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THE NATIONAL BOARD OF BOILER AND PRESSURE VESSEL INSPECTORS

SUBGROUP ON BOILERS

Minutes

Meeting of January 15, 2013
Mobile, Alabama

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The National Board of Boiler & Pressure Vessel Inspectors
1055 Crupper Avenue
Columbus, Ohio 43229-1183
Phone: (614)888-8320
FAX: (614)847-1828

1. **Call to Order –**

Chairman, Mr. C. Hopkins called the meeting to order at 8:00 a.m.

2. **Announcements**

Introductions of those in attendance

Wednesday, January 16, 2013 – Continental Breakfast at 7:00 a.m. to 8:00 a.m. (guests included) in the Mobile Bay Foyer and USS Alabama Tour & Reception from 6:00 p.m. to 9:00 p.m. The reception will be held in the ship's Ward Room. Transportation by bus has been arranged to and from the ship. All (guests included) interested in attending must meet in the hotel lobby at 5:30 p.m. to board the bus going to and boarding to return at 8:45 p.m. 9:00 p.m. at the latest.

Thursday, January 17, 2013 – Breakfast Buffet at 6:30 a.m. to 8:00 a.m. and Lunch Buffet at 11:30 a.m. to 12:30 p.m. (guests included) in the Schooner room.

3. **Adoption of the Agenda**

Adding Roster Additions and Changes as New Business

There was a motion to adopt the agenda as published. The motion was unanimously approved.

4. **Approval of Minutes of July 17, 2012 meeting**

There was a motion to approve the agenda as published. The motion was unanimously approved.

5. **Review of the Roster (Attachment 1, pages 5-6)**

There was a motion to approve the roster as published. The motion was unanimously approved.

6. **Action Items (Attachment 2, pages 7-14)**

NB08-2101 ***Part 1 SG on Boilers*** – CSD–1 does not address solid fuel firing and it would appropriate for the NBIC to look into it. A task group of G. Halley (Project Manager), M. Richards, G. Scribner and B. Moore has been assigned. (Attachment 2, pages 7-14)

January 2013

Mr. Halley presented the below noted Document (**1.** and **2.**) Draft for Review. Each have been reworked and reworded into a more prescriptive language. Discussion also took place concerning the location of definitions – If they are so distinct are they necessary to be in the glossary. This TG continues to work on noted Document 1.with plans to distribute to the SG for comment via the NB website. Mark Mooney, a member of Part 2-Inspection was invited into the meeting to assist with 'wording' so as to minimize any unforeseen conflicts common to both Parts 1-Installation and Part 2-Inspection. Mr. Mooney will take this to their TG to review, comment, and work on and will report back to the SG-Boilers meeting to be held in July 2013.

1. Part 1, Section 6, Supplement 4 Installation of Biomass (Wood/Solid Fuel) Fired Boilers
2. Suggested Additions to NBIC, Part 2 – Inspection to cover Biomass Fired Boiler Installations (Section 6, Supplement X)

NB10-1201 ***Part 1, SG Boilers*** – Request for a format change to Part 1 Installation. A TG of G. Scribner (Project Manager), B. Moore, S. Konopacki and D. Patten was assigned. (No Attachment)

January 2013
Mr. Scribner presented a progress report. The TG continues to work on achieving consistency in Section 2 and 3 with all common wording and does it really need to be in both sections or in a general section. A partial draft should be completed to present at the July 2013 meeting with a final to be completed by the next edition.

NB11-0802 ***Part 1, 1.4.5 SG on Boilers*** – Boiler installation report review. A task group of D. Patten (Project Manager), G. Scribner, B. Moore, M. Wadkinson, S. Konopacki, and M. Richards has been assigned.
(No Attachment)

January 2013
Mr. Scribner presented a progress report. Discussion was held concerning who will use and who does use the I-1 form. Consensus was that there is a significant amount of difference from one state to another with respect to content of the form as well as use. Mr. Scribner will be developing a list of questions for a survey to distribute to jurisdictions and manufacturers, etc. to determine the appropriate content for the form. Paul Schuelke requested to be added to the task group and Terry Parks expressed that he is available to assist especially with regards to the questions on the survey.

