all cases the equipment manufacturer's recommendations should be followed.*

DAILY

- Blow down and test low water cutoffs of steam boilers (once per shift for high pressure)
- Blow down gage glasses (steam)
- Blow down make-up feeder (low pressure steam)
- Blow down boiler (steam)
- Check boiler control linkage
- Check boiler and system for leaks
- Check burner flame

WEEKLY

- Check compressor(s) lubricating oil level (control and atomizing)
- Check flame signal strength for both pilot and main flame, and record readings
- Check flame failure cutoff and timing
- Check pilot and main flame fuel shutoff valve closing
- Check igniter and burner operation
- Check level in chemical treatment tank

MONTHLY

- Check compressor(s) air filter, and clean or replace as required
- Check boiler water treatment test results received from treatment company; adjust treatment as required
- Lubricate motor and equipment bearings
- Test fan and air pressure interlocks
- Check main burner fuel safety shutoff valves for leakage
- Check low fire start interlock
- Check high pressure/temperature interlocks
- Test low water cutoffs (hot water)
- For oil – test pressure and temperature interlocks
- For gas – test high and low gas pressure interlocks
- Manually lift safety/safety relief valves and check operation

SEMI-ANNUALLY

- Check flame failure system components
- Check piping and wiring of all interlocks and shutoff valves
- Recalibrate all indicating and recording gages and instruments
- Perform a slow drain test for low water cutoffs (steam)
- Check combustion control system
- For oil – check atomizers and strainers
- Test boiler safety/safety relief valves in accordance with *ASME Boiler and Pressure Vessel Code, Sections VI and VII*

ANNUALLY

- Perform the SEMI-ANNUAL maintenance procedures
- Check all equipment coils and diaphragms
- Perform a pilot turndown test
- Recondition or replace low water cutoff
- For gas – check drip leg and gas strainer
- Clean boiler firesides
- Drain boiler; open manholes and hand holes, and clean watersides
- Have boiler inspected by a commissioned inspector
- Clean burner and fans
- Replace gaskets
- Leak-test all fuel valves
- Test operation of all controls and safety devices
- Have fuel-burning system adjusted using combustion test instruments

AFTER EACH PERIOD

- Make a record of all maintenance and parts replacement in the maintenance log

Recommendations for a Safe Boiler Room

Mercury is falling and boiler start-up season is in full swing. Activity in the boiler room may have cooled down over the summer months, but things will heat up as boilers are back in operation and personnel work to keep facilities safe and warm during the long winter months.

In conjunction with boiler inspection before the annual restart, fall is also a great time to examine the boiler room itself to ensure a safe environment for the busy heating season. Consider the following suggestions for optimal safety in the boiler room:

1. ***The boiler room is for the boiler.*** The boiler room should not be considered an all-purpose storage area. The burner requires proper air circulation in order to prevent incomplete fuel combustion and production of carbon monoxide. Therefore, keep the boiler room clean and clear of all unnecessary items.

2. ***Knowledge is powerful, as are boilers.*** Ensure all personnel who operate or maintain the boiler room are properly trained on all equipment, controls, safety devices, and up-to-date operating procedures.

3. ***Look for potential problems.*** Before startup, ensure the boiler room is free of all potentially dangerous situations, such as flammable materials or mechanical or physical damage to the boiler or related equipment. Clear intakes and exhaust vents; check for deterioration and possible leaks.

4. ***Inspection matters.*** Ensure a thorough inspection by a properly qualified inspector – one who holds a National Board commission.

5. ***Reinspection matters, too.*** After any extensive repair or new installation of equipment, make sure a qualified boiler inspector reexamines the entire system.

6. ***Observe new equipment.*** Monitor all new equipment closely until safety and efficiency are demonstrated.

7. ***Develop a maintenance schedule.*** Use boiler operating log sheets, maintenance records, and manufacturers' recommendations to establish a preventive maintenance schedule based on operating conditions, as well as on past maintenance, repairs, and replacements performed on the equipment.

8. ***Create thorough checklists.*** Establish a checklist for proper startup and shutdown of boilers and all related equipment according to manufacturers' recommendations.

9. ***Don't overlook automated systems.*** Observe equipment extensively before allowing an automated operation system to be used with minimal supervision.

