

BOILER REFRESHER TRAINING

Sponsored by the School Pool for Excessive
Liability Limits

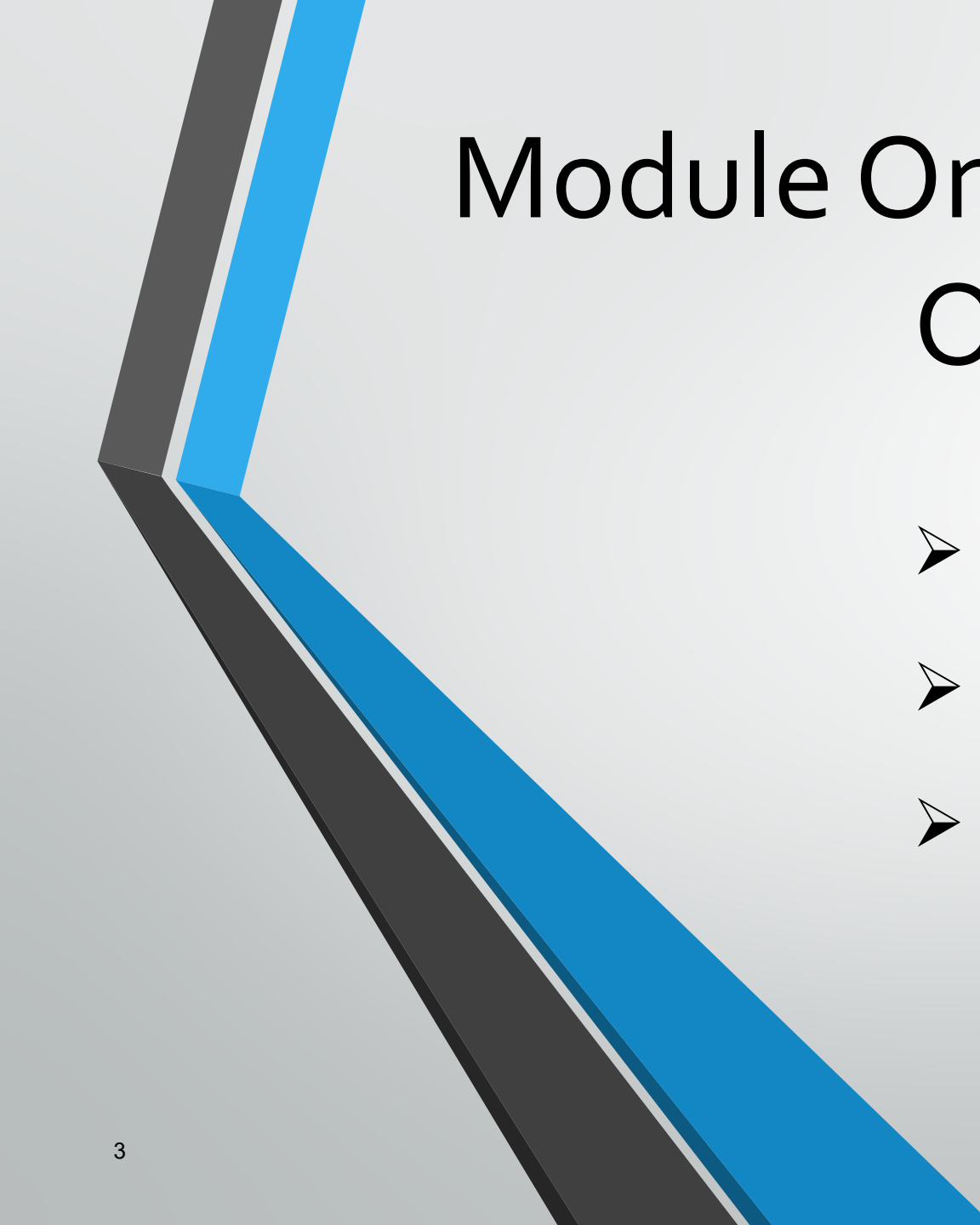
Joint Insurance Fund

SPELL - JIF



Course Outline

- Format: Open discussion, shared experiences
- Compliance requirements
- Logbook 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 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!