NB12-1401- ***Part 1 SG on Boilers*** – Reference item NB09-0204. Address the installation of Potable Water Heaters. A task group of G. Scribner (Project Manager), P. Bourgeois, B. Moore, and H. Tyndall was assigned. (No Attachment)

January 2013
Mr. Scribner presented a progress report. Discussions have taken place concerning further definitions addressing specifically installation requirements only, not certifications for Boilers, Water Heaters, etc.. It was noted that with regard to "Boiler Room" that cautionary statements are needed and that there is unique stuff to each to define language by next meeting to review. Mr. Gary Scribner is the (Chair) of the TG for this item.

7. New Business – (Attachments 3-4, pages 15-25)

SG Boilers Group Picture – Requested by B. Moore

Roster Additions & Changes – Mr. Craig Hopkins announced his resignation from Chair of SG Boilers. The SC will take nominations and vote to elect a new Chairman.

Introduction of Paul Schuelke with interest to become a Member of the SC Installation and SG Boilers. His Resume was distributed and comments were expressed. A vote will take place for appointment to SG Boilers in the SC meeting. (Attachment 3, pages 15-21)

New Item – Outline of Proposed Installation Requirements for Condensing Boilers. New Action Item Request Form completed and Action Item number NB13-1101 has been assigned. A TG of G. Halley (Project Manager), M. Wadkinson, D. Patton, B. Moore, P. Bourgeois, and R. Snyder have been assigned. (Attachment 4, pages 22-25)

8. Future Meetings

January 13-16, 2014, San Antonio, Texas

Three locations have been selected by committee members for the January 2015 meeting being either Orlando, FL; San Diego, CA; or Phoenix/Tucson, AZ. These locations will be submitted to the NBIC Committee for final approval of one location.

9. Adjournment

The meeting adjourned at 11:33 a.m.

Respectfully Submitted,

Jeanne Bock
Secretary

Attendance List Boiler Subgroup

Meeting Date: January 15, 2013

Craig Hopkins Seattle Boiler Works 500 South Myrtle Street Seattle, WA 98108 Ph: 206-762-0737 Fax: 206-762-3516 Email: chopkins@seattleboiler.com	Attended: Yes ☒ No ☐ Initial	**Geoffrey Halley** ABMA 1315 Ridge Road Wildwood, MO 63021 Ph: 636-394-3483 Fax: 636-527-2839 Email: ghalleysji@aol.com	Attended: Yes ☒ No ☐ Initial
Paul Bourgeois Traveler's 6812 5th. Street Northport, AL 35476 Ph:205-339-6314 Fax: 888-803-1522 Email: pcbourge@travelers.com	Attended: Yes ☒ No ☐ Initial	**Gary Scribner** Missouri Division of Fire Safety P.O. Box 844 Jefferson City, MO 65102 Ph: 573-751-8708 Fax: 573-526-5971 E-mail: gary.scribner@dfs.mo.gov	Attended: Yes ☒ No ☐ Initial
Brian Moore Hartford Steam Boiler One State Street P.O. Box 5024 Hartford, CT 06102 Ph: 860-722-5657 Fax: 860-722-5530 Email: brian_moore@hsb.com	Attended: Yes ☒ No ☐ Initial	**Jeanne Bock** National Board 1055 Crupper Ave. Columbus, OH 43229 P: 614-888-8320 F: 614-847-1828 Email: jbock@nationalboard.org	Attended: Yes ☒ No ☐ Initial
Harold Tyndall Zurich Services Corporation Risk Engineering 770 Corbett Street Winterville, NC 28590 Ph: 252-215-1144 Fax: E-mail: **Harold.tyndall@zurichna.com**	Attended: Yes ☒ No ☐ HGT Initial	**Stanley Konopacki** Midwest Generation 235 Remington Blvd. Suite A Bolingbrook, IL 60440 Ph: 630-771-7596 Fax: 847-599-2256 Email: SKonopacki@MWGen.com	Attended: Yes ☒ No ☐ SLK Initial

