BULLETIN

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

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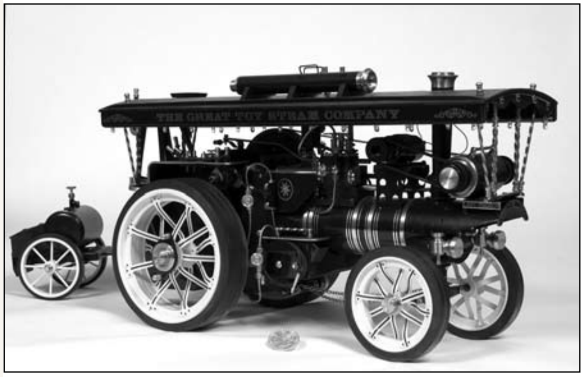

Doug Pusser (cover) of The Great Toy Steam Company wants you to play with his toys. Read more on page 12.

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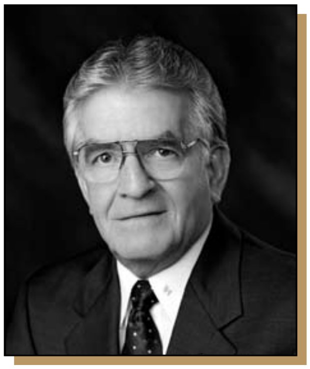


Acknowledging the Past, Celebrating the Future

BY DONALD E. TANNER, EXECUTIVE DIRECTOR

For the National Board, 2006 is a year of milestones.

Having just completed celebration of our 75th General Meeting, we now acknowledge yet another significant event in our organization's long and distinguished history: the 10-year anniversary of the National Board Web site.

It was May 13, 1996, that the National Board launched its home page at the 65th General Meeting in Louisville, Kentucky. Since that time, our Web site has evolved from a veritable cache of articles and news items to a sophisticated communications medium that is today the premiere information source in the boiler and pressure vessel industry.

And we owe it all to you.

Through the support and encouragement of our Web site visitors, the National Board has reshaped its Internet program to provide the industry with what is the most complete online library of technical data on boilers and pressure vessels to be found anywhere. And it's all FREE.

Currently, visitors can access five years of *BULLETIN* articles; check on laws, rules, and regulations for over 75 jurisdictions; comment on proposed changes to the NBIC; ask a code question; preregister for the General Meeting; take an online training course; access a variety of informational publications; order out-of-print ASME code sections; contact a National Board member; register for a National Board seminar; test their technical knowledge; learn of job openings; order data reports; locate authorized inspection agencies; apply for accreditation programs; access team leader information; locate a stamp holder; and check on the latest industry news.

That's only the beginning. Plans call for expansion of online training, making available even more technical material, and adding video.

To those who have never visited *nationalboard.org*, I extend to you a personal invitation to make our Web page part of your professional routine. And to those who have not visited recently, I especially encourage you to stop by and witness for yourself the numerous improvements we have put into place.

As always, we continue to update our home page every other Friday at 9 a.m. (EST). Since 1996, those updates have included over 900 news items from around the industry.

While many other Web sites today charge for accessing online technical material, the National Board has made its content available at no charge. Even data previously accessible for a fee is now free. That is our obligation and commitment to the safety process.

With the exception of the Members Area, every National Board Web site section is readily accessible to any and all. Some sections (e.g., *National Board Synopsis of Boiler and Pressure Vessel Laws, Rules and Regulations*) do require visitors to be registered. Registration is free and provides a convenient mechanism for us to electronically notify you every time the site is updated.

As we are all aware, the Internet has revolutionized the way we communicate. For the past ten years, the National Board home page has played an integral role in sharing with our publics a tremendous archive of data essential to the safety process. It is for this reason I encourage you to visit as often as practicable.

Thank you for ten great years! And thank you for making *nationalboard.org* the number one source for information on the inspection of boilers and pressure vessels.

Let the next ten years begin . . . ❖

Taking on ASME Section VIII, Div. 1, Pressure Vessel Efficiency

by Robert D. Schueler Jr., Senior Staff Engineer

ASME Code Section VIII, Div. 1, Pressure Vessel Code, seems to present a number of questions regarding welded joint efficiency. Part of the confusion stems from a series of revisions, which began during the 1986 edition cycle. The 1987 addenda (along with a number of refinements) through the 1999 addenda changed the old concept of stress multipliers along with the RT definitions in favor of our current system. The current system is based on welded joint category (UW-3), joint type (Table UW-12), and the degree of radiographic examination applied (UG-116[e]).

An additional source of confusion is the location of rules within the code text and how the references are linked together. A common misconception is the code will lead the user to the required rule; this is not the case. All pertinent code rules are in effect at all times. It is up to the code user to search for them.

Presented here is a list of questions and corresponding answers addressing common inquiries about the 2004 Edition with 2005 Addenda of ASME Code Section VIII, Div. 1. While the answers are meant to be helpful, they are merely the author's explanation of the more complex rules found in the code book itself.

Q. *Where do the requirements for pressure part efficiency begin?*

A. Look at the formulas given for each pressure part where the term "E" denotes efficiency. The nomenclature will refer to the rules in UW-12 for joint efficiency. Paragraph UW-12 includes subparagraphs (a) through (f), which refer to UW-11(a) and UW-11(a)(5). For the condition applicable to no radiographic examination, the path from the formula to UW-12 and then to UW-12(c) is correct. Unfortunately for the other plans, this does not direct the user to the true starting point, which can be found in UG-116(e). Paragraph UG-116(e)(1) through (4) provides the definitions of each of the radiographic plans and sends the user along the proper path.

Q. *What is the difference between an RT-1 and an RT-2 vessel?*

A. The definitions for the RT-1 and RT-2 are provided in paragraph UG-116(e) and, by reference, UW-11(a). Paragraph UW-11(a) defines both plans as full radiography. The RT-1 plan requires all butt-welded joints be fully radiographed over their entire length using the criteria in paragraph UW-51. The RT-2 plan requires all category A and D butt-welded joints be radiographed over their entire length using the criteria in paragraph UW-51. All category B and C butt-welded joints must be spot radiographed per UW-11(a)(5)(b) using the criteria in paragraph UW-52. Depending on the welded joint type employed for welded components, the efficiency will normally be established by a category A or D butt-welded joint (UG-27 footnote 15). A vessel complying with either plan will be 100 percent efficient for both components having type 1 welded joints (Table UW-12 column [a]) and seamless head or shell sections (UW-12[d]).

Q. *Can RT-2 be used to satisfy the radiographic requirements of special service lethal construction or must an RT-1 plan be used?*

A. RT-1 must be applied. This is a function of the rule provided in paragraph UW-2(a), which requires compliance with paragraph UW-11(a)(4). Paragraph UW-11(a)(4) ties in the rules in UW-11(a)(1) and UW-11(a)(3) which sets the condition RT-1 as defined in paragraph UG-116(e)(1). Paragraph UW-11(a)(5) was not part of this set of requirements and is therefore not applicable to special service lethal constructions.

Q. *The vessel has a number of longitudinal and circumferential welded joints along with a category D butt-welded joint, all affecting a single cylinder shell section of the vessel. With each of these joints having its own welded joint efficiency, how do you determine what value of "E" is to be used in the formula in UG-27?*

A. The definition of the term "E" in UG-27(b) refers to UW-12 for welded joint efficiency. Based on the requirements for each joint, making contact with the cylindrical shell being considered, a list of all such welded joints and their corresponding joint efficiencies must be compiled. The joint efficiency must be expressed in terms of **equivalent longitudinal efficiency** (see UG-27 footnote 15) for each joint to permit the selection of the controlling item (most severe case).

Example:

The vessel is to be stamped RT-4. The cylinder has a type 1, fully radiographed longitudinal joint in accordance with UW-51. A nozzle conforming to Figure UW-16.1 sketch (f-4) is installed in the cylinder using a type 1 joint which is spot examined per UW-11(b). Seamless 2:1 ellipsoidal heads are attached at both ends and are type 1 butt-welded joints, spot examined per UW-11(a)(5)(b) (also see UW-52[b][4] for limitations). There are no ligament conditions on the cylinder.

Expressed in terms of **equivalent longitudinal efficiency**:

Ligament efficiency
— UG-53 not applicable to this example

Longitudinal cylinder joint
— Table UW-12 column (a) = 1.0

Circumferential joints
— Table UW-12 column (c) = 0.70 x 2 = 1.4

Nozzle joint
— Table UW-12 column (b) = 0.85

Based on this, the lowest value of "E" used in the equation will be 0.85 resulting from the nozzle joint.

Q. *Given a seamless head or shell section, other than a hemi-spherical head (see UG-32), what is the design efficiency of the seamless section?*

A. Paragraph UW-12(d) answers this question with a question, as follows: Was the weld(s) joining the seamless head or seam-less shell spot examined per the rules given in UW-11(a)(5)(b)? If yes, the seamless head or shell efficiency is set at 100 percent. If no, the seamless head or shell efficiency will be set at 85 percent.

Q. *When following an RT-3 plan per UG-116(e)(3), can seamless head or shell sections have an efficiency of 100 percent?*

A. No, RT-3 complies with the rule in UW-11(b). The requirement that would permit a higher efficiency is found in paragraph UW-11(a) and is not applicable to a UW-11(b) spot radiographic plan. Therefore, the rule in UW-12(d) will set the efficiency at 85 percent. Note: UW-11(a)(5)(b) cannot be applied with RT-3 (see UW-52[b][4]).

Q. *If the answer to the previous question is no, what would be required to permit a higher efficiency for seamless head and shell sections?*

A. It will be necessary to select an RT-1, RT-2, or RT-4 plan in which the requirements of UW-11(a)(5)(b) will be satisfied.

Q. *Can a nonradiographed vessel have aligned vessel longitudinal joints between courses?*

A. No, with a nonradiographed construction, the rule in UW-9(d) takes on a different meaning and must be read as mandating the joints be staggered a distance greater than five times the plate thickness.

Q. *How can one determine the applicable RT number from the data listed on the Manufacturer's Data Report?*

A. Based on the information provided, with the exceptions of an RT-4 and nonradiographed vessel, the RT level cannot be determined from the data report. Only a limited amount of weld joint efficiency and degree of radiographic examination information is required on the report. The actual RT number only appears on the vessel stamping (see UG-116[e]).

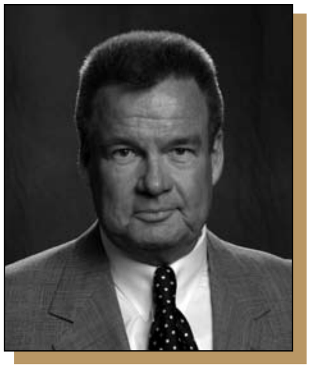
Q. *What is the difference between a type 1 and a type 3 single-sided butt-welded joint made without backing?*

A. Weld types are defined in Table UW-12. Type 1 welds include single-sided butt-welds made without backing. To be a type 1 weld, both sides of the weld must agree with the requirements of UW-35. A type 3 weld is described as the same single-sided butt-weld made without backing, but it does not require agreement with UW-35. Paragraph UW-35(a) states: "Butt-welded joints shall have complete penetration and full fusion." The paragraph then goes on to describe the as-welded condition required on both sides of the weld. The determination as to the weld type becomes a question of proving the condition of the as-welded joint on both the inside and outside weld faces. A type 1 weld must be examined over its full length on both surfaces to ensure requirements of UW-35 have been met. Failing to provide this examination will result in the weld joint defaulting to type 3.

Q. *Can a radiographic examination of a type 3 weld provide the necessary assurance that the single-sided butt-weld, made without backing, meets the requirements of a type 1 weld?*

A. No, radiographic examination will not prove full fusion, full penetration, or the actual surface of the opposite face of the weld. It suggests these things but cannot be considered satisfying the UW-35 requirement. Radiographic examination yields a two-dimensional image while our question needs three-dimensional verification.

Do you have a question not covered here? Send it through the "HAVE A QUESTION?" link at *nationalboard.org*. A National Board staff member will respond to your inquiry in an expeditious manner. ❖



An Idea Whose Time Has Come . . .

BY PAUL BRENNAN, DIRECTOR OF PUBLIC AFFAIRS

"The problem with bad ideas is that they seemed like good ideas at the time."