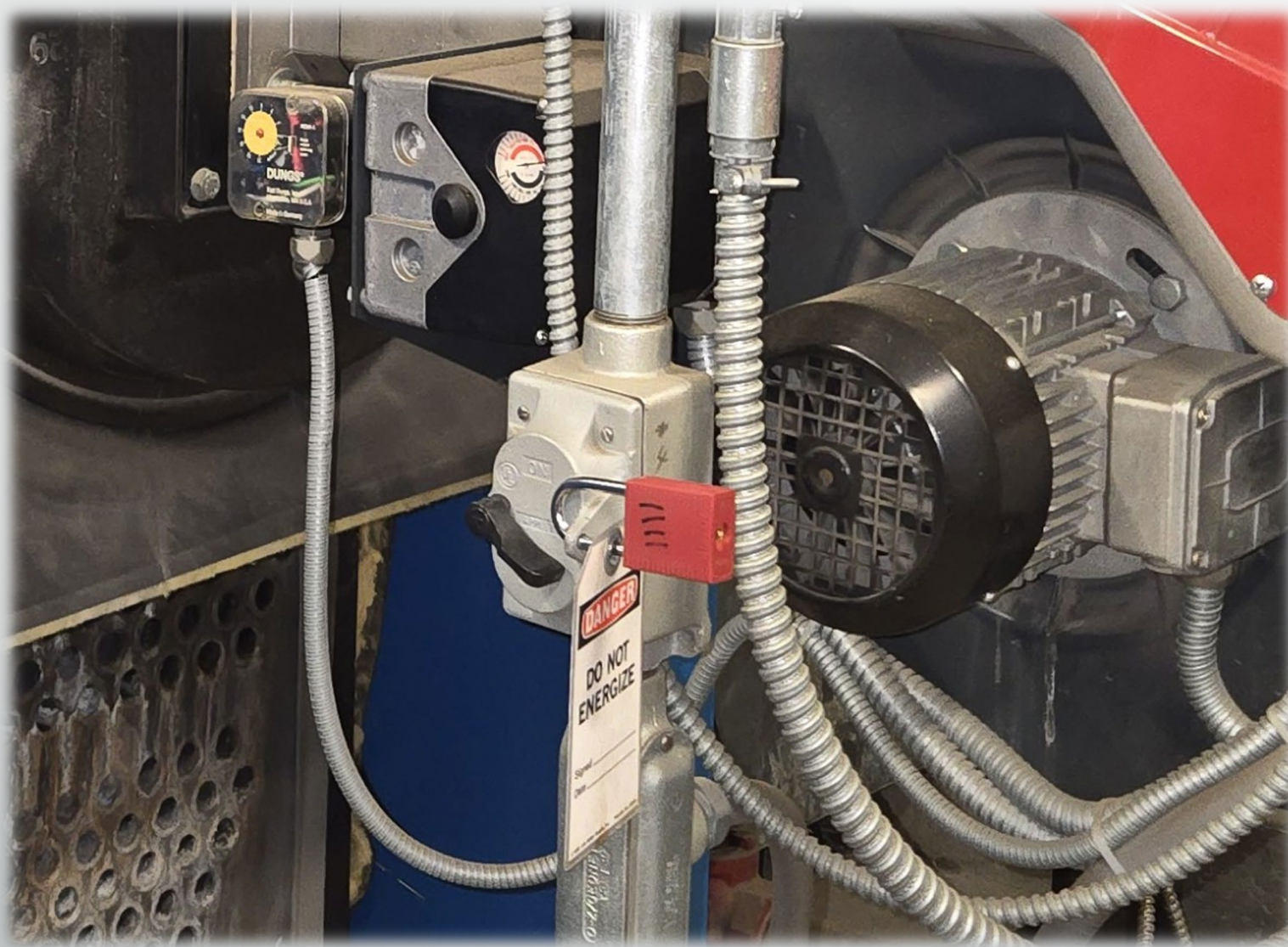
#2 – Protect Property

Boiler explosion

'Ignored Warnings': Investigators release video report in deadly 2017 boiler explosion



Lockout -
Tagout



Lockout - Tagout



Lockout -
Tagout

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.
- ✓ Maintain all logbooks for a period of no less than three years.