10. ***Keep safety at the forefront.*** Establish a periodic preventive maintenance and safety testing program that follows CSD-1-2007, latest applicable edition, Part CM and the manufacturers' recommendations.

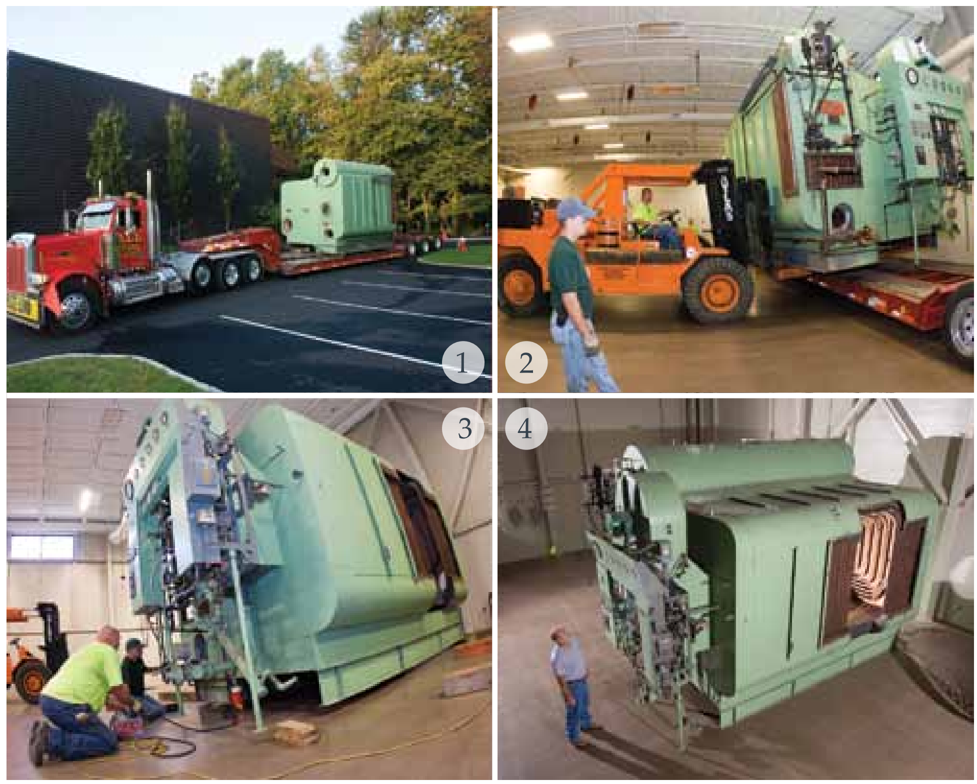
Legacy of a Boiler

A boiler identified as No. 1 could be considered special by some. Granted, there are thousands of No. 1's registered with the National Board, but how many served 36 years in one of the largest, not-for-profit pediatric healthcare networks in America, only to enter a second life as a hands-on training tool for new inspectors attending a National Board course?

So is the legacy of *this* Boiler No. 1. It was the very first boiler registered as National Board No. 1 by the Murray Division of The Trane Company in Burlington, Iowa.

The 40,900-pound "D" style boiler got its start in 1974 when it was manufactured for installation at Nationwide Children's Hospital in Columbus, Ohio. Founded in 1892, the hospital maintains a tradition of providing quality medical care without regard to a family's ability to pay. It was ranked in US News & World Report's 2010 "America's Best Children's Hospitals" and Parents magazine's 2009 top ten "Best Children's Hospitals" list.

Boiler No. 1 remained in service at the renowned hospital until mid-July 2010, when it was "rescued" by National Board Senior Staff Engineer John Hoh.



(1) Arriving at the National Board campus; (2) Lifting the boiler from the transport trailer; (3) Final positioning; (4) After 36 years, a new home.

New Life for Boiler No. 1

In March 2010, National Board learned the boiler was going to be "retired" from service because a new energy center was being constructed with new boilers. The boiler was turned over to a demolition contractor for removal. When Hoh saw an opportunity, he spoke with the contractor and asked if they would consider donating the boiler to the National Board for use in training courses. The contractor agreed.