I have no inkling who came up with this clever but true witticism. However, it brings to mind something occurring in our industry that merits serious attention: the absence of pressure vessel laws in more than twenty percent of state jurisdictions.

Currently, the states without a pressure vessel law number eleven: Arizona, Connecticut, Florida, Louisiana, Michigan, Montana, New Mexico, South Carolina, South Dakota, Texas, and West Virginia. Despite the diverse geography of these jurisdictions, most share a similar history in the development of their boiler laws.

It was then jurisdiction officials considered it prudent to pass *only* boiler legislation while at the same time agreeing to later revisit pressure vessel regulation. Problem is, later never came. And it may not. (Hence the bad idea, good idea thing.)

History notwithstanding, there has been very little enthusiasm over the past several decades to pass legislation in nonpressure vessel jurisdictions. Until recently.

Alabama passed a boiler *and* pressure vessel law in 2000. And at least one state boiler board has committed itself to making a pressure vessel law reality within the next two years. In another energy-producing state, equipment conditions are such that an independent federal agency has indicated it might actively campaign for pressure vessel regulation.

In today's world, passing new pressure equipment legislation is as elusive as defining the meaning of life. Special interests in the states without pressure vessel regulation have pledged such laws will never become part of the legislative fabric.

The irony is, now more than ever, *every* jurisdiction *should* have a pressure vessel law.

If you don't think so, visit the U.S. Chemical Safety and Hazard Investigation Board Web site (*www.csb.gov*). Specifically, go to the *Current Investigations* page or the *Investigations Completed* page. More than half of these investigations have involved pressure vessels and the release of hazardous materials.

The fact that pressure vessels frequently contain a variety of chemicals and deadly gases is particularly troublesome. An explosion not only has the capacity to kill those who happen to be close by, it can set in motion the release of hazardous material potentially catastrophic to the surrounding community.

The inherent danger of pressure vessels is not new. The National Board has issued warnings since its inception. In an analysis of National Board incident reports several years ago, the Summer 2002 *BULLETIN* revealed: *"When it comes to equipment categories, UNFIRED PRESSURE VESSELS proved by far to be the deadliest. During the ten-year reporting period [1992 – 2001], a total of 64 persons were killed by UNFIRED PRESSURE VESSELS . . ."*

That total was equal to the number of deaths over the same period caused by power boilers, water-heating boilers, and steam-heating boilers *combined*.

As you know, the National Board no longer collects incident report data. The reason: these reports only identified accidents involving owners and operators. We will never know how many innocent bystanders were victims of pressure vessel accidents. Nor will we know the number of people killed or injured in those states without a pressure vessel law (there are no regulations requiring collection of this data).

What we *do* know comes from the 2003 Incident Report, the last one published by the National Board: pressure vessels accounted for *every one* of the eight lives lost that year.

It is no secret certain energy, manufacturing, and retailing interests have provided formidable opposition to pressure vessel regulation. Unfortunately for those states without a law, that opposition may have contributed to hundreds of deaths and untold destruction.

Apparently none too concerned, special interests have been more proactive lately in seeking to attenuate even long-standing jurisdiction regulations. Recently, legislators in one Midwestern state significantly modified pressure limits to preclude inspection of a variety of pressure vessels that were heretofore regulated. In another instance, a powerful legislator with close ties to food retailers was able to secure a questionable exemption for pressure vessels containing refrigerated liquids. According to the chief inspector who strongly objected to the regulatory change, "It was a significant victory for both the equipment manufacturer and the beverage industry."

A chief inspector from a nonpressure vessel state recently told me that although pressure vessel users from large companies reap appreciable benefits sans regulation, it is the thousands of smaller users who are big winners. "For some of these businesses," he laments, "no fees and no inspections mean no additional expenses, and no proper maintenance or record-keeping. That's where problems begin." And sometimes end.

Like boilers, *all* pressure vessels need to be periodically inspected by a commissioned authority. And like boilers, pressure vessels are vulnerable to many of the same perils that prompt explosion. The 2002 *BULLETIN* listed OPERATOR ERROR OR POOR MAINTENANCE as the leading cause of pressure vessel accidents *ten years in a row.*

Granted, a jurisdiction with a pressure vessel law may not necessarily be statistically safer than a state without. But states *with* regulations do have an inspection mechanism to correct violations. Since 2000, those violations nationwide have totaled over 26,000 (or over 26,000 accidents that might have been prevented). Obviously, we have no idea how many violations might have been reported in those jurisdictions without a law.

As for the hope pressure vessel legislation will be passed sometime soon in the aforementioned eleven jurisdictions, there is good news and bad news. First the bad: legislators in these states do not assign a high priority to pressure vessel regulation. The good news: if you live in one of these states (and there are 64 million of you), contact those legislators and register your concern. While the odds of modifying their priorities may seem remote, these elected officials do take constituent issues very seriously.

If enough people call and write, legislators may have more than a passing interest in your state's next pressure equipment accident. After all, *accidents are the number one cause of safety legislation* (another great witticism – but true). Sadly, it need not be that way.

If you agree, pick up the telephone and call your legislator TODAY. Someone's life could depend on it. Maybe yours.

STRENGTH IN NUMBERS

Although it has received little notice, National Board membership is now at an all-time high. As of this writing, there are 64 members, or about four more than the yearly membership average. The increase is primarily attributed to the addition of chief inspectors now representing new jurisdictions. These include: Alabama, Idaho, New York City, and Nunavut Territory.

The year 2005 was one of the busiest on record for new members. A total of 11 chief inspectors were approved including new members succeeding previous members in Arizona, Iowa, Louisiana, Manitoba, Montana, Oregon, Pennsylvania, Saskatchewan, and Washington. ❖

Lay-up of Heating Boilers

by Robert Ferrell, Senior Staff Engineer

Each spring, the National Board receives inquiries from concerned boiler owners and operators about the best method to lay up a heating boiler for the summer.

The primary purpose of laying up a boiler is to extend its life. A boiler should be shut down when not required to provide heat. We "lay up" the boiler to prevent further corrosion on both the waterside and fireside, which enhances longevity. A secondary purpose of laying up a boiler — and an economic savings opportunity — is to perform an inspection of its condition during shutdown. This aids in evaluating the water treatment requirements on the waterside and the combustion efficiency on the fireside.

The recommended method of boiler lay-up is dictated by a boiler's type and size, and by economic and safety-oriented advantages achieved performing the lay-up.

There are different types of lay-up to be aware of. This article focuses on dry lay-up and wet lay-up. Some factors in the selection of lay-up include length of shutdown time, size and type of boiler, and the amount of effort to refill and monitor the boiler with treated water.

Before beginning lay-up and cleaning of a boiler, be sure the combustion system is performing efficiently. This will minimize creation of soot in a clean boiler when started in the fall.

Dry Lay-up

(recommended for steel steam boilers)

Dry lay-up should be used when the boiler will be shut down for an extended period or when there is no urgency to restart (as with a standby boiler). This method also works in areas where the idle boiler may be exposed to subfreezing temperatures. Unlike the wet lay-up method, it requires a minimal amount of monitoring.

After performing a lock-out and tag-out of the system, the steps for dry lay-up can be as simple as:

1 — Draining the boiler

Perform a bottom blow-off on the boiler before and then after shutdown to remove sediment and scale and to drop the unit's pressure and temperature. Once the unit is at zero psi gage pressure and water temperature is under 140°F, open an air vent and boiler drain to empty the boiler. **Do not use the safety valves for vents.** If a vent valve is not installed, remove the plug or cap on the top cross-fitting of the water column and install one on the side of a tee. This will also allow venting of air during the refilling of the boiler.

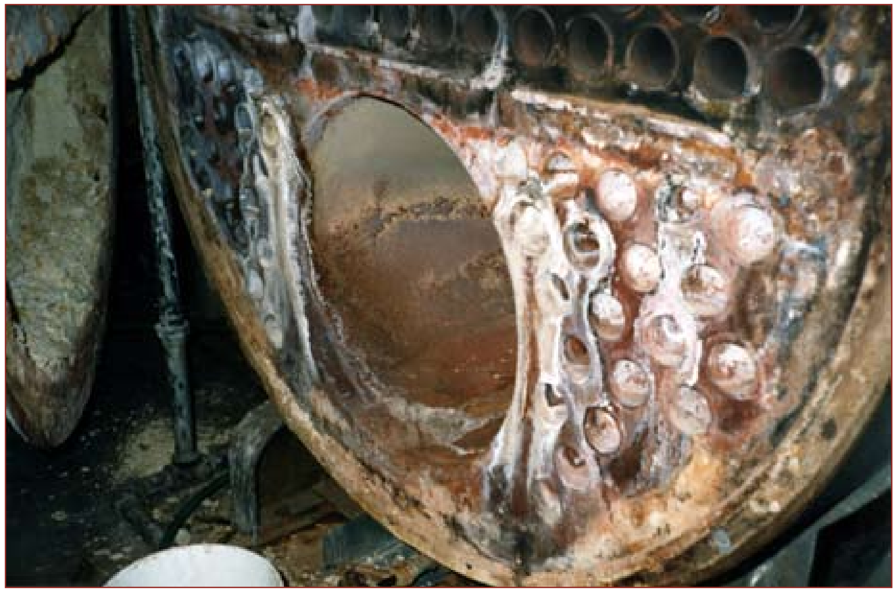
2 — Opening the fireside

When cleaning the boiler, remember that soot is easier to remove when it is warm and dry. Some technicians fire the boiler to get the water and soot warm before cleaning. The method of removing the soot on the tubes must take into account tubes using extended heating surfaces or dimpled tubes. Manufacturer's instructions should be followed to minimize metal removal on the tubes.

While cleaning the boiler's fireside, look for rust (orange) or scale (grayish white) trails on the pressure boundary wall. Mark those areas for further evaluation of leakage. Look for soot trails on fireside gaskets to evaluate possible short-circuiting of combustion gases, corrosion of the gasket seating surface, and overheating of air-cooled surfaces. Discolored or chalky paint is an indication of possible overheating.

Inspect refractory and insulation on the fireside. Small cracks in refractory are normal due to expansion and contraction, especially

Possible leaks can be detected on the fireside of this firetube boiler. *Courtesy of Gurina Company.*



where openings such as observation ports pass through the refractory.

3 — Opening the waterside
With the outlet, feed, and make-up valves locked and tagged closed, and the air vent valve locked and tagged open, remove all inspection opening closures.

Look for signs of gasket leakage and potential corrosion of the gasket seating surface (which could prevent a good seal). Inspect all hand-hole and manway yoke bolts and nuts for deterioration (which could prevent uniform tightening of the gasket). Using a battery-operated light, inspect the waterside (in accordance with all applicable confined space entry procedures) and evaluate the scale and corrosion condition. Wash down the boiler and attempt to move all scale and sediment out of the washout openings at the bottom of the boiler. Any scale and sediment not removed will trap moisture and oxygen and corrode the boiler.

4 — Drying all surfaces
Depending on ambient air temperature, a fan can be used to blow dry the waterside. Electric air heaters can be used on the fireside to warm and dry out the waterside. It is not recommended to use fuel-fired air heaters because of the potential of adding moisture or getting petroleum products on the waterside or soot on the fireside.

5 — Performing examination
Closely examine all surfaces showing potential leakage. Dye-penetrant examination is an inexpensive method to check leaks for potential cracking. A pressure test may be required before startup. Refer to the *National Board Inspection Code*, Part RB-1000 through 5000, and the National Board Web site (*nationalboard.org*) under the Inspectors' Corner/Inspector Guides links for guidance.

6 — Determining if any repairs are required
Make repairs using an organization meeting jurisdiction requirements. In most cases, the jurisdiction will require an "R" Stamp. A listing of "R" organizations can be found in the *Manufacturer/Repair Directory* on the National Board Web site.

After examinations and repairs are completed, fireside surfaces can be swabbed with neutral mineral oil to prevent further corrosion. It is important to remember that the initial light-off may be a little smoky until the oil is burnt off or the boiler water is hot enough to evaporate the oil.