Protect yourself and your District.

Document!


Document!

Document!

It Always Matters!

Record Keeping –

- ✓ Preserves appropriate funds to properly maintain heating systems.
- ✓ Maintain all service records relating to boiler service and service to associated systems for no less than three years.
- ✓ Preserve all inspection reports/certificates.
- ✓ Maintain all training records.
- ✓ Establish a written policy and/or practice for maintaining boiler room access.



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?

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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?

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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. Five hours between each equipment check

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C. Seven hours between each equipment check

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



What are the duties of a licensed operator?

- (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.

HS 500/600 Boiler Log Procedure

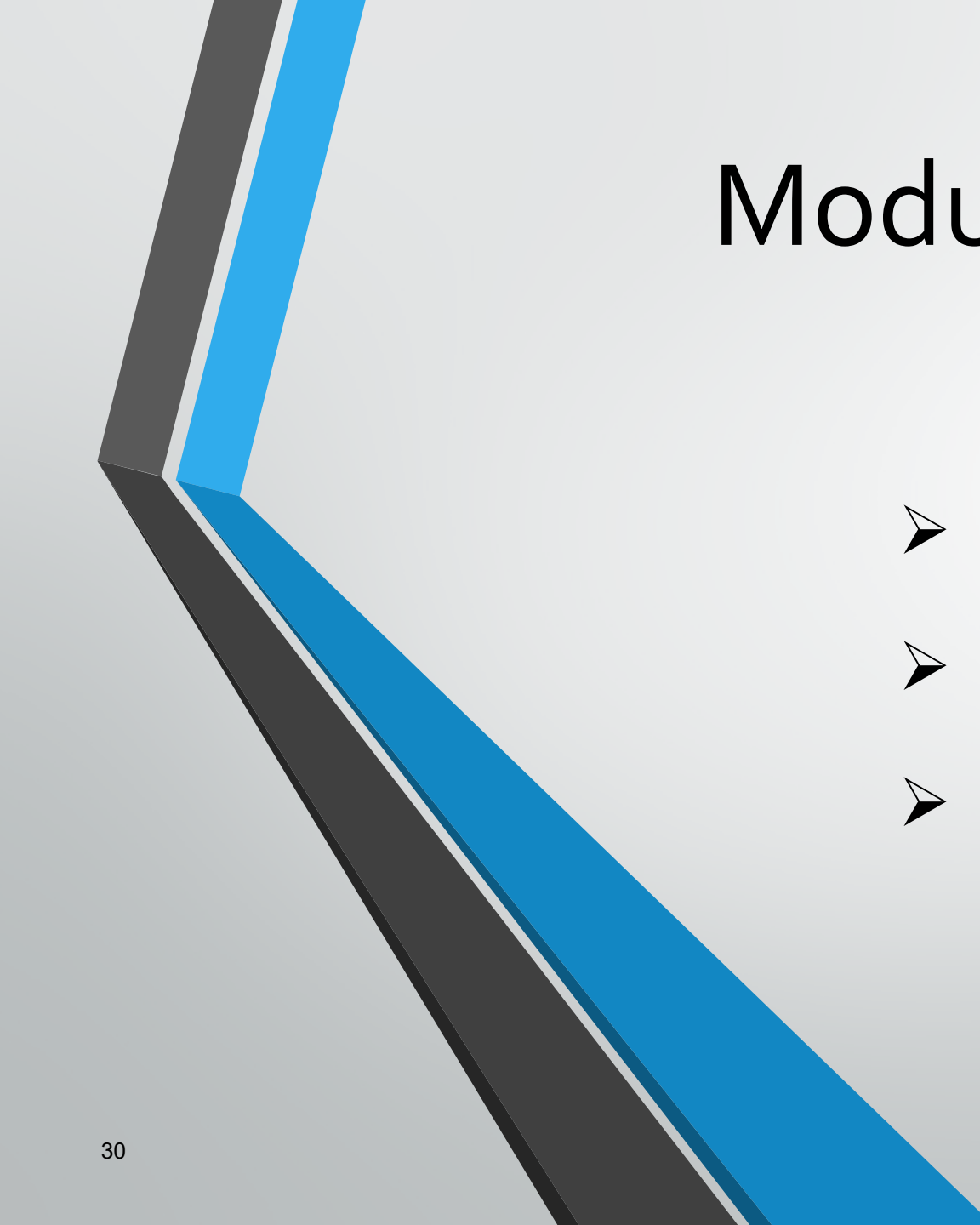
- Step 1: Record Time.
- Step 2: Record Boiler 1 Supply Temperature (see example/picture 1).
Normal operating range; 140/200 Degrees.
- Step 3: Record Boiler 1 Return Temperature (see example/picture 2).
Normal operating range; 140/200 Degrees.
- Step 4: Record Boiler 2 Supply Temperature (see example/picture 3).
Normal operating range; 140/200 Degrees.
- Step 5: Record Boiler 2 Return Temperature (see example/picture 4).
Normal operating range; 140/200 Degrees.
- Step 6: Record Pump 1 Pressures (see example/picture 5). Normal
operating range; 12/80 PSI.
- Step 7: Record Pump 2 Pressures (see example/picture 6). Normal
operating range; 12/80 PSI.
- Note: If any actual temperature or pressure readings exceed the normal
operating range listed above, contact your immediate supervisor.