Attendance List Boiler Subgroup

Meeting Date: **January 15, 2013**

Raymond Snyder Arise 150 Costa Loop Auburndale, FL 33823 Ph:865-965-4417 Cell: ~~732-778~~-6024 863-954-7939 Fax: ~~865-987-0185~~ NONE E-mail: Raymond.snyder@ariseinc.com	Attended: Yes ☒ No ☐ *Initial*	**Donald Patten** R.F. MacDonald Co. 25920 Eden Landing Road Hayward, CA 94545 P: 510-570-7422 F: 510-784-1004 Email: don.patten@rfmacdonald.com	Attended: Yes ☑ No ☐ Initial
Melissa Wadkinson Fulton Companies 912 Centerville Road PO Box 257 Polaski, NY 13142 P: 315-298-7112 Fax: Email: Melissa.wadkinson@fulton.com	Attended: Yes ☒ No ☐ *Initial*	Name: H MICHAEL RICHARDS Company: SOUTHERN COMPANY Address: 42 INVERNESS CTR City/State/Zip: BHAM AL 35242 Ph: 205/992-7113 Ext. Fax: E-mail: HMRICHARD@SOUTHERNCO.COM	
Name: Paul Schuelke Company: Weil-McLain Address: 500 Blaine St City/State/Zip: Michigan City IN Ph: 219-879-6561 Ext. 407 Fax: 219-877-0535 E-mail: pschuelke@~~com~~ weil-mclain.com		Name: Terry Parks Company: NBBI Address: 1055 Crupper Ave City/State/Zip: Columbus, OH 43229 Ph: 614 431-3221 Ext. Fax: E-mail: tparks@nationalboard.org	
Name: Company: Address: City/State/Zip: Ph: Ext. Fax: E-mail:		Name: Company: Address: City/State/Zip: Ph: Ext. Fax: E-mail:	

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Part 1, Section 6
Supplement 4

Installation of Biomass (Wood/Solid Fuel) Fired Boilers

(Draft for Review and Comment January 2013)

S4.1 – Scope

NBIC Part 1, Section 6, Supplement 4 provides requirements for the installation of Biomass (Wood/Solid Fuel) Fired Boilers as defined in NBIC Part 1, Glossary.

S4.2 PURPOSE

a) The purpose of these rules is to establish minimum requirements, for the installation of Biomass Boilers.

b) It should be recognized that many of the requirements included in these rules must be considered in the design of the boiler by the manufacturer. However, the owner-user is responsible for ensuring that the installation complies with all the applicable requirements contained herein. Further the installer is responsible for complying with the applicable sections when performing work on the behalf of the owner user.

c) This supplement provides requirements for the installation and control of boilers which use biomass as a major fuel component and will address the differences that occur when solid fuels, such as Biomass, are being used. Thus the primary thrust of this section ~~will be~~ directed toward the control of the fuel handling and distribution systems. IS

d) Fuels ~~will~~ vary widely depending upon source, moisture content, particle size and distribution, however once the fuel has been established, the owner-user should adhered to as closely as possible in order to minimize handling, combustion and emissions problems.

e) Additionally the emissions control equipment is designed around the initial fuel specification. Any changes in fuel fired will impact on the performance of the various elements of the emissions control system.

f) Biomass boilers and boiler rooms require additional considerations than traditionally fueled boilers that may include

- Transportation of the fuel from a storage facility to a metering device within the boiler room
- Transportation of the metered fuel to the boiler, for distribution to a combustion system whether it be a grate upon which the combustion takes place, a bubbling fluidized bed, circulating fluidized bed or suspension burner.

- In grate based combustion systems combustion air is typically divided into an underfire air system and an overfire air system, each of which must be closely controlled in order to produce clean, efficient combustion.
- Induced draft fans to overcome the pressure drop of the emissions control equipment
- A fly ash or carbons recycle system, to return unburned carbon to the combustion zone.

S4.3 – Determination of Allowable Operating Parameters

The allowable operating parameters of the combustion side shall be installed in accordance with jurisdictional and environments requirements, manufacturer's recommendations, and/or industrial standards, as applicable.

S4.4 – General Requirements

a) Power Boilers utilizing biomass as the primary fuel source shall meet the requirements of NBIC Part 1, Section 2 and this supplement.

b) Steam Heating, Hot Water Heating, and Hot Water Supply Boilers utilizing biomass as the primary fuel source shall meet the requirements of NBIC Part 1, Section 3 and this Supplement.

S4.5 – Fuel System Requirements and Controls

a) Fuel Transport Systems shall address preserving fuel particle size distribution, fire prevention, and the suppression of fires or explosions.
In a single installation various types of fuel transportation systems may co-exist, the most common systems are

- Conveyor systems- In these systems fuel is dropped onto a moving belt, bucket elevator, drag link conveyor or a screw or auger mechanism. Speed of the conveyor may be varied to meet fuel demand.
- Lean phase pneumatic systems
  In these systems fuel is dropped into a moving airstream, mixes with the air, and travels through a pipe at a velocity of approximately 5000 ft/min. Air pressures are in the region of 25 inches water column.