Removing and transporting the boiler was no small matter. It was rolled out of its old location using special, heavy-duty machinery rollers. Once outside, a forklift – with a lifting capacity of 65,000 pounds – loaded the equipment onto a truck. It was moved to a warehouse close to National Board headquarters where Gurina Company of Columbus, Ohio, prepared it for instructional use at National Board's Inspection Training Center (ITC).

"They cut an opening in the waterwall tubes making up the side of the furnace to create a 'doorway,' " explains Hoh. "This will allow easy access for entering the furnace. Once inside, students will be able to see the burner, refractory, tube configuration, gas pathways, and more."

In addition, the steam drum and mud drum were opened on each end to allow viewing of internal surfaces. "We will install lighting in the furnace and drums to ensure easy viewing of normally dark and hard-to-see areas," says Hoh. The boiler was moved to the Inspection Training Center at the end of August.

The boiler is a watertube design with maximum allowable working pressure (MAWP) of 250 psi and a maximum designed steaming capacity of 20,000 lb/hr. This is the second watertube boiler used in training, but as Hoh explains, "This one is much larger and a very good representation of what an inspector may see in an industrial environment while performing inservice inspections."

BENJAMIN ANTHONY

Chief Boiler and Pressure Vessel Inspector, State of Rhode Island


Bulletin Photograph by James Jones

In a sense, you could call him an artisan. A kind of survivor in a creative discipline whose practitioners he calls a dying breed.

Rhode Island Chief Inspector Ben Anthony may not think of himself as a modern day Noah (he of the ark, *Book of Genesis*, and so on). But there is something almost spiritual to be said for an individual who reveres boat construction. *Old* boat construction.

Ben thinks his passion for boats may have had its origin in his birthplace of Jamestown, Rhode Island. Once a thriving resort town in the tradition of Nantucket, Jamestown was home for the state official's early development years.

"I would take a ferry boat to and from high school in Newport during the school year," a smiling Ben recalls. "A forty-five minute trip each way."

Of course, that's when he attended school. "Sometimes I would ride the ferry all day," he recounts in reference to his periodic disposition toward hooky.

Admitting he didn't much care for school, the state official did manage academically to carry a "B" average through high school. A brief experience during the summer hiatus working on boats gave Ben a taste he has forever savored. Back then, he winks, "I even thought about teaching boat construction."

Following graduation in 1966, Ben entered the Marine Corps "basically because my brother also joined." Ben harbored no reservations about going into the Marines. An infantryman, he served 14 months in Vietnam before exiting the corps in 1970.

Shortly after receiving his discharge, Ben was approached by a friend who wanted to know if the future National Board member was interested in building boats. "This was during the time boat companies were thriving in the area and boats – pleasure yachts, fishing crafts – were very popular along the [New England] coast," he explains.

Ben's dream of a seafaring career was short-lived. Eight months on the job, the Rhode Island official was asked by a friend of his parents if he wanted to be a boiler operator at a state hospital.

"No," answered the Jamestown native *without hesitation*.

"Yes," contradicted Mary Jane, his soon-to-be wife.

As is so often the case during great and momentous debate among the sexes, Ben was out-voted.

"The boat company offered no benefits," he reveals with measured contrition. "The operator job did." And so in 1971, the newly married Ben Anthony was welcomed to the boiler industry.

Having worked his way to heating plant engineer, Ben eventually left the hospital to assume the position of chief engineer at a state college in Providence.

In 1987, the former Marine received a call from then-Rhode Island Chief Inspector Tom Wickham. "Although he didn't know anything about me personally, Tom invited me to interview for an inspector position," Ben recounts.

Joining the state boiler and pressure vessel operation not only marked a new beginning in Ben's professional career, it commenced a special relationship with his late predecessor.

"Tom taught me a lot," Ben offers with a smile. "Foremost, he told me *never* to compromise and to make sure to do things right *the first time*."

Ben gleaned more than wisdom from his mentor. "First he encouraged me to take some math courses. He also gave me a stack of code books and sent me to a corner to read," he recalls. And read he did. For a year and a half.

Upon Tom Wickham's retirement in 1999, Ben was named acting chief inspector.

"At that time, I didn't yet have my commission and the state didn't have the budget to provide me with training," he recalls. But that didn't stop the late National Board Executive Director Don Tanner from making Ben's desire to secure his commission a reality.