7 — Closing the dry boiler
If the ambient air is always dry, the boiler can remain open. However, if humidity and dew points get high, then the boiler should be closed. Before closing the boiler, place moisture-absorbing material such as silica gel or lime (also called unslaked lime, quick lime, calcium oxide, burnt lime, calx, and caustic lime) in the waterside and fireside. (This is not required on the fireside if it is swabbed with mineral oil.) Use a flat tray or pan to contain the material. Set it inside the boiler, and close all openings. This material should be renewed or redried every three months.

The stack should also be covered to eliminate moisture accumulating near the boiler stack connection. A sign or tag should be placed on

The waterside of this watertube boiler clearly shows deposits. *Courtesy of Gurina Company.*

the boiler power disconnect to warn of the stack cover. A stack damper does not provide a sufficient seal from the main stack. If the main stack cannot be sealed, slip a piece of sheet metal between the boiler exhaust flange and stack flange.

For smaller boilers, incandescent lights have been used to keep the boiler and/or control panel warm to prevent the collection of moisture. Electrical safety should be considered before placing light fixtures in a boiler.

Wet Lay-up

(recommended for steel water boilers and cast-iron boilers, both steam and water)

The steps of preparing a boiler for wet lay-up are essentially the same for dry lay-up. The exception is when a boiler is closed and prepared to be filled with water and water treatment chemicals.

Perform dry lay-up steps 1-6 (except do not swab the fireside with mineral oil) and then follow with step 7 below.

7 — Filling the boiler with water and treatment chemicals

The alkalinity should be adjusted to greater than 400 ppm. This prevents acidic corrosion of the waterside. Tri-sodium phosphate or caustic soda has been used in the past to accomplish this (about 3 pounds/1000 gallons). Also add an oxygen-scavenging chemical such as sodium sulfite to a concentration greater than 200 ppm (about 5 pounds/1000 gallons) or sodium chromate (100 ppm steam, 300 ppm water boilers) or hydrazine (consult a water treatment company for concentration information).

Fill the boiler to its normal operating level with water hotter than 180°F. This temperature helps drive off dissolved gases. If hot water is not available, heat the water using the boiler's burner after the water level reaches the lowest permissible level as marked on the boiler. Vent the air and gases as needed. Since there is no feed or condensate tank to introduce the treatment chemicals on water boilers, it is recommended the chemicals be premixed with water before being placed in the boiler. Fill the boiler, allowing air to continue to vent until the water boiler is full or until the steam boiler is at its normal operating level and warm.

When Wet Lay-up Is Complete

It is strongly recommended boiler water be circulated periodically to prevent stratification of chemicals. The burner can be used to warm the water and induce natural circulation. A water boiler can use its system circulator but this will change the concentration of chemicals when diluted by system water.

Monitor the chemical concentrations routinely while in lay-up. System leaks will cause make-up water to be introduced and with it more oxygen and carbon dioxide.

Before starting a steam boiler in wet lay-up, perform a bottom blow-off of the boiler to reduce the alkalinity (thus minimizing the chance of carryover). For all boilers, ensure all tags and locks are removed, and witness the system cycles for a minimum of three cycles. This will help ensure proper operation of the boiler before leaving it in automatic mode. ❖

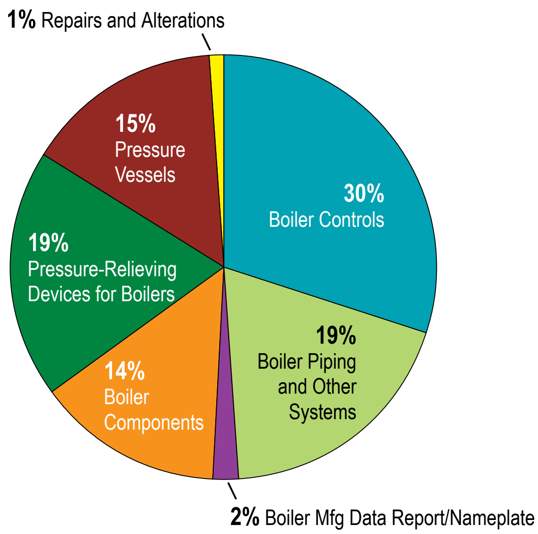
2005 Report of Violation Findings

The National Board Annual Violation Tracking Report identifies the number and type of boiler and pressure vessel inspection violations among participating member jurisdictions. The chart below details violation activity for the year 2005.

The Violation Tracking Report indicates problem areas and trends related to boiler and pressure vessel operation, installation, maintenance, and repair. Additionally, it identifies problems prior to adverse conditions occurring. This report can also serve as an important source of documentation for jurisdictional officials, providing statistical data to support the continued funding of inspection programs. ❖

Annual Report 2005

Category	Number of Violations	Percent of Total Violations
Boiler Controls	16,543	30%
Boiler Piping and Other Systems	10,423	19%
Boiler Manufacturing Data Report/Nameplate	1,195	2%
Boiler Components	7,821	14%
Pressure-Relieving Devices for Boilers	10,183	19%
Pressure Vessels	8,187	15%
Repairs and Alterations	809	1%

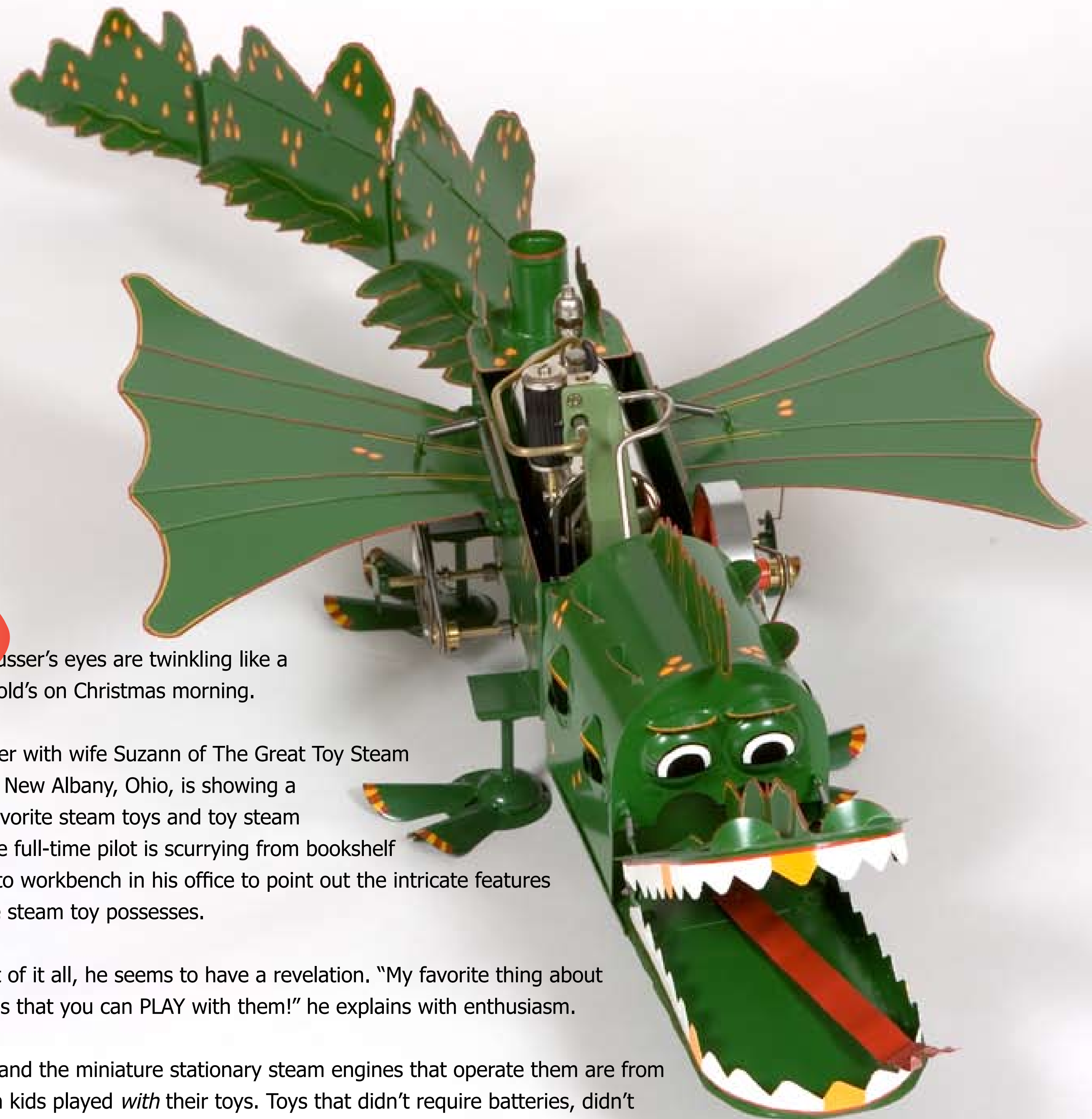


Summary for 2005

Number of jurisdictional reports:	388
Total number of inspections:	688,539
Total number of violations:	54,352
Percent violations:	8%

Playing With

A Look at the Past and Present o



Doug Pusser's eyes are twinkling like a seven-year-old's on Christmas morning.

Pusser, owner with wife Suzann of The Great Toy Steam Company in New Albany, Ohio, is showing a visitor his favorite steam toys and toy steam engines. The full-time pilot is scurrying from bookshelf to tabletop to workbench in his office to point out the intricate features each unique steam toy possesses.

In the midst of it all, he seems to have a revelation. "My favorite thing about steam toys is that you can PLAY with them!" he explains with enthusiasm.

Steam toys and the miniature stationary steam engines that operate them are from a time when kids played *with* their toys. Toys that didn't require batteries, didn't necessitate other playmates, and didn't warrant parental guidance ratings. Live steam toys

Photography by Greg Sailor

Fire

f Steam Toys and Miniature Steam Engines

and toy steam engines are interactive and educational, providing the lure of mechanical action and immediate enjoyment and fun.

The first rule of thumb with these toys is that they are just that — *toys*. While they may be pricier than the games found in toy stores today, they are meant to provide hours of enjoyment for kids of all ages. And although some of the high-end steam toys seem almost too splendid to play with, they are all built to be functional. Worldwide, more than 30 manufacturers of steam toys still exist, making stationary, marine, mobile, and railway steam toys, engines, and accessories.

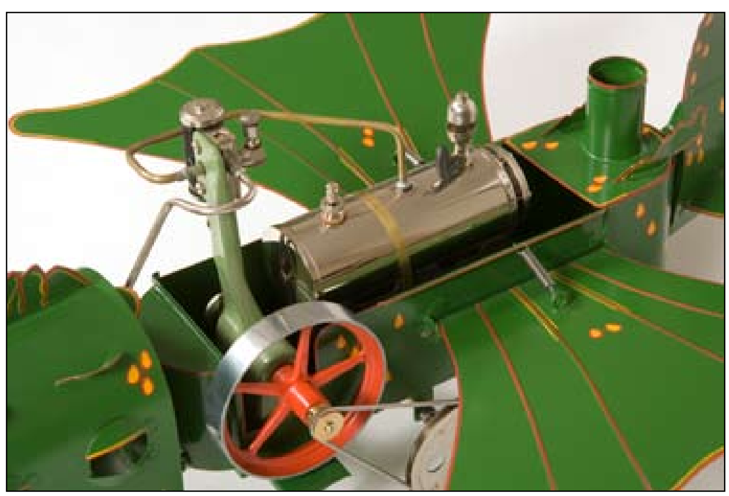
Just as much fun — if not more so to some — are the miniature steam engines that help bring steam toys to life. Essentially a stationary steam power plant, the toy steam engine can be a thrill on its own, with its interactive boiler and moving parts. And when not in use, it is considered by many a stunning display of mechanical art.

The Great Toy Steam Company sells new and used steam toys and miniature steam engines solely online through its Web site (*ministeam.com*). The company has been in business three years and has seen sales increase between 30 percent and 40 percent each year, making it one of the largest e-commerce steam toy dealers in the world. Sales in 2005 alone grossed $400,000.

Pusser attributes rising sales to older folks becoming more computer savvy. "I would say our average customer is at least 60 years old, someone who remembers playing with these types of toys when he was little. They generally are stunned and thrilled to find them again. They are eager to recreate the magical memory by buying one for a grandchild. It is passing the torch, so to speak," he speculates.