b) Fuel Transport Solid Fuel Metering Systems vary depending upon the fuel used and the particle size distribution, these metering systems include but are not limited to:

- Variable speed augers
  Variable speed, helically flighted, augers can be located in the bottom of a fuel metering bin. Alternatively they could be a part of a retort type stoker. The auger dimensions, flighting, and speed range are selected on the basis of fuel being burned, its size range, heating value and required boiler turndown range. The metered fuel typically is then dropped into the throat of a venturi, (or in some cases a plain pipe) though which the fuel transport air flows to carry the fuel into the boiler combustion zone, for distribution on a grate, upon which the burning of the fuel takes place.
- Variable speed air-lock valves
  This valve is basically a rotating slotted cylinder, operating within an outer cylinder, suitably sealed to prevent leakage. Rotational speed and slot dimensions can be varied to accommodate changes in fuel flow rate. The fuel passing through the valve, typically, is deposited onto a moving grate type stoker.
- Variable stroke rams
  This is another device that can be located on the bottom of a metering bin, is typically used on smaller units and is essentially a batch feed mechanism. The stroke of the ram is adjusted to set fuel flow rate.

S4.6 – Combustion Requirements

a) Overfire Air/Underfire Air Distribution

When solid fuels are burned on a grate, rather than in fluidized bed units or in suspension, it is normal practice to introduce some of the combustion air under the grate, or bed, and the remainder over the bed. In many cases fuel transport air becomes a part of the over-the-bed combustion air. The proportioning of the overfire to underfire airflow rates is dependent upon several factors, such as fuel particle size, fuel density, burn rate and volatiles. In general the objective is to get as complete a burn on the grate as possible, without creating large quantities of particulate emissions, and then using the overfire air to complete burning of the volatile and small particulate matter, leaving the fuel bed.

Loss of combustion air from either the underfire or overfire source shall cause shutoff of the fuel supply and a lockout condition.

The control system shall be capable of maintaining the correct relationship between underfire air and overfire air, over the complete firing range of the boiler, while promoting complete burning with minimum particulate emissions.

b) Programming Controls

Programming controls may be relay based, or on more current units, PLC based. Interactive graphics displays may also be incorporated into the system.

Access to PLC based controls and interactive graphic displays shall be limited to qualified individuals and password protected. PLC functions shall be confined to the normal boiler operating logic, covering startup, interlocks, and normal shutdown sequences.

Safety controls, which cause boiler safety shutdown when activated, shall not be interfered with by the PLC logic. shall not intefere with
Consideration should be given to having the PLC logic comply with the requirements of NFPA-85.

c) Pre-firing Checks/interlocks

In addition to the Safety Controls defined in Section 4.5 and 4.6 proof of air handling fans or blowers are operating properly shall be required. This includes:

- Induced draft fans
- Fuel transport fans
- Underfire air and Overfire air fans, and
- Carbon, or flyash, re-injection fans.

In cases where variable speed drives are used on fans, the combustion system manufacturer's instructions shall be followed in terms of the allowable upper and lower limits of the power supply frequency (Hz).

d) Pre-purging

Pre-purging the boiler and its venting system shall be required. Unless defined otherwise by the manufacturer of the fuel burning equipment, the pre-purge may be achieved by operating the induced draft fan prior to starting the remaining fans in the installation.

Purge air volume shall be set during commissioning by the combustion system manufacturer, or the manufacturer's representative, in accordance with applicable Codes or Standards and shall not be capable of being reset by operating personnel.

e) Ignition Systems

Solid fuel ignition systems and/or methods can vary from the placement of manually ignited, oil soaked rags on the fuel bed, to gas or oil fired pilot burners or lances but in all cases shall be in accordance the manufactures recommendations.

f) Firing Rate Control and Fuel/Air Ratio Control

The control system shall be capable of maintaining the desired air to fuel ratio over the entire firing range of the boiler, while promoting clean, stable combustion.

g) Re-injection Systems

In installations where fly ash is re-injected from a multi-cyclone collector into the combustion zone for carbon re-burn; precautions should be taken to ensure that plugging of the reinjection pipe work does not occur. Consideration should be given to installing cleanouts in the pipe work.

h) Shutdown and Post Purge

add ;)

Unless the boiler manufacturer's instructions state otherwise, the fuel supply shall be terminated at shutdown, and the overfire air should remain on until the fuel bed is burned out, and the residue cooled.