Example 1





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



Boiler Types...

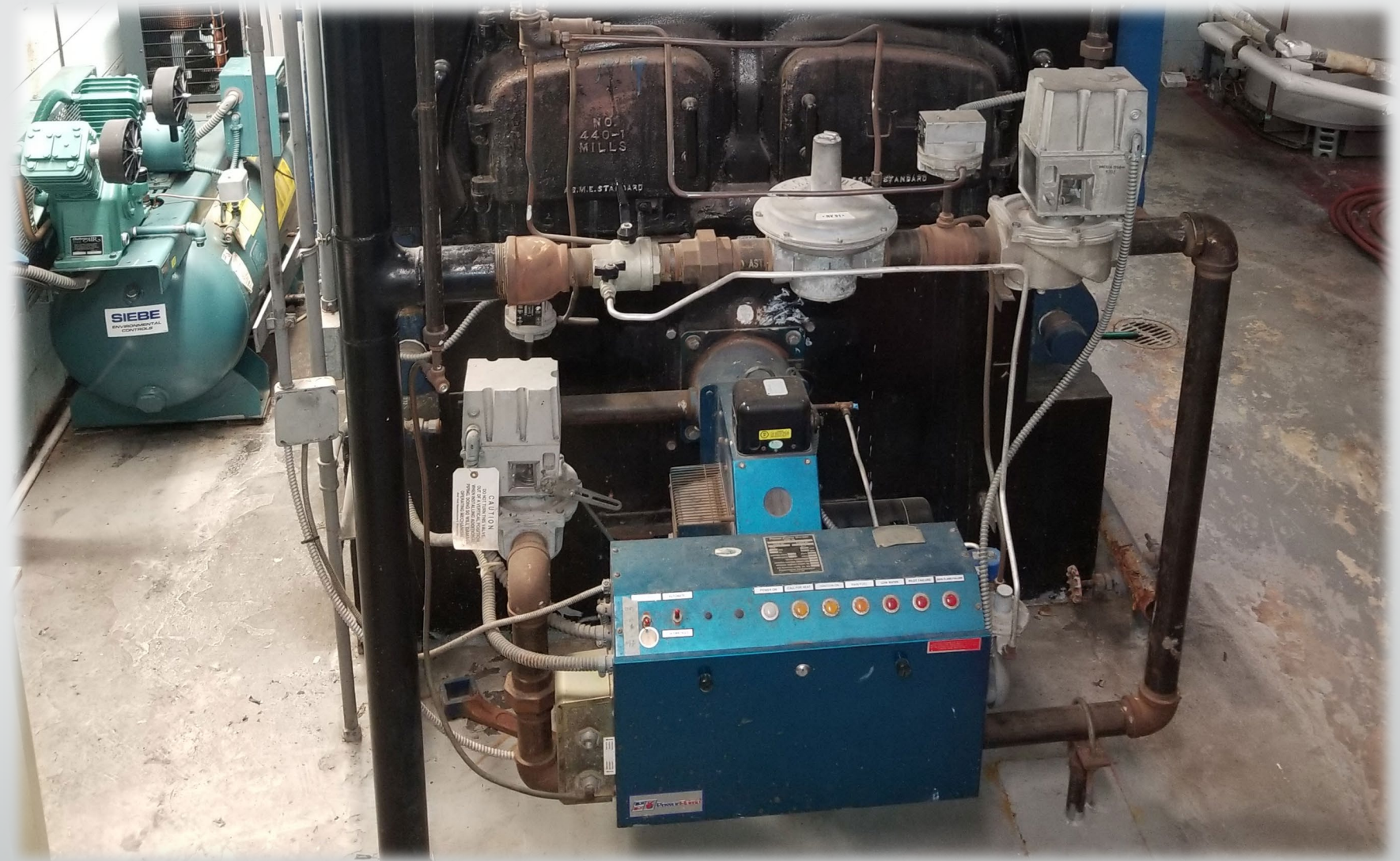
...From Then to Now