"If it wasn't for Don, I would have never made it to where I am today. Even though I wasn't a member back then, Don made sure I received the necessary training at no charge to the state!"

The year 2003 proved a watershed for the acting chief inspector. "I received my commission, was named permanent chief inspector, and became a member of the National Board," the state official proudly explains.

At present, the Rhode Island native is responsible for approximately 29,000 boilers and pressure vessels, 26 percent of which are inspected by the state.

Having now recorded his forty-first year with the state of Rhode Island, Ben emphasizes he is "not even close" to retirement.

"Our operation is financially self-sufficient. I have a great staff of four inspectors and wonderful support from my chief of operations."

Another deterrent to retirement, Ben adds, is a very fulfilling personal life that includes his forty-year marriage and the pride he expresses in his daughter and two sons.

"About the time I joined Tom," he notes, "Mary Jane and I purchased a 150-year old farmhouse located on an old turkey farm in North Kingston."

Situated far from city lights, Ben's closest neighbor is his son's family who lives next door. "I enjoy the solitude," Ben offers with a grin. "Not only is it relaxing and without stress, it allows me to enjoy those things important to me."

Like spending quality time with his neighbor and six-year-old grandson Gabriel. Like making cabinets and fishing. Growing wine grapes. Working the apple orchard. Restoring his 1941 Chevy coupe (a work in progress for the past ten years). And tending to his "pets."

Among the critters at home on the Anthony family farm: goats, ducks, chickens, and a wild deer or two, to name only a few. And they are, Ben emphasizes, truly *pets*.

As for his penchant for boat-building, Ben hasn't yet entirely given up. "It's hard to explain," he relates with excitement. "Building a boat is like solving a puzzle: the layout, figuring the angles, the math, steaming wood to construct a magnificent hull – it's quite a challenge. Maybe someday I'll build another one in my barn."

That, however, may be a sight of considerable concern to Ben's neighbors down the road.

Lest we forget: there is precedent for bringing together a boat and animals.

The last time it rained for forty days. And nights.

WELDING FOR THE COMMISSIONED INSPECTOR

BY KIMBERLY MILLER, MANAGER OF TRAINING

The welding area allows for demonstration of the GMAW-S, GTAW, and SMAW processes.

How much about welding does an inspector truly need to know? This is an interesting—and sometimes debatable—question. *Should an inspector know how to weld? Should he know the intricacies of metallurgy or what makes a weld "work"? Or does he simply need a basic understanding of different welding processes?*

These are great questions discussed by National Board training department staff for some time. And the conclusion we came to?

No, an inspector does not need to know how to weld or the intricate details of metallurgy. But an inspector does need to know more than terminology. An understanding of different methods, controls, and NBIC and/or ASME Code requirements for welding are essential if an inspector is to properly perform his duties.

Much of this can be taught in a classroom or workshop setting. For example, code requirements, types of materials, and necessity of qualifying a welding procedure or a welder can be discussed with an instructor leading a class. Photographs or videos can illustrate various types of welding methods. But the National Board thought we could expand on the latter with the addition of a "real-life" scenario.

Enter the new welding demonstration area of the inspection room. Students are now able to watch a welder demonstrate different welding processes, after which they are shown the results and provided guidance on what to look for when in the field. For inspectors needing to understand what makes a weld solid and acceptable or a defective code violation, this is valuable information. Allowing students to stand witness to a live demo aids in their overall training experience.

Of course, our students' safety is a high priority. The welding area of the inspection room has been properly outfitted with a fume extractor and welding screens. Face shields are distributed to each student during all demonstrations.

Welding demonstrations have been permanently added to the *Inservice Inspection Course* (IC). Plans are underway to expand use of the new welding area in other courses. The benefit of classroom instruction combined with live demonstration provides students an enhanced learning experience that will enable them to better perform their jobs in the field.

Looks like the future of National Board training has just become a little "brighter".