New definitions

Conveyor system(s)- A fuel transport system utilized on biomass boilers that drops fuel onto a moving belt, bucket elevator, drag link conveyor or a screw or auger mechanism. (The Speed of the conveyor may be varied to meet fuel demand.)

Lean phase pneumatic system(s)- A fuel transport system utilized on biomass boilers that drops fuel into a moving airstream, mixes with the air, and travels through a pipe at a velocity of approximately 5000 ft/min. Air pressures are in the region of 25 inches water column.

Suggested Additions to NBIC, Part 2 – Inspection, to Cover Biomass Fired Boiler Installations (Section 6, Supplement X)

(Draft for Review and Comment 10/31/12)

SX.1 - Scope

a) This supplement is intended to provide additional inspection requirements to cover Biomass fired boilers and the additional equipment utilized in these installations. In this context Biomass is intended to mean various types of wood wastes, or wood byproducts.

b) Many of the requirements of the earlier Sections of Part 2 are common to all boiler installations irrespective of the fuel being fired; therefore this supplement will address the differences that occur when solid fuels, such as Biomass, are being used. Thus the primary thrust of this section will be directed toward the inspection of the fuel handling and distribution systems, and the impact these systems may have on the pressure vessel itself.

SX.2 – Assessment of Installation

a) A general assessment of the complete installation shall be undertaken, in terms of observable results of operating and maintenance practices. Indicators include the general boiler room cleanliness, for example significant quantities of fuel particles (dust) should not be apparent in the boiler room.

b) The combustion air inlet shall be free of any debris or dust particle build up, and where moveable louvered intakes exist, the actuating mechanisms shall be clean and operate freely. Corrective action is required when non-compliance is noted.

c) The flue gas venting system shall be checked for tightness, with no observable signs of leakage. Corrective action is required if leakage is noted.

d) The intakes of the various fans or blowers shall be free of fuel particle build up or signs of other debris. Corrective action in terms of cleaning is required when discrepancies are noted.

e) The fuel metering equipment and the fuel transportation system shall be free from signs of particulate or dust leakage. Corrective action in terms of cleaning and repair work is required as necessary.

f) Electrical equipment and controls shall be properly protected from the ingress of dust, by ensuring that all cover plates are properly installed and all panel doors are intact, operable and closed.

g) Verify that all guards for rotating equipment (shafts, bearings, drives) are correctly installed and fan inlet screens are in place.

h) On the boiler, generally check for signs of potential problems, including;

- Water leaks
- Missing or misaligned pieces or parts
- Condition of support systems
- Provision of "Danger" or "Caution" signs
- Excess vibration
- Excess noise.

i) Verify that the Owner/User has established function test, inspection, requirements, maintenance and testing of all controls and safety devices in accordance with the manufacturer's recommendations. Verify that these activities are conducted at assigned intervals in accordance with written procedures, non-conformances which impact continued safe operation of the boiler are corrected and the results are properly documented. These activities shall be at a frequency recommended by the manufacturer, or frequency required by the jurisdiction. Where no frequencies are recommended, or prescribed, the activity should be conducted at least annually

SX.3 – Boiler Room Cleanliness

a) While boiler room cleanliness is of primary importance in all boiler rooms it is of particular importance in biomass fired boiler rooms. Biomass can contain fine particulate, which if allowed to leak from the transportation system into the surrounding boiler room, will eventually be drawn into fans, resulting in the possibility of combustion air systems becoming plugged.

b) Boiler rooms containing quantities of fine dusts are susceptible to fire or explosion, again emphasizing the need for high standards of cleanliness.

SX.4 – Emission Control Requirements

a) Emission control is dependent upon the fuel being fired and the emission requirements prevailing at the location of the boiler installation. As such they are a part of the initial design and installation process, and apart from ensuring that they are

kept in top working condition, so that emission requirements are not violated; there is little that can be done from the inspector's point of view.

b) When Continuous Emissions Monitors (CEM's) are in use, they should be demonstrated to be functioning properly and have a current calibration sticker.

c) Delta-P pressure gauges which measure the pressure drop across the various elements of the emission control system should all be functioning correctly.

d) There should be no sign of erosion caused by entrained particulate matter, in any part of the breaching, ductwork, stack or the individual emission control elements.

e) On systems in which the emissions control system incorporates a baghouse, appropriate fire detection and suppression systems shall be incorporated and functioning properly.

