

# BOILER REFRESHER TRAINING

Sponsored by the School Pool for Excessive Liability Limits

Joint Insurance Fund

SPELL - JIF



# Course Outline

- Format: Open discussion, shared experiences
- Compliance requirements
- Log book entries
- Boiler types
- Basic boiler function
- Critical system components
- House keeping
- Emergency Response Plan



# Module One - Compliance Outline

- Why need for regulations
- Compliance obligations
- Minimum Requirements

Priority #1 – PROTECT YOUR LIFE and the  
LIVES of OTHERS!

Priority #2 – Protect Property

# **It's the Law...**

**N.J.S.A. Title 34:7-1 to 34:7-36  
ENGINEER AND FIREMAN LICENSING; BOILERS, PRESSURE  
VESSELS AND REFRIGERATING PLANTS**

**and**

**N.J.A.C Title 12:90.1-1 to 12:90.10-3  
BOILERS, PRESSURE VESSELS AND REFRIGERATION**

## What could possibly go wrong?!

In order to maintain comfortable indoor winter environments, we:

- ✓ Introduce hazardous and volatile substances (fuel oil / natural gas) into a facility.
- ✓ Burn large quantities of these substances in vessels in order to raise the temperature of water. In some cases, to create steam.
- ✓ Force this heated water, or steam, through the facility.
- ✓ Ensure that combustion gases properly exit the facility.

# 2001 – Boiler Explosion Minnesota Day Care Facility



#1 – PROTECT LIFE!

#2 – Protect Property

Boiler explosion April, 2017

<https://abcnews.go.com/GMA/video/killed-boiler-explosion-caught-camera-46562554>



# What Does the State of New Jersey Require?

Depending on the size of the heating plant, at a minimum, the district shall:

- ✓ Have the pressure vessel(s) inspected annually by a State licensed inspector.
- ✓ Post the inspection certificate in plain sight within the boiler room.
- ✓ Ensure that a licensed low pressure boiler operator is in the facility any time the building is occupied.
- ✓ Ensure that all operators maintain their respective licenses.
- ✓ Post all operator licenses in plain sight within the boiler room.
- ✓ Maintain a properly completed daily data log. The log is to remain in the boiler room.



Protect yourself and your District.

Document!


Document!

Document!

It Always Matters!

# Record Keeping –

- ✓ Preserve appropriate funds to properly maintain heating systems.
- ✓ Maintain all service records relating to boiler service and service to associated systems.
- ✓ Preserve all inspection reports/certificates.
- ✓ Maintain all training records.
- ✓ Written policy and/or plan for maintaining boiler room access and expectations.



What criteria will trigger the need for a licensed operator to be present in a building?

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## **12:90-3.3 Equipment requiring a licensed operator**

(a) Any person operating the equipment listed below shall have the appropriate license as specified in *N.J.A.C. 12:90-3.4* through 3.8.

1. Any steam boiler, steam generator, hot water boiler for service over 250 degrees Fahrenheit, or similar equipment potentially capable of generating steam having a safety valve or valves set higher than 15 pounds per square inch gauge and rated over six horsepower;
2. A steam or hot water heating plant with an indicated or rated capacity that exceeds either 499 square feet of heating surface or 100 boiler horsepower or 1,000 kilowatts or 4,000,000 BTU input regardless of pressure or temperature conditions, **and only when the building or building being served is deemed occupied;**



What is the definition of an “occupied” building?

# What is the definition of an “occupied” building?

## **12:90-2.1 Definitions**

“Occupied building” means a building which is occupied by persons other than custodial or security personnel. A building is not deemed to be occupied solely on the basis of attendance by custodial or security personnel.



What are the duties of a licensed operator?



# What are the duties of a licensed operator?

## **12:90-3.10 Duties of licensed persons**

- (c) – Each low pressure boiler operator shall not jeopardize the safe operation of a low pressure heating boiler and shall remain on the premises.
- (d) – At a minimum, the operator shall monitor the conditions of the low pressure boiler plant twice every 24 hours, with no less than...
  - A. Eight hours between each equipment check
  - B. Two hours between each equipment check
  - C. Seven hours between each equipment check
  - D. Once a shift

# What are the duties of a licensed operator?

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# What are the duties of a licensed operator?

(f) A boiler operator's log shall be maintained in each plant containing over 100 horsepower. Every operator on the shift shall review the log and, at the end of each shift, shall sign the log. All logs shall include the date, name of the operator(s) on duty, and time of relief. Any personnel who are training to obtain their licenses under the requirements of *N.J.A.C. 12:90-8.4* shall include within the log the actual time spent as a trainee. When the operator of a low pressure plant is not in the boiler room, as permitted in (c) above, the operator shall indicate in the log periodic tours of the boiler plant as required in (d) above.