While most of its customers are in the United States, The Great Toy Steam Company ships worldwide and has patrons in Tasmania, Ireland, New Zealand, Japan, and Germany, to name a few.

Pusser's interest in steam toys began when, at seven, he was given a Jensen steam engine as a present. After years of enjoyment, the toy, like the fate of most, was forgotten. Nearly twenty years passed before the engine was found again. As an adult with a bent for mechanical tinkering, Pusser found the toy fascinating in a whole new way. While traveling Europe, Pusser took some time to visit a couple of steam toy manufacturers' factories. His interest grew from there, taking an entrepreneurial path. He decided to



A close-up of the miniature boiler that operates a steam toy dragon.

become a dealer — so not only is he an owner of a steam toy business, but he is a lover of the gadgets as well.

Folks like Pusser who grew up with a steam toy can appreciate the qualities that set them apart from other toys: this plaything is functional, beautiful to look at, and will stand the test of time for generations to come. In particular, Pusser attributes the toys' educational aspect to the Germans, known to create toys that surpass normal engineering standards and have increased play value.

With steam toys, the fun begins with the miniature steam engine, powered by a very small boiler. Most toy boilers are brass with nickel-plating. When asked about boiler construction standards, Pusser explains that most toy boilers are of high quality, built with good materials. Companies are known to perform their own safety tests and inspections. He goes on to say the standards in England and Germany used to construct these boilers are also well-thought out, resulting in numerous quality and pressure tests that are validated by accompanying certification.

While some people may casually refer to these boilers as miniatures, they are not a miniature boiler in the strict sense as defined by ASME Code Section I. Other people may refer to these boilers as hobby boilers. Here we run into a term used to define a specific boiler application within jurisdictional laws and regulations. These boilers may be operated in a hobby or recreational environment, but most jurisdictional laws and regulations were written to address larger hobby boilers operating at higher pressures. Nevertheless, these boilers *may* be subject to individual jurisdictional regulation if operated in a public venue.

Miniature steam engines come three ways: completely unbuilt as a casting kit, partially fabricated as a machined kit, and completely assembled, ready-to-run. While about 80 percent of The Great Toy Steam Company's customers order the steam engines completely built — mostly due to a lack of the machinery needed for finishing such a piece of equipment — casting kits are popular nonetheless. The project is a fun one for grand-fathers or fathers to do with their adolescent engineers.

But the question must be asked: can building and subsequently playing with steam engines be dangerous? Pusser explains, "The level of steam power involved is so low that you are basically boiling tea. However, it is essential the relief valve is checked before a boiler is fired. And that the boiler has enough distilled water in it to not run dry. Those are the two most important things to pay attention to when playing with this equipment."

The boilers on these miniature steam engines are generally fired by a dry fuel tablet (one 14-gram tablet can bring about two cups of water to a boil in about five minutes), a butane burner, or an electrical heating element. The die-hard collector who wants to keep his toys in pristine condition uses an air compressor when he wants to run a toy, as firing the boiler decreases its resale value.

Steam created by the boiler demonstrates the basic principle of changing heat and water into mechanical power. So how exactly does the magic happen? In a nutshell, water in the boiler is heated, generating steam. Once steam pressure is high enough for use, it can be released to a reciprocating engine to create useful work. Generally, how *much* steam is released is controlled by a throttle valve, which allows the speed of the engine to be

Steam toy replicas of the *Titanic*, the gun boat *Schwaben*, and the *Queen Mary*.

regulated. Simpler engines have no throttle valve and are controlled solely by steam pressure.

After passing through the throttle, the steam is directed to the reciprocating engine, sometimes by way of a superheater. A superheater simply adds heat to the steam, usually by running the steam pipes past the boiler's heat source. Hotter steam contains more energy, so it can do more work more efficiently. Steam systems that do not use a superheater are referred to as "saturated" systems.

When the steam arrives at the engine, it is directed into one end of a cylinder via a sliding valve. Once in the cylinder, the steam expands and pushes against one side of a piston — this is a power stroke. The piston's motion is then transferred to a crank by a connecting rod. This rotation is what gets the flywheel — or the ship's prop, or the railroad locomotive — moving. The valve's motion is also keyed to the crank (the rod that moves the valve back and forth is attached to an eccentric lobe or crank attached to the crank).

Just prior to the piston reaching the end of its stroke, the valve cuts off admission of any more boiler steam. In models this is usually pretty close to the end of the piston's stroke. On full-sized steam engines, fresh steam admission may be cut off after as little as 65 percent of the piston's stroke. This increases efficiency by allowing the trapped steam's expansion to push the piston instead of drawing down boiler pressure. Close to the end of the piston's stroke, the valve opens a port to exhaust the spent steam. This is when you hear the "chuff," and when the steam inlet port for the opposite end of the cylinder is exposed. Fresh boiler steam is admitted and a power stroke begins in the opposite direction, continuing rotation of the crank via the connecting rod. When this power stroke reaches the end of its stroke, the whole cycle starts over.

Jensen steam engine Model #76 Kit.

Because most "mill-type" steam engine models have only one cylinder, the crank will be attached to a flywheel to prevent the engine from becoming stuck at either end of the piston's stroke. The flywheel carries it past these points with the energy it has stored from the previous power strokes. (Most models require the flywheel be turned by hand to start.)

Most point to James Watt of Scotland as the developer of the steam engine we know today. He was instrumental in refining a more modern version of the existing atmospheric engine, helping to push forward the industrial era that was underway in the second half of the 18^{th} century. Working from the (Thomas) Newcomen atmospheric engine, Watt implemented a separate condenser that increased energy efficiency, and later improved the design of steam-driven pistons, resulting in a method that converted reciprocating motion of the piston to rotating motion. It wasn't long before his modifications were incorporated into successive machinery.

Historical credit for being one of the first builders of model steam engines goes to Ernst Plank of Nuremberg, Germany, established in 1866. Seven other major toy steam engine manufacturers were also located in the Nuremberg area: Bing, Carette, Doll, Falk, Krauss Mohr, Marklin, and Schoenner. England played a role with manufacturers Mamod, Bowman, and Burnac, with the US joining in with Ind-X, Empire, and Weeden. It is estimated that between the 1880s and the 1960s, nearly half a million model steam engines were built. Stuart Models of the United Kingdom boast they are the oldest company in the world still producing a range of model steam engines, setting up shop in 1898.

Jensen Steam Engine Manufacturing, established in 1932 and located in Jeannette, Pennsylvania, touts itself as the oldest surviving toy steam engine manufacturer in the world today making by hand stationary model steam engines, steam turbines, and miniature power-generating plants. Additionally, the company makes boilers, using seamless brass tubing.

According to Jensen's Steve Tyner, "Jensen hand-builds each of our toy steam engine boilers beginning with seamless brass tube stock. The steam ports for a miniature whistle, the all-important safety relief valve, and the steam dome are added using specially created dies, on our heavy press. Boiler end-caps are also press-formed from heavy sheet brass. Once each boiler component part is completed, they are hand-cleaned and assembled before being annealed and silver-soldered on a special turntable device. This process adds an additional level of safety to the boiler.

Each one is subjected to close individual inspection. Once the vessels have cooled, they are hand-polished and packaged for shipment to an outside vendor for nickel plating."

When asked about superiority between engine manufacturers, Pusser answers diplomatically. "Each manufacturer has its own characteristics. For example, Jensen is known to make their engines and particularly their boilers with the strongest materials. Mamod is known for its steam car and English bus lines. Wilesco products look nice and are the world's largest manufacturer of toy steam engines. The mark of a well-manufactured steam engine is longevity. Good model steam engines will appreciate in value."

Steam toy manufacturers took advantage of this engineering technology and began popping up in the 1860s. Unquestionably, some of the best toy manufacturers were located in Europe. These manufacturers were most prolific from the 1890s through the 1930s, considered the golden age of steam toys.

One of the most striking lines of tin steam toys comes from German toymaker Tucher & Walther. Tucher & Walther was established in 1977 by Elisabeth Walther and Bernhard Tucher as a private company in Germany's traditional toy center, Nuremberg. Their idea was to sell traditional tin toys to collectors, starting out as a little repair shop, restoring old tin toys produced by defunct local factories.

Business developed rapidly — the antique toys proved to be a bestseller. By 1979, the company was not only selling the antique toys but new ones as well, kicking off their own line with a handmade zeppelin and Ferris wheel. Growth resulted in a move to a larger building in 1991, where today the company produces hand-painted tin toys for the entire world.

Walther explains their process: "Handmade tin toys are manufactured in limited editions — between 50 and 500 pieces, depending on the item. Mr. Tucher does all the inventions and designs, creating more than 10 new items each year. The base material is the tin plate. The material is then cut, punched, stamped, curved, and embossed. Each individual part of the tin toy body is then soldered together by hand. After that, the items are fit up, sprayed with color, and finally hand painted.

"It is the old traditional method, similar to that used during the peak time of tin toy production in Nuremberg from

Tucher & Walther "Shooting Man" Model T 564. Only 500 made.

Tucher & Walther "Artist at Easel" Model T 419. Only 1,000 made.

Morton Hirschberg, author of *Steam Toys – A Symphony in Motion.*

1880 to 1920. However with the introduction of plastic, tin toys lost their popularity and became instead a beloved item for collectors."

For a closer look at the world of steam toy collecting, the *BULLETIN* sought out collector Morton Hirschberg. Known to have one of the largest collections of steam toys in the world, Hirschberg is retired from a career in computer science, working mostly as a civilian employee of the US Army. He is past president of the Antique Toy Collectors of America and author of *Steam Toys — A Symphony in Motion*.

Hirschberg started collecting toys in 1980. "At first I bought only early-American cast-iron toys — bell toys and Hubley Royal Circus. Then in 1982 I saw a beautifully displayed collection of steam toys. Having limited financial resources, I came to the conclusion that I could not be an eclectic collector and that it would be much better for me to focus. Steam toys were charming, painted, and articulated. All the attributes I needed," he says with satisfaction.

He is proud of his collection, explaining that most of his toys are operational. His oldest pieces include a Schoenner four-horse carousel, circa 1875. Additionally, Hirschberg has several toys from around 1890, namely the Carette ballerina toy with two girls wearing their original cloth tutus, the Bing Linen, and the Bing Cotton Mill.