WEIL-McLAIN

Paul H. Schuelke, P.E.
Director, Technical Services
Tel 219.879.6561 Ext. 407
Fax 219.877.0535
pschuelke@weil-mclain.com

January 7, 2013

Mr. Don Cook
Chair, NBIC Committee

Hand Delivered

Dear Mr. Cook:

I am requesting consideration for membership to the National Board Inspection Code Subcommittee on Installation and Subgroup on Boilers. This is my 40th year in the boiler industry and I have been an active member in the ASME-CSD committee for the past 20 years.

With this letter I am providing a one-page summary of my boiler experience and a more detailed multi-page list of my work experience. Weil-McLain has supported my work on the ASME-CSD committee and will support my involvement in the NBIC.

Please contact me if you have any questions and thank you for your consideration.

Sincerely,

Paul H. Schuelke

Paul H. Schuelke, P.E.
Director, Technical Services
Weil-McLain

Cc: Gordon Stretch
VP, Product Engineering
Weil-McLain

Experience Summary

PERSONAL DATA:

Name: **Paul H. Schuelke**

Home: Address: 1587 N. Rustic Drive
La Porte, IN 46350

EDUCATION:

1983 Masters of Business Administration
St. Ambrose University
Davenport, Iowa

1974 Bachelor of Science in Mechanical Engineering
South Dakota School of Mines and Technology
Rapid City, South Dakota

CERTIFICATIONS:

California Professional Engineer
Certificate No. M 18867

Six Sigma Black Belt

TECHNICAL MEMBERSHIP:

1993 to today
Committee Member
The American Society of Mechanical Engineers
Controls and Safety Devices for Automatically Fired Boilers

EXPERIENCE:

I have worked in the boiler industry for over 35 years, holding positions of salesman, consulting engineer and various engineering positions for boiler/burner manufactures. These include Manager Customer Engineering, Engineering Manager, Chief Engineer, Director Product Application, and Director Product Compliance. Currently I hold the position of Director, Technical Services for Weil-McLain.

I am or have been responsible for pressure vessel design, boiler control system design, boiler and burner applications, service, and product compliance with ASME Section I, Section IV, CSD-AFB, Underwriters Laboratories, and other state and industry requirements.

Paul H. Schuelke

1587 N. Rustic Drive

La Porte, IN 46350

EXPERIENCE:

Jan 2006 to Present — Director, Technical Services

Weil-McLain
500 Blaine Street
Michigan City, IN 46360

I have the responsibility to insure that products manufactured by Weil-McLain meet and exceed customer expectations and industry standards. Specific areas of responsibilities are providing technical support for resolving insurance claims and product liability litigation. Also, I am the chairperson of the product safety design review committee.

Activities involved with resolving claims and litigation include working with attorneys, coordinating experts, and participating in site investigations and product inspections for personal injury and property damage claims due to fires, explosions, water damage freeze damage, scalding, and construction accidents. Expert reports, affidavits, deposition and trail testimony are provided when needed.

The chair of the product safety design review committee oversees the activities of the committee to verify that new products are designed and supplied to industry standard and installation instructions and warnings are suitable for the foreseeable use and misuse of the product. In addition, a Failure Mode Effect Analysis (FMEA) and appropriate follow-up action is completed on all items on the engineering bill-of-materials.

In addition, I oversee the Technical Service Technicians and Consumer Relations. These groups answers boiler questions, heating system installation questions and operation questions, asked by the Weil-McLain sales force, distributors, contractors, engineers, and consumers.

Aug 1997 to Jan 2006 — Director, Product Compliance

Weil-McLain
500 Blaine Street
Michigan City, IN 46360

I had the responsibility to insure that products manufactured by Weil-McLain meet and exceed customer expectations and industry standards. Specific areas of responsibilities were providing technical support for resolving insurance claims and product liability litigation. Also, I was the chairperson of the product safety design review committee.

Activities involved with resolving claims and litigation include working with attorneys, coordinating experts, and participating in site investigations and product inspections for personal injury and property damage claims due to fires, explosions, water damage freeze

damage, scalding, and construction accidents. Expert reports, affidavits, deposition and trail testimony were provided when needed.

The chair of the product safety design review committee oversees the activities of the committee to verify that new products are designed and supplied to industry standard and installation instructions and warnings are suitable for the foreseeable use and misuse of the product. In addition, a Failure Mode Effect Analysis (FMEA) and appropriate follow-up action is completed on all items on the engineering bill-of-materials.