TRAINING WRAP-UP *CLASS OF SPRING 2010*

MARCH, 2010 "A" CLASS
NATIONAL BOARD AUTHORIZED INSPECTOR COURSE

MAY, 2010 "RO" CLASS
NATIONAL BOARD BOILER AND PRESSURE VESSEL REPAIR TWO-DAY SEMINAR

APRIL, 2010 "I" CLASS
NATIONAL BOARD AUTHORIZED NUCLEAR INSERVICE INSPECTOR COURSE

JUNE, 2010 "RTL" CLASS
NATIONAL BOARD REVIEW TEAM LEADER SEMINAR

APRIL, 2010 "N" CLASS
NATIONAL BOARD NUCLEAR INSPECTOR COURSE

JUNE, 2010 "A" CLASS
NATIONAL BOARD AUTHORIZED INSPECTOR COURSE

MAY, 2010 "IC" CLASS
NATIONAL BOARD INSERVICE COMMISSION COURSE

JUNE, 2010 "VR" CLASS
NATIONAL BOARD PRESSURE RELIEF VALVE REPAIR SEMINAR

Member Retirements

Robert J. Aben retired on June 30, 2010, from his role as chief boiler inspector in Michigan. A fourteen-year veteran of the US Coast Guard, he was an authorized inspector for Hartford Steam Boiler prior to becoming assistant chief inspector in 1989. He became chief inspector and a National Board member in 1990. In 2008 he was elected chairman of the board and served in that role until his retirement.

Gary Myrick retired on July 1, 2010, from his position as chief boiler inspector for the state of Arkansas. Mr. Myrick worked as a state boiler inspector in Arkansas for 22 years. In 2003 he became chief inspector and eventually went on to serve 29 years with the state of Arkansas.

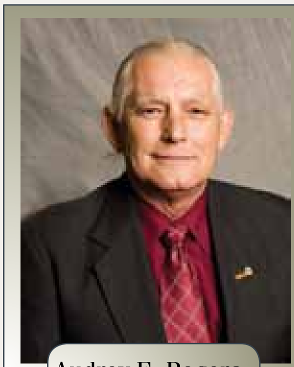
Jovie Aclaro retired from his office of senior safety engineer for the city of Los Angeles, California, on May 7. Born in the Visayan Islands, the mechanical engineer immigrated to the United States in 1974. He moved to California in 1987 and became senior safety engineer in 1990, serving for twenty years. Prior to his work in Los Angeles, Aclaro worked for Mobile Oil, Hartford Steam Boiler, and United Technologies.

Audrey E. Rogers retired from his position as chief boiler inspector for Tennessee in July. Mr. Rogers served in the US Army from 1968 to 1970. He was employed by Combustion Engineering from 1967 to 1980, when he went to work for the State of Tennessee as a boiler inspector. In January 2008 he became chief inspector.

Robert J. Aben

Gary Myrick

Jovie Aclaro



Audrey E. Rogers

National Board Mourns Myron H. Diehl

It is with sadness the National Board announces the sudden death of former Maryland Chief Inspector Myron H. Diehl Jr. on June 1. He was 59.

Mr. Diehl served as Maryland chief from 1988 to 1999. Prior to joining the state, he was employed by Hartford Steam Boiler. Mr. Diehl was a member of the Board of Trustees from 1991 to 1993 and served as chairman of the National Board Internationalization Committee. Additionally, he also was a member of the Task Group on Incidents and Violation Tracking. He held National Board Commission No. 8860 with "A," "B," and "I" endorsements.

After leaving Maryland, Mr. Diehl joined Zurich North America before going to work for CNA Equipment Breakdown as Mid-Atlantic Zone EBRC consultant. He was named an Honorary National Board member in 2008.

Active in ASME, Mr. Diehl was on the CSD-1 Committee and the ASME QFO Committee. He also served as vice chairman of the American Insurance Association's Committee for Boiler and Machinery.

"The pressure equipment industry has experienced the sudden loss of a valued fellow co-worker," commented National Board Executive Director David A. Douin. "In addition to effectively representing the state of Maryland for eleven years as a member, Myron's contributions to the National Board were substantive and many. I join with his colleagues at CNA in mourning his loss and extend to his family our deepest sympathies."

Mr. Diehl is survived by wife Joanne Mary Pope Diehl, daughter Rachel Marie, and son David.