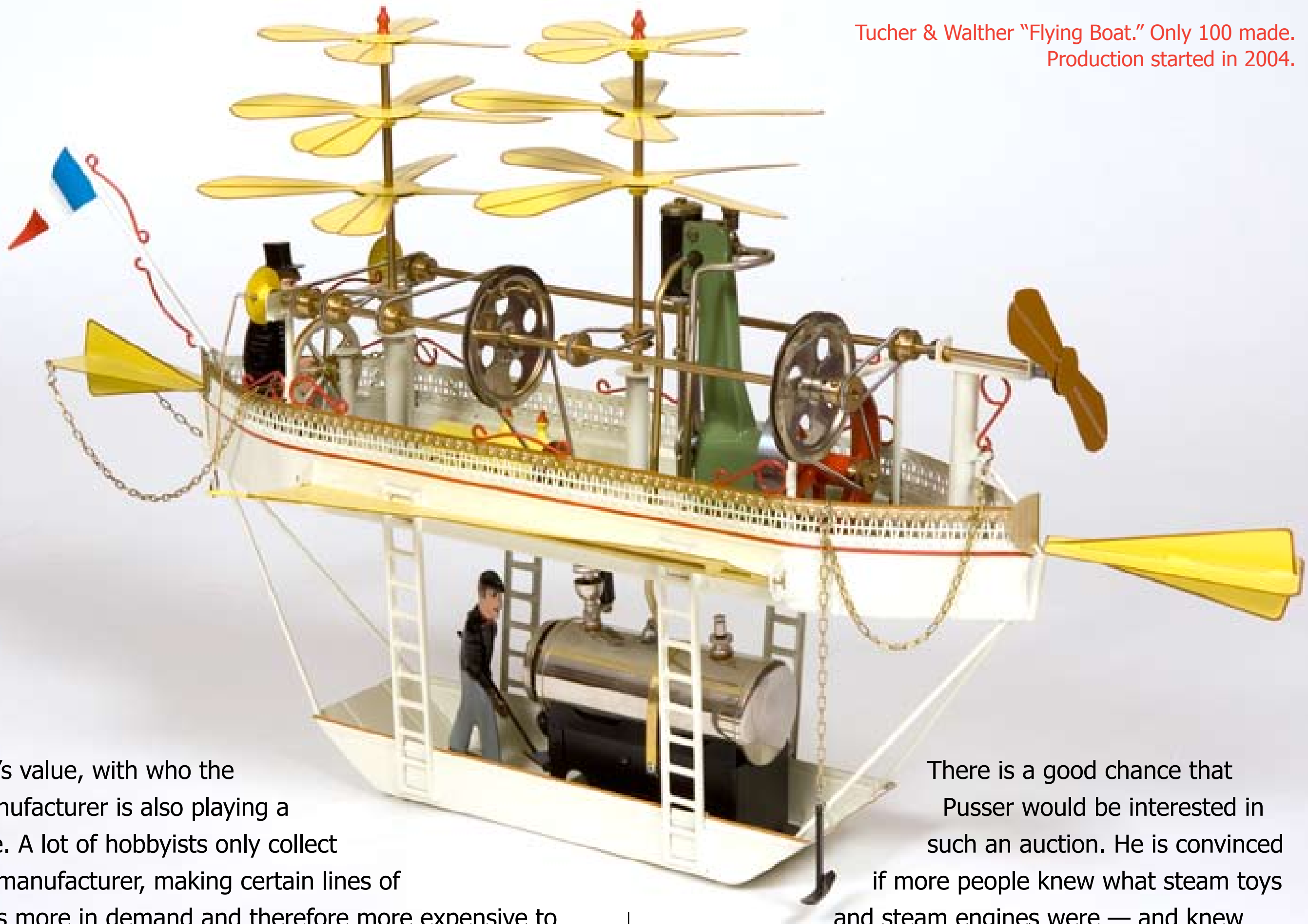
He is adamant about displaying his collection, rather than storing the pieces. "I feel it is criminal to have a collection stored away. After all, it is the visual sensation derived that gives meaning to the collection," he reveals with conviction.

While he has purchased a number of German toys from online auction site eBay, Hirschberg finds most of his goodies at auctions, toy shows, and dealers. His advice to someone interested in purchasing a steam toy is that it is never too late to begin a collection.

"My suggestion is to buy the most expensive piece you can afford. One or two 'good' toys will certainly keep their value as opposed to the middle and low-end pieces. In case of more common items, buy them in near-perfect condition with the original box, if possible. Condition should always be a consideration. The less restorative work that needs done — if any for that matter — the better. Finally the price paid should be commensurate with the piece purchased," Hirschberg explains.

He speculates that since the mid-1980s, condition has been the overwhelming driving factor in determining an antique

Limited edition reproduction of a Marklin 1930s stationary steam engine, with a limited edition reproduction of an early 1900s Marklin carousel.



Tucher & Walther "Flying Boat." Only 100 made. Production started in 2004.

toy's value, with who the manufacturer is also playing a role. A lot of hobbyists only collect by manufacturer, making certain lines of toys more in demand and therefore more expensive to acquire. He adds that rarity cannot be overlooked, citing a number of recent auctions in which rare pieces have done extremely well. Antique steam toys can cost as little as a hundred dollars and run up to five figures.

Hirschberg agrees with Pusser that running a steam toy with a steam engine can decrease its value. "If the toy is painted, whether new or old, firing up an engine can immediately strip a good deal of paint away, decreasing the value dramatically. To run a steam toy with an engine requires they both be fastened to a board and connected by a spring. Both the mounting and the spring can damage the toy," he advises. Of course if you are more interested in enjoying your steam toy than reselling it, both men encourage you to go right ahead and take advantage of a steam engine's most dynamic property — steam technology.

Hirschberg continues to seek out special pieces to add to his collection, but he is mindful that he won't be around forever to enjoy his toys. "As with many of the collections we have seen and known about since we started collecting, our wish is to sell the collection at auction so that others may have the opportunity to purchase them and delight in them as much as we have," he says with a smile.

There is a good chance that Pusser would be interested in such an auction. He is convinced if more people knew what steam toys and steam engines were — and knew where to find them — they would become steam enthusiasts. Pusser is looking to grow his Web site and sees a huge niche for his company, particularly in Japan and Germany where the number of visitors to his site is increasing constantly. With The Great Toy Steam Company stocking around 1,000 different steam toys, miniature steam engines, and accessories, Pusser thinks the company could realistically gross $4 to $5 million someday. It is clear his enthusiasm for steam toys and his desire to share them with the world are driving his business plan.

Steam toys hold a special place in many a heart. The interest is fostered most often at a young age and the fascination generally lasts a lifetime. They are valued not only for their aesthetic worth but for the ideals they represent. The toys stand for a simpler time, when a child was thrilled to get a toy and played with it for hours. They are beautiful, artistic, delicate, powerful, dirty, and fun, which is why so many are captivated by them. How many toys can claim to have been played with for so many generations? More than just a mere *toy* — neglected and often discarded in short order — steam toys influence and change lives. Ask any "kid" who has one. ❖

Boiler Recovery

Monday, August 29, 2005, will forever be remembered as the day hell broke loose in the South. Hurricane Katrina — the *eleventh* named storm of the 2005 hurricane season — roared ashore the Gulf Coast that day, changing the lives of those in her path forever. Not a month later, Hurricane Rita slammed the same southwest corner of Louisiana, adding insult to injury.

In the midst of the cleanup and rebuilding of Louisiana, Alabama, and Mississippi, boiler inspectors are dealing daily with new challenges that no training prepared them for. Quite a learning curve, as one inspector put it.

The consensus agreement among those boiler professionals working to get this equipment back up and running is that the recovery is long and tedious. Many areas in the states hit by the hurricanes are still in major disarray. Some still do not have power. Others still do not have phone service. Many streets remain impassable. And as the images on television show us, entire parishes and towns are still in ruins. One inspector with the insurance industry who lives near New Orleans uses the word "chaos" to describe the environment there today.

Water was the biggest enemy of pressure equipment. Particularly hard hit was New Orleans, built below sea level. Lake Pontchartrain's waters were allowed to seep into innumerable boilers when its levee walls failed and its waters flooded the streets, homes, and businesses of New Orleans. But the real culprit was the salt from the tropical ocean waters that blew ashore with the hurricanes. Between the water and the salt, the corrosive effects have made most boilers inoperable.

It can be said the process of getting a business or company back on its feet after a disaster starts with the boiler. Without the boiler, a business does not have heat, and it does not have hot water. Without these two vital provisions, there is not much chance to be of service to the public. So the priority for most businesses in Mississippi, Alabama, and Louisiana right now is to have their boilers evaluated, inspected, and approved for use. Regardless of the manner in which a boiler was employed, an internal inspection of each and every unit is now required before start-up can commence.

Imagine as a safety official or insurance professional having to determine where to begin. An inspector with the Louisiana state

The boiler return tank/hot water preheater and boiler feed pump ruined and rusted after sitting in 6-feet-deep flood water. Equipment owned by Eric and Mary DuBuisson at Slidell Cleaners of Slidell, Louisiana.

Flood damage to the mechanical room of Benjamin Franklin High School in New Orleans.

government explained that Chief Boiler Inspector Bill Owens' department started first by working with processing plants, such as chemical, gas production, and power plants, to get the utilities back on line as quickly as possible. Once the supply of utilities was started, the group moved on to smaller boilers, starting with large corporations and so on. The game plan was to bring everything back on line as quickly and safely as possible so cleanup and rebuilding could begin.

The evaluation process has been slowed by lack of ample help. Manpower has been a problem for both the state agencies and insurance companies. There simply is too much work for the current staffs to handle. In Alabama, the state employs one inspector who is handling permit inspections only; all flood-damaged boilers are inspected by insurance inspectors under normal inspection frequencies. Louisiana employs nine boiler inspectors, three of whom are working in the impacted areas with six or seven insurance inspectors. In Mississippi, the one inspector who worked and lived in the hurricane region lost his home in the storm. All inspections of the coastal area are now handled from the state office in Jackson. The jurisdiction is also working closely with insurance company inspectors.

Boiler repair shops are reporting similar woes. Since so many boilers are in need of parts, availability is scarce. One repair firm in Alabama was contacted by more than 600 companies in Alabama, Mississippi, and Louisiana immediately after Katrina's flood waters had receded. Repair shops are also finding it hard to meet demand with help as well. There are just not enough technical people on hand to help out.

One inspector reported that the greatest damage he is seeing can be attributed to improper protection of control systems. He has repeatedly recommended that a boiler's controls be replaced before it can be restarted. Another inspector has seen a lot of electrical damage and failed electronic parts, even with no application of power. Yet another inspector saw numerous boilers suffering refractory damage, requiring them to be dried out or completely replaced. All agree that taking into account the considerable number of moving parts on a boiler — dampers, gas valves, linkages, motor bearings — the efforts involved to bring a boiler back online after water damage are significant.

An insurance inspector working primarily in New Orleans has found that the age of most of the city's boilers has played a big role in how the reconstruction is progressing. The city's landscape of old, historical buildings has meant older boiler units. Repair costs exceed the cost of most new units. Many customers are opting for package heating boiler units.

Finances have slowed the process for a lot of businesses. Once a boiler is inspected and recommendations for its safe startup have been made, the insurance process begins. Waiting on a check to pay for new equipment can be slow, particularly in light of the numerous claims being filed.

Wind damage to the ceiling over the boiler room of Slidell Cleaners, established in 1929.

Another unfortunate dilemma presented to inspectors in Mississippi, Louisiana, and Alabama is the number of buildings that were simply wiped away by the storms. Often there is nothing where an address log says a building should be. Many businesses were abandoned after the hurricanes. All locations have to be checked. With the number of Gulf residents relocated all over the country, it has been a challenge trying to contact absent boiler owners.

Because so many businesses want to get back on their feet, boilers are being restarted prematurely by maintenance staff, without prior evaluation by a state or insurance professional. Recovering boilers after any flood is a tedious process and can be dangerous for personnel who are not properly trained. The inspectors in the Gulf region have found a number of boilers have been recovered — and ruined — as a result of impatience with the inspection process.

If there is a bright spot in any of this, it is the level of partnering between state inspectors and insurance companies. The attitude is that all are in the same boat, so to speak, working for the same goal — to help business owners and the public in general. A protocol procedure for all inspectors has been put in place in Louisiana, to support a more unified and streamlined inspection process. Safe operation is the priority.

As one inspector put it, everyone is taking it step-by-step. Every day, different circumstances demand different solutions. With so many items to canvas and inspect, this is expected to be a long-term process. This is seconded by another inspector, who says their projected timeline for completion of the inspections runs as far out as the rebuilding of these areas. Though many business owners are eager to reopen, the inspectors are offering patience and understanding by explaining the evaluation process. Each and every boiler must be attended to, and boiler operating permits are only reactivated once an inspection and any necessary repairs are completed.

To assume there are lessons that can be taken from these tragedies is a little like adding salt to a wound. Could something have been done to preserve more of this equipment? When salvaging lives, boilers seem inconsequential. Removing boilers from service before a damaging flood is possibly too idealistic. As many in the Gulf Coast region can attest, there simply was not time to conduct such technical maneuvers.

All who contributed to this article agreed: this is a human interest issue, above and beyond a job. This work is different. It is about helping people and not just about being an inspector. Each is proud of the work he is doing, knowing he is indirectly making a difference in the lives of many. Most residents are gratified to have a boiler to come back to and possibly salvage — a symbol of life returning to normal. ❖

What Caused the Accident of C&O Locomotive 1642?

Traveling eastbound from Handley, West Virginia, Chesapeake and Ohio Railway Locomotive 1642 got only as far as Hinton (West Virginia) 71 miles away before its boiler exploded, killing the engineer, fireman, and head brakeman instantly. The following is a transcript of the original Interstate Commerce Commission report on the June 9, 1953, explosion.

Our industry strives constantly to prevent boiler accidents from occurring. However, wisdom can be gained from expert analysis and well-detailed investigation reports of such events.

The official federal investigation uncovered a definitive cause of the explosion. Can you figure it out without reading ahead? Put your inspector hat on and get started.