Jan 1989 to Aug 1997 — Director, Product Applications

Weil-McLain
500 Blaine Street
Michigan city, IN 46360

I was responsible for engineering and technical staff of eleven people who performed all product application functions, provided technical field support, and wrote all technical publications including installation manuals. The Product Applications Department provided all job specific drawings, quotations and submittals for special boiler applications, answered all technical product and application questions from installers, distributors, consulting engineers, and sales personnel. All technical manual and service guides were developed and written by this group.

July 1987 to Jan 1989 — Engineer

Williams & Davis Boilers, Inc.
P. O. Box AF
Hutchins, TX 75141

I was responsible for all product engineering, product design, product drafting for a regional boiler manufacturer with 5 to 7 million dollars of annual sales. They provided additional customer support preforming service, and boiler installations.

July 1984 to July 1987 — Chief Engineer

Stone Johnston Corporation
300 Pine Street
Ferrysburg, MI 49409

I was responsible for the pressure vessel, mechanical and electrical design for fluidized bed boiler systems, including fans, coal handling, limestone handling, natural gas delivery, control and instrumentation. Also, providing assistance to the Manager of Engineering in the day to day questions form manufacturing, sales, and management; the processing of standard boiler order; and providing support to the field sales force, Completed extensive research on CAD/CAM systems and the integration with the existing NC plasma-cutting equipment.

Mar 1984 to July 1984 — Manager of Engineering

Kewanee Boiler Corporation
101 Franklin Street

Kewanee, IL 61443

I was responsible of all product engineering activities, including product design, order processing, and research and development.

Feb 1983 to Mar 1984 — Product and Sales Manager

Kewanee Boiler Corporation
210 W 22nd Street
Oak Brook, IL 60521

I was responsible for the sale of firebox boilers, burners, waste heat boilers, and repair parts. More than half of my time was spent at the plant in Kewanee, IL assisting the engineering department process sales orders. The reminder was spent on national market studies and sales support of the representative sales force.

Mar 1980 to Feb 1983 — Manager of Customer Engineering

Kewanee Boiler Corporation
101 Franklin Street
Kewanee, IL 61443

I was responsible for the activities of 14 engineers and professional people who were engaged in quotations, order entry, and boiler application engineering. This included pricing, terms and conditions of sales; order submittals preparation; compliance with Underwriters' Laboratories; Factory Mutual; Industrial Rick Insurers; ASME section I and IV; and preparation of shop manufacturing drawings. In addition, I served as the technical contact for the sales force on boilers, boiler systems, burners, economizers and waste heat boilers. We implemented process systems to reduce the order processing time from 14 days to 4 days. Prepared the background studies on cost effectiveness of word processing and CAD systems, and over saw the design and the beginning of an in-house customer relations seminar.

May 1979 to March 1980 — Chief Engineer

Electric Boiler Corporation of America
Subsidiary of Kewanee Boiler Corporation
Atlantic, IA

I was responsible for the design, research and development, quality control, service and application for the electric boilers. The capacity ranged from 20 Kw to 1600 Kw and the pressure ranged from 15 psig to 1500 psig.

I was also responsible for the quality control of the guardian safety relief valve and the Kewanee retrofit burner. In addition, I helped coordinate the burner field service with the Kewanee Boiler Corporation Field Service Manager.

I was the primary customer contact for all products.

Sept 1978 to May 1979 — Mechanical Engineer

Donald Bentley and Associates
San Francisco, CA

I was a boiler specialist and energy analyst working with a team of engineers on a 22 building survey of the Lawrence Berkeley Laboratory. Primary responsibility was the detailing of existing mechanical systems and alternative system cost for a DOE 1 computer analysis. In addition, I was the primary writer of the mechanical reports and assistant editor of the project.

Jan 1975 to Sept 1978 — Engineering Sales

L. O. Schuelke Company, Inc.
San Carlos, CA 94070

I worked with purchasing agents, engineers, contractors and maintenance personnel in Northern California on the selection and operation of industrial boilers, burners, and heat exchangers. I was responsible for the sales, coordinating shipments, original start-up, warranty and emergency service.

May 1974 to Sept 1974 — Summer Laboratory Assistant

Kewanee Boiler Corporation
Kewanee, IL 61443

Assisted in the research and development of burners, also, conducted Environmental Protection Agency Tests on boiler stack emissions, and addicted in various other experiments in the laboratory.

May 1973 to Sept 1973 — Summer Office Engineer

L. O. Schuelke Company, Inc.
San Carlos, CA 94070

I was responsible for the selection and sales for American Standard shell and tube heat exchangers. This was done by working with factory personnel to provide economical selections to the customer.