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. _____

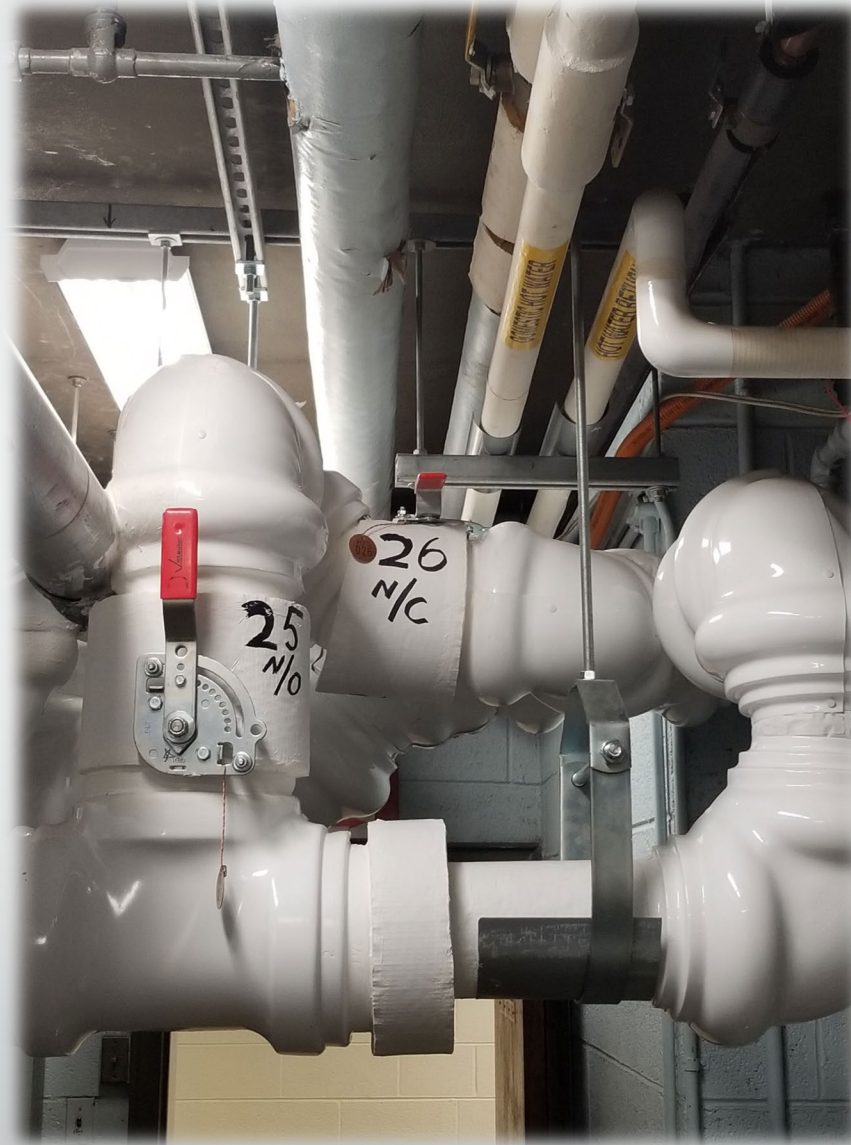
Circulation Pumps & Pump Drives (VFD's)