Photography courtesy of The Chesapeake and Ohio Historical Society.

Interstate Commerce Commission
Washington

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Report No. 3520
Chesapeake & Ohio Railway Company
In RE: Accident
At Hinton, W. Va., on
June 9, 1953

In the matter of making accident investigation reports
under the Locomotive Inspection Act of
February 17, 1911, as amended

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Description of Accident

Chesapeake & Ohio Railway locomotive No. 1642, hauling eastbound freight train Extra 1642 East, departed from Handley, W. Va., at 1:20 p.m., June 9, 1953, and proceeded without any known unusual incident to CW Cabin, near the city limit of Hinton, W. Va., a distance of 71.6 miles from Handley, where, about 5:25 p.m., the boiler of the locomotive exploded while the train was moving at an estimated speed of 20 miles per hour.

The train left Handley, W. Va., with 91 loaded cars, adjusted tonnage 7,510 tons. A stop was made at Thurmond, W. Va., 38.6 miles from Handley, at 2:55 p.m., where coal and water were taken, and a stop was made at Quinnimont, W. Va., 12 miles from Thurmond, at 4:12 p.m., where water was taken and cars were picked up. The train departed from Quinnimont, approximately 21 miles from the point of the accident, at 4:38 p.m. with consist of 123 loaded and 2 empty cars, 10,430 adjusted tons. The tonnage rating for the locomotive over this part of the division was 11,500 adjusted tons. Approaching the scene of the accident the track was undulating, but at the point of the explosion was level and tangent. The weather was clear and dry. The positions of the three employees on the locomotive at time of the accident were not known.

At the point of the explosion, there were two tracks on the left side of the eastbound main, the westbound main and a switching lead, and on the right side New River ran approximately parallel with and about 55 feet from the eastbound main.

The force of the explosion tore the boiler from the frame and cylinder connections and it was thrown upward and forward. The boiler struck on its front end on the rails of the eastbound track approximately 440 feet ahead of the point of the explosion, then rebounded. The back head struck the track 639 feet ahead of the point of the explosion where the boiler came to rest on its right side in reversed position with front end on the adjacent westbound track and firebox on the switching track. The smoke box front was blown off and several superheater units were blown out. The cab was blown 133 feet to rear and 58 feet to right of the point of explosion where it fell at the water edge of New River. Grates, grate bars, throttle lever, and other parts were scattered for distances up to approximately 772 feet from point of accident, some falling in New River. Many appurtenances were badly damaged and some parts could not be located. The track rails at point of explosion were indented by the trailing truck wheels and the two rear pairs of driving wheels and the westbound track was moved approximately 5-1/4 feet to the left. At the point where the front end of the boiler struck, the track rails were broken and badly bent and a large hole was torn in the road bed. Where the back head of the boiler struck, the westbound track was

moved 3 feet to the left. The locomotive running gear with tender attached came to rest with front end alongside the front end of the boiler with only trailing truck wheels derailed. All tender truck wheels were derailed and the front truck was off center. The tank was skewed to the left with left front corner leaning approximately 10 degrees to the left. Nine cars were derailed and bunched, five were at approximately 90-degree angles with the rails four of which were on their sides.

The engineer, fireman, and head brakeman were killed. The engineer's body was found at the water's edge of New River, approximately 75 feet to rear of the cab. The fireman's body was found in the cab, and the brakeman's body was found in a ditch on the left side of the tracks near the point of the explosion.

Description of Locomotive

Locomotive 1642 , 2-6 + 6-6 type, carrier's classification H-8 Alleghany, was built by the Lima Locomotive Works Inc., at Lima, Ohio, in December 1944. The four cylinders were 22-1/2 x 33 inches, the diameter of driving wheels 67 inches with new tires, weight in working order 771,300 pounds, weight on driving wheels 507,900 pounds, and tractive effort 110,200 pounds. The locomotive was equipped with an Alco Type H power reverse gear, American multiple front end throttle. Standard M D stoker, Franklin No. 8-A Butterfly mechanically operated fire door, Baker valve gear, Worthington Type 6-1/2 SSA feedwater pump, Nathan Type 4000-C special injector. The boiler was equipped with a Nathan Type B low water alarm and there were three Nicholson thermac siphons in the firebox. Locomotive had made 97,000 miles since last Class 3 repairs and 18,000 miles since last Class 5 repairs. The rectangular cast-steel water-bottom tender had capacity of 25,000 gallons of water and 25 tons of coal.

The boiler was of the three-course conical type with combustion chamber and wide radial-stayed firebox; builder's serial boiler number 8811. The inside diameter of the first course was 101-1/8 inches, second course 103-11/16 inches, and third course 106-5/16 inches; thickness of first course 1-9/32 inches, second course 1-5/16 inches, and third course 1-11/32 inches. The boiler had 48 2-1/4 inch outside diameter flues and 278 3-1/2 inch outside diameter flues, 23 feet in length, and 71 Elesco Type E superheater units. The working steam pressure of the boiler was 260 pounds per square inch.

The radial-stayed firebox was 180 inches long and 109 inches wide, and combustion chamber was 118 inches long. The firebox consisted of a one-piece crown and upper side sheets, lower one-fourth side sheets, door sheet, flue sheet, and inside throat sheet. Flue sheet and throat sheet were 9/16-inch thick and other sheets were 3/8-inch thick. Flue sheet seam was riveted and door sheet seam was riveted across the top and welded down the sides. Other seams and patches in the firebox were butt welded. The crown sheet was 11-3/4 inches higher at the flue sheet than at the door sheet. The firebox was fitted with three thermic syphons. There was no syphon in the combustion chamber. New flue sheet and lower side sheets were applied on April 6, 1950, at which time a patch was applied in bottom of combustion chamber, one-half section applied to left syphon, and patches applied to center syphon and to diaphragm of connection sheet. Crown stays were 1-1/8 inch diameter reduced body type, spaced approximately 4-1/16 x 4 inches. Combustion chamber stays were 1 inch diameter, spaced approximately 4-1/6 x 4 inches. Firebox stays were 1 inch diameter, spaced approximately 4-1/8 x 4 inches. All stays were rigid except in the combustion chamber and breaking zones.

Examination of Boiler and Appurtenances

The crown sheet had been overheated its entire width at flue sheet, the overheated area extending to the 12th row of stays on each side of the longitudinal center at front end and tapering gradually upward and backward to the 1st row of stays on right and left sides of center syphon at the 57th transverse row. The line of demarcation was distinct and indicated the water had been approximately 7-1/4 inches below the highest part of the crown sheet. Crown sheet had evidently initially pulled from 123 stays and pocketed at the front center. The stays in this pocketed area were a deep blue in color, stay ends were cupped to a maximum depth of 1/4 inch, and stay holes were elongated to a maximum diameter of 1-3/4 inches. The sheet was not thinned to any noticeable extent.

The back flue sheet tore through the top row of flues from the flue sheet flanges at the 11th row of crown stays on the right side to the 13th row on left side. The tear continued into the sides of combustion chamber, terminating in vicinity of the 20th longitudinal row and 5th transverse row of stays on each side. The top part of the flue sheet below the tear was pulled from 41 flues and folded down. The crown sheet and side sheets above tears in the combustion chamber were blown down against the bottom of combustion chamber, the folds on each side starting at the ends of the tears in sides of combustion chamber sheet.

Irregular tears practically crossed the crown sheet between the 24th and 28th transverse rows of stays and extended down in the side sheets to about the 20th longitudinal rows of stays on each side. Other irregular tears crossed crown sheet at about the 39th transverse row of stays and extended down in side sheets to about the 20th longitudinal row of stays on each side. Irregular longitudinal tears joined the ends of those transverse tears in the side sheets. The rear row of tears across crown sheet were just ahead of the thermic syphons. A large part of the torn out portion of crown sheet folded down over the throat sheet and left syphon. The three syphons were pulled out of the inner throat sheet; were badly bent and center syphon was broken through more than 50 percent of its cross-sectional areas at the neck.

The crown sheet was pulled from approximately 861 stays. A total of 1587 stays were pulled from the crown sheet, combustion chamber, and side sheets. Threads on crown stays and in stay holes appeared to have been in good condition prior to the accident. There were no broken crown stays or staybolts in firebox sheets. No crown stays or staybolts showed any indication of having been worked excessively, and all flue ends appeared to have been in good condition previous to the accident. There was a slight amount of scale on the sheets.

The back head and the roof sheet and door sheet were dented when the boiler struck the track rails. Both sides of the mud ring were sprung outward 13 inches at the center.

Safety valves: The boiler was equipped with four 3-1/2-inch consolidated safety valves, three open and one muffled type, located on top of the third course. Safety valves were not badly damaged in the accident, but the right safety valve nipple was partially pulled from the boiler. The safety valves were applied to Locomotive 1636, same class as Locomotive 1642, and each valve tested twice. A test gage was mounted adjacent to the safety valves and a certified gage was used in the cab. On both trials, No. 1 valve opened at 255 lbs. and closed at 252 lbs., No. 2 valve opened at 260 lbs. and closed at 252 lbs., No. 3 valve opened at 262 lbs. and closed at 256 lbs. The No. 4 valve simmered at 262 lbs. and opened fully at 266 lbs.

Steam gage: An Ashcroft 400-pound 6-inch double-dial steam gage which had been mounted at center of boiler back head was not recovered. Steam gage valve and siphon pipe were found broken and twisted.

Water-level indicating devices: The boiler was equipped with a Nathan 300-pound water column, located 29-1/2 inches to the right of vertical center line of boiler back head. Three gage cocks and a 6-1/2-inch reflex water glass were applied to the columns. An additional reflex water glass was mounted on the left side of the boiler back head 26 inches left of back head vertical line. The water column, both water glasses and all water-glass valves, and gage cocks were made by Nathan Manufacturing Company.

All water level indicating device connections to the boiler were broken off or torn out by impact.

The bottom connection between water column and boiler was located 16 inches above the horizontal center line of the back head. A 1-1/2-inch O.D. copper pipe extended from the top of the water column to a company's standard spud which was located 12 inches ahead of wrapper sheet calking edge and 6 inches to right of the top center line. The bottom water-column spud which extended into the water space 4 inches was crushed, but its 3/4-inch opening appeared to be unobstructed. The top column steam pipe was destroyed and the wrapper sheet spud broken off. The 1-1/4-inch opening in the spud was found clean and unobstructed. The interior of the water column was free from scale and mud deposits; the 3/4-inch drain valve was torn off but was found in closed position and operated freely when tested.

Three double-seated gage cocks were spirally mounted on the water column with 3-inch differences in height. The gage cocks which were broken off and damaged could not be tested under pressure. The

5/16-inch openings into the column were unobstructed. Visual inspection of component parts when disassembled showed no evidence of leakage or abuse. Carrier's records showed the lowest gage-cock opening had been 6-1/2 inches above the highest part of the crown sheet and level with the lowest reading of the water glasses.

Right water-glass valve connections were broken off flush with the water column, leaving clean 3/8-inch holes. The 5/8-inch O.D. copper steam pipe connecting the right water glass to the water-glass valve was found in good condition.

The left reflex water glass was mounted 26 inches to the left of the vertical center line of boiler back head with the bottom connection 25 inches above the horizontal center line. A 5/8-inch O.D. copper steam pipe connected the water glass to a company's standard spud which entered the boiler 6 inches to the left of center line and 12-1/2 inches ahead of the wrapper sheet calking edge. The bottom connection to the left water glass had been broken off. The bottom spud extended 3 inches into the water space and its passageway was unobstructed. The left top water-glass steam pipe and spud were not recovered.

The right and left top and bottom water-glass stop valves were found in fully opened position. The 3/8-inch valve openings were unobstructed. The threads on both water-glass bodies were damaged, but the unbroken reflex glasses showed a clear water line at all heights when tested with cold water. The drain valve from these valves were not recovered.

Injector: The Nathan Type 4000-C injector, which had capacity of 13,000 gallons per hour, remained attached to the right side of the main frame. Its steam pipe, delivery pipe, starting lever, and extension to overflow valve were torn off and the injector was found in badly damaged condition. Four company officials stated that the steam valve and regulating valve were found in closed position. A new overflow valve stem was applied in order that tests could be conducted on Locomotive 1636. During a two-minute test with boiler pressure at 205 pounds, the water was raised 1-3/4 inches. The pressure was raised to 255 pounds; the level of water lowered to conform with original height, and approximately identical performance was obtained in a second two-minute test. Starting when the 266-pound safety valve lifted, the injector was tested at various stages of descending boiler pressure. These tests demonstrated the injector functioned properly until the steam pressure had fallen to 120 pounds.

The carrier's drawings showed the starting lever for the nonlifting injector was of the latched lever and quadrant type, and secured to the floor at the left side of engineer's seat box, 24 inches ahead of the back wall of the cab.

Feedwater pumps: The boiler was equipped with a Worthington Type 6-1/2 SSA feedwater pump, 14,400 gallons per hour capacity. The turbine-driven cold water pump with attached feed water hose was broken from the bracket at the left rear main frame extension. The strainer and its compartment were clean and the strainer was found in proper position. The pump could not be tested because of the damaged condition of the impeller housing and water discharge fitting. The governor steam control valve was removed from the cold water pump and tested on Locomotive 1610 in the condition as found. Results of the tests indicated this control valve functioned practically identically with the original equipment of Locomotive 1610.

The feedwater heater was so badly damaged that any previous leakage from the system and its related piping could not be determined. The drifting control steam valve was dismantled and its spring and valve were found in good condition.

The hot water pump was broken through the center member and the piston rod was bent approximately 20 degrees. All parts of the steam portion of this pump, including reversing valve, were well lubricated

and worked freely; packing ring and valve ring fit and pressure against the cylinder walls were good. The hot water portion of this pump was also found in good condition. All 12 wing-type valves were found seated and valve springs had good resilience. Valves had good contact with the seats. There were no foreign objects found in the cylinder or pump passages.

The manifold steam valve and piping, with throttle valve attached, had been separated from the manifold. The manifold valve was found in open position. The 1-1/2-inch 300-pound Lukenheimer throttle valve was found completely closed with threaded valve steam bent.

The hot and cold water pumps, drifting control valve and governor control valves were disconnected after the accident and examined. Visual inspection did not indicate any defective conditions.

Boiler checks and delivery pipes: The 3-1/2-inch delivery pipes were badly damaged but the check valves and stop valves remained attached to the boiler. The stop valves were found in open position and were clean. The 3-inch right boiler check valve, located on the first boiler course, operated freely and had 1/16 inch lift in excess of the carrier's standard. This valve body had a small deposit of soft scale. The valve and its seat were in good condition. A corresponding check valve, located above the center line on the left side of the first course had lift 5/32 inch in excess of the carrier's standard and was found clean. The valve and its seat were in good condition and the valve was free.

Blow-off cocks: The boiler was fitted with four 2-inch Okadee blow-off cocks located near the mud ring corners. The two front blow-off cocks were piped to a blow-down separator located on top of the boiler and manually operated from the right and left sides of the cab. The right back blow-off cock was torn off and its valve was found seated and could not be operated manually. The other three cocks remained attached, but due to damage of the operating mechanisms, the former valve positions could not be determined.

Low water alarm: The exterior parts of the Nathan Type B low water alarm which had been located on the third course of the boiler were damaged and the interior drop pipe was twisted from normal position. The cab alarm whistle and pipe were found crushed against the boiler back head. Carrier's records, dated March 29, 1950, indicated that the water level at which the alarm would function was 6-3/4 inches above the highest point of the crown sheet.

Feedwater tank, tank valves, hose and strainers: The feedwater tank valves were found fully open, and the 4-1/2-inch feedwater hose remained attached to the right side. The 8-inch circular copper strainer in the feedwater line to the injector was not found. The left hose was found with the cold feedwater pump. Both tank hose were in good condition. There was between 3/4 and 1 inch of scale and rust flakes in the bottom of the tank which could have been dislodged by shock at the time of the explosion. The carrier's standard water level gage was observed by first witnesses and showed water at the second opening approximately 21 inches from the bottom of the tank.

Boiler water condition: Records of boiler water hardness on file at Hinton, W. Va., for June 8, 1953, showed 90 grains inbound and 85 grains outbound. On arrival at Handley, W. Va., on June 9, 1953, the hardness was shown at 70 grains, and when last dispatched from Handley the reading was 50 grains.

Summary of Evidence

The engineer who operated Locomotive 1642 on its next to last previous trip and who was the last engineer to handle the locomotive on the road prior to the engineer who was killed in the accident stated that nothing unusual occurred on that trip and that the feedwater pump and injector operated satisfactorily. His fireman on that trip also stated that no trouble was experienced during the trip; that he operated the water pump without difficulty; that the injector was also used and functioned properly.

The foreman at Thurmond, W. Va., stated that when the locomotive took coal at that point on the trip on which the accident occurred the engineer asked him to look at the cold water pump governor and see if it was stuck; it was examined, found free, and put back in. He then went with the engineer into the cab to examine the squirt hose which operated from the cold water line, the cab was washed down, and the locomotive was put back on the train.

A machinist at Handley, W. Va., the point from which the locomotive was last dispatched, stated that he tested the water pump and it raised the water level line 1-1/4 inches per minute and that he did not find anything wrong with the pump.

A machinist helper, who was between 150 and 175 feet from the track and approximately 1-1/2 miles from the point of the explosion, stated that when the locomotive passed by him the engineer was seated in his usual position in the cab; the fireman was in a bent position on the left of the engineer; that the low water alarm whistle was sounding, and the exhaust from the stack sounded as if the engineer was working a medium throttle.

A roundhouse foreman and a sheet metal worker stated that they arrived at the scene of the accident about 5:30 p.m. and saw water running from the left tank hose which had been severed; that it continued to run until about 6:10 p.m., and that no water was coming from the injector overflow.

The telegraph operator on duty at CW Cabin at the time of the accident stated that he received a telephone inquiry concerning location of Extra 1642 East; he looked down the track and saw the train approaching from a distance of about 600 feet; he rose and as he again looked at the approaching train the explosion occurred. He stated the locomotive appeared to disintegrate, then was obscured by steam and smoke. After parts of the locomotive stopped falling, he called the train dispatcher and reported that Locomotive 1642 had blown up and was wrecked in front of the office and requested that an ambulance be called. He further stated that he noted nothing unusual when he first observed the train approaching and that the locomotive sounded as though the engineer was working a medium throttle.

Cause of Accident

It is found that this accident was caused by an overheated crown sheet due to low water.

Dated at Washington, D.C., this 6th day of July, 1953. By the Commission, Commissioner Patterson.

George W. Laird,
Acting Secretary

❖

Galanes, Perry Elected to Advisory Committee

Two have been elected by the Board of Trustees to the Advisory Committee: George W. Galanes, representing the welding industry, and Charles E. Perry, representing boiler manufacturers. Galanes' term expires in 2008, while Perry's expires in 2006.


George W. Galanes

Mr. Galanes is manager of Metallurgy and QA with Midwest Generation EME in Chicago. He has been with the company since 1999.

From 1982 through 1999, Mr. Galanes was employed with Commonwealth Edison Co. as metallurgical engineer, principal metallurgical engineer, senior metallurgical engineer, and boiler expert.

A licensed Professional Engineer in metallurgy for the State of Illinois, Mr. Galanes received a bachelor's and master's degree in metallurgical engineering from the University of Illinois, Chicago. He is a member of the *National Board Inspection Code* Main Committee and of two subgroups (Fabrication and Examination, and Materials) under the *ASME Boiler and Pressure Vessel Code*, Section I subcommittee.


Charles E. Perry

Mr. Perry is executive vice president of Dillon Boiler Services Company in Fitchburg, Massachusetts. He has been with the company since 1988.

Mr. Perry began his career in 1968 as marine engineer with American Trading and Transportation. In 1971, he became chief engineer with the Directorate of Engineering at Fort Devens, Massachusetts. He joined Shawmut Worcester County Bank in 1986 as facilities officer.

Honorably discharged from the Navy Reserve as lieutenant, he attended Maine Maritime Academy, graduating with a marine engineering degree. He received a master's degree from Worcester Polytechnic Institute.

Mr. Perry is a member of the American Society of Mechanical Engineers and serves on the board of the Massachusetts Board of Boiler Rules. ❖

John Burpee

Chief Boiler, Elevator, and Tramway Inspector, State of Maine


photograph by Pat Michaud

There is no place like home. Just ask Maine's Chief Boiler, Elevator, and Tramway Inspector.

Having traveled much of the world serving his country and establishing a career, John Burpee has always made it a priority to get back home — or at least as close to home as one could get. A suggestion he is not unlike a salmon fighting the upstream current to return to its birthplace generates a grin from the state official.

"I was born in Newport, Maine," John proudly admits. "It's just a small town in Central Maine at a crossroads heading toward the resort communities.

"Life was good growing up in Newport," he explains. "I did just about everything kids were interested in back then: a lot of fishing, played sports, delivered newspapers . . . even pumped gas at a gas station. There are many positive memories."

And one bad memory. While working at the gas station, John was held up at knifepoint. "Not a good experience," he agrees. "The guy cut the station's phone lines and made off with the day's take. But I got his license number." The perpetrator was caught shortly thereafter.

"While in high school, I served as senior class president, was a member of the National Honor Society, and was editor of the yearbook," he continues. His academic achievements notwithstanding, John had no specific ideas regarding his professional future.

"I guess the first time I got serious about it was during a political science project," he recalls. "I was interviewing a marine engineer from the Maine Maritime Academy and was very impressed with the possibility of traveling the world on a ship." So impressed, he applied to the Maine Maritime Academy in Castine for enrollment following his high school graduation.

"It was a four-year program that from the beginning prompted me to make some important career decisions," the Maine official observes. Given the choice of becoming a "deckie" (following a curriculum for ship-destined officers) or marine engineer, John chose the latter because of "better land-based opportunities." During the second year, his NROTC participation earned him a Navy scholarship. He was graduated as a US Navy Ensign in 1986.

A month before graduation, the future National Board member took an important step that would significantly affect his future. He married Patricia, his high school sweetheart and now wife of 19 years.

Moving to Newport, Rhode Island, to attend a four-month Surface Warfare Officer School, John was subsequently ordered to Norfolk, Virginia, where he was deployed in April of 1987 to the Persian Gulf, Spain, and Bahrain onboard the USS *Coontz*. "At that time I was a Surface Warfare Officer," he explains. "My main responsibility as an 'M' Division officer was to oversee the main propulsion engines and 1,200-pound steam plant."

John remained on the USS *Coontz* until her decommission in October of 1989. It was during this time he began thinking about life after his four-year Navy commitment. Moving on to the Destroyer Squadron Two, the Newport native prepared and submitted a letter of resignation effective at the conclusion of his tour of duty.

"The commodore approached me and flat-out asked what it would take to keep me in the Navy," John reveals with a smile. "I politely replied: Send me back to Maine."

The Navy complied and in 1990 returned the state official to the Maine Maritime Academy as an NROTC instructor. "I was teaching navigation, marine engineering, and naval operations," he explains with a distinct New England accent. "In addition to teaching, I was the officer in charge of an NROTC unit across town at the University of Maine at Orono."

Teaching, John came to appreciate, was a bit more difficult than anticipated. "I was sent out to San Diego to be taught how to teach," he smiles.

While in California, the National Board member learned more than just how to teach. "I learned how to sail," he offers. Returning to Castine, John embarked on an annual routine for the next three and a half years: "Teaching in the winter and sailing in the summer."

Toward the end of his second tour, John decided to leave the service to spend more time with his family. "My kids were young and it wasn't a difficult decision." What was difficult, however, was deciding what to do following his discharge.

It was at the Maine Maritime Academy Boiler and Pressure Vessel Conference in 1993 that John received what he thought was good advice. "A retired Navy chief working for an insurance organization told me to become a boiler inspector because the insurance companies were hiring," he recalls.

The problem back in 1993: insurance companies *weren't* hiring. But intrigued about the possibility of becoming an inspector, John took an interim job as power plant engineer at a small hospital.

In the fall of 1994, the Maine chief learned of an inspector opening with an insurance company in Chicago. "I called and they hired me sight unseen," he explains. "I moved the family to Illinois just so I could be an inspector!"