1970 to 1972 — Part time and summer employment.

Christian Candles, Inc.
Redwood City, CA

I was responsible for general maintenance and construction at the factory.

EDUCATION:

1983 — Masters of Business Administration
St. Ambrose University
Davenport, IA

1974	Bachelor of Science in Mechanical Engineering South Dakota School of Mines and Technology Rapid City, SD
	Organizations: Theta Tau Fraternity Wrestling Team American Society of Mechanical Engineers Student
1970	San Carlos High School San Carlos, CA

CERTIFICATION:

California Professional Engineer
Certificate Number M 18867

Six Sigma Black Belt

TECHNICAL MEMBERSHIPS:

1993 to Present	Committee Member The American Society of Mechanical Engineers Controls & Safety Devices for Automatically Fired Boilers

SEMINARS:

DRI Product Liability
NAFI – Fire and Explosion Cause and Origin

NB13-1101

Action Item Request Form

8.3 CODE REVISIONS OR ADDITIONS

Request for Code revisions or additions shall provide the following:

a) Proposed Revisions or Additions

For revisions, identify the rules of the Code that require revision and submit a copy of the appropriate rules as they appear in the Code, marked up with the proposed revision. For additions, provide the recommended wording referenced to the existing Code rules.

Existing Text:

ADDITION OF INSTALLATION REQUIREMENTS FOR CONDENSING HOT WATER BOILERS TO ~~SE~~ PART 1. (INSTALLATION) OF NBIC.

b) Statement of Need

Provide a brief explanation of the need for the revision or addition.

CONDENSING HOT WATER BOILERS ARE A RAPIDLY GROWING SEGMENT OF THE HVAC INDUSTRY. THEY REQUIRE SPECIAL TREATMENT IN SEVERAL AREAS OF INSTALLATION - CONDENSATE DRAIN, PH CONTROL OF CONDENSATE, VENT MATERIAL SELECTION, AIR FILTRATION ETC.

c) Background Information

Provide background information to support the revision or addition, including any data or changes in technology that form the basis for the request that will allow the Committee to adequately evaluate the proposed revision or addition. Sketches, tables, figures, and graphs should be submitted as appropriate.

When applicable, identify any pertinent paragraph in the Code that would be affected by the revision or addition and identify paragraphs in the Code that reference the paragraphs that are to be revised or added.

INSTALLATION FAILURES, PARTICULARLY IN THE VENTING SYSTEM AND COMBUSTION AIR DELIVERY SYSTEMS HAVE BEEN FOUND RESPONSIBLE FOR SEVERAL SAFETY RELATED INCIDENTS, INCLUDING FATALITIES. NBIC DOES NOT CURRENTLY ADDRESS CONDENSING BOILERS AND THEIR SPECIAL REQUIREMENTS

Outline of Proposed Installation Requirements for Condensing Boilers

Rational

Define the aspects of installation of Condensing Boilers which are unique from other products covered by this section.

The following listing is offered as points for discussion in the development of an addition to Part 1 (Installation) of the NBIC:

- *Condensate drain system*
  - Routing
  - Termination point (preferably away from occupied areas)
  - Trap height v vent system ΔP
- *Material selection for stack (vent) and piping*
  - Pitch/ Drainage of condensate
  - Corrosion resistance
  - Temperature capability
  - Termination relative to air intake systems, snowlines, etc.
  - Sizing, routing and pressure drop
- *Sealed combustion systems*
  - Outside air intake location relative to vent products, snowlines, etc.
  - Routing and sizing
  - Filtration
  - Burner Manufacturer requirements
- *Condensate pH control*
  - Local sewer Codes
- *Air inlet filtration*
  - Filter ΔP/sizing
  - Burner Manufacturer requirements
- *Glycol usage*
  - Materials compatibility – Seals, etc.
  - Boiler Manufacturer recommendations – Dilution, etc
  - Disposal
- *Installation clearances*
  - Local/National Standards
  - Boiler Manufacturer's recommendations
- *Water treatment*
  - Boiler Manufacturer's recommendations

- *Piping systems*
  - Boiler manufacturer's recommendations
  - System designer requirements
- *Boiler flow and temperature requirements*
  - Boiler Manufacturer's recommendations
  - System designer requirements

Questions

1) Should this be a standalone supplement? Or, should it be worked into existing text?
2) Do we need two documents – one for installation plus a guideline for inspection section?