System Information



Isolation Valves



Boiler Status Displays

The image shows a control panel for a boiler system. The central digital display is divided into several sections:

- Master Info:** Displays "Boiler Enabled".
- System Supply:** 140°F
- Inlet Temp:** 136°F
- Ignition Status:** Burn
- Flow Rate GPM:** 97.0
- Target:** 140°F
- Outlet Temp:** 141°F
- Delta Temp:** 5°F
- Plant Rate:** 17%
- Firing Rate:** 16%
- System Pump:** 83 hr
- Isol Valve:** Open
- Hydronic:** A grid of temperature limits:
 - Inlet Hi: 185°F, Inlet Lo: 73°F
 - Outlet Hi: 212°F, Outlet Lo: 57°F
 - System Hi: 188°F, System Lo: 57°F

Below the display is a red "RESET" button. To the right of the display are four indicator lights labeled "POWER", "CFH", "FIRING", and "SERVICE". The "POWER" light is green, "CFH" is red, "FIRING" is blue, and "SERVICE" is unlit. Below these lights are the labels "RUN" and "IDLE".

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

Avoid creating an emergency plan during an “emergency”.

- ✓ Develop a written plan. Provide a copy of the plan to all administrative, custodial and maintenance staff (including service contractors).
- ✓ Include the names and cell phone numbers of key staff and/or contractors.
- ✓ Include the account numbers for natural gas, electric and water utility companies for the respective locations.
- ✓ Include the emergency contact number for all utilities.
- ✓ The plan should be reviewed prior to the start of 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.

Emergency Response Plan (con't)

- ✓ 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.
- ✓ Review and exercise the plan annually.
- ✓ Conduct a “Tabletop” or “What if” scenario.



Open Discussion Questions?

SPELL – JIF Web Sites

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

SPELL Safety 360 Resources Web Site

Safety 360 Resources - SPELL JIF

Safety 360 Resources

Click on the searchable links below to view and download valuable resources that help K-12 school districts address systemic cybersecurity risk. Have questions? [Contact Rick Hillman, your JIF Virtual Safety Director here.](#)

Table 1					
Document Name	Document Category	Document Type	Document Format	Attachments	
1 Safety 360 Risk Advisory - Child Rest...	Risk Advisory	Advisory	Word File		
2 Water Intrusion Standard Operating ...	Water Intrusion Manage...	Standard Operating Pro...	Word File		
3 High Humidity Building Check Stand...	Water Intrusion Manage...	Standard Operating Pro...	Word File		
4 Roof Drainage Checklist	Water Intrusion Manage...	Checklist	Word File		
5 HVAC Condensate Checklist	Water Intrusion Manage...	Checklist	Word File		
6 Leak, Moisture Control & Mold Resp...	Water Intrusion Manage...	Best Practice	Word File		
7 Water Damage – Cleanup and Mold ...	Water Intrusion Manage...	Response Guideline	Word File		
8 Guidelines for Remediating Building ...	Water Intrusion Manage...	Response Guideline	Word File		
9 Backstop Safety Inspection Checklist	Gym Safety	Checklist	Word File		
10 AHERA Program Annual Notice Tem...	AHERA	Notice Template	Word File		
11 Snow & Ice Control Plan	Snow & Ice Control	Sample Program Template	Word File		

18 records

Airtable Copy base View larger version