(2) – Low pressure boiler operator logs shall contain at a minimum the information as outlined in ASME Section VI, Recommended Guidelines for the Care and Operation of Heating Boilers, paragraph 6.09(b), incorporated herein by reference.

# Logbook Type & Entries

**GUIDELINES FOR  
LOGBOOKS  
COMPLIANCE TO BOILER  
REGULATIONS N.J.A.C. 12:90**

**Department of Labor and Workforce Development**

**Labor Standards & Safety Enforcement**

**Division of Public Safety**

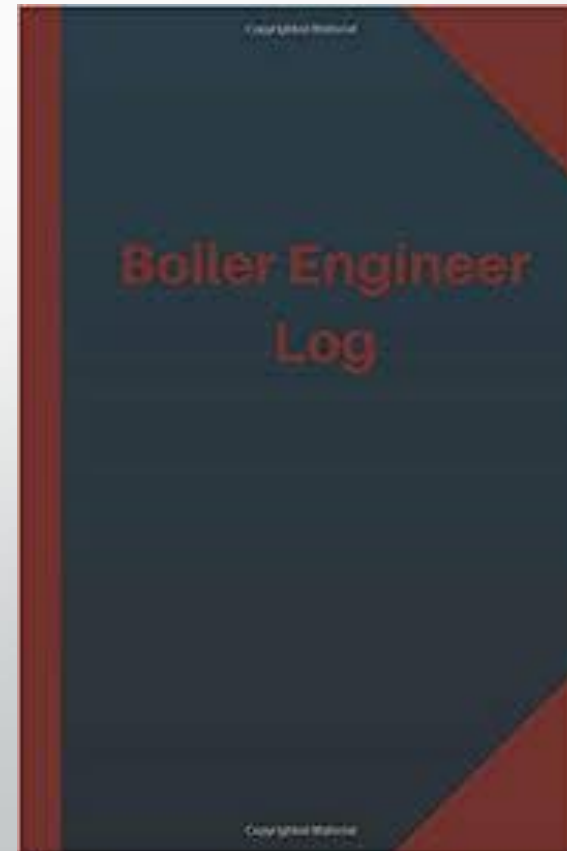
**and**

**Occupational Safety & Health**

**Bureau of Boiler and Pressure Vessel Compliance**


# Logbook Type & Entries

- ✓ Must include bounded pages
- ✓ Record primary system information such as:
  - ❖ System pressure
  - ❖ System temperature
- ✓ Document and report any issues