Withers Appointed Assistant Executive Director-Technical

Charles Withers has been appointed assistant executive director - technical, effective November 1. Mr. Withers has over 35 years experience in the boiler and pressure vessel industry. He has served on staff with the National Board since 2001. Prior to his employment with the National Board, he was chief inspector of Colorado from 1996-2001. He worked as an authorized inservice nuclear inspector for Kemper Insurance Company from 1985-1996 and was an authorized nuclear inspector for Hartford Steam Boiler from 1981-1985. He served in the United States Navy as a nuclear machinist mate and qualified engine room supervisor from 1975-1981.


Charles Withers

Wielgoszinski Honored with 2010 Safety Medal Award

Robert Wielgoszinski, principal code consultant for the Hartford Steam Boiler Inspection and Insurance Company of Connecticut, received the 2010 National Board Safety Medal Award at the 79th General Meeting in San Antonio, Texas.

Mr. Wielgoszinski, who has devoted over 35 years to the pressure equipment industry, holds National Board Commission No. 7831 with "A," "B," "N," "NS," and "IS" endorsements. For the past 14 years, he has served as a member of the NBIC Committee, representing authorized inspection agencies, and currently presides as vice chairman. In 1994 he was appointed a member of the National Board Examination Committee, a position he holds today on what is now the Committee on Qualification for Inspections.

Since 1989 he has served on numerous ASME committees, including the Subcommittee on Accreditation, the Standards Committee on Qualifications for Authorized Inspection, the Committee on Boiler and Pressure Vessel Conformity Assessment, and the Section I and Section IV Standards Committees.

The Safety Medal Award is the highest honor bestowed by The National Board of Boiler and Pressure Vessel Inspectors. It recognizes the commitment and dedication of one very special industry professional to the discipline of safety in its every form.


Robert Wielgoszinski

New Advisory Committee Representatives Seated

The Board of Trustees met on August 10 and approved Kathy Moore and Robert Wielgoszinski as new Advisory Committee representatives. Ms. Moore is quality control manager for the Joe Moore Company in Raleigh, North Carolina. She will represent National Board Stamp Holders.

Mr. Wielgoszinski is principal code consultant for Hartford Steam Boiler Inspection & Insurance Company of Connecticut and represents Authorized Inspection Agencies. He will complete the term of Chuck Schaber, who recently resigned.


Kathy Moore

Bryan, Hannon, Reyes, Vallance Become National Board Members

New Tennessee Member

Chad W. Bryan has been accepted to the National Board membership representing Tennessee where he serves as chief boiler inspector.

Mr. Bryan began his career as an apprentice in the petrochemicals industry. In 1992 he launched his own business serving the Federal Highway Safety Administration. After returning to the power industry, he earned his CWI certificate before becoming site quality manager for Day & Zimmerman TVA.


Chad W. Byran

New Arkansas Member

Dennis R. Hannon has been accepted to National Board membership representing Arkansas.

Mr. Hannon was employed from 1980 to 1990 by Travelers Insurance Company as a boiler and machinery inspector. From 1990 until 1998 he was a shop inspector for Contract Inspection Services. In 1998 he joined the State of Arkansas Department of Labor as a boiler and pressure vessel inspector.


Dennis R. Hannon

New Los Angeles Member

Cirilo F. Reyes has been accepted to the National Board membership representing Los Angeles, California. He serves as safety engineer for the Los Angeles Department of Building & Safety.

Mr. Reyes earned a BSME from the University of the Philippines. In 1973 he became production supervisor at Machine Shop & Foundry, Singer Industries, in the Philippines. From 1977 to 1980 he served as stationary engineer at Encino Hospital. He worked for Hartford Steam Boiler Inspection & Insurance as an authorized inspector from 1980-2006.


Cirilo F. Reyes

New Michigan Member

Boiler Division Chief William Vallance has been accepted to the National Board membership representing Michigan.

Mr. Vallance served in the US Navy during the Vietnam War aboard the USS England CG/DLG-22. Starting his professional career with Hartford Steam Boiler in 1978, he joined Baker Perkins as a quality engineer for ASME in 1981. In 1987 he began his career with the state of Michigan as a deputy boiler inspector and progressed to senior deputy boiler inspector in 1999. In 2001 he became assistant chief inspector and accepted the position of chief in July.


William Vallance

National Board Seeks Inservice Inspection Examination Input

In an effort to expand its examination information base, the National Board is requesting input from pressure equipment industry professionals. To this end, the organization is soliciting new questions to be included in upcoming Inservice Inspection Commission examinations.