John lost little time in negotiating a return to his home state. "I really loved inspection work but I wanted to do it in Maine," he emphasizes. The following year, John was able to transfer to Central Vermont and finally to Southern Maine. On the way to becoming a paper mill specialist, he found himself doing more and more out-of-town projects. "I really wanted a job that would keep me home."

In 1999 upon learning of an open chief inspector's position for the State of Maine, John promptly submitted an application. In September of that year, he took over the chief's position and a department missing a critical component. "We had no idea how much equipment was being operated in the state," he acknowledges with concern. He reacted by implementing a state boiler tracking system that today keeps tabs on more than 4,000 boilers and 4,000 pressure vessels (the latter estimated to be only about ten percent of the equipment in operation).

In addition to boilers and pressure vessels, John oversees regulation of approximately 100 ski lifts and 3,800 elevators, with the assistance of two boiler inspectors and two elevator inspectors.

Between trying to find the state's remaining 20,000 pressure vessels and making sure skiers and elevator riders are safe, John admits to no hobbies. "I try to spend as much time as possible with my family." The Burpees have two children: 18-year-old daughter, Heather, and 15-year old son, Alexander.

John was recently asked to share his professional knowledge by teaching at a local community college. It is, he says, an activity he would welcome and thoroughly enjoy, "just as long as it's in Maine."

As for the salmon analogy, John firmly adjusts his glasses and observes with a straight face: "Better to find your way back to Maine than find your way onto a menu."

Did we mention John's New England sense of humor? ❖

Electronic "UM" Registration Now Available From The National Board

The National Board has announced it is making available U-3 forms for electronic registration of items manufactured under the ASME "UM" symbol stamp. The electronic process is accessible through the National Board's Electronic Data Transfer program.

"The National Board has been registering "UM"–stamped vessels since 2002," explains National Board Executive Director Donald Tanner. "This new electronic option will be of particular assistance to companies manufacturing a significant quantity of these smaller unfired pressure vessels constructed in accordance with ASME Section VIII, Division 1."

Mr. Tanner emphasizes companies can also register these pressure vessels by completing a printed U-3 form available by accessing NATIONAL BOARD FORMS under RESOURCES on the National Board home page and following the link to the ASME Data Report Forms page. The forms may then be forwarded to the National Board to be registered at a cost of 40¢ per item (plus 40¢ for each attachment).

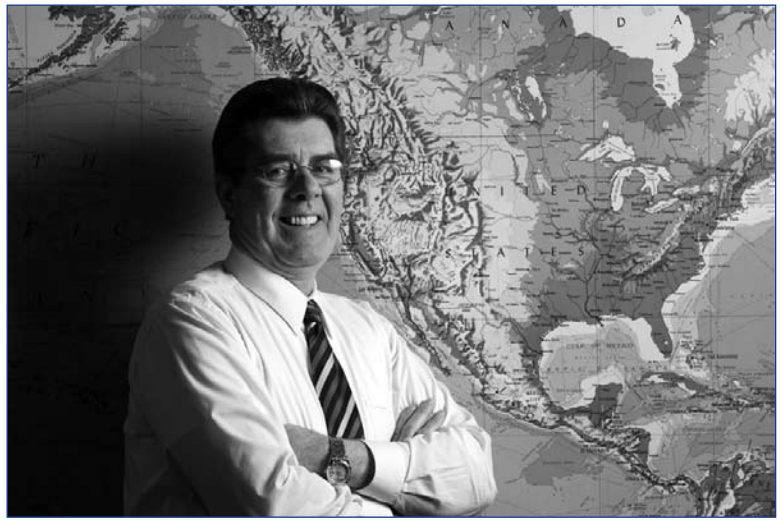
A "UM" pressure vessel is documented on a Certificate of Compliance (U-3 form) signed by the manufacturer. Production of "UM" vessels differs from "U"–stamped vessels in that each "UM" vessel is not required to be inspected by a National Board commissioned inspector. An ongoing process of monitoring the manufacturer's quality program by an authorized inspector is required as well as an annual audit of the program by an Authorized Inspection Agency.

For more information on electronic National Board registration of "UM"–stamped vessels or National Board's Electronic Data Transfer program, contact Nikki Estep, manager of data reports, by telephone at 614.431.3217, or via email at *nestep@nationalboard.org*. ❖

Richard McGuire

Manager of Training

photograph by Greg Sailor



Richard McGuire is discussing a condominium he and his wife Pam are eyeing. To some, the thought of moving a life's worth of belongings brings a headache and stomach pain. Not to Richard. That's because he has moved 26 times in his life. Yes, *26*.

"Let's see," he begins with a deep breath, "I was born in Oklahoma, but when I was small, we moved to San Diego where my dad was stationed with the Navy. Eventually we moved to Torrance, California, where I spent the remainder of my childhood. At 17, I got married then went into the Navy. Stationed in Idaho for 39 months, we moved 18 times in seven years. After the Navy, we moved to San Luis Obispo, California, so I could go to college. My first job out of school took us to Tacoma, Washington, in 1974. We landed in Columbus in 1983 and have been here ever since."

Richard has seen more moving boxes than a roll of packing tape. And while a move after retirement back to Washington where his parents still reside isn't completely out of the question, he and Pam are happy right where they are now, living on the west side of Columbus with their two feline babies, Buji and Mitsy Mouse. The couple will be married 44 years in September.

A Navy vet, Richard was honorably discharged in 1970 as a first class petty officer. Two weeks out of the Navy, he was attending classes at California Polytechnic State University. Inspired by his father's welding career, Richard went on to get a bachelor's degree in welding technology, graduating cum laude.

Richard used his degree in various ways through the years, but training was always the central point of his career. His progression to manager of training with the National Board was a natural step. He joined the organization April 1, 1987 (hold the jokes), coming from the American Society for Nondestructive Testing. His patient, laid-back demeanor and upbeat personality make him a good fit for leading students.

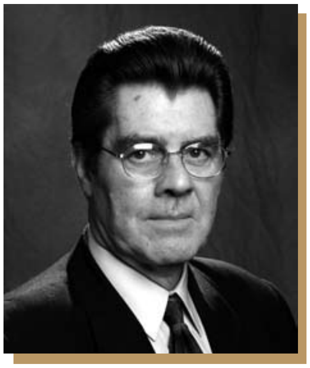
"I love teaching. I love standing in front of people and seeing the light come on. It is rewarding to see people's appreciation for you when you have done a good job," he explains passionately.

Be it a moving van or golf cart, Richard is always on the go. An avid golfer for more than 30 years, Richard says he is getting better all the time. In fact, he proudly boasts consistent scores of less than 100 on 18 holes. When he isn't chasing a golf ball, Richard spends time chasing his two grandsons. The parents of two kids himself, Richard's age is disguised by his thick head of dark hair and youthful energy.

Ironically, Richard can connect his day job to his most favorite hobby. "Golf is like teaching. Two things keep you going — doing really well and doing really badly," he says with a laugh.

Good thing he does both well. ❖

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



What Does it Mean to Successfully Complete a Course?

BY RICHARD MCGUIRE, MANAGER OF TRAINING

Many of us have taken a course or attended a seminar where we have received a certificate on our way out that reads, "(Your Name) has Successfully Completed the (whatever) Course/ Seminar."

Successful completion is a subjective term. What did the student do to receive a certificate? Simply sitting in the seminar for the required amount of time may qualify. Receiving a passing score on a final examination or completing a project for which the instructor assigns a grade might work, too. Participating in various class activities may persuade the instructor to agree the course was completed successfully.

There is much more to judging the successful completion of a course. Students should think about the reasons for taking the class before they do so to determine what a successful outcome means. For example, did a supervisor recommend the course? Is the student readying himself for a promotion? Is there a new technique or code update to become familiar with? Was a question raised on the job that the student didn't know the answer to?

A good portion of success can be attributed to the amount of effort put into learning. A little preparation before class begins can really help. Attendees should read up on the study materials and code books in the weeks leading up to the course so it is familiar. Allowing plenty of travel time and being rested can reduce stress.

When you arrive at the National Board, there are several things to do during your time in Columbus that will benefit your overall learning experience. Get to know others in the class, including the instructor. Getting together with other attendees will help you establish professional relationships that can last a lifetime — ones that might just facilitate career growth someday. As you listen to a speaker, make an effort to visualize how the knowledge will affect your job day-to-day. Pay close attention to what the instructor is saying and doing. If you don't understand, ask. Odds are that if you have a question, at least one other person in attendance has a similar question. Take advantage of the opportunities to have one-on-one sessions with the instructor during breaks or at lunch. Read ahead. If you are given handout materials, read the next day's lessons the night before. Formulate any questions you might have about the material, and during the session the next day, make sure the instructor answers your questions. Instructors appreciate your asking questions, as it helps them determine where in the subject matter more time needs to be spent.

Also critical is remaining in touch with the National Board after a training seminar has ended. Instructors are always available to discuss situations that arise in the field.

There are opportunities to turn a week of class time into a more significant learning experience. Leave the National Board Training Center knowing you have learned something, and knowing how to apply the knowledge. You'll find the value of your certificate is directly proportional to the amount of care and planning you put into receiving it. ❖

ENDORSEMENT COURSES

(A) **Authorized Inspector Course** — TUITION: $2,500
September 11–22 | October 23–November 3

(B) **Authorized Inspector Supervisor Course** — TUITION: $1,250
August 14–18

CONTINUING EDUCATIONAL OPPORTUNITIES

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

July 31–August 4 (Examination August 5)

(IBI) **Introduction to Boiler Inspection** — TUITION: $2,500
July 24–August 4

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

August 21–September 1

(R) **Boiler and Pressure Vessel Repair Seminar** — TUITION: $400
October 16–17

(VR) **Repair of Pressure Relief Valves Seminar** — TUITION: $1,250
July 24–28 | October 16–20 (Houston)

(WPS) **Welding Procedure Workshop** — TUITION: $670
October 18–20

REGISTRATION FORM

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

☐ Mr. ☐ Ms. ☐ Mrs.

Name ______________________

Title ______________________

Company ______________________

Address ______________________

City ______________________

State/Zip ______________________

Telephone ______________________

Fax ______________________

Email ______________________

NB Commission No. ______________________

Payment Information (check one):

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

Cardholder ______________________
Card # ______________________
Expiration Date ______________________
Signature ______________________

Hotel Reservations

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

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

For additional information regarding seminars and courses, contact the National Board Training Department at 1055 Crupper Avenue, Columbus, Ohio 43229-1183, 614.431.3216, or visit the National Board Web site at nationalboard.org.

Rotten

YORK ROLLING MILL, AFTER THE BOILER EXPLOSION. 10 KILLED, 19 INJURED.

"This much is known. A two hundred and fifty horse power steam boiler exploded and the rest followed. Time will tell why it exploded," stated *The Gazette* of York, Pennsylvania, on Tuesday morning, August 11, 1908. The previous afternoon brought ". . . by far the most disastrous accident that ever occurred in York" as the York Rolling Mill, run by the Susquehanna Iron Company, suffered an explosion of massive proportion, resulting in 10 dead, 22 injured, and incalculable damages.

According to another story in *The Gazette*, "iron flew in all directions" as pieces of the boiler and the mill were strewn blocks away around the area. Most of the men who were killed or injured were working close to one of the furnaces. Citizens rushed to the scene; many thought an earthquake was taking place, as they had never experienced an explosive force of that magnitude. The local newspapers estimated more than 5,000 people arrived at the mill within "an incredibly short time," eager to help in whatever way possible. Many even used their vehicles to take the injured to the nearest hospital.

Although mill officials cited a recent inspection of the boiler, it was surmised by independent officials that the boiler was in fact defective, and was known to have been secondhand when installed 12 years prior. Furthermore, the boiler was usually a reserve boiler and never had more than 35 or 40 pounds of steam carried in it. Judging from pieces found at the explosion, the boiler was badly rusted at its seams and edges and was exceptionally thin in other areas. One boiler expert declared the boiler "rotten."

Damages were estimated at upwards of $15,000. *The Gazette* articles never gave an exact determination of the cause of the explosion.

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

Thanks to Lila Fourhman-Shaull at York County Heritage Trust for her contribution to this column. ❖

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