# Open Discussion Questions?



# Module Two – Systems Outline

- System Types
- System Components
- Safety Devices

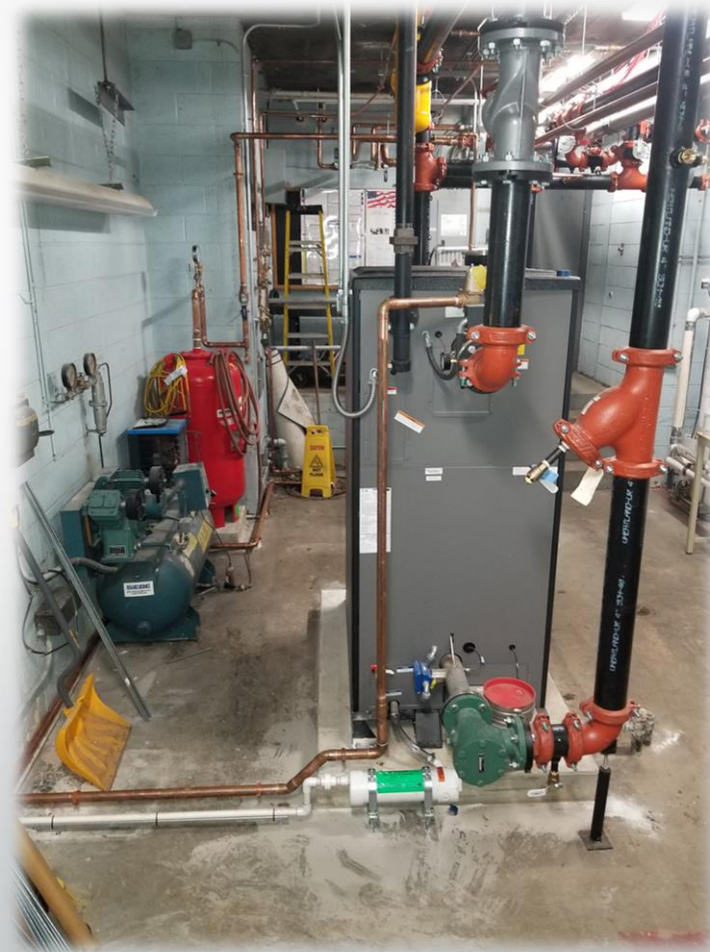
# Virtual Tour

<https://my.matterport.com/show/?m=ZeJkE5tcbqC>



# Boiler Types...

## ...From Then to Now

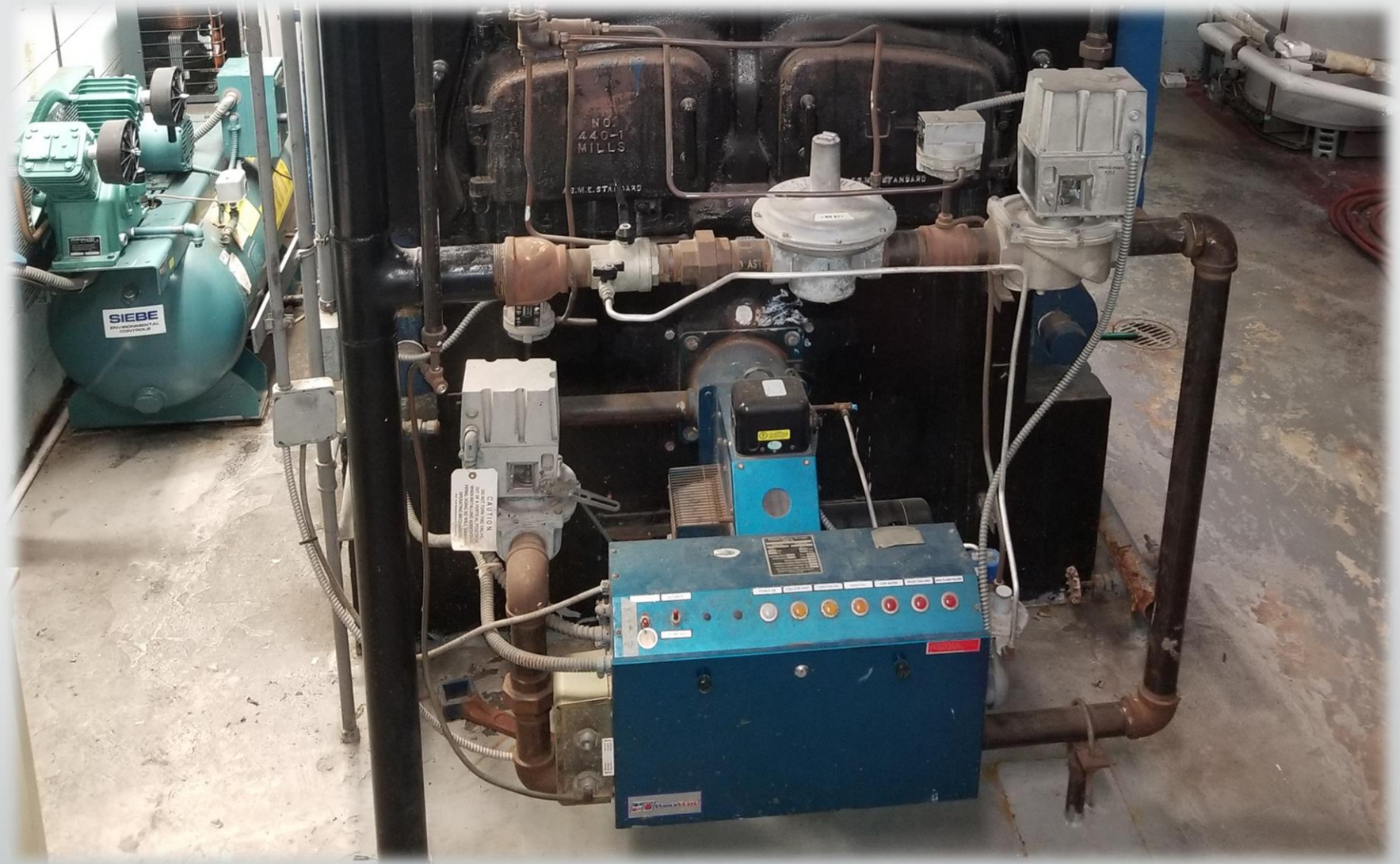


# System Components





# Natural Gas Burner







## Hot Water Systems

1. \_\_\_\_\_

2. \_\_\_\_\_

3. \_\_\_\_\_

4. \_\_\_\_\_

5. \_\_\_\_\_

6. \_\_\_\_\_

7. \_\_\_\_\_

8. \_\_\_\_\_

9. \_\_\_\_\_





Steam Systems

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_
6. \_\_\_\_\_

# Circulation Pumps & Pump Drives (VFD's)

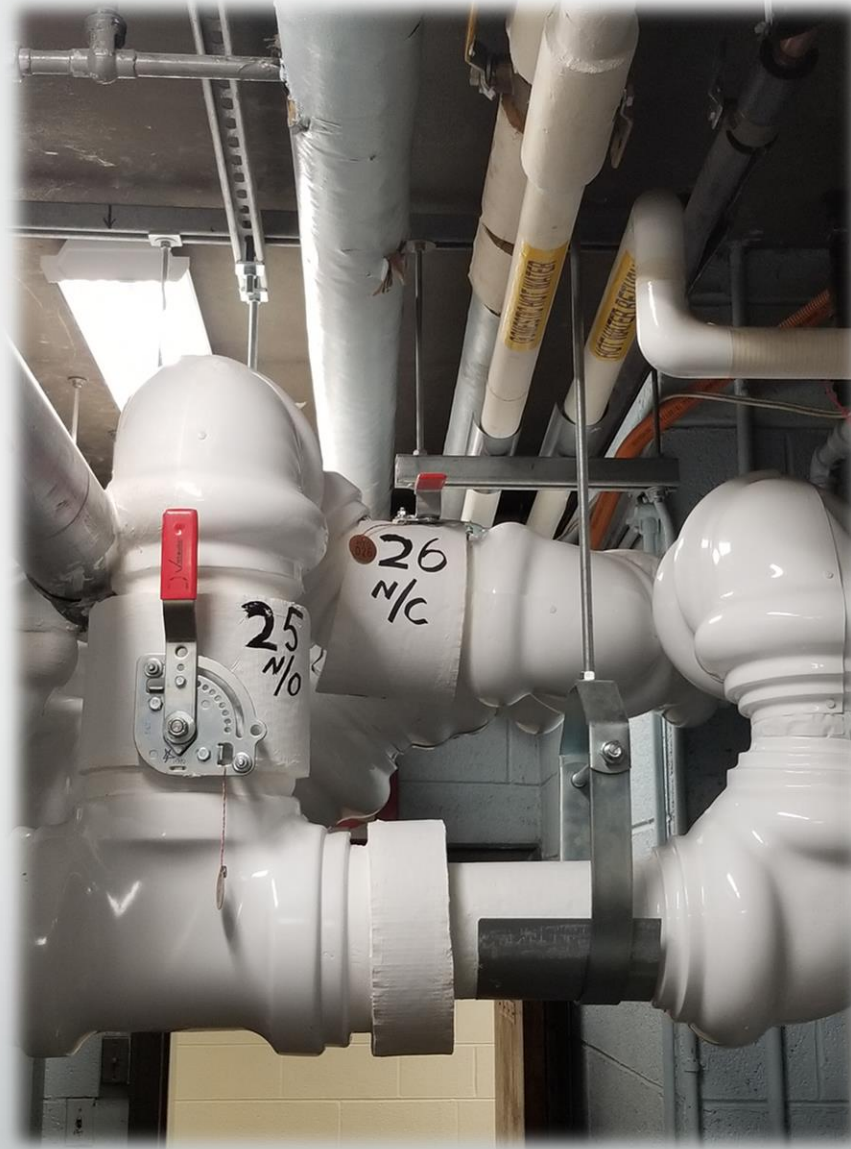




# System Information

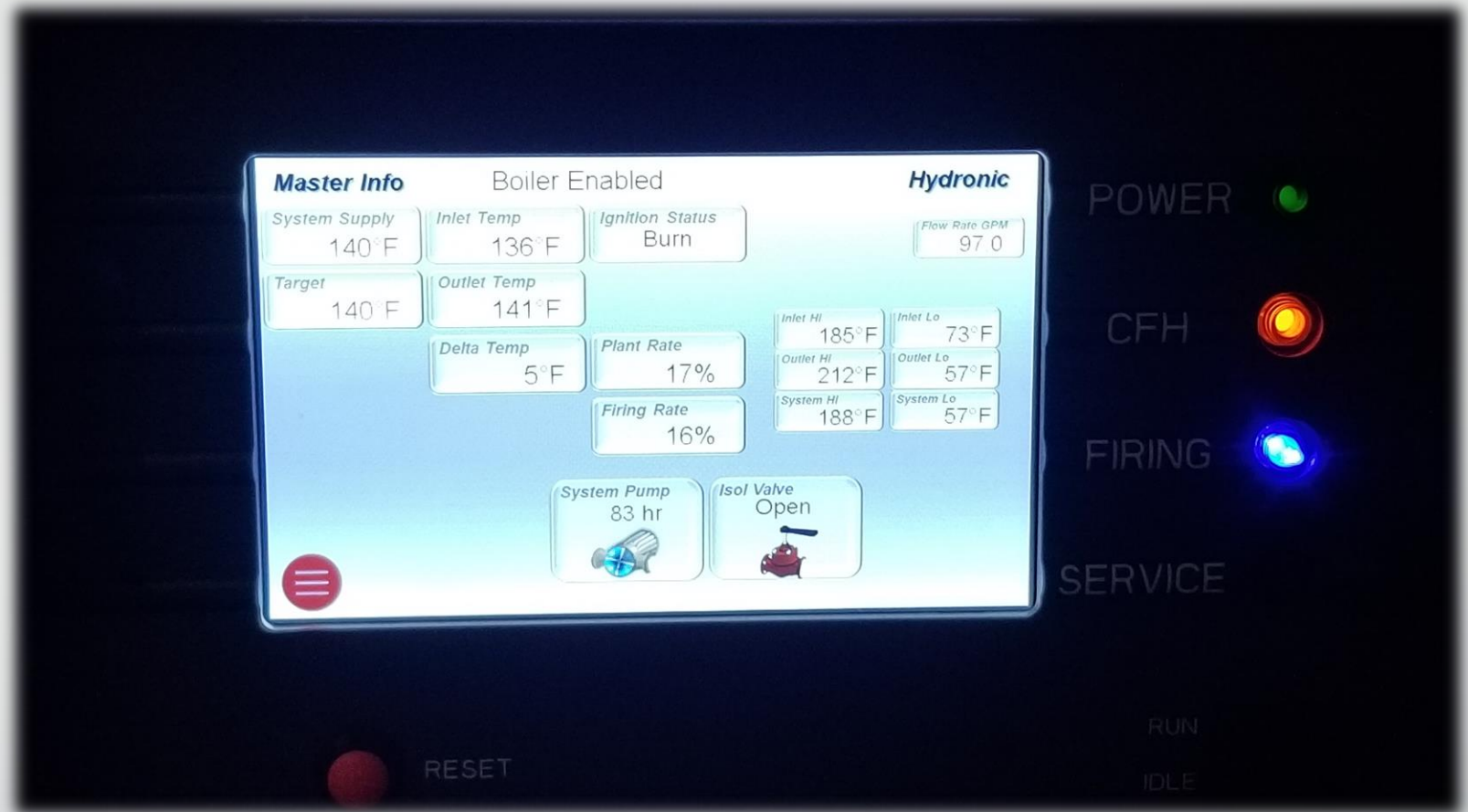