"Our goal is to make constructive use of the wide variety of experience available in all sectors of our industry," commented National Board Executive Director David Douin. "In this regard, submissions will help improve our bank of examination material as well as generate questions reflecting a more inclusive industry perspective."

Any individual in the pressure equipment industry – including inspectors, repair firms, AIAs, and owner-users – are encouraged to submit a question. Each person making a submission will receive an acknowledgement and a follow-up as to final disposition of the question.

To submit a question, complete the Test Question Construction Form on the National Board Web site at http://www.nationalboard.org/SubmitExamQuestion.aspx

Call for 2011 Safety Medal Award Nominees

The National Board of Boiler and Pressure Vessel Inspectors is seeking nominations for the 2011 Safety Medal Award. This award, the highest honor bestowed by the National Board, will be presented at the 80th General Meeting in Las Vegas.

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:

- Candidate name, title, employer, and business address.
- A listing of specific candidate contributions or achievements relative to the award.
- A candidate biography that includes positions held, National Board involvement, and participation in industry activities, including any honors and awards known to the individual making the nomination. (Note: In order to be considered, the candidate must have served on a National Board committee or a nationally recognized standards committee, have participated in National Board activities for not less than 15 years, and been recognized as a contributor to professional organizations related to the boiler and pressure vessel industry.)
- Name, title, employer, and business address of the individual submitting the nomination.

Letters of recommendation must be received by December 31, 2010.
Mailing address:

The National Board of Boiler and Pressure Vessel Inspectors
ATTN: David Douin, Executive Director
1055 Crupper Avenue
Columbus, Ohio 43229

"Building Considered Almost Total Wreck"

"This was once an attractive showroom for deep freeze units, stoves, refrigerators and general appliances," reads one photo caption. But on the night of February 27, 1954, a hot water supply boiler exploded and "reduced to shambles" the Truck and Farm Equipment Company building in Marshalltown, Iowa.

According to an article in the *Marshalltown Times-Republican*, dated March 1, 1954, State Fire Marshal Zack T. Cook examined the debris and declared, "After seeing this, there's no doubt in my mind that the boiler exploded."

Mr. Cook observed that some of the flues were bulged upward and others "had been shot about the building like arrows." The roof above the boiler and adjacent wall were completely blown apart with the boiler penetrating 30 inches of a reinforced concrete floor. Authorities conducted an initial test of fuel oil for the boiler and found nothing to cause the explosion.

"The section of the north wall, nearest the boiler, was disintegrated by the blast. All glass in the building was broken, walls were bulged and cracked, doors were torn out of their casings and big holes appeared in the roof where flying debris went through either going up or coming down," the article recounts.

Outside in the display lot ten trucks and five tractors were damaged by debris. One small tractor parked near the boiler room wall was "torn to pieces." The rear tires were blown off and found nearly 20 feet away. Two refrigerators blasted out of the display room and landed on a terrace in front of the building. Brick and tile were propelled 220 feet and punched holes through one wall of the neighboring Beatrice Foods Company building.

Inside the display room five gas stoves, 12 freezers and refrigerators, garden tractors, and other merchandise were destroyed by the impact. Nearly 200 bushels of seed corn stored in the display room were "blown out with the flying glass from the windows."

No one was injured in the explosion, which occurred around 10 p.m. The newspaper reported upwards of $150,000 in damages, comparable to nearly $1,200,000 in 2010 dollars.

WRECKAGE RESULTING FROM EXPLOSION OF HOT WATER SUPPLY BOILER ON PREMISES OF THE TRUCK AND FARM EQUIPMENT COMPANY, MARSHALLTOWN, IOWA - FEBRUARY 27, 1954.


SAVE THE DATE
02.28.11
That's the application deadline for National Board's 2011 Technical Scholarships. These two prestigious $6,000 scholarships are available to children, step-children, grandchildren or great-grandchildren of past and present staff and members of the National Board as well as past and present Commissioned Inspectors employed by a member jurisdiction.
NBBI TECHNICAL SCHOLARSHIP
For full eligibility requirements, go to ABOUT US on the National Board home page, or email Scholarship Coordinator Connie Homer at chomer@nationalboard.org.