# Isolation Valves





# Boiler Status Displays



# Variable Frequency Drive (VFD) Displays



# System Controls





# Protection Devices & Deficiencies

# Protection Devices





# Examples of Plant Deficiencies



# Examples of Plant Deficiencies





# Examples of Plant Deficiencies





# Examples of Plant Deficiencies



# Examples of Plant Deficiencies






# Examples of Plant Deficiencies





# Open Discussion

## Questions?



# Module Three – Best Practices

# Suggested Best Practices

- ✓ Become familiar with normal boiler room conditions
  - Sites
  - Sounds
  - Smells
- ✓ Know the location & function of critical system components
- ✓ Proper labeling

# Emergency Response Plan

- ✓ Create a written plan. Provide a copy of the plan to all custodial and maintenance staff (including service contractors).
- ✓ Avoid creating an emergency plan during an “emergency”.
- ✓ Plan should be reviewed prior to every heating season.
- ✓ Expose custodial staff to “normal” boiler room conditions, i.e. gauge readings, the sound of pumps and burners when they are functioning properly.
- ✓ The plan should include the proper boiler/pump shut-down (outside of pressing the e-stop) and start-up sequence. Do not simply hand the plan to staff. Personally train custodial/maintenance staff on how to the proper boiler/pump shut-down (outside of pressing the e-stop) and start-up sequence.
- ✓ The plan should include the expected response during and after an electrical power outage.
- ✓ Exercise the plan annually.



# Open Discussion Questions?



# SPELL – JIF Web Site

<https://www.spelljif.